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Academic Adaptation and Stress Associated With University Life: Insights From First-Year Students

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Abstract
University attrition rate is increasing around the world and there is a consequence for the student who is dropping out, the university, and society as a whole including costs, psychological issues associated with the perceived feeling of failure, and issues around employability and job satisfaction (Sosu & Pheunpha, 2019). The university attrition rate is increasing in Mongolia too. About 80% of the students who study at the Teachers' School, Mongolian National University of Education (MNUE) are from the country of Mongolia and most of them come to the capital city to do their tertiary education. Due to the differences between rural and urban lifestyles, and expectations of tertiary education, the dropout rate is increasing especially at the beginning of the first semester. There is an urgent need to better understand the need to drop out of the university and find ways to support these students to adjust to university life and life outside the university. This study aims to explore the issues associated with adjusting to university studies and its relationship with attrition. It used the SPSS-20 program to collect data from 80 first-year students. The findings revealed that the students needed support in many aspects of their studies, including support with time management, stress management, and well-being. The study suggests policymakers and university managers to develop a plan to better support students to seamlessly transition into the university and life outside the university during the first half of the first semester.

Keywords: Academic Adaptation, Stress, University Life, First-Year Students, Attrition, Retention

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Introduction

Transitioning into the first-year university life can be one of the most challenging times for many university students. To successfully navigate through university studies, it is important to become socially and academically integrated (Tinto, 1993). When students experience study and life-related challenges, some students drop out of the university, especially in the first half of the first semester (Sosu & Pheunpha, 2019). Research shows that dropouts usually spend about 8 years as low-income earners (Hällsten, 2017).

To find better ways to support students, several studies have investigated the reasons why students drop out of the university. The consensus of the studies was that the reasons are varied and complex and unique to individual circumstances and contexts (e.g., Stratton et al., 2008; Bernardo et al., 2016; Contini et al., 2018). However, it was identified that a student who experiences several risk factors are highly likely to drop out compared to a student who struggles with one or two issues.

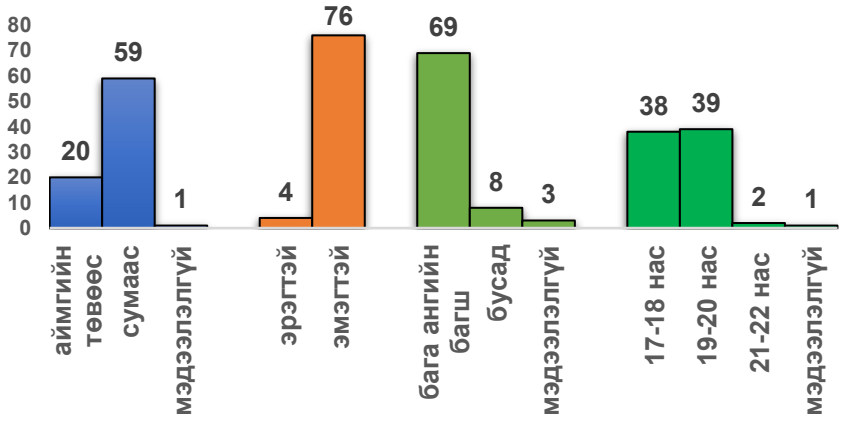
One of the common risk factors is students' intellectual capability (Voelkle & Sander, 2008). Voelkle and Sander (2008) point out that students who enter university with a lower grade from their previous educational institutions are a high indicator of a drop out. Students with limited intellectual capabilities not only experience academic challenges but also may experience an emotional distress (Bernardo et al., 2016). However, other research shows that if such students pass this period and remain studying, they achieve better academic results by the end of their degree (Hoare & Johnson, 2011).

Researchers highlight the importance of supporting these students on how to cope with emotions associated with the struggles around academic integration and help them integrate into the university life (Bernardo et al., 2016). It was also found that family support is essential to achieve optimal integration and psychological well-being (Romero et al., 2015).

Context and the study

In 2020 it was identified that the teaching profession was listed second in the high-demand professions list in Mongolia. About 80% of the students who study at the Teacher's School, Mongolian National University of Education are from the country of Mongolia and most of them come to the capital city to do their tertiary education. Due to the high demand of teachers, it is paramount for the university to decrease attrition and help students to study successfully.

Of the 80 students who participated in this study, 25% come from central province regions and 73.8% were from small villages. The majority or 95% of the students were female and only 5% were male. On average the participants were between 17-18 (48.7%) years of age and the rest of the students were in their early or mid-twenties. 86.3% of the students were studying primary education and the rest were studying various subjects in school. See Figure 1.



Graph 1. Student population

The MNUE has a support system in place to assist first-year students to transition into university life and life outside the university. For example, the Students' Association of the university provides various support services such as financial support, academic support, and housing support, and organizes sporting, well-being, and fun activities to help students network, connect with peers, talk to guest teachers and experts, and form friendships. Teachers also provide outside-classroom academic support. All teachers give their timetables to their students. Students then can book a face-to-face or an online appointment to talk to the teacher. However, more needs to be done to find ways to better support first-year students to adjust to university life and life outside the university. This study aims to explore the issues associated with adjusting to university studies and its relationship with attrition.

Methodology

A Statistical Package for the Social Sciences (SPSS-20) program was used to collect data. The SPSS is one of the best data collection tools as it is easy to use and has in-depth statistical analysis including frequencies and cross-tabulations statistics. Its text analytics helps researchers to uncover insights from responses to survey questions (IMB n.d). A total of 80 students completed the SPSS-20.

Results

At the time of completing the survey, the 80 student participants studied at the Teachers' School, Mongolian National University of Education.

Knowledge about the capital city prior to university

25% of the participants, prior to becoming university students have visited the capital city where the university is located several times already. 53.8% of the students have visited the city only a few times whereas 21.3% reported that they have never been to the city prior to their study in the city. In response to a question 'how well did you know the capital city prior to your study?', 51.2% answered that they knew very little. 93.7% of the students reported that they are adjusting to city life relatively easily. It was identified that those students who knew very little about the city also reported that they struggled to adjust to city life. 62.8% of the students faced some form of difficulties during the early adjustment phase whereas 36.3% of the students reported that they almost never experienced any difficulties.

Students were also asked about their prior knowledge of the university before enrolment. 67.5% of the students had some basic understanding of the university and expectations of university studies. 32.5% of the students however reported that they knew nothing of the university and the expectations associated with the university study.

Issues with studying and living in a big city

When students started their life and studies at the university, they started experiencing a range of issues associated with life and their studies including 43.8% said that they experienced financial difficulties, 21.3% study-related issues, 13.8% hardships around their living conditions, and 12.5% reported that they were lonely and needed a friendship. A large number of students or 81.3% of the students reported that they felt stressed with 18.7% saying that they experienced very little stress. Of the things that they were stressed the most about were financial hardships (43.8%), health issues (31.3%), extracurricular activities (7.5%), and 1.3% reported stresses around family, friendship and relationships.

The issues and their impact on behaviour and well-being

It was identified that these issues mentioned above had a negative impact on students' behaviours and well-being. 22.5% of the students experienced difficulties in simple communications, another 22.5% could not relax, 13.8% reported that the issues made them feel angry, 11.3% experienced disrupted sleep, 10% increased feeling emotional and cried regularly, 8.8% noticed unwanted changes in eating habits, and 7.5% felt anxious. These issues made 21.3% of the students to consider dropping out of the university altogether.

There was a flow-on effect from these issues including limited leisure time, lack of concentration on studies, thoughts about the wrong choice of profession, inability to manage time, increases in study load, and inability to pay rent, even some of the students reported feelings of pressure from some of the teachers that they may potentially fail the unit.

Study load

77.6% of the students reported that they stress due to a study load. This included requirements such as attending classes (70%), 12.5% self-independent study, 7.5% spent on extra-curricular activity organized by the school, 2.5% of the students reported that they had to work part-time, and only 1.3% was able to spend quality time with friends.

Living situations

To better understand students' life, the researchers asked questions about their living situations. 16.3% of the students lived at home, 27.5% lived in a dormitory, 38.8% lived with their relatives, and 15% lived in a rental property. Most of the students spent on an average minimum of 10 minutes and a maximum of 2 hours traveling to and from the university. The students who lived in the dormitory spent the least amount of time in commute. 52.6% of the students reported that they experience stress due to not having an ideal living arrangement, however 47.4% experience little to no stress in their living situations. See Table 1.

Table 1. Commute time from home to the university

Living situations	N	Mean	Std. Deviation	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
Home	9	75.56	44.190	41.59	109.52	20	120
Dormitory	18	20.83	25.394	8.21	33.46	10	120
With relatives	28	96.43	60.137	73.11	119.75	20	240
Rental	7	72.86	26.277	48.56	97.16	40	120

Money

In response to a question about finances, 86.3% of the students are funded by their parents and family members, 20% make money from part-time jobs, and only 3.8% of the students study on scholarships. Students spent 37.5% of their money on school fees, 23.8% on school-related supplies, 2.5% on accommodations, 18.8 on transportation, 3.8% on health, and 8.8% on leisure activities.

Relationships and friendships

In response to a question about being friendly with their classmates, 57.1% of the students reported that they have a friendly relationship, 39% average and 3.9% did not get on well with their classmates. It was good to see that almost half of the participants received a positive influence from their peers (44.9%) and 46.2% also received more or less positive influence from their peers. 89.7% reported that overall students' relationships and how to influence each other are positive with very little negativity. Also, 94.9% of the students reported no bullying occurred during the time they first joined the university and 2.5% experienced some time of bullying.

Overall satisfaction with the university

67.9% of the students were overall well satisfied with their choice of studying at the MNUE, 29.5% felt somewhat satisfied and 2.6% were dissatisfied.

The findings revealed that the students needed support in many aspects of their studies in the big city. Of the issues, there are 2 key areas that need a careful focus which include support with stress management associated with study load, and well-being.

Discussion

As can be seen from the results, a small percentage of the students (2.6%) reported that they were dissatisfied with the university, reported stresses around family, friendship, and relationships (1.3%), and experienced some time of bullying (2.5%). Though the number is low, these are the students who are likely to drop out of the university.

It is worth noting research that shows that female students have a lower hazard of dropping out of university compared to male students (Ortiz & Dehon, 2013). A large student population of the MNUE is female students and it is assuring to think that with more targeted support, these students are likely to continue their studies at the university.

The main areas of concern are well-being and stress management associated with study load. It was found that students from disadvantaged family backgrounds or who live with unsupportive family members are more likely to have emotional distress that has risen from their study load (Zhang et al., 2021). This shows that though students may have support with their studies from the university if there is an issue in their households, their engagement may decrease and emotional distress may increase (Daniels et al., 2021). Research shows that coping strategies may potentially mediate the effects of emotional distress (Padron et al., 2021), and exercise along with stronger family and friends seem to be more helpful to become resilient (Killgore et al., 2020).

Research shows that the lack of time management skills and stress experienced by university students are the main contributors to academic failure (Ahmad et al., 2021). Research also shows that with the right intervention students improve and the failure rate decreases (Ahmad et al., 2021).

Conclusion

There is a need to have a strategic plan in place to better support the students to seamlessly transition into university and city life during the first half of the first semester. There are two key areas that need to be addressed as a result of this study.

- Develop time and stress management skills to help students succeed in their studies
- Coping strategies with emotional distress and overall well-being

The ability to use time wisely in learning is an issue for many students. Many students study full-time, and have family commitments, and part-time jobs. This causes stress and emotional distress. Policymakers, university managers, teachers, and other support services staff need to take into consideration such research findings to develop a better intervention to help first-year students to seamlessly transition into their university studies.

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The Dichotomy Between Final Year Undergraduate New Zealand Nursing Students' Reports of Learning and Their Practice Intentions in Aged Residential Care: Challenges and Surprises

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Abstract
The aged healthcare sector internationally is facing a crisis in attracting and retaining a nurse workforce. Alongside the global rise in longevity, the sector is experiencing an increasing demand on their services. Yet undergraduate nursing students are often reluctant to consider aged residential care (ARC) with perceptions that a lack of opportunities, compared to hospital positions, will mean that their education and high-tech skills are underutilised. This paper describes our institution's atypical response of offering ARC practicums in both the first and third years of study and our desire to discover students' perceptions of their learning and experience. Where the first-year experience allows students to undertake fundamental care, the final, month-long year 3 placement, focuses on managing complex care, enhancing nursing leadership and management practices and quality improvement. This mixed method study collected questionnaire data from 72 of 96 (75%) year three Bachelor of Nursing students and facilitated four focus groups involving 38 students. Findings included both congruent and disparate themes from contemporary literature on this subject. Whilst students reported some mixed experiences, they noted improved confidence in applying a range of knowledge and skills in response to encountered needs. Thirty percent said that they were more likely to choose the ARC sector as a career specialty. The biggest factor to which they attributed this positive shift was their interaction with registered nurses and managers. This paper shares our reflections on implications for how we can better prepare our students and educators for placement roles, skills and responsibilities and support the sector.

Keywords: Student Preference, Aged Care, Curriculum

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Introduction

Aotearoa New Zealand (NZ), like many countries is experiencing a growing older population, (by 2036 over 25% will be over 65) and an increasing shortage of nurses (NZ Aged Care Association, 2022). This demographic profile signals the need to provide health services tailored to supporting people living with the normal effects of aging including increasing frailty, chronic conditions, ill health and the need for both home-based and aged residential care support (ARC). The requirement for registered nurses (RNs) to provide speciality care in the community and ARC facilities is expected to increase proportionally, yet the number of RNs choosing to work in ARC is decreasing (Nursing Council of New Zealand, 2018). ARC settings account for 9% of the current RN workforce, yet a study in 2012 of the new graduate Advanced Choice Employment (ACE) programme, found only 1.32% of the 1232 national RN graduates selected ARC as a preferred setting (NZ Health and Disability System Review, 2019), a finding confirmed by Hughes et al. (2020) the following year.

Due to this lack of ability to attract NZ graduates and experienced nurses, the ARC sector is highly reliant on internationally qualified nurses (IQN), of whom 27% were working on temporary visas, prior to the pandemic (NZ Health and Disability System Review, 2019). The impact of Covid-19 on international nurse recruitment has created significant workforce issues meaning there are currently over 1000 vacant RN positions in ARC (NZ Aged Care Association, 2022). Retention of staff also continues to impact ARC with a high turnover of RNs reported at 48% in 2022 (NZ Aged Care Association, 2022), up from 38% in 2017 (NZ Health and Disability System Review, 2019). Issues concerning the nursing workforce in the ARC sector have long been predicted (WHO, 2012). Nurse leaders, educators, researchers and policy makers in recent years have been focused on developing responses to the need to recruit and retain far more RNs in the ARC sector.

Literature review

The need to identify perspectives to foster education and practice responses to increase BN students' entry into the ARC sector has been the topic of numerous international studies over the last 20 years (Algoso et al, 2016; Brown et al, 2008;Wilkinson et al., 2016) including: career intentions (Happell,1999; Rodgers & Gilmour, 2011); student perspectives of working with older persons (Koh, 2012, McAllister et al, 2020) and factors that contribute to career preferences (Lea et al., 2017; Liu et al, 2013; McKenzie et al., 2014; Wilkinson et al., 2016). Four critical factors have emerged in the literature: (1) BN students' negative/social stereotypical attitudes toward older persons (Abbey et al., 2006; Cheng et al., 2015; Evers et al., 2011; Henderson et al., 2008); (2) the influence of prior work (part-time employment) in ARC on negative attitudes (Happell, 2002); (3) experiences in ARC practicum placements as students (Hunt et al., 2020; Moquin et al., 2018; Robinson et al., 2008; van Iersel et al., 2018); (4) the influence of education providers, including the BN curricula (Abbey, 2006; Algoso et al., 2016), educational preparation (Hunt et al., 2020; Lea et al., 2017; Moquin et al., 2018), and the influence of nurse educators (Foster, 2019).

Aged residential care provides an essential mainstream function within our health care system and is currently not valued as such, according to Hughes (2020). Over 40,941 ARC beds are provided in some 670 facilities throughout NZ (NZ Aged Care Association, 2022). These facilities provide 24-hour care and assessment, rehabilitation, and palliative care services; with 96% of facilities offering additional respite care to provide breaks and support for families and carers. The average age of residents entering ARC is 85 years and rising. A

growing proportion have cognitive impairment and/or multiple long-term conditions requiring significant levels of speciality care. Stays in ARC are becoming shorter over time with the medium length of stay 18 months, however the acuity of the resident is increasing (NZ Health and Disability System Review, 2019). With predicted increasing need, resident acuity is likely to continue alongside population aging (Boyd et al., 2009). We urgently need to discover the impact of BN students' learning, perceptions and experiences of their ARC placement and create multisector resources to complement educational preparation and support the ARC nursing workforce.

Background

In responding to these challenges, nursing education through curricula design, preparation and management of practicum experiences and educator role modelling appears to be highly influential (Foster, 2019), along with strong partnership relationships with ARC agencies. In NZ, nursing programmes must offer a minimum of 1100 hours of practicum (clinically based experience - Nursing Council of NZ, 2016) across the three-year BN degree and pass a national exam to enter the register as an RN. All practicum experiences are supervised learning experiences with student nurse educators (SNE) allocated contact hours with a group of students. Contracted access and service agreements in ARC settings enable quality outcomes to be negotiated and collaboratively managed. ARC practicum experiences begin in second semester, year one, to assist BN students gain foundational nursing skills, including hygiene care, therapeutic communication skills and competency in taking vital signs (Foster, 2019). SNEs are allocated five hours per week per first year student to facilitate and supervise their learning as they support residents with activities of daily living (ADL). In preparation for this practicum, students participate in classroom lectures, tutorials and laboratory skill development and simulation sessions to prepare them to move from theory to practicum experiences. Bi-cultural and Te Tiriti o Waitangi learning, developmental studies, fundamental nursing practice skills and care, ethics, research, consumer rights, science and professional development as a nurse are facilitated.

In our institution's initiative to promote aged care as a career option, which is the subject of this paper, students return to the ARC setting in the first semester of their final year for a 96-hour practicum experience. Two further practicum experiences; 'speciality nursing – acute' and 'primary care – community' are also scheduled in rotation during this semester. The three practicum placements offer high contact with older persons. The assessments undertaken in the placements enable students to demonstrate the four domains of RN competence in New Zealand: Professional responsibility; Management of nursing care; Interpersonal relationships; Interprofessional health care and quality improvement (Nursing Council of New Zealand, 2016). A comprehensive holistic assessment with a selected resident including care planning and evaluation is undertaken. Based on the assessment findings, students then implement a quality improvement project in collaboration with the resident, to improve the resident's quality of life and health outcomes. Students are expected to participate in a range of activities and practicum leadership and management with the RN staff in the ARC facility. This is a significant advance from their earlier year one ARC experience which was often with a health care assistant. Few NZ nursing programmes place students in ARC in year three (Foster, 2019) yet we view this placement as an attempt to reverse the dominant negative narrative of older persons' health care and ARC settings as an area that requires only rudimentary nursing skills.

However, just supplying the year three ARC placement may not be enough to turn the tide. As a team of senior BN teaching and leadership staff, we have become increasingly concerned about the variety of experiences and learning outcomes reported by SNEs and year three students through their placement evaluations, and in debriefing/moderation team meetings. We therefore developed a formal research inquiry to investigate student perceptions and experiences and the match, or mismatch, with classroom learning and practicum preparation.

Research

The aim of this research was to increase our understanding of third year students' perceptions and experiences of ARC settings, and impact on their career aspirations. Specifically, we asked;

1. Do ARC practicum experiences for year three BN students positively or negatively influence their career choice as an RN in ARC?
2. What features of this experience can be enhanced to improve perceptions and experiences of working in ARC?

Research Design

This study used a mixed method approach, collecting qualitative and quantitative data. Mixed method research is the planned collection and integration of quantitative data via a questionnaire and qualitative data using focus groups, within a single study or coordinated cluster of studies (Creswell, 2012). The advantages of mixed method are complementarity (using more than a single research approach), practicality (to use a variety of tools to address an important research question) and enhanced validity (multiple and complementary data leads to more confidence in inferences). Qualitative data from the questionnaire and focus groups enabled connected conversations that allowed us to capture complexities and subtleties about student experiences, alongside numerical data about frequency.

Participants and data collection

Year three BN students were contacted via the year three Moodle (learning management system) clinical page. Postings on the page informed them about the research and invited them to participate. Once they had read the participant information sheet and completed a consent form, they could proceed to the questionnaire (Appendix 1) and/or volunteer to attend focus groups. Focus groups were held on each main campus in May and July 2021 and facilitated by an educator from the nursing department who was not in the research team or engaged in ARC supervision or assessment. The audio-taped meetings with 8-10 students per group, lasted between 45-60 minutes and were scheduled over the student break, with lunch and refreshments provided. A Māori Kaiako (teaching staff member) from the research team and Department of Nursing provided support with students who identified as Māori to give full feedback.

Data Analysis

Qualitative data from the questionnaire and focus groups were analysed using an inductive approach which included:

1. Focus group audio data was transcribed by a member of the research team, while another team member typed the questionnaire narrative data onto an excel spread

sheet. According to Thomas (2006) this is an initial step in analysis of data that catches the fullest and richest data. The other benefits are the continuation of confidentiality as no other person is exposed to the raw data and is also a way for the researcher to be further immersed in the data and develop awareness of issues of importance. Files are printed for all members of the research team.

2. Detailed reading of text: the transcribed data are read between the five researchers and understanding of the themes and phenomena in the text are identified and discussed.
3. Creation of categories: themes and/or categories are identified.
4. Overlapping coding and un-coded text: to reduce overlapping, text may be coded into more than one category and text that is not relevant is not assigned to a category.
5. Continued revision/refinement: sub-topics, including contradictory viewpoints and additional insights were identified. Appropriate quotes are agreed to communicate the essence of a category (Thomas, 2006, p. 241-2).

Quantitative questionnaire data analysis

Descriptive statistics (mean and standard deviation, pie charts and bar diagram) are used below to report questionnaire data. Frequency, percentages, mean and range measurement tools (Polit & Beck, 2018) aided analysis. Statistical software *Stata* was used to perform quantitative analysis in this study.

Findings

Three quarters or 75% of our year three BN students responded to the questionnaire.

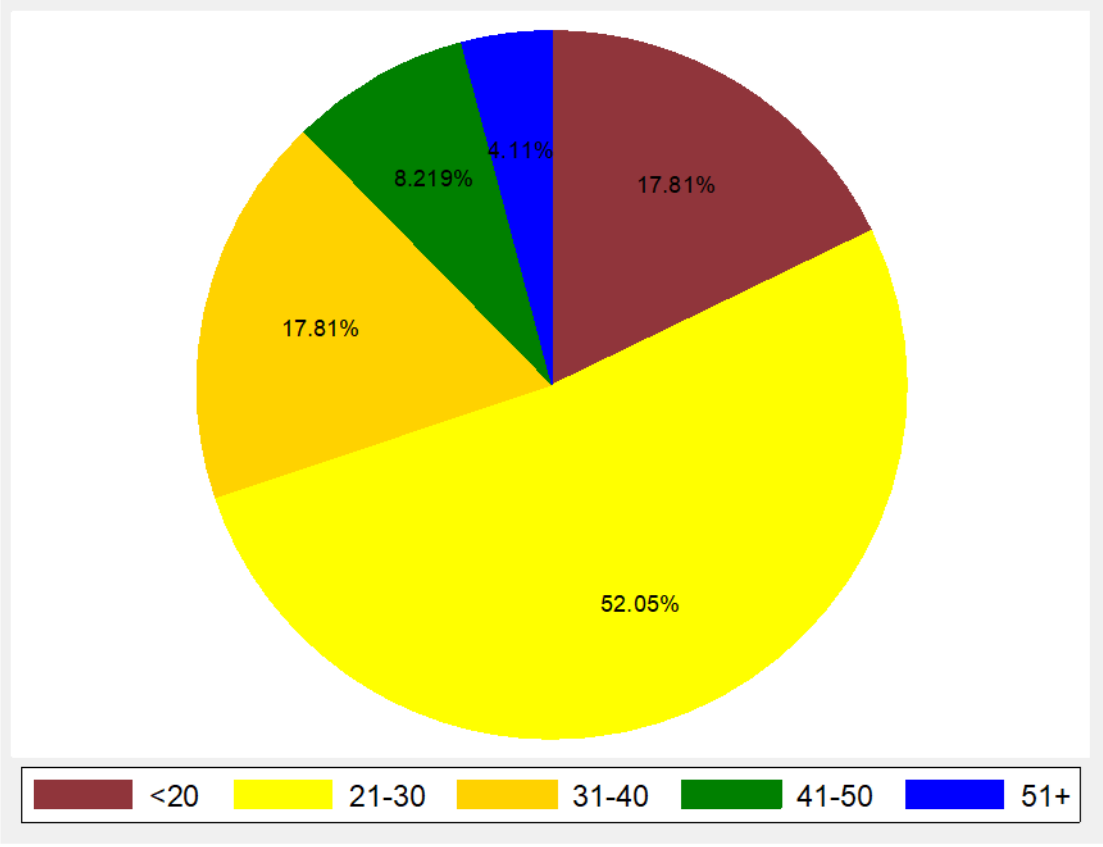


Figure 1: Pie chart of age distribution

Figure 1 shows the age distribution of the participants showing the age group 21-30 had the most (52%) participants followed by the age groups 31-40 years, and under 20 years.

Length of time in BN

The largest group 86% identified three years in length of time they have spent in the BN, 8 % had spent two years (likely to be IQN who were granted recognition of prior learning to enter into year two of the BN), 5.5% identified four year and one student had been enrolled for five years in BN.

Work

The majority of the students (82%) did not work in ARC at this stage in the BN programme. Of the 13 or 18 % of the students who identified they currently worked in ARC, three or 23% worked fewer than 10 hours per week, seven or 54% worked 10-20 hours per week and three or 23% worked over 20 hours per week in ARC as well as full time study in the BN.

Experience and change in perceptions

The participants were asked if their recent ARC experience increased their likelihood to choose ARC as a place to work as a RN. The following two pie graphs indicate their responses.

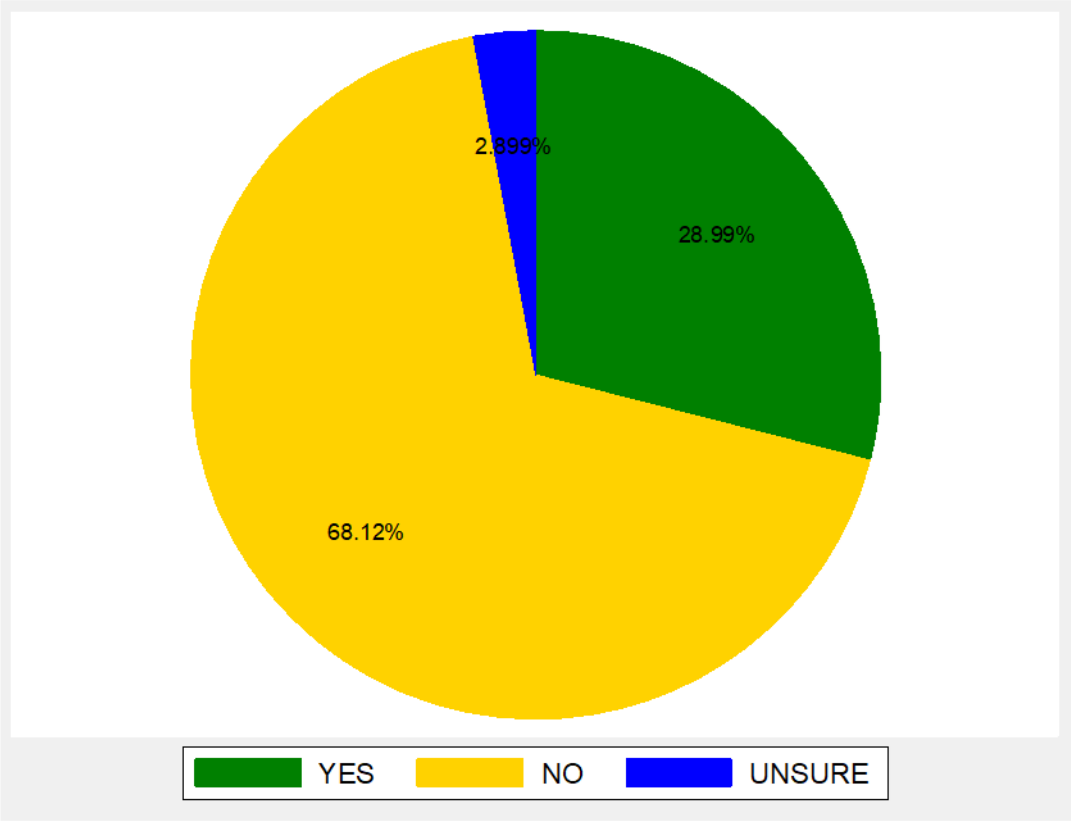


Figure 2: Pie chart -more likely to choose ARC

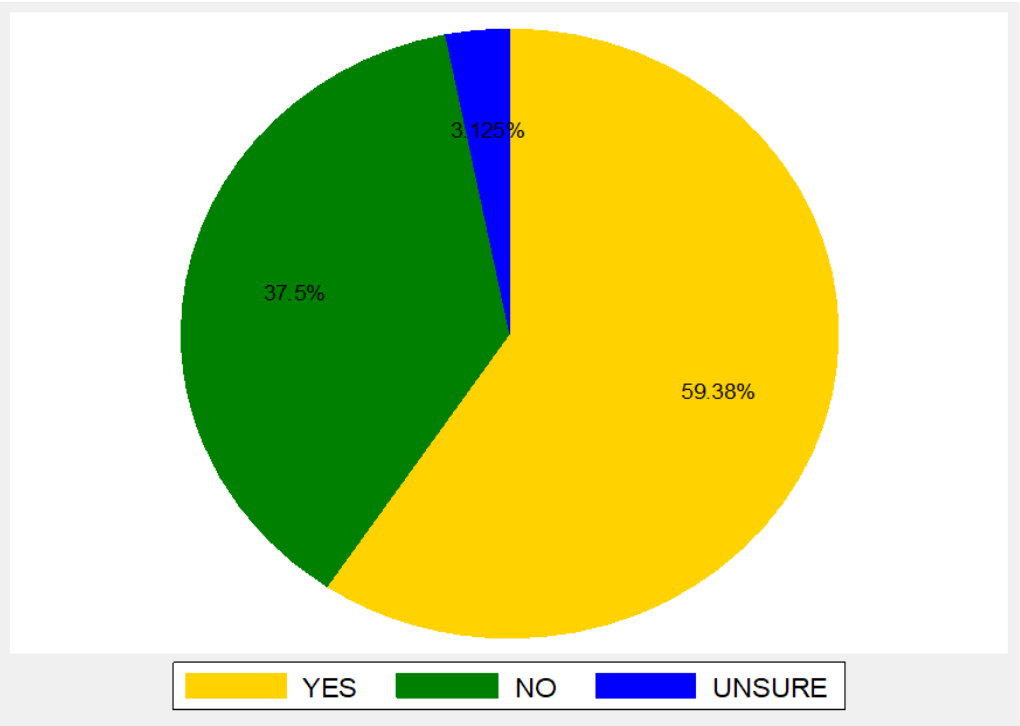


Figure 3: Pie chart-less likely to choose ARC

Figure 2 shows that 68.12% of the participants said no when they were asked if they are ***more likely to choose ARC***. Yet when this question was posed as now ***less likely to choose ARC*** the negative response was reduced to 59.38 % a difference of 8.74%. Similarly, the "more likely to choose ARC" 28.99% in the first question increased to 37.5% (less likely – answer no) in the second question – difference of 8.51%. These findings contrast to what we expected to find from their overall satisfaction and learning in this practicum experience. The overall satisfaction level of the participants was moderate to high. However, the response to this question presented in the pie charts (Figures 2 and 3) suggests that two-third of the participants were unlikely to choose ARC. One important finding was that over 30% of participants perspectives shifted to a positive perception of working/choosing ARC as a career option in the future, with a further 8% as a possible shift.

The next section of the quantitative data asked students to rate experiences, learning, and the ability to apply key curriculum concepts to their professional practice in their ARC practicum. A Likert scale (1: Least opportunity to apply/practice, 2. Somewhat able to apply 3: Mostly able to apply, 4: Excellent opportunity to apply/practice) was used to obtain student responses. The data is presented in Table 1.

Table 1: Summary statistics

Variables	N (Obs.)	Mean	Std. Dev.
Te Tiriti o Waitangi	72	1.94	1.11
Managing older adults with complex conditions	73	2.67	1.05
Cultural safety	73	2.55	0.99
Assessment skills with the deteriorating patient	73	2.51	1.04
Leadership and management of care	73	2.29	1.09
Delegation and supervision	73	2.23	1.11
Advancing nursing practice – ethics, QI,	73	2.51	1.06
Advanced Care Planning	73	2.22	1.06
Advocating for your resident	73	2.52	0.93
Communication with the RN/CNL	73	2.85	1.00
Increase knowledge of disease management	73	2.34	1.04
Increased knowledge of medications	73	2.30	1.11
Overall Experience (mean ranking of experience on above 12 items)	73	2.41	0.74

Table 1 above shows the summary statistics of the responses of the participants. A total of 12 closed questions were used to rate their satisfaction level with their ability to apply expected skills and knowledge/learning (see appendix for survey questionnaire). An index was created as an overall satisfaction level by taking simple averages of the 12 Likert scale questions. The mean level of satisfaction of the different aspects of ARC practicum is satisfied to moderate satisfaction except the *'Te Tiriti o Waitangi*' aspect which shows satisfaction level was relatively low. Overall, satisfaction level was moderate (2.41). The results also suggest that the highest level of satisfaction (2.85) was with '*Communication with the RN/CNL.*'

The mean satisfaction level helps us to find a potential answer to the RQ1 of this project and suggests that the ARC practicum had an overall positive experience for the participants. Also, this finding suggests that more work needs to be done to support learning and application of *'Te Tiriti o Waitangi*' to enhance the experience where satisfaction level was lowest and a potential area to further improve (a possible potential answer to the RQ2) expected skills and knowledge/learning.

Difference between year one and year three

After the analysis of their learning, **s**tudents were asked to identify what they achieved in their ARC practicum experience that differed from their year one experience. Following analysis, student comments reflected three areas: *'Nursing and management of care skills', 'Knowledge and thinking development'* and *'the Role of the RN.'*

A. Nursing and management of care skills

Students reported their ability to be more independent and confident (a boost from year one) with their nursing skills. They described better insights regarding professional skills, treatments and medication calculation and administration. Greater exposure to complex patients, focused assessments, wound dressings and care planning were also identified.

One student summarised… **"***Better insight regarding clinical skills, and a different range of knowledge - just being a 3rd year student and having slightly more knowledge."*

B. Knowledge and thinking development

Students identified that learning by observation and interactions with patients, developing critical thinking and learning about long term conditions provided better insights for care. Developing de-escalation techniques and looking after residents with dementia led to more confidence with their knowledge base.

A common theme reported by students related to… "*taking more responsibility and looking after complex patients."*

C. Role of the RN

Many comments reflected students developing their independence and working alongside an RN. Learning leadership/delegation skills and a better upstanding of the role of the RN was identified along with involvement with doctor's visits/clinics and managerial function within the role of RN and the paperwork required in ARC. The most frequent response was captured by one student who said, "*I have a better understanding of the role of the RN after ARC."*

Identified education and practice preparation

When considering their educational and practice preparation that supported their ARC placements, students' comments continued to reflect the same categories as identified above, *'Nursing and clinical skills,' 'knowledge and thinking development';* and *'the Role of the RN.'*

A. Nursing and clinical skills

Students reported learning/identifying usual ARC residents' medical conditions, communicating with patients/ and common co-morbidities, alongside a mini-CAF [competence assessment framework – an assessment component], online resources/lectures, and working and learning from labs "helped a lot."

De-escalation techniques e.g., 're-direct don't correct' and information for QI project [another assessment point] were identified. Being able to do manual/moving and handling and medication/calculations/administration/rights was also mentioned.

One student summarised their learning, "…*how to manage care with complex patients was really important."*

B. Knowledge and thinking development

The assessment essay for learning about complexities of care in one core course was cited alongside poly pharmacy, and general knowledge regarding common health issues experienced by the older adult. One student reported that … "*Prep was good, however, did not really get a chance to solidify this learning at ARC."*

C. Role of the RN

Students gave some examples when considering their preparation in managing care, with one student stating improved understanding of "*how to assess if patient is about to give consent due to cognitive decline*" and "*having previous acute care experience assisted my practice."*

Suggestions for improvement

The final question asked students to comment about ways educators and the organisation could improve their ARC placement experiences**.**

Positive perceptions of student learning outcomes included the following student comments; "*I was very privileged and staff encouraged me to do as much as possible -an awesome placement as a year 3 students."* Another student signalled the importance of the RN: "*so much of the experience relates to the relationships you build with your RN. If you work alongside a great RN, it is great placement."* Further student comments included, "*Lovely staff and patients in my ARC facility which made it enjoyable… Thank you for the opportunity. It really helped with my confidence since it was a place where we can direct our own practice under RN supervision."*

Yet a number of students reported negative experiences relating to them not feeling valued, such as "*I felt unwelcome… and I was left alone for long periods of time"* and *"I felt redundant to requirements."* There were issues within the agency as well: "*I enjoyed aged care but not the facility"* and *"I had good support, however the ARC facility I was at was consistently under staffed."* Students identified facilities where, "*They [RN] seemed to lack understanding what students are allowed to do despite being advised"* and "*the nurses in ARC are too busy to teach.*"

Four students stated they didn't think that an ARC placement is beneficial in year 3, with six students suggesting removing this placement, for example the comment "*Would be better to have another hospital experience.*" However, these more negative comments represent only around 7% of respondents.

Focus group findings

The focus group data from 38 participants concurred closely with the comments students made in their questionnaire responses, both positive and negative, about their ARC experiences. Many responses focused on their ability to provide care, and relationships with RNs and clinical nurse leaders (CNL) and being used as care assistance to support illness and reduced staffing. The impact of senior nursing leadership and management was again referred to, with students describing nurse managers across a continuum of support - from welcoming and working to ensure learning opportunities were provided, to being office-based with little engagement with students. Across the four focus groups students reported their own and others' suboptimal experiences captured in the questionnaire feedback addressed earlier.

The detailed analysis of the focus group findings is the subject of an additional paper (Foster et al, in review – 2023).

Conclusion

In undertaking this mixed method research, we wanted to extend our understanding about year three BN students' perceptions, experiences and learning in an ARC setting. Our challenge was to make sense of the difference between the students' recording of high overall satisfaction in identifying knowledge and skills generation, yet the persistent reporting, as in the literature, that two-thirds of graduating nurses were unlikely to choose ARC as a practice setting. However, more than 30% of participants did report a shift to a positive perception of working/choosing ARC as a career option in the future, with a further 8% still considering this. It appears that most of this difference was due to students' professional interactions with RNs and student nurse educators, as well as nursing leadership experiences. This study suggests that educational and practicum preparation requires significant improvements to ensure that these positive experiences are consistent across all ARC practicum experiences. Based on our finding the research team recommend the following;

1. **Improve understanding of contributions of year three students** "*RN*s *need a clear picture of what we are there to do*" and that "*more education of facility staff is needed"*
2. **Facility support –** Students called for **"***More access to resources and qualified nurses*"; our response is to suggest an increase of SNE hours for more onsite guidance and facilitation of both student and RN learning and development
3. **Preceptor training for RN -** Students told us, **"***There is limited independence and learning, … there was little we could do to advance our nursing practice***"**
4. **Salary and professional development initiatives to attract more graduates to the sector**
5. **Campaigns to share the skill mix and importance of ARC work**

The data gathered in this research contributes to developing a better understanding of how and when ARC placements support student learning, their importance in the BN curricula and the contribution of ARC to the national and international health sector. This knowledge of BN students' perceptions of the ARC sector, as well as identifying factors that may dissuade them seeking employment, impacts the way nurse educators and the ARC sector prepare and plan for practicum experience, recognising that new graduates are a key future workforce.

Such recognition of the advanced skillset required by RNs may contribute to a cultural shift to increase desirability to work in ARC. Our future as aging people depends on this!

Acknowledgements

We would like to thank the Toi Ohomai research office for supporting this research, the year three students who participated and the aged residential care providers for their ongoing support of student learning.

Appendix 1 – **Questionnaire - Nursing students experience in aged residential care (ARC) placements as third year undergraduate students**

This questionnaire is designed for year three BN students at Toi Ohomai who have completed NURS. 7116b practicum. We expect the questionnaire will take approximately 15 minutes to complete. All data will be confidential and no personal details are required thus no identifying features are sought.

By completing this questionnaire, you are confirming that you have read the participant information sheet and giving your consent for the data you provided to be collated analysed and reported.

After analysis, this completed questionnaire will be scanned and kept in a password protected electronic file for three years then destroyed.

We appreciate your assistance with this research project. Thank you.

A. Background - biographical

1. Age – year band in decades

2. Ethnicity

3. How long have you been a BN student?

- Two years
- Three years
- Four years
- More

4. Do you currently work in ARC outside of your BN programme?
Yes no
If no, please disregard the next question

5. How many hours per week do you work?
Less than 10hrs
10-15hrs
More than 20hrs

B. Experience as year three ARC placement

6. What did you achieve as a year three student in your ARC practicum experience which was different to your year one experience? (Comment box)

7. What aspects of your preparation for this practicum was the most helpful? (Comment box)

8. What aspects of your preparation was least helpful? (Comment box)

9. Please rate your experiences in your third year ARC placement relating to applying the following components of year three professional practice requirements.

Likert scale (1-4)

a. *Te Tiriti o Waitangi*
b. *Managing older adults with complex conditions*
c. *Cultural safety*
d. *Development of advancing assessment skills with the deteriorating resident?*
e. *Leadership and management of care*
f. *Delegation and supervision*
g. *Advancing nursing practice – ethics, QI,*
h. *Advanced Care Planning*
i. *Advocating for your resident*
j. *Communication with the RN/CNL*
k. *Increased knowledge of disease management and medications*

10. In what way, if any, do you think your ARC practicum experience in year three could be improved? (Comment box)

11. Has your ARC experience increased your likelihood of choose ARC as a place to work as an RN? (Comment box)

12. Has your ARC experience decreased your likelihood of choose ARC as a place to work as an RN? (Please explain -Comment box)

13. Has your perception of working in ARC changed? Comment box

14. Is there anything you would like to add as feedback from your ARC practicum? (Comment box)

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Make the World a Better Place: Design Skills in an Academic Context

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Official Conference Proceedings

Abstract
This article aims to present a pedagogical practice carried out in an academic context with undergraduate students from the 2nd year of the Communication Design course at Lusófona University (UL) in the second semester of 2021/22. A proposal that provides continuity to a project developed in the 1st semester in partnership with this NGO. A collaborative endeavour to help build a school in Monte Chimoio, Manica, Mozambique, through a collection of design artefacts for fundraising – T-shirts and sweatshirts for different ages and genders, hats, key holders and tote bags. The creative process was done using the Design Thinking methodology (problem definition, project ideation, prototyping and implementation of the chosen proposal). The article is divided into four parts: Introduction, literature review, work methodology and final considerations. The President of the NGO will take part in the last step of the creative process by selecting for print the best propositions. This pedagogical exercise proved to be an opportunity for students to engage in a real-life project with the possibility of applying the tools and methods learned in the course. Design scholars must motivate and prepare design students to work on projects that contribute to society and to recognise the role design plays in social issues — a Design practice through co-working that educates students to use design processes to support positive social change giving them the ability to be part of a project with a cause.

Keywords: Design Skills for a Better World, Pedagogical Practice, Design Educators, Collaborative Project

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Introduction

A collaborative project was developed to help build a school in Monte Chimoio, Manica, Mozambique village. The briefing proposed a collection of design artefacts for sale and fundraising, such as T-shirts and sweatshirts for different ages and genders, caps, key holders and tote bags. A project carried out by *The Big Hand,* a non-governmental organisation (NGO) that promotes the well-being of children living under unfavourable environmental conditions, with particular attention to orphan girls, ensuring their access to education, healthcare, nutrition, water and basic sanitation. *The Big Hand* believes that children raised in a healthy environment can change the world. Also, it believes in a world where all children are treated with dignity, in a world that protects its children, guaranteeing them access to nutrition, water, sanitation, health, shelter, information and quality education that allows them to reach their full potential and in that way they contribute to their community and the world. It works in partnership with communities, local organisations and governments.

This design project was a co-creation started from the collaboration between the Academy (ULP) and *The Big Hand*. For this purpose, a partnership protocol was established between both institutions in January 2022.

Design scholars must motivate and prepare design students to work on projects helping those in need of a better world. This proposed briefing offers a concrete opportunity for design students' immersion in a specific context through co-working, building empathy with others, and learning by doing.

Design skills for the common good and the importance of collaborative project

Design scholars must motivate, prepare and challenge design students to work with real projects to help those in need. Today's world faces unprecedented problems: "Phenomena such as terrorism, climate change, immigration, cybercrime, poverty or malnutrition can no longer be truly understood without considering the complex socio-technical systems that support our way of living." (Tromp & Hekkert, 2021, p.1). According to Alice Rawsthorn e Paola Antonelli, "Design is not a miracle cure, but is a powerful tool that can help us to address these issues if applied sensitively and responsibly." (Rawsthorn & Antonelli, 2022, p.12). Design scholars must cultivate an approach to social issues and promote the value of design to inspire and prepare the next design generation as changemakers. Design must be used to impact positive social change. "As methods and tools make developing a business, program, or project more accessible, designers can actively use their amazing talents to educate and inform, fight injustice, build community, and make the world a better place" (Heller & Vienne, 2018, p.76).

According to Rawsthorn & Antonelli, "An essential first step is to ensure that design is seen, both inside and outside the design community, as capable of addressing complex problems, rather than continuing to be confused with styling" (2022, p.13). Additionally, " (…) designers worldwide are committed to working for the greater good of all communities, geographies, and species, and making all our lives fairer, safer, healthier, and more enjoyable, productive, and inclusive" (Rawsthorn & Antonelli, 2022, p.15).

How can a teacher challenge students and stimulate them toward social issues? How can students feel stimulated? My experience of 17 years in teaching has shown me that real projects are the best solution. Working with local Associations or NGOs has always been a

great challenge for students, who commit and dedicate themselves with great enthusiasm to the projects.

> When you are a student or professional, and you want to improve the world, how do you do that? You concentrate on a problem that speaks to and motivates you and allow yourself to be inspired and challenged, giving it all you have. You have to offer the abilities you have built up through experience – the skills, knowledge, methods and tools of your profession, strengths, and qualities. (Tromp & Hekkert, 2021, p.xii)

As an academic today, many students and professionals want to make a difference in the world and wish to use design to counteract social issues. It is urgent to motivate students by making them feel valuable in today's society, using design as a social agent of change " (…) called upon designers to move away from commercial design and instead be responsive to people´s 'true needs' " (Tromp & Hekkert, 2021, p.8).

As Papanek "(…) explicitly called for designers to move away from commercial business, and this may have motivated some designers to work with NGOs rather than support commercial interests." (Tromp & Hekkert, 2021, p.12). According to him, "(…) integrate ethical considerations and social values into the design discipline, and use design for what Papanek referred to as real needs." (Tromp & Hekkert, 2021, p.12). It is necessary to teach our students to use the tools that design has at their disposal not only for the creation of services or objects for merely economic purposes but also for the service of the planet and society, in the hope of contributing to a better world; and "From this perspective, design is an instrument of power. It is the art of inventing and shaping two, three, and four-dimensional forms intended to satisfy needs, wants and desires, thereby effecting changes in the attitudes, beliefs, and actions of others" (Buchanan & Margolin, 1995, p.48).

Buckminster Fuller[1] (1895-1983) was recognised for his comprehensive perspective on the world's problems. He developed pioneering solutions that reflected his commitment to the potential of innovative design to create technology that does "more with less" and thereby improves human lives. During the 1940s, he began to teach and lecture at universities, including Harvard and MIT, and in the late 1950s, he became a professor at Southern Illinois University (SIU). At Black Mountain College, he proposed to the students to help him develop a design formula with which anyone could construct lightweight domed structures of different sizes and for diverse terrains, aiming to create a new type of emergency shelter – a geodesic dome. Since then, "Millions of geodesic domes have since been constructed worldwide. As well as providing emergency housing for people who might otherwise have been homeless." This home solution was developed after world war II (Rawsthorn & Antonelli, 2022, p.8).

Ezio Manzini has played an essential role in developing a design for social innovation as a scholar and active member of the DESIS network. "Manzini articulates how design can support global transformations towards more sustainable futures" (Tromp & Hekkert, 2021, p.16).

Moholy-Nagy recognised Design as "a powerful force in society by acting as an efficient and ingenious agent of change, free from commercial constraints" (Rawsthorn, 2020, p.9).

[1] https://www.bfi.org/about-fuller/biography/

This briefing was an opportunity to design students' immersion in a specific context through a collaborative project, building empathy with others, learning by doing and ensuring the right to education for Manica children. With this project, design played an essential role as a social agent of change, raising community awareness and generating support to build a school in Mozambique. "Empathy, the ability to understand other people, or put simply as being able to 'walk in another's shoes, is a key attribute for all socially-oriented activities (…)" (Scharoun, Hills, Montana-Hoyos, Peng & Sung, 2020 p.3).

Work Methodology

In the second semester of 2021/22, students from the 2nd year of Communication Design Bachelor in the module of Communication Design II were challenged to use creative design artefacts for sale and fundraising, aiming to help a non-governmental organisation (NGO) that promotes the well-being of children living under unfavourable environmental conditions, ensuring their access to education, healthcare and nutrition.

Client: *The Big Hand,* an NGO based in Lisbon, Portugal.

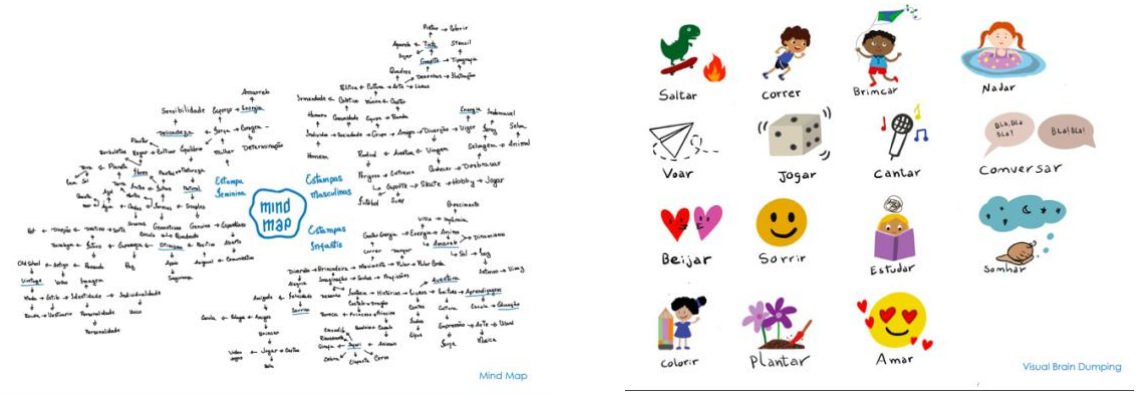
Briefing: A collection of design artefacts for sale and fundraising – T-shirts and sweatshirts for different ages and genders, caps, key holders and tote bags for sale and fundraising to build a school in Monte Chimoio, Manica, Mozambique. Students had five weeks to work on this project (2 classes a week/3, hours each). The creative process was done through the Design Thinking methodology in the following order: *problem definition, ideation, prototype and implementation (problem-solution)* (Lupton & Philipps, 2011).

1. *Problem definition:* In the beginning, President David Fernandes presented the NGO and the briefing through videoconference. The objectives and the target were taken into account (T-shirts for all ages from babies to adults, sweatshirts for teenagers and tote bags, caps, backpacks, critical holders for all), available time (five weeks), proposal (Creative design artefacts for sale and fundraising to build a school in Mozambique), and a schedule with dates for the first-term, mid-term, and final-term assessment.

2. *Ideation and Prototype:* ideas were generated with tools such as words, images, colours and shapes through brainstorming, keywords, action verbs, brain dumping, a mind map and a mood board. Students presented the creative process and ideas with several drawings in the sketchbook. A practice that generates more ideas. Brainstorming is an exercise that starts with a divergent approach to creating an extensive range of options. According to Brown, "When I use drawing to express an idea, I get different results than if I try to express it with words, and I usually get to them more quickly" (Brown, 2009, p.81), (Figs.1 and 2).

Each proposal's strengths and weaknesses were analysed to find the most effective way of fulfilling the initial goal. Design tools, such as colour, contrast, balance, typography, legibility, composition, scales and materials, were considered considering that the campaign will contain a message that needs to be strong but easily understood. This phase was vital to guide students' work and advise them accordingly, as practice-oriented initiatives are crucial in Design teaching. This phase requires exceptional guidance from the teacher, as the teacher's experience allows them to draw attention to certain aspects that often go unnoticed by younger students. Students had difficulty composing the graphic elements in the roll-up because it is extended support in height but narrow in width. This is why, at this stage, an interim presentation and evaluation were carried out, where these factors are highlighted and

usually surpassed. During the creative process, meeting groups facilitate dialogue and share ideas rather than issuing instructions. Creating a collaborative class is a way to learn through engaging students, sharing insights, and gathering feedback from the group. A collaborative process where everyone involved benefits from a positive discussion where solutions are found and sometimes lost ideas are rescued.



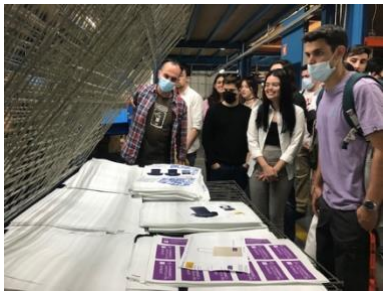
Figs. 1 and 2 – Ideation phase: mind map and visual brain dumping from Sarah Nogueira and Danielly Correia.

The trip

To complement the project developed in the Design classes, on May 25th, 2022, a trip was prepared to a graphic company that produces and prints graphic material for fully customised merchandising – *Nobrinde*. In terms of merchandising production, the company can work with several quantities and materials available in the market: glass, ceramics, textiles, acrylics, paper, wood and metal technology, and also several types of merchandising products/gifts to order, such as T-shirts, sweatshirts, caps, handbags, backpacks, pencils, pens, USBs, agendas, flags, and others.

Positive aspects: The trip took place during the ideation phase, a decision that allowed students to have an opportunity to understand all the manufacturing and printing process—a chance to ask questions and become enlightened to decide based on costs and production time. Also, the fact that the proposed work is intended for a real client and, in particular, with a humanitarian purpose increased the students' commitment and encouraged them to work closely together to create the best design proposed. During this activity, teams tested ideas in an exploratory process to increase the number of solutions and find the best one (Figs. 3,4 and 5).

3. Prototype: Testing ideas through an exploratory process. Different materials and techniques were tested to find the best proposals. In this term, students presented the advantages and disadvantages of each possible solution in a convergent approach after testing their ideas (Figs. 6, 7, 8, 9, 10, 11, 12 and 13).



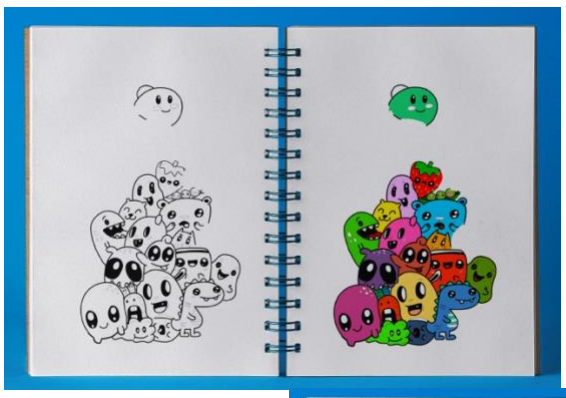


Figs. 3, 4 and 5 – Trip to *Nobrinde*, producing and printing graphic material for fully customised merchandising.





Figs. 6, 7 and 8 – Sarah Nogueira and Danielly Correa.





Figs. 9, 10 and 11 – Luis Góis and Gustavo Santos.





Figs. 12 and 13 – Hugo Carvalho and Pedro Herbstrith Saboya created *The Big Dreamers* alphabet.

4. *Implementation (problem-solution)*: The final solution was developed, finished, and presented with the creative process, and all the steps were justified accordingly. The final assessment considered creativity, relevance, impact, and legibility (Figs. 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 and 30).

After the teacher conducted this evaluation in the classroom through an oral presentation, a session was scheduled with the NGO President where students presented their proposals via videoconference. One will be selected to be implemented (Figs.31 and 32).



Figs. 14, 15, 16 and 17 – Luis Góis and Gustavo Santos.



Figs. 18 and 19 – Luis Góis and Gustavo Santos.

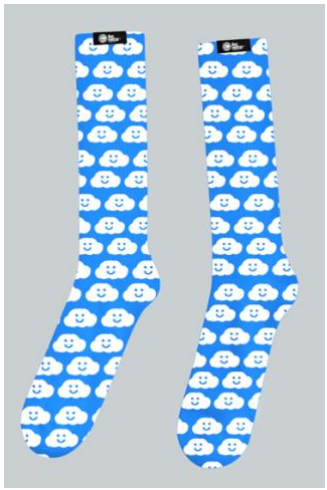



Figs. 20 and 21 – Luis Góis and Gustavo Santos.






Figs. 22, 23 and 24 – Hugo Carvalho and Pedro Herbstrith Saboya.


Figs. 25, 26 and 27 – Hugo Carvalho and Pedro Herbstrith Saboya.







Figs. 28, 29 and 30 – Sarah Nogueira and Danielly Correa.





Figs. 31 and 32 – Luis Góis and Gustavo Santos presented their work via videoconference to the NGO President.

Conclusion and Final Considerations

This briefing offers a concrete opportunity for design students' immersion in a specific context through co-working, building empathy with others, learning by doing and helping those in need. In Communication Design bachelor's at Lusófona University, we believe design students must develop sensitivity to social issues. This pedagogical practice proved to be an opportunity for design students to have an immersive design project that focuses on a specific social situation and the possibility of applying the tools and methods learned in the curriculum course. Design scholars must motivate and prepare students to work on projects helping those in need for a better world. Students must believe that design should play a role in social issues, such as equity and social justice. Also, an opportunity to prepare students for the real working world by engaging through innovative practices for real problems and preparing them for the challenges they will face. This academic project that goes beyond traditional university practices was an opportunity to develop core skills for the workplace. A chance to visit a factory that produces and prints merchandising objects, to ask questions, and become enlightened to decide based on costs and production time. This collaborative work allowed students to see their work published and sold to support a social project. It proved to be an opportunity for students to engage in real-life work with the possibility of applying the tools and methods learned in the course.

Acknowledgements

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Working in the Pacific, Working in Asia: The Challenges of Sustaining International Partnerships in a Pandemic

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The Asian Conference on Education & International Development 2023
Official Conference Proceedings

Abstract
In early 2020, members of the international, nursing and research teams at Toi Ohomai Institute of Technology, New Zealand, met with a number of education and practice providers in China, to explore an education and research collaboration. These discussions facilitated the establishment of the Sino-New Zealand Aged Healthcare Association (SNZAH) which currently has 15 inaugural New Zealand members including academic staff, medical and healthcare practitioners, and aged care professionals. Membership is growing with the launch of a website, and interest from other Chinese universities and technical institutes. The advent and impact of COVID-19 has certainly stymied our progress. However, our early adoption of cultural lens theory as a way of understanding one another's contexts and drivers has enabled us to 'keep calm and carry on', and even begin to thrive. We have conducted an initial iterative review into good practice in aged healthcare in New Zealand and achieved several co-authored research publications; we have held an online symposium with simultaneous translation options; and we have established a Learning Centre in Chengdu – all from our New Zealand base, and despite a raft of challenges. This paper outlines the roles of effective leadership and management in pursuing goals of internationalisation, when all the usual protocols of relationship-building have had to be revisited. We are also interested in connecting with readers who may be involved in similar collaborations in the aged healthcare and nursing sector.

Keywords: Aged Healthcare, Internationalisation, International Research Collaboration

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Introduction

Aotearoa New Zealand is a trade-dependent country, and our economic relationship with China is our second largest, following our close exchange of goods and services with our nearest neighbour Australia. The New Zealand–China Free Trade Agreement (FTA) signed in 2008 (and further upgraded in 2016) was China's first FTA with a developed country. China is one of the world's fastest-growing economies and its vast population and growing middle class represent huge potential for our much tinier nation. Alongside our agricultural and forestry exports, education and tourism links have been growing steadily: prior to the arrival of Covid-19, around 450,000 Chinese tourists, and 40,000 Chinese students visited New Zealand annually (Ministry of Foreign Affairs & Trade, 2022).

New Zealand's providers of higher education have also pursued partnerships with Chinese universities and technical institutes, to progress research, collaboration and knowledge sharing through seminars, visitor exchanges, conferences, and collaborative research. This paper is an account of one such partnership, the Sino-New Zealand Aged Healthcare Association (SNZAH). Naturally the member institutes are interested in the inherent opportunities for profit generated through programme offerings, consultancy, and bilateral commercialisation ventures. However, first and foremost, SNZAH was born from an interest in the trade of ideas and good practice.

The following sections outline the SNZAH international partnership, and its context: the shared challenge of planning effective and emancipatory healthcare for an ageing population. Next, we discuss New Zealand's unique bi-cultural environment, which was one of the key interest areas for our Chinese partners, and how a cultural lens methodology has been an integral element within SNZAH. We then describe our progress to date, including research outputs, an online symposium with simultaneous translation, and a new China-based learning centre. These achievements have been hard-won, despite the restrictions and shock of a worldwide pandemic which has arguably affected China more than any other nation. We hope that some of our experiences and learnings will be transferable to likeminded colleagues in their own collaborative endeavours.

The SNZAH initiative

In early 2020, members of the international, nursing and research teams at our New Zealand institute of technology met with a visiting delegation of education and practice providers from China, to explore an education and research collaboration. Visits to these organisations had occurred in the previous year with an international consultant and senior nursing department staff. Discussions at these meetings focused on health workforce development and positive ageing for older people The resultant SNZAH association was formed with 15 New Zealand members including academic staff, medical and healthcare practitioners, and aged care professionals. A number of Chinese nursing education providers were either early signatories or expressed an interest in considering joining the venture once the threat of Covid-19 had passed – although three years on, Covid remains an ongoing challenge internationally. Present or potential Chinese partners include Chengdu University, Sichuan Vocational College of Health and Education, China Medical University, and Jinjiang College (part of Sichuan University). We have also commenced discussion with representatives of the prestigious Peking University, Beijing (Honeyfield et al., 2021).

In addition to the delays Covid-19 has wrought, a compounding challenge is noted in the backdrop of New Zealand's higher education ecosystem. A large-scale transformation known as the Reform of Vocational Education (RoVE) is currently underway, which will see the amalgamation of 16 legacy institutes of technology and polytechnics into a single new entity: *Te Pūkenga – New Zealand Institute of Skills and Technology*. Alongside systemic changes to every level of operations, including curricula, assessment and service provision, Te Pūkenga now assumes responsibility for all international enterprises established by the previously independent subsidiaries. The Memorandum of Understanding signed with Chengdu University to establish a learning centre on behalf of SNZAH (described later in this paper) was Te Pūkenga's very first undertaking in this arena.

The account which follows describes SNZAH's activities and achievements to date. The association's key role is to act as an important link with key China health and education provider-partners, to share skills and knowledge and facilitate education at certificate, diploma, degree and postgraduate levels studies in aged healthcare. The Association's stated objectives are to promote:

1. Research and evidence-based practice in aged healthcare
2. Educational programme design, development, and delivery at all levels
3. Human resource, leadership, and management capability
4. Supportive built environments and infrastructure (www.snzah.org)

The ageing population: an international concern

The world's population is ageing, and in virtually every country in the world the population aged 65 and over is growing faster than all other age groups. The United Nations (2022) forecasts that by 2050, one in six people in the world will be over age 65 (16%), up from one in 10 in 2022 (10%). Further, the number of persons aged 80 years or over is projected to triple, to 426 million in 2050. Healthcare and long-term care systems will become increasingly critical.

Yet despite this growing demand for gerontology services and specialists, multiple studies are testifying to a looming crisis in the personnel pipeline (Gawande, 2014; King et al., 2011). Simply put, nurses, and nursing students, show a persistent disinclination to specialise in this area (Wilkinson et al., 2016). Our recent review of the literature for SNZAH (Honeyfield et al., 2021, p. 59) includes this illustrative account:

> When the American Journal of Gerontological Nursing (Your turn, 2001) asked its readers for suggestions to improve recruitment of students into nursing programmes focused on elder care, the published correspondence noted a range of barriers: "…gerontology is at the bottom of the heap [due to] Western society's emphasis on the culture of youth"; "Nursing home experiences are poorly mentored and many instructors have an attitude of 'let's get this over with'"; "geriatric nursing is still viewed as 'the place where lousy nurses go'"; and "Gerontological nurses are overworked, undercompensated (e.g. money, benefits), understaffed and often work in outdated facilities with shoddy equipment." (pp. 44-45)

Ageism in healthcare, as a stereotyped and discriminatory response, has remained relatively unchanged over the last 20 years (Foster, 2021), and can be defined as judging an entire population group based on one shared characteristic (Fisher, 2018). Such bias, whether conscious or not, is clearly against the interests of the older person, and can lead to

disrespect; disempowerment and neglect (Rodgers & Gilmour, 2011). For nursing practitioners and students, such negative constructs, if unchallenged, will continue to see a shortage of nurses selecting aged healthcare as a preferred career pathway: a huge concern for governments, hospitals and communities (Parker et al., 2021).

Worldwide, there is a growing call for a paradigm shift (for example, Gawande (2014) in America; Song and Tang (2019) in Japan, and Rodgers et al. (2017) in New Zealand. Increasingly, accounts of successful re-alignment of care philosophy, revisited policies and procedural guidelines, and individualised quality care experience for those in the end stages of life are being sought, and shared. This is one way in which New Zealand can contribute value to our much larger Chinese partners, through the framework provided by SNZAH. Our country already has a 'wellness' orientation, with a vision for all New Zealanders to live well, stay well, and get well (MOH, 2016) and to ensure New Zealand is a great place to age (MSD, 2019). Overall, New Zealand's health system has many strengths, and our people are living longer and healthier lives, with generally high levels of self-rated health and wellbeing and good access to acute and emergency care (NZHDSR, 2020). Of course, there are still inequities and failures, and a considerable way to go, but we have made a start (NZHDSR, 2020).

The Aotearoa New Zealand cultural context, and the connection with ageing

Culture, says Statistics New Zealand (2009), is:

> a general way of life that contributes to national identity and society. [It is also] the shared knowledge, values, and practices of specific groups…Cultural expression and participation contribute to individual well-being and sense of belonging. The expression of, and respect for, cultural practices, language, and beliefs is part of a socially cohesive society. These expressions of culture are sustained by being passed down generations, and through the protection of heritage. (p. 127)

The bi-lingual, full name of our country reflects its dual heritage of indigenous and western cultures, languages and world-views. By placing their language first, we acknowledge Māori as *tangata whenua*, the original people of the land. The symbolism of this convention is representative of our present-day efforts to live in a bi-cultural nation, respecting the values and wisdoms of each people. Our founding agreement, *Te Tiriti o Waitangi* (the Treaty of Waitangi), was signed by representatives of the British Government, and 46 Māori rangatira in 1840 (Orange, 2012). Despite disputed wording and different versions, *Te Tiriti* is integral to contemporary life in our country; its signing is commemorated by a public holiday, it is taught in schools and is widely referenced in all spheres of public life, including healthcare provision.

Redress for wrongs perpetrated against Māori in colonial times are ongoing and necessary. In health, as in many other areas, Māori are disadvantaged when compared to *Pākehā* (New Zealanders of European descent), with a lower life expectancy (a gap of approximately 7 years), a higher incidence of smoking, hazardous drinking and obesity. Māori health status is also unequal across almost all chronic and infectious diseases, as well as injuries, including suicide (Ministry of Social Development, 2019).

Informing government policy, a number of studies have focused on Māori health and ageing. One of the most significant is a longitudinal study begun in 2010, known as '*Life and Living*

in Advanced Age, a Cohort Study in New Zealand' (LiLACS). Led by the School of Population Health at the University of Auckland and funded by the Ministry of Health and the Health Research Council of New Zealand, it is a "world leading research programme that aims to determine the predictors of successful advanced ageing and understand the trajectories of health and wellbeing in advanced age" (LiLACS NZ, 2015) and the first such study in the world of an indigenous population. The study clearly established the importance of culture to older Māori, as holders of heritage, knowledge and *tikanga* (customary protocols). Specific findings included:

- almost all participants (82%) had been to a *marae* (a traditional Māori tribal meeting place) in the last 12 months
- half (51%) of Māori in advanced age have a complete understanding of their *tikanga*
- forty-seven per cent of Māori reported that their contacts were mainly with other Māori
- 'ageing in place' was a vastly preferred option over institutional care, and represented a significant difference between Māori and non-Māori. Overall, less than half of Māori (36% of women, 50% of men) were living in residential care, compared to three-quarters (76%) of non-Māori men and women with a comparable level of need

The LiLACS team reported that strong cultural identity, participation and respect arising from their involvement in community, and the cultural norm of being cared for by *whānau* (family) were key contributors to the reduced demand for institutional care by this population sector. Emery et al.'s (2021) small community study endorses these findings, concluding that maintaining *whanaungatanga* (relationships) and undertaking *iwi* (tribal) cultural roles and duties are vital for Māori intergenerational positive ageing.

A cultural lens methodology

Cultural Lens theory is a five-step approach to evaluating how theories, practices or phenomena apply across cultural groups (Dik et al., 2019; Hardin et al., 2014). This tool, originally from the domain of psychology and often used in anthropology, is designed to help researchers metaphorically look through different cultural lenses to view the object of their inquiry in a different way – especially when we seek to understand a non-Eurocentric worldview. We have previously published extended descriptions of the tool and its use (Fraser et al., 2022; Honeyfield et al., 2021) and therefore will not repeat a step-by-step account here. However, what is worth revisiting and relevant to this discussion, is the very broad, but useful summary of the New Zealand-Chinese cross-cultural comparison generated by the Hofstede Insights Group (n.d.) online tool (Figure 1.). In this very generalised overview, it is national characteristics rather than ethnicity which is being described, so that even in highly multicultural societies all citizens are considered together. Thus the New Zealand scores and descriptors conflate Māori and Pākehā cultures, for the sake of highlighting international contrasts – an acknowledged limitation.

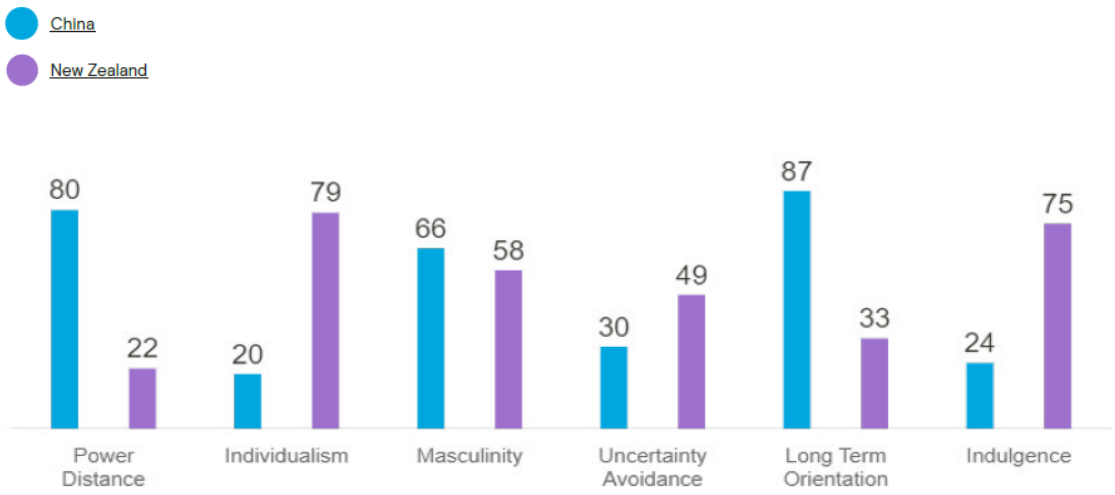


Figure 1. China-New Zealand cross-cultural comparison using the Hofstede Index. (Hofstede Insights, n.d. Reproduced under academic articles permission, https://hi.hofstede-insights.com/faq)

To borrow from our previous precis of the Hofstede Index dimensions:

> *Power Distance* is defined as the extent to which people accept that power is distributed unequally. In China, for example, subordinate-superior relationships are more accepted than in New Zealand which aspires more to egalitarianism. *Individualism* is about people´s self-image as "I" or "We". In contrast to New Zealand, China is a highly collectivist culture where people act in the interests of the group and not necessarily of themselves. *Masculinity* is used to describe societies driven by competition, achievement and success, a value system that starts in school and continues throughout organisational life. People will sacrifice work-life balance and are motivated more by being the best at what they do, than by liking what they do. *Uncertainty Avoidance* describes how a society responds to the unknown future. While New Zealand's score is neutral, China's lower score indicates comfort with ambiguity and an adaptable and entrepreneurial mindset. *Long term orientation* is about views of societal change and the importance of tradition. According to the Hofstede Index, New Zealanders are normative in their thinking: respecting established systems, seeking quick results, and with a relatively low commitment to saving for the future. China is a more pragmatic culture, adapting traditions easily to changed conditions, with a focus on saving and investing, thriftiness, and perseverance. *Indulgence* is "the extent to which people try to control their desires and impulses, based on the way they were raised" (Hofstede Insights, n.d.). Compared to China, this index score suggests New Zealand is a more indulgent society: optimistic, focused on enjoying life, having fun, acting as they please and spending money more freely. (Honeyfield et al., 2021, pp. 20-21)

Understanding one another's cultural character was important during the outbreak of Covid-19, as SNZAH members fought to keep the momentum of the new partnership through the challenges of 2021 and 2022. China's *long term orientation* meant that they were the more prepared to step back, pause and wait for conditions to be more favourable before progressing our agreed agenda. China also has one of the world's highest *power distance* scores and embraced their leadership's strict internal enforcement of authority and sanctions related to

lockdowns and damage control more readily than many western cultures. Some of this isolation mindset may have affected enthusiasm for international ventures. Certainly, the *collectivist* considerations of safeguarding a national population did not encourage top tier management support for prioritising SNZAH initiatives. It is probably not surprising, either, that New Zealand, with its high *individualism* and *indulgence* ratings, and low *long term orientation* score, took the lead in progress during this period. However, it must be noted that New Zealand did have the benefit of a locally based cultural mediator and translator in *Access New Zealand* to steer these efforts and keep the initiative on track.

SNZAH achievements to date

1. Research and publications

Collaborative research opportunities were one of the key drivers for the partnership, and the subject of some of our earliest dialogue. SNZAH's first project was an integrative literature review of good practice reports regarding aged healthcare provision in both countries. The research would then be used to guide the development of a culturally-responsive teaching and learning programme, in which healthcare of older people is an attractive and valued career choice. Following early discussions, the New Zealand and Chinese partners expected that each would conduct a parallel integrative review of the relevant literature published in English and Chinese as Volumes I and II, to be then amalgamated into a single bilingual account. Three key strands as priority areas of mutual interest were set to guide the structure of each volume:

- Wellness and positive ageing
- Culture and indigenous populations – and in New Zealand, biculturalism
- Education

Unfortunately, the impact of Covid-19 caused delays for each research team, but with far greater consequences for the Chinese teaching hospitals, medical educators and professionals who had intended to participate. The New Zealand team therefore determined to proceed with Volume I, (Figure 2), as an independent text, hoping that in the future the original intention of parallel accounts and a synthesis of cross-cultural learning will be completed.



Figure 2. *'What is good practice in aged healthcare provision? A literature review of international studies informed by cultural context: The Aotearoa New Zealand perspective'*
(Honeyfield et al., 2021. Reproduced with permission from https://snzah.org/)

A conference presentation, poster and journal article by New Zealand members of the association have further assisted the dissemination of this first volume. This is an example, we believe, of 'leading from the side' (Burke & Baron, 2014), trying to offer an example without overstepping a partnership relationship, or minimising the different challenges of their lived reality. It is about being productive, setting high standards, and persevering in our own realm while keeping the door open for our colleagues to join us, when they are able.

2. An online symposium

International fora, such as conferences and symposia, are another effective way to share accounts of good practice across both academic and healthcare practitioner communities. Pre-pandemic plans had embraced the idea of an annual aged healthcare symposium, alternating between New Zealand and China as host nations, although by 2021 this had clearly become impossible. Nevertheless, in March 2022 the association successfully held an online conference via *Zoom* video-conferencing. Keynotes were shared between Chinese and New Zealand experts, a team of professional interpreters provided simultaneous translation, and the *Programme and Book of Abstracts* (Figure 3) was bi-lingual. A key challenge of not being able to convene face-to-face was the five-hour time difference, meaning that New Zealand delegates were in attendance late into the evening.

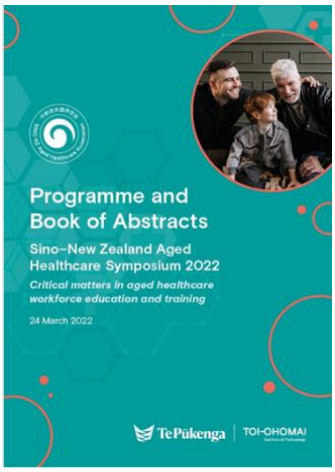


Figure 3. SNZAH symposium 2022 *Programme and Book of Abstracts*
(Reproduced with permission from https://snzah.org/)

Our keynotes for this inaugural event were:

- Professor Stephen Neville, Director of the AUT Centre for Active Ageing and Head of Department (Nursing) at Auckland University of Technology
- Cheyne Chalmers, an adjunct professor at Deakin University and an Executive Director at Ryman Healthcare
- Professor Matthew Parsons, clinical chair in gerontology, Waikato District Health Board and the University of Waikato
- Professor Liu, China Medical University
- Professor Shangbin, Peking University Health Science Center
- Dr. Li Liu, Director, Health care service and management, School of Medical Care, Chengdu Polytechnic

Addresses from delegates covered a wide spectrum of topics related to aged healthcare: the importance of exercise, the impact of Covid-19, the role of nurse practitioners, a cultural

approach to caring-in-place, elderly care informed by Artificial Intelligence, vocational education advantages – and many more.

At the time of writing, the location and format of our 2023 event remains uncertain as China's current travel restrictions make travel for this purpose unlikely, but we hope that with goodwill and a strong inaugural event to pave the way, we will be able to continue this annual exchange of ideas – tentatively scheduled for October/November 2023. Our management and leadership learning here is to do with flexibility and adaptability. Covid-19 has delivered uncertain and unpredictable circumstances on a scale not previously seen, and has had the potential to derail our partnership, but an optimistic approach of problem-solving and a readiness to ask external experts for advice (Burke & Baron, 2014) has enabled us to continue, and grow.

3. A purpose-built learning centre

Where research and the symposium have thus far been largely driven by SNZAH's New Zealand partners, the opening of the Chengdu Learning Centre in Chengdu, South-West China in 2022 is a tangible expression of both countries' commitment to advancing academic collaborations. A joint venture between Chengdu University and Te Pūkenga, the Centre (Figure 4) will have multiple uses, including online meetings, Symposia, professional development and train-the-trainer workshops. An important proposed use will be as China's first testing centre for the Occupational English Test (OET). OET was founded in 2013 by partners Cambridge Assessment English (UK) and Box Hill Institute (Australia) and is widely used internationally by hospitals and universities as proof of ability to communicate in English-medium healthcare environments (https://www.occupationalenglishtest.org/about-oet/).



Figure 4. Classroom, Chengdu Learning Centre. (Photo: Access New Zealand)

At the time of writing, final agreements to offer OET at this site are still in progress, yet the Centre has been built. Leadership and management texts frequently warn against the 'Build it and they will come' approach as unsubstantiated wishful thinking. Yet our learning to date, has been more aligned with (Ellis (2018) four pre-planning tips: be realistic, be prepared, be in community, be courageous. A further admonition by this author is to think long-term, not short-term – a mindset which tallies closely with China's cultural characteristic of *long-term orientation* (Hofstede Insights, n.d.).

Conclusion

In August 2020, New Zealand's prime minister, the Right Honourable Jacinda Adern, addressed the China Business Summit, referencing a Māori *whakatauki* (proverb):

> *Tuia ngā waka, Tuia ngā wawata, Tuia ngā hou-kura*
>
> Let us bind our connection, let us bind our vision, let us bind our shared aspiration for peace and prosperity (https://www.beehive.govt.nz/speech/pm-speech-china-business-summit)

Adern was drawing on an indigenous cultural value from Aotearoa New Zealand, but using the saying also as a reference to New Zealand and China's desire to work together, and to collaborate for mutual benefit. This is a vision which SNZAH shares, and one which has sustained members from both countries through the ravages of Covid-19, and the challenges of national responses. We have learned new ways to support one another, we have learned to be pragmatic and expedient, and we have committed ourselves to a confidence that one day soon, we will be able to work alongside one another rather than through screens. So much of what we have managed to achieve to date has drawn on relationships forged through a willingness to understand each other, and our respective cultures. With one foot in Asia and one in the Pacific, we have a solid platform from which to launch future actions in aged healthcare education, and we hope, to make a real contribution to older peoples' care, wellbeing and quality of life.

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Effectiveness of Modified Individual Learning Monitoring Plan on Science Achievement and Student Engagement Among the Grade 11 Academically Challenged Learners

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Abstract
Monitoring student's progress is one of the key roles of a teacher because the goal of education is the academic achievement of the learners. With this, the researcher devised a modified individual learning monitoring plan patterned to that of the DepEd to assess its effectiveness in student engagement and academic achievement among the Grade 11 academically challenged learners in science. This study is supported by progress monitoring theory, goal theory, theory of zone of proximal development, and expectancy-value theory. The study was conducted to determine if there is significant difference between the student engagement and science achievement of the experimental and control group before and after the use of Modified Individual Learning Monitoring Plan (MILMP). The researcher used non-equivalent quasi-experimental research design where control and experimental groups were selected purposively using the criteria; 40%- previous science grade, 20%- previous science teachers interview and 40%- for the 1st quarter grades in earth and life sciences. Data were collected using survey questionnaire for student engagement and 50-item achievement test and focus group discussion. The statistical tool used are percentage, weighted mean, T-Test, Wilcoxon signed rank Test and Mann-Whitney U-test. Data reveals that the level of science engagement and achievement of the experimental group increased after the use of MILMP than to that of the control group. Overall, the use of MILMP is effective in improving the science achievement and student engagement of the academically challenged learners because of Immediate feedbacking and communication to parents and learners, active involvement of the parents and specific learning objective. The MILMP is easy to use and does not consume so much time, effort, and money on the part of the parents and learners.

Keywords: Individual Monitoring Plan, Response-to-Intervention, Progress Monitoring

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Introduction

Due to the increasing demands to maintain the quality of education amidst the time of pandemic DepEd's goal "Sulong Edukalidad", poses a great challenge to educators to make every effort to reach out to the school children and give the best quality of education they can offer for them to learn the necessary competencies even if they are out of the campus or stay at home. Learners have full control of their time and learning because they have the alternative distance learning modality (modular print) wherein, they were just given modules, a weekly home learning plan, and a schedule every day on what subjects they will have for that specific time of the day. The problem faced by the teachers is that a lot of students were having backlogs in the required outputs and written outputs. Some just pass empty activity sheets and summative tests, some do not communicate with the teacher even if he is being reached out through calls and chats, and some copy answers from the internet or from their classmates. The low summative and performance results were evidence that these learners may be having a hard time in the distance modality. These problems faced in the teaching field inspired the researcher to develop a Modified Individual Learning Monitoring Plan (MILMP) to monitor the struggling learner's academic progress and improve their science achievement.

As cited in the work of Steele (2019), "there is a need for teachers to be 'thermostats, not thermometers'" meaning the teachers should not just assess the learning but most importantly make changes based on the status and needs of the learners identified. It is supported by the Work of Victoria (2019), Dolin et al. (2019), and Torres (2019) that teachers use information from summative and formative assessments and assess the effectiveness of teaching and make improvements in teaching styles. As the teachers identify learners who need academic support, they may provide additional assistance and constantly monitor the growth of the learners providing them feedback on their growth so that they can change themselves and regulate their own learning. Through this, it will be more predictive of the achievement of the targeted goal. Although, this could take more of the teacher's time and effort, constant monitoring of the improvement of the learners will let the learners feel that they are cared for and ensured that no one is left behind. Educators should also ensure mastery of necessary competencies before going to the next to prevent premature presentation of ideas by monitoring learners closely. As the teacher identifies the academic need of the learner and vulnerability, timely remediation must be done. Some of the results of closely monitored learners were being motivated, having high-quality work, having to learn goals as their top priority, and being self-governing thinkers. (Harrell et al., 2018, Gray & Toms, 2018). Wijngaards-de Meij & Merx (2018) presents the idea that large instructional advantages are attained when the curriculum, the instruction, and the measures of assessing students' progress are aligned. DM-CI-2020-00162 Urges the teachers to use the DepEd's Individual Monitoring plan, for students after assessing the result of their summative and formative assessment who shows learning gaps or difficulty in the learning areas assessed.

From the Individual Learning Monitoring Plan (ILMP) implemented by DepEd, the researcher added some research-based elements which were not included in the present ILMP to fully ensure the learning progress of the students such specific learning objective or goal, feedback method, date of giving feedback, problems meet, solutions made, signatures of parents, learners, and teachers. The MILMP will serve as a document for the socio-economic status of the learner, interventions made, and the problems meet during the intervention as well as how the learner responds to the interventions made. The plan indicated in the MILMP will be changed after the learner was assessed after making interventions. There was also

limited study on how effective this tool is since it is new in the teaching field. It is in this cause that the researcher was inspired to test the effectiveness the of Modified Individual Learning Monitoring Plan (MILMP) to the science achievement and engagement of the grade 11 academically challenged learners.

Theoretical framework

This study was anchored in the Progress Monitoring theory by MacGregor, Ormerod, and Chronicle which states that a problem-solver seeks to minimize the gap between the problem's recent or present state and the goal state. If he assesses that the problem-solving methods used do not help for coming up to the solution, there he will consider and use other alternative approaches. This theory is ruled by assessing the difference between the current state and the goal state (Alaidaros, Omar, & Romli, 2018). Another theory that supports this study is the Achievement Goal Theory. It states that goal acceptance, commitment, goal difficulty, and specificity as well as feedback are important in successful achievement of something. Also, if the person is committed to the goal and makes it as intrinsic motivation, he will positively achieve his goals (Bardach et al., 2020, Borovoi et al., 2020). Another is the Vygotsky's Theory of the Zone of Proximal Development. This theory tells that support is given to the learner by teachers or peers until it is slowly removed if the learner is gauged that he can already solve problems on his own (Lasmawan & Budiarta, 2020). Lastly, the Expectancy Value Theory by Wigfield & Eccles's (2020) supports this study for it states that when one has high expectancy for success, one will believe they can perform a task well.

Methods

In this study, a non-equivalent group quasi-experimental research approach was utilized. Similar to a true experiment, a Quasi-experimental design seeks to establish a cause-and-effect relationship between a dependent and independent variable or the outcome after an intervention. The difference between this from a true experiment is that it does not use randomization. The non-equivalent type of a quasi-experimental design uses groups that are similar, but it does not follow randomization in selecting participants (Miller, Smith, & Pugatch, 2019; Rogers & Révész, 2020). The participants were purposively selected using the given criteria; 40% previous science grades in junior high school, 20% previous science teacher's assessment interview, and 40% in the first quarter grade in earth and a life science subject for the first quarter. The 10 students at the bottom were selected in both sections and assigned as control and experimental group. This was conducted for Grade 11 students under the HUMSS strand of Corcuera National High School during the second quarter of the first semester of the school year 2021-2022, from November- January.

A 50-item multiple-type test was devised by the researcher to determine the science achievement of the learners. It was validated and pilot tested before use. To test the reliability of the instrument, Cronbach's Alpha was utilized. The result was .840, meaning the test items had a high internal consistency and reliability. A survey questionnaire for student engagement adopted from the work of Reeve and Tseng (2011) was utilized to determine the level of engagement of the learners in science. An online focus group discussion (FGD) was organized to gather the parent's feedback on the use of MILMP and validate the result of the study. In using the MILMP, the researcher first accomplished MILMP highlighting the need and competency the learner needs to master, the specific objective the teacher wants to achieve, the interventions to make, the schedule of monitoring, and the method and date of giving feedback. Then through home visits, the researcher explained the MILMP to both the

parents and learners. Monitoring approaches such as home visitation, monitoring the learners via messenger, and having phone calls with parents were oriented to both the parents and the learners. After the parents and learners agreed with the plan, they affixed their signatures on it as evidence that they will do their part in making the plan successful. A copy of MILMP together with a weekly home learning plan was given to each parent and learner for them to be guided on what to do in the absence of the teacher. The researcher monitored the learner on the specified date in the MILMP and then gave immediate feedback after the outputs were checked either through home visits or messenger chat. The schedule given for accomplishing their modules was every Saturday to give way for the regular modules they have in 2nd quarter. After giving intervention with the use of MILMP, a post-test was employed to assess their learning after the use of MILMP. For the control group, the monitoring approach was just traditional monitoring through messenger chat specially if the learner failed to pass the output on the scheduled time.

Table 1: Comparison of Monitoring Approach between the use of MILMP and the C onventional Monitoring

Use of MILMP	Conventional Monitoring
Home visitation Messenger Chat Phone Calls	Messenger Chat

Results and Discussion

Table 2 shows that the level of engagement in science of the experimental group before the use of MILMP (M = 2.91, SD = 0.47) is average while after the use (M = 1.98, SD = 0.43) is high. This result indicates that before the use of MILMP in the experimental group, they have average level of engagement meaning, the students just do the school task for compliance. However, after the use of MILMP, the students' engagement became high.

Table 2: Level of engagement in Science Learning before and after the use of MILMP for Experimental Group

Statemant	BEFORE				AFTER				MILMP			
	Mean	Std. Deviation	Rank	Description	Mean	Std. Deviation	Rank	Description	WM	Std. Deviation	Rank	Description
SE1	2.9	0.876	8.00	A	2.2	0.919	5.50	H	2.55	0.945	6.50	H
SE2	3.2	0.632	3.50	A	2.7	0.823	2.00	A	2.95	0.759	2.00	A
SE3	3.3	0.823	2.00	A	2.3	0.823	3.50	H	2.8	0.951	3.00	A
SE4	3.5	0.85	1.00	L	2.9	0.738	1.00	A	3.2	0.834	1.00	A
SE5	2.5	0.972	17.00	H	1.4	0.516	16.50	VH	1.95	0.945	17.00	H
SE6	2.6	0.843	16.00	A	1.7	0.483	13.00	VH	2.15	0.813	14.00	H
SE7	2.8	0.789	11.00	A	1.4	0.516	16.50	VH	2.1	0.968	15.50	H
SE8	2.8	0.919	11.00	A	1.7	0.483	13.00	VH	2.25	0.91	12.00	H
SE9	2.7	1.059	14.00	A	1.5	0.527	15.00	VH	2.1	1.021	15.50	H
SE10	2.7	0.949	14.00	A	1.8	0.919	10.00	H	2.25	1.02	12.00	H
SE11	3	0.816	5.50	A	1.7	0.949	13.00	VH	2.35	1.089	9.50	H
SE12	2.8	0.919	11.00	A	2	0.943	8.00	H	2.4	0.995	8.00	H
SE13	2.9	0.568	8.00	A	1.8	0.919	10.00	H	2.35	0.933	9.50	H
SE14	3.2	0.632	3.50	A	2.2	0.789	5.50	H	2.7	0.865	4.00	A
SE15	3	0.667	5.50	A	2.1	0.738	7.00	H	2.55	0.826	6.50	H

SE16	2.7	0.823	14.00	A	1.8	0.789	10.00	H	2.25	0.91	12.00	H
SE17	2.9	1.101	8.00	A	2.3	0.483	3.50	H	2.6	0.883	5.00	A
SE	2.912	0.465		A	1.971	0.4343		H	2.441	0.6518		H

Legend:
1.0 - 1.79 – Very High Engagement (VH)
1.80 – 2.59 – High Engagement (H)
2.60 – 3.39 – Average engagement (A)
3.40 – 4.19 –Low engagement (L)
4.20 – 5.00 –Very Low engagement (VL)

The control group who is not exposed to MILMP's level of engagement in science before (M = 2.68, SD = 0.48) and after (M = 2.68, SD = 0.48) is both Average as shown in Table 3. Students in the control group were not exposed to MILMP, they were in the modular mode of learning only and no interventions and simple monitoring such as sending messages through messenger if no output was submitted.

Table 3: Level of Engagement in Science Learning of the Control Group, not exposed to MILMP

Statement	Before				After				Not Exposed to MILMP			
	Mean	Std. Deviation	Rank	Description	Mean	Std. Deviation	Rank	Description	WM	Std. Deviation	Rank	Description
SE1	3.20	0.919	4.00	A	3.20	0.919	4.00	A	3.20	0.894	4.00	A
SE2	3.20	0.919	4.00	A	3.20	0.919	4.00	A	3.20	0.894	4.00	A
SE3	3.40	0.843	1.00	L	3.40	0.843	1.00	L	3.40	0.821	1.00	L
SE4	3.10	1.287	6.00	A	3.10	1.287	6.00	A	3.10	1.252	6.00	A
SE5	2.60	0.966	9.00	A	2.60	0.966	9.00	A	2.60	0.94	9.00	A
SE6	2.00	0.816	16.00	H	2.00	0.816	16.00	H	2.00	0.795	16.00	H
SE7	2.40	0.843	11.00	H	2.40	0.843	11.00	H	2.40	0.821	11.00	H
SE8	2.30	0.675	13.50	H	2.30	0.675	13.50	H	2.30	0.657	13.50	H
SE9	2.30	1.059	13.50	A	2.30	1.059	13.50	A	2.30	1.031	13.50	A
SE10	1.90	0.738	17.00	H	1.90	0.738	17.00	H	1.90	0.718	17.00	H
SE11	2.40	0.699	11.00	H	2.40	0.699	11.00	H	2.40	0.681	11.00	H
SE12	2.10	0.568	15.00	H	2.10	0.568	15.00	H	2.10	0.553	15.00	H
SE13	2.40	0.966	11.00	H	2.40	0.966	11.00	H	2.40	0.94	11.00	H
SE14	3.00	0.943	7.00	A	3.00	0.943	7.00	A	3.00	0.918	7.00	A
SE15	2.70	0.823	8.00	A	2.70	0.823	8.00	A	2.70	0.801	8.00	A
SE16	3.20	0.919	4.00	A	3.20	0.919	4.00	A	3.20	0.894	4.00	A
SE17	3.30	0.675	2.00	A	3.30	0.675	2.00	A	3.30	0.657	2.00	A
SE	2.68	0.48		A	2.68	0.48		A	2.68	0.47	SE	A

Legend:
1.0 - 1.79 – Very High Engagement (VH)
1.80 – 2.59 – High Engagement (H)
2.60 – 3.39 – Average engagement (A)
3.40 – 4.19 –Low engagement (L)
4.20 – 5.00 –Very Low engagement (VL)

The experimental group's pretest and post-test (M = 15.20, 29.70) (SD = 5.55, 5.08) show a shift from low to average science achievement same as that of the control group in their pretest and post-test (M = 20.00, 20.30) (SD = 9.46, 5.46) as shown in Table 4. From having

low science achievement, meaning the students have low scores from the achievement test given by the teacher on the pre-test to having average or median scores on the post-test.

Table 4: Science achievement of the control and experimental groups before and after the use of MILMP

Group	*Test*	*Mean*	*Std. Deviation*	*Description*
Experimental	Pretest	15.20	5.55	L
	Post Test	29.70	5.08	A
Control	Pretest	20.00	9.46	L
	Post Test	20.30	5.46	A

Legend:

40.01 – 50.00 – Very High Science Achievement (VH)
30.01 – 40.00 – High Science Achievement (H)
20.01 – 30.00 – Average Science Achievement (A)
10.01 – 20.00 – Low Science Achievement (L)
1.00 – 10.00 - Very Low Science Achievement (VL)

In Table 5, A Mann-Whitney U-test indicates that there is no significant difference in the experimental and control group's Level of science achievement before the use of MILMP (M = 8.9, 12.1), U = 34, ρ = 0.23. Thus, this result failed to reject the null hypothesis.

Table 5: Comparison in Science Achievement between control and experimental groups Before using MILMP

Group	*N*	*Mean Rank*	*Sum of Ranks*	*Mann-Whitney U*	*Sig. (2-tailed)*	*Description*	*Decision*
Experimental	10	8.9	89	34	0.225	Not Sig.	Accept Ho
Control	10	12.1	121				
Total	20						

Mann Whitney U-test in Table 6 reveals that there is a significant difference in science achievement between the experimental and control group after the use of MILMP (M = 6.3, 14.7), U = 8.000, ρ = 0.001. Therefore, the null hypothesis is rejected. This means that when the MILMP is used as a monitoring tool, students' achievement is better than those who were not exposed to it.

Table 6: Comparison in Science Achievement between control and experimental groups After using MILMP

Group	*N*	*Mean Rank*	*Sum of Ranks*	*Mann-Whitney U*	*Sig. (2-tailed)*	*Description*	*Decision*
Control	10	6.3	63	8.000	0.001	Sig.	Reject Ho
Experimental	10	14.7	147				
Total	20						

Wilcoxon signed rank test in Table 7 shows that the science achievement of the experimental group had positively increased from that of the pre-test (M = 5.50), Z = -2.805, ρ = 0.005. This test indicates that this difference is statistically significant, thus null hypothesis is

rejected. This result implies that the scores of the experimental group in the post-test proved as compared to that in the pretest after the use of MILMP.

The same test also indicates that there is no significant difference in the science achievement of the control group from the pretest to their post-test. There are 3 negative ranks (M = 9) which mean the scores decreased in the post-test than on the pretest and 7 positive ranks (M= 4) which means that their scores increased in the post-test, Z = -0.051, ρ = 0.959. Therefore, this result failed to reject the null hypothesis. This means that the scores of the students in the control group in the pre-test and post-test may differ but statistically, there is no significant difference.

Table 7: Comparison in Science Achievement between the pretest and posttest as to groups

Category		N	Mean Rank	Sum of Ranks	Z	Sig. (2-tailed)	Description	Decision
postcon-precon	Negative Ranks	3	9	27	-0.051	0.959	Not Sig	Accept Ho
	Positive Ranks	7	4	28				
	Ties	0						
	Total	10						
postExp-PretestExp	Negative Ranks	0.00 0	0.000	0.000	-2.805	0.005	Sig	Reject Ho
	Positive Ranks	10	5.50	55				
	Ties	0						
	Total	10						

The summary of difference between each learner's score in the pre-test & post-test was presented in Table 8 below.

Table 8: Summary of Learner's pre-test & Post test result with their gender

EXPERIMENTAL			
Student No.	Gender	PRETEST	POST-TEST
1	F	22	29
2	M	13	23
3	F	11	34
4	F	14	30
5	F	12	26
6	F	11	24
7	M	16	26
8	M	28	33
9	M	13	39
10	M	12	33
MEAN		15.9	29.70
SD		5.55	5.078
CONTROL			
1	F	22	32

2	F	32	16
3	F	17	21
4	F	13	18
5	M	33	21
6	M	10	12
7	M	9	17
8	F	33	22
9	F	16	25
10	M	15	19
MEAN		20	20.3
SD		9.463	5.458

A Mann-Whitney U-test in Table 9 reveals that the use of MILMP is effective (U = 7.50, ρ = 0.001). Thus, the null hypothesis is rejected. The use of MILMP is effective in the improvement achievement as seen in the increase in the post-test of the experimental group. Evidence shows that frequent information and feedback to parents through calls and chats, home visitation, and interventions suited to the needs of the learners make progress monitoring effective (Bergman & Chan, 2019).

Table 9: Effectiveness of MILMP

Group	*N*	*Mean Rank*	*Sum of Ranks*	*Mann-Whitney U*	*Sig. (2-tailed)*	*Description*	*Decision*
Experimental	10	6.25	62.5	7.500	0.001	Sig	Reject Ho
Control	10	14.75	147.5				
Total	20						

Table 10 presents the Mann-Whitney U-test. This test reveals that there is no significant difference in the level of engagement in science learning between those exposed to MILMP and those not exposed (U = 146, ρ = 0.143) thus, this result failed to reject the null hypothesis. Level of engagement was assessed by the learners using a self-report questionnaire thus, self-report surveys are somehow posing biases and limitations such as honesty wherein students may make socially acceptable answers rather than being honest about the real state and subjects may sometimes be unable to assess themselves accurately (Pedneaut, 2020).

Table 10: Comparison in the level of Engagement in Science Learning between experimental and control group

Group	*N*	*Mean Rank*	*Sum of Ranks*	*Mann-Whitney U*	*Sig. (2-tailed)*	*Description*	*Decision*
Exposed to MILMP	20	17.8	356	146	0.143	Not Sig	Accept Ho
Not Exposed to MILMP	20	23.2	464				
Total	40						

To gather the feedback of the parents as to what they can say about the use of MILMP, the Focus-Group Discussion (FGD) reveals the following. The MILMP does not require a lot of money, time, and effort on their part, it's easy to use and they viewed the importance of

parent's involvement. Lastly, immediate feedback and constant communication with the teacher about the progress of their child helped them know how their child is doing in school.

Table 11: Parent's Feedback on the use of MILMP

Theme	**Parent's Feedback in the Use of MILMP**				
Transcripts	**Emerging Concept**	**Sub-categories**	**Categories**	**Frequency**	**%**
Use of MILMP does not require so much time, money and effort, because we have a copy of the MILMP of the teacher we became oriented of the strategies she used and when is the follow-up to our child	Not Time Consuming on parents	Easy to use	Time Factor	**3**	**75%**
It is not time consuming on my part because I always monitor my child if she already finished her school tasks even before the pandemic					
It does not require so much time, money and effort but I am quite challenged in monitoring my child if she does her school works because for whole day, I am washing laundry for a living in town	Not Requiring money on parents	Free to use	Budget & Resources	2	**50%**
There is no problem with the implementation and use of MILMP, I always encourage my child to do the assigned tasks	Involving Parents in their child's learning	Facilitates active involvement of parents	Parental Support & Involvement	3	**75%**
There are no challenges met during the use of MILMP, I just facilitated and reminded					

I became more involved in my child's academic achievement because of MILMP					
Through immediate feedback and constant communication with the teacher, it helps us be engaged more"	Giving Timely & Immediate Feedback	Establishes Constant Communication	Immediate Feedbacking	4	**100%**
By texting and calling or even during the home visit, I can immediately know if my child understands the lesson or not					
Immediate feedback and communication about how my child progresses is not a burden					
It's good, I really want to know if my child passes all the exams					
The score of my child increased, I think MILMP is helpful	Helps in increasing test scores.	Effective tool in helping the child learn the competencies	With need-based interventions	1	**25%**

Conclusion

Based on the statistical results, it can be inferred that the use of MILMP is effective due to constant communication, active involvement of parents, and immediate feedback. The use of MILMP does not require so much time, effort, and money on the part of the parents. Parent involvement, timely feedback, and communication help in the best implementation of the tool. Most importantly, MILMP improves science achievement and student engagement of academically challenged learners. It is suggested that a larger population will be involved in the study for future researchers who will pursue related or the same study as this. Teachers should also ensure alignment of the strategies to the academic need of the learner identified through the MILMP.

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The Effects of Instructional Scaffolding in Students' Conceptual Understanding, Proving Skills, Attitudes, and Perceptions Towards Direct Proofs of Integers

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Abstract
Students find mathematical proving a challenging task and often perform poorly in proving despite its importance in developing students' critical thinking and reasoning skills. The purpose of the study is to determine if instructional scaffolding can improve students' conceptual understanding, proving skills, and attitudes and perceptions towards proving. The instructional scaffolding strategies used were providing hints, examples, and questions for the students to develop ideas, showing how to perform a task, and letting the students provide feedback, ask questions, and show support to their fellow peers. Foundations or preliminaries prior to proving integers were also tackled first. The study used mixed methods quasi-experimental design where twenty-six Grade 11 STEM students participated in surveys involving attitudes and perceptions on proving, an odd/even concept test, and a proving test. Students generally had positive attitudes and perceptions towards proving even prior to the intervention and these further improved due to the intervention as the t-test result shows a significant improvement. A rubric was used to score students' proofs. Nine students were able to progress from the beginning level to developing, approaching proficiency, proficiency, and advanced levels in their proving skills although fifteen of them retained their levels. Students' difficulties in proving were due to improper representations of the integers as arbitrary values and errors in performing operations in simplifying algebraic expressions. Nonetheless, it can be deduced that instructional scaffolding is effective in improving students' conceptual understanding of integers and proving skills, and attitudes and perceptions towards proving.

Keywords: Instructional Scaffolding, Conceptual Understanding, Proving Skills, Direct Proofs of Integers

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Introduction

Proving is regarded as an important activity in mathematics by many if not all mathematics educators and mathematicians (Baştürk, 2010; Ersen, 2016). The National Council of Teachers of Mathematics (NCTM, 2000) espoused the integration of proving into the curriculum since it improves mathematical thinking and reasoning skills across age levels. Thus, it comes as no surprise that concepts involving logic including direct proofs are now included as competency skills required of Senior High School students to learn in the Philippines (Department of Education, 2016).

Leddy (2001, p. 13) defined proof as "a reasoned argument from acceptable truths.". De Villiers (1999) described proving to involve exploration, analysis, and creating new results which plays an important role in mathematics knowledge generation through deduction. In proving statements, students could use various strategies such as using examples to perform illustrations, disproving false statements, and using definitions, properties, and theorems (Ersen, 2016).

However, there are learners who struggle in proving (Weber, 2001). Weber (2001) identified students' difficulties in starting a proof, the lack of mathematics concepts and how to use these concepts in the proof. Due to its abstract nature, proving has always been considered a challenging skill to learn due to its complex processes which often than not, teachers are avoiding to teach (Güler, 2016; Varghese, 2017).

Varghese (2017) expressed that effective classroom mathematics teaching can bring about any desired improvement in students' mathematics education by providing opportunities for students to interact, propose mathematical ideas and conjectures, evaluate their thinking, and develop reasoning skills. Instructional scaffolding has been used in teaching mathematics to students in order to develop certain mathematical skills, that can serve as a factor in their achievement. Instructional scaffolding strategies involve collaboration between the teachers and students when learning a certain lesson. Students initially need support from the teacher, but through gradual release of responsibility, they have to do tasks individually once the purpose of the instructional scaffolding strategies has been achieved. Ihechukwu (2020) have shown instructional scaffolding strategies to be effective in developing students' critical thinking skills in mathematics, especially in problem-solving. Therefore, this study posits that instructional scaffolding strategies can also be applied in teaching students in proving.

The purpose of the study is to determine the effects of instructional scaffolding to students' conceptual understanding, attitudes and perceptions towards direct proof on integers. Specifically, it sought to answer the following research questions:

1. Is there a significant difference in the attitudes of students on proving theorems on integers before and after instruction?
2. Is there a significant difference in the perceptions of students on proving theorems on integers before and after instruction?
3. Is there a significant difference in the levels of students on proving skills before and after instruction?
4. What was the students' conceptual understanding of direct proving of integers?

Proving Skills

Tall (1999) states mathematical proof is following a logical way to explain why and how the conjecture has been reached. Varghese (2017) explains that proving is a complex task because it covers a wide range of student competencies such as identifying assumptions, identifying relevant properties and structures which may be definition of terms, postulates, corollaries or theorems, and organizing these in logical arguments. In the study of Güler (2016), academicians experience difficulties teaching proof because the proofs mostly focus on the nature of mathematics being incremental, has an abstract structure and uses symbolic representations. Because of these difficulties, Varghese (2017) suggests that students may initially be exposed to proofs using illustrative examples for its explanatory function, but should gradually progress to communicating mathematical ideas using symbolic representations using arbitrary values as a mathematical language of proof. Academicians in the study of Güler (2016) further remarked that the lack of understanding of the logic of proof methods might cause students to mistakenly think that proofs can be solved using trial and error method and by illustrating examples. They suggest students understand the different types of proofs and to internalize logical proof methods representation.

Direct Proof is one of the most fundamental proving strategies to be studied along with proofs by contradiction, proofs by contraposition, and proofs by induction. According to Doruk (2019), the different ways to prove consist of the following: using counterexamples, providing mathematical induction, contradicting statements, direct proving, and indirect proving. In direct proving, the hypothesis is usually treated as the given and then gaps are filled in to reach the conclusion of the conditional statement. This entails that students first understand (1) the parts of a conditional statements, the hypothesis or premise and the conclusion; (2) the different forms of a conditional statement, converse, inverse, and contrapositive; (3) discerning which of the forms is logically equivalent to the conditional statement; (4) translating a statement in the conditional statement form; and (5) understanding mathematical symbols such as "$\in$" ("is an element of") and "$\Rightarrow$" ("if… then...) (Laili & Siswono, 2020).

Conceptual Understanding of Proof

Stavrou (2014) indicated that there are misconceptions about direct proofs. One of these is students use specific examples instead of applying properties, axioms, definitions, and theorems in proving various statements. He cited students using numbers instead of arbitrary constants in proving a number theory-related statement as one of the examples in situations in proving. Aside from this error, students use the conclusion as a basis of assumption in proving the conclusion of the given statement. Students also do not use both conditions of a biconditional statement in proving biconditional statements. Lastly, students also lacked understanding and analysis of the definitions they would be using in proving statements. There were instances when students were able to complete proving statements although there were some mistakes in parts of their proofs. This implied that understanding definitions, properties, axioms, and theorems serve as one of the most fundamental and important steps in proving statements (Sari, et. al., 2018).

In ruling out the misconceptions in proofs, Buchbinder and McCrone (2020a) devised teaching strategies using their MKT-P, also known as Mathematical Knowledge for Teaching, Framework. In this framework, they used KLAP (Knowledge of the Logical Aspects of Proof) in addressing their misconceptions about basic terminologies, definitions,

and theorems in proving. This aimed at teaching students in using proper mathematical vocabulary and notations in proving statements since these serve as the first steps in proving. This also targeted correcting their logical reasoning skills, which are required in proving. It was also suggested that students be encouraged to develop their skills in explicating conditional statements, using mathematical language, and reasoning logically (Buchbinder & McCrone, 2020b).

Attitudes and Perceptions

Attitudes in mathematics in general is focused on the following aspects: liking, value, and confidence. In the liking aspect, attitudes were based on how the students like and show their interest in mathematics, in general wherein proofs are integrated in the lessons. These highlighted enjoyment as one of the determinants of liking mathematics. In the value aspect, attitudes indicated the need to learn proving and problem-solving in mathematics and the purposes of learning mathematics in real-life situations and everyday life. These also emphasized how important mathematics concepts, including proving, are. The confidence aspect is composed of self-esteem and independence in doing mathematical problems and even proving mathematical statements (Giannoulas & Stampoltzis, 2021; Khine et al., 2015). Aside from liking, value, and confidence, Laili & Siswono (2021) considered motivation as one of the indicators of attitudes in proofs. Motivation involved the willingness to prove statements independently. In proving mathematical statements, attitudes focused on interest, enjoyment, and appreciation towards proofs and their relevance. It was found that proving is important not just in learning mathematics and its concepts, but also in its application in everyday life. Additionally, proving builds critical thinking and other higher-order thinking skills in the students and enhances confidence in mathematical concepts (Lee, 2022). Proving has also been perceived by teachers as a way of communicating in mathematics and a guide in providing logical and valid explanations (Lesseig et al., 2018; Ersen, 2016).

On the other hand, based on the study of Ersen (2016), teachers perceive students have to memorize theorems, properties, and definitions and consider it as a requirement in understanding mathematics in proving, which can cause some students to have negative perceptions that proving is difficult, time-consuming, and unnecessary.

Methods

The research study utilized a quasi-experimental research design with mixed methods approach to analyzing data. Quantitative data constitutes students' responses from survey questionnaires on attitudes, perceptions, and scores from students' proving tests. Qualitative data consist of students' solutions and answers. There were twenty-six (26) Grade 11 students taking up Science, Technology, Engineering, and Mathematics (STEM), from a private school located in Quezon City, who participated in the study. They were chosen through convenience sampling method. The selection was based on the availability of their schedules and willingness to participate.

The following research instruments were administered: surveys focusing on attitudes and perceptions on proofs, diagnostic tests, comprehensive tests, and instructional scaffolding worksheets. Permission to conduct the study were secured from the school principal, class adviser, and the students.

First, the participants took the diagnostic test to measure their prior knowledge on related concepts in proofs and answered the surveys on attitudes and perceptions of proof before the intervention. Then, the researcher implemented a series of scaffolding interventions focusing on the fundamentals of direct proofs. The instructional scaffolding strategies used were providing hints, examples, and questions for the students to develop ideas, showing how to perform a task, and letting the students provide feedback, ask questions, and show support to their fellow peers. Foundations or preliminaries prior to proving integers were also tackled first. The researcher conducted the comprehensive test and the survey questions on attitudes and perceptions of proofs after the intervention. A rubric was used to score students' proofs. Students' scores were used to determine their proving skills level. The paired t-test was used to determine if there is improvement in students' attitudes and perceptions on proof brought by the intervention. Students' solutions and answers were analyzed using narrative analysis in order to draw out students' difficulties in proving. There were 4 class sessions allotted for the intervention and each intervention session consisted of 60 minutes.

Findings

Attitudes and Perceptions of Proof

Table 1: Comparative Analysis of the Attitudes Towards Proofs Before and After Instructional Scaffolding

	Pre-Intervention Attitudes	Post-Intervention Attitudes
Mean	3.7276	4.2115
Number of Participants	26	26
Standard Deviation	0.4500	0.5428
Standard Error Mean	0.0883	0.1064
Pairwise Comparison		
Mean Difference	0.4839	
Standard Deviation	0.6663	
Standard Error Mean	0.1307	
95% Confidence Interval of the Mean Difference	Lower Upper	0.2149 0.7531
t-value	3.704	
Degrees of freedom	25	
p-value (2-tailed)	0.001	

Based on Table 1, the students already showed positive attitudes during the pre-intervention with a mean of 3.7276. After the interventions, their attitudes improved with a difference of 0.4839, leading their attitudes to have a mean of 4.2115, which implies that their attitudes were very positive. The level of significance for this data was 0.05. The computed t-statistic was 3.704, which is greater than the critical value for a 2-tailed hypothesis, 2.060. The p-value, 0.001 is less than the significant level, □□= 0.05. With these, the null hypothesis was rejected and we conclude that there is a significant difference between the attitudes of the students toward proof before and after the instructional scaffolding interventions.

Table 2: Comparative Analysis of the Perceptions Towards Proofs Before and After Instructional Scaffolding

	Pre-Intervention Perceptions	Post-Intervention Perceptions
Mean	3.6731	3.8237
Number of Participants	26	26
Standard Deviation	0.3681	0.4333
Standard Error Mean	0.7219	0.0848
Pairwise Comparison		
Mean Difference	0.1506	
Standard Deviation	0.3652	
Standard Error Mean	0.0716	
95% Confidence Interval of the Mean Difference	Lower Upper	0.0032 0.2981
t-value	2.104	
Degrees of freedom	25	
p-value (2-tailed)	0.046	

Based on Table 2, the students showed positive perceptions during the pre-intervention with a mean of 3.6731. After the interventions, their attitudes improved with a difference of 0.1506, leading their attitudes to have a mean of 3.8237. The computed t-statistic is 2.104, which is greater than the critical value for a 2-tailed hypothesis, 2.060. The p-value, 0.046 is less than the significant level, □□= 0.05. With these, the null hypothesis was rejected. Thus, there is a significant difference between the perceptions of the students toward proof before and after the instructional scaffolding interventions.

Proving Skills

Table 3: Frequency Distribution of Students based on their Proving Skills Levels Before and After the Interventions

Level of Proving Skills	**Advanced**	**Proficiency**	**Approaching Proficiency**	**Developing**	**Beginning**	**Total**
Before the Intervention	0	1	0	1	24	**26**
After the Intervention	6	2	1	2	15	**26**

In can be gleaned from Table 3 that most of the students (24) were at the beginning level in proving direct proofs, while only one of the students received a developing level and another received an approaching proficiency level before the instructional scaffolding interventions. After the interventions, there are less students in the beginning proficiency level and there are more students who reached higher proficiency levels. To be more specific, nine students were able to progress from the beginning level to developing, approaching proficiency, proficiency, and advanced levels in their proving skills. Nonetheless, fifteen (15) out of the twenty-four (24) students remained in the beginning proficiency level.

Conceptual Understanding of Proof

In the diagnostic test, the areas of conceptual understanding focused on the following: identifying the hypothesis and conclusion of a conditional statement and providing illustrations (Stavrou, 2014; Sari et. al., 2018). Here are samples of the answers given by the students in the diagnostic test:

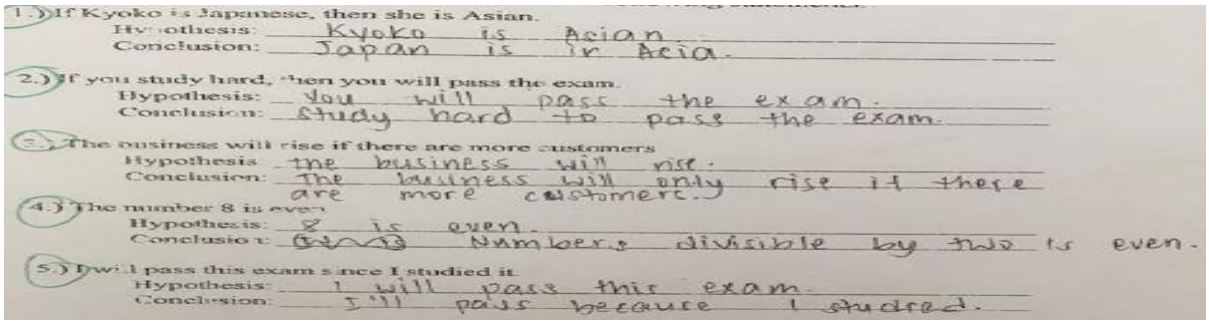


Figure 1: Answers of the Student 1 in Identifying the Hypothesis and Conclusion

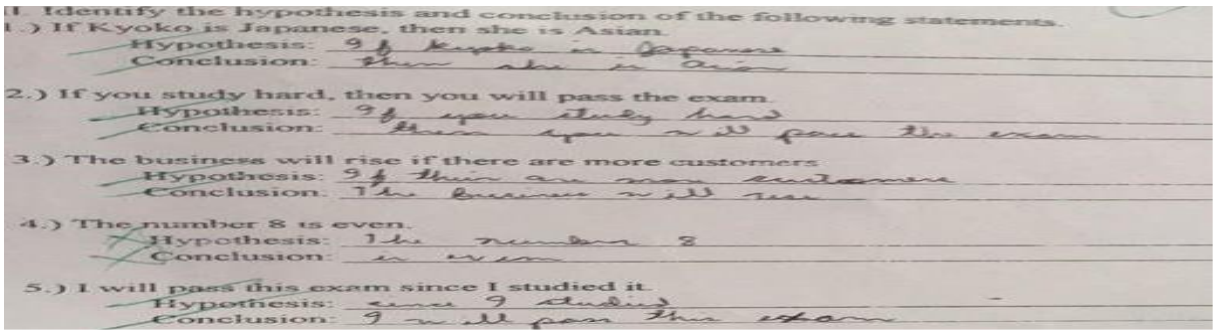


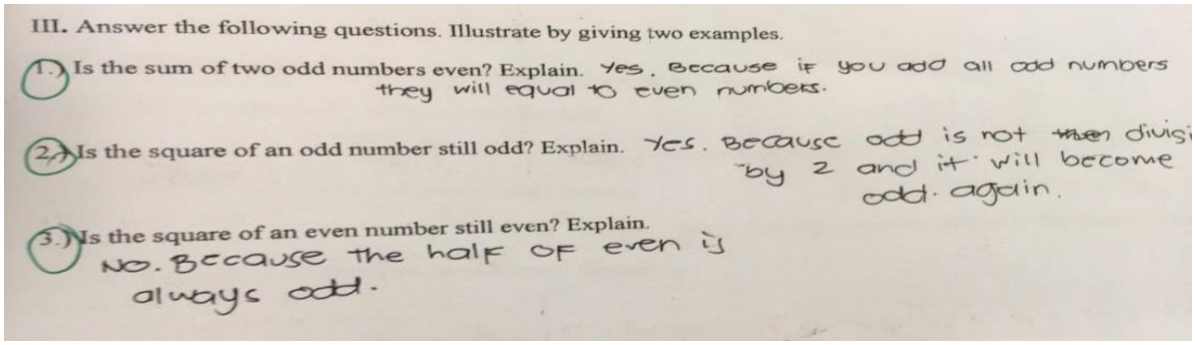
Figure 2: Answers of Student 2 in Identifying the Hypothesis and Conclusion

Based on Figure 1, Student 1 was not able to identify the hypothesis and conclusion properly since he was not able to understand what the hypothesis and conclusion are. While in Figure 2, Student 2 was able to identify the hypothesis and conclusion of a conditional statement.

Table 4: Students' Scores in Identifying Hypothesis and Conclusion of Given Conditional Statements

Score (Out of 10 points)	Number of Students (N=26)
9	2
8	5
7	1
6	3
4	2
3	1
2	2
0	10

The results (see Table 4) show that there are still many students (10 out of 26) who were unable to distinguish the two different parts of a conditional statement and very few, only 2 students got a score of 9 points. No student got a perfect score.


III. Answer the following questions. Illustrate by giving two examples.

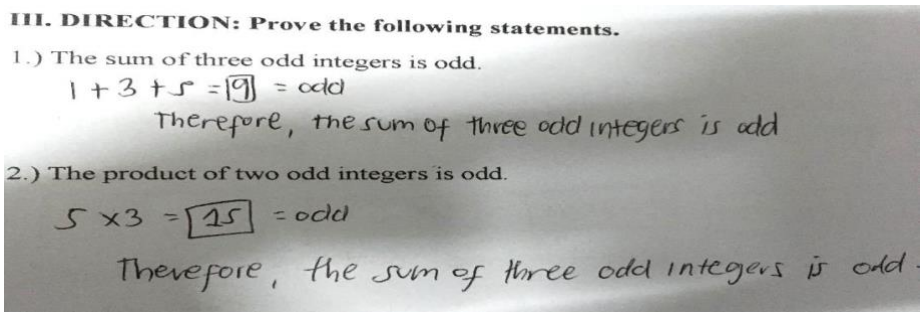
1.) Is the sum of two odd numbers even? Explain. Yes. Because if you add all odd numbers they will equal to even numbers.

2.) Is the square of an odd number still odd? Explain. Yes. Because odd is not ~~then~~ divis by 2 and it will become odd again.

3.) Is the square of an even number still even? Explain. No. Because the half of even is always odd.

Figure 3: Answers of Student 3 in Providing Illustrations

Another set of items were given to test if students could explore and observe patterns by giving examples in order to formulate conjectures prior to its direct proving skills. Figure 3 shows Student 3 failed to illustrate by giving numerical examples to explain their answers. Instead, they reiterated the statement and gave a verbal explanation without any computational basis. Figure 4 shows the correct answer by Student 4.


III. DIRECTION: Prove the following statements.

1.) The sum of three odd integers is odd.

1 + 3 + 5 = [9] = odd

Therefore, the sum of three odd integers is odd

2.) The product of two odd integers is odd.

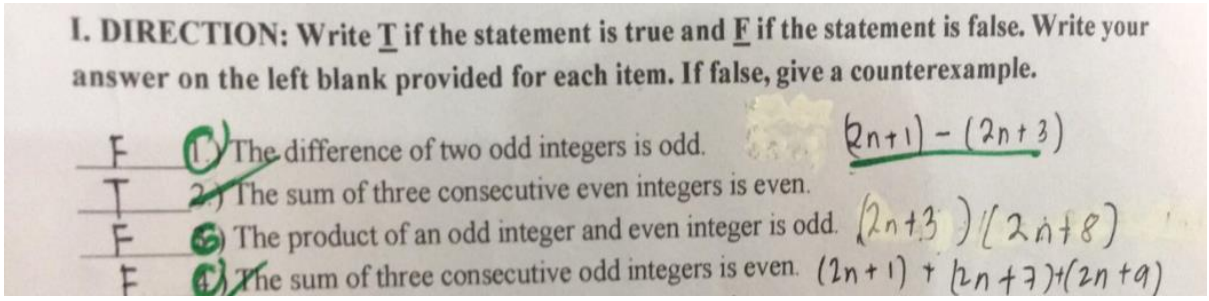
5 x 3 = [15] = odd

Therefore, the sum of three odd integers is odd

Figure 4: Answers of Student 4 in Proving Statements

The figures presented so far illustrate students' prior knowledge before the implementation of instructional scaffolding strategies.

In the comprehensive test, the key areas for conceptual understanding focused on the following: representing integers using arbitrary constants, proving counterexamples, and direct proving. Here are examples of students' answers in the comprehensive test:


I. DIRECTION: Write T if the statement is true and F if the statement is false. Write your answer on the left blank provided for each item. If false, give a counterexample.

F 1.) The difference of two odd integers is odd. (2n+1) - (2n+3)

T 2.) The sum of three consecutive even integers is even.

F 3.) The product of an odd integer and even integer is odd. (2n+3)(2n+8)

F 4.) The sum of three consecutive odd integers is even. (2n+1) + (2n+7)+(2n+9)

Figure 5: Answers of Student 5 in Providing a Counterexample

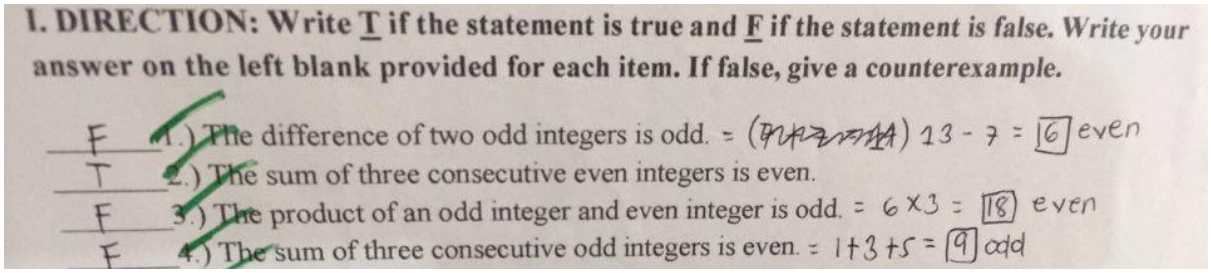


Figure 6: Answers of Student 6 in Providing a Counterexample

As can be seen in Figure 5, Student 5 used arbitrary constants in providing counterexamples. This means the student has not understood what a counterexample is. While in Figure 6, Student 6 used numbers in providing counterexamples. Student 6 was able to disprove statements by using numbers as means of counterexamples.

Table 5: Students' Scores in True or False and Counterexample Items

Score (Out of 5 points)	Number of Students (N=26)
4	2
3	6
2	4
1	14

In Table 5, many students (14 out of 26) scored only one point, and few students (only 2) scored 4 points. No student got a perfect score.

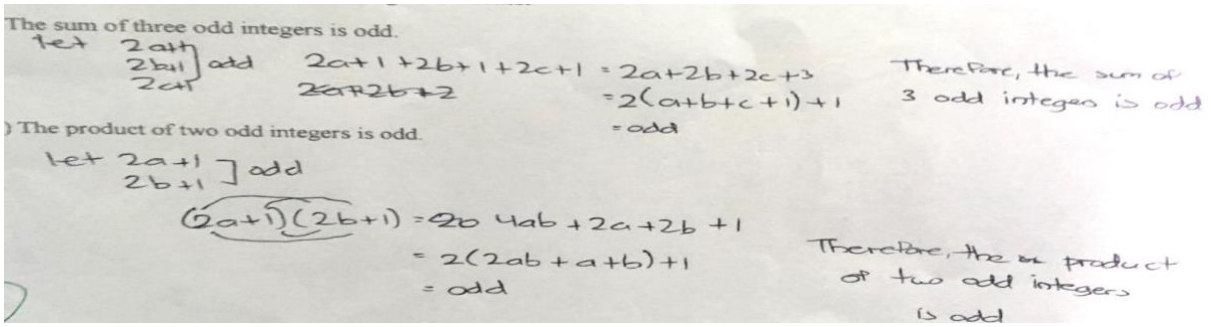


Figure 7: Answers of Student 7 in Proving Statements

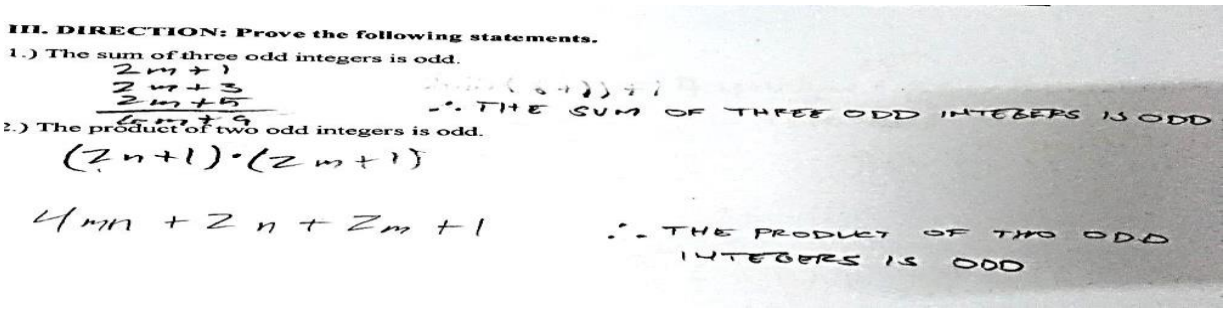


Figure 8: Answers of Student 8 in Proving Statements

Students 7 and 8 were able to represent arbitrary constants as given for odd and even integers. Moreover, both of them were able to use different variables in representing different odd integers. However, only Student 7 was able to represent the product as an arbitrary form of an odd integer, such that "2(a + 2ab + b) + 1, where a and b are integers". Student 8 failed to show that the product is an odd integer.

Discussion

As students go to higher levels in mathematics, critical thinking is a necessary skill in problem-solving and proving. Since they are at higher levels in mathematics, they need to explore other skills, particularly in proving. Based on the results of the diagnostic test, which was before the implementation of the instructional scaffolding strategies, students lack the preliminary skills, such as using arbitrary constants, in proving direct proofs. Because of the misconceptions they had, they needed to undergo a series of instructional scaffolding interventions. During the interventions, they were given worksheets with guided examples and were allowed to collaborate with their peers for them to develop ample prerequisite knowledge and skills in proving direct proofs involving integers. With the help of instructional scaffolding strategies, the students developed some skills in proving direct proofs regarding integers. They were able to represent integers using arbitrary constants and provide counterexamples to disprove false statements involving integers. Many improved in representing integers using arbitrary constants, which is one of the first steps in proving direct proofs involving integers. Observing how the frequency count of students from different proficiency levels, the instructional scaffolding proved to be effective. Consistent to students' performance, t-test results show students' attitudes and perceptions significantly improved after instructional scaffolding intervention.

Conclusion and Recommendation

This study focuses on how the students perceive and behave towards direct proofs and prove and understand direct proofs. Proofs are one of the lessons students should learn in order to understand mathematics. These are being studied by Grade 8 students only in geometry. However, direct proofs involving integers are being studied in Grade 11 General Mathematics under Logic. However, students exhibit misconceptions about proving direct proof. Based on the findings, the respondents had problems identifying the hypothesis and conclusion of conditional statements, representing arbitrary constants in terms of odd and even integers, and stating the given in proving direct proofs involving integers. In the diagnostic test, many struggled with their conceptual understanding of the basic concepts prior to direct proving. While, in the comprehensive test that was administered after the interventions, there were still students who struggled in proving albeit some students have shown improvement in skills in proving integers. All these show that instructional scaffolding has helped the students in learning how to prove integers directly.

This study promotes instructional scaffolding interventions in proving direct proofs involving integers. It is recommended that teachers be more intentional in utilizing instructional scaffolding in proving so the students can be able to maximize their potential in proving.

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Grading of Project-Electronic Courses in the Pre-COVID, COVID, Hybrid, and After-COVID Semesters

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The Asian Conference of Education & International Development 2023
Official Conference Proceeding

Abstract
Providing consistent and fair grading of the student's work during a semester is never a simple task. Consistent and fair grading becomes even more complicated when the course organization is changed. This contribution explores the practical experience of teaching three electronic courses: "Electronic Instrumentation", "Real-Time Digital Signal Processing" and "Image processing". Before 2020 above courses were provided by using what our days can be called “normal” (pre-COVID) logistics: in-class frontal lectures, laboratories, home works, and hardware-based projects to be presented physically in class. Then, during a number of semesters, different variants of “COVID logistics" were used. Later “HYBRID” logistics was used (some students still can work from home), whereas the last semester was a gradual return to “After-COVID” logistics – which is supposed to be close to the original “normal” logistics with some modifications. Obviously, most changes are in the hardware-based assignments. In order to make grading as consistent and fair as possible, detailed Excel Grading Tables were created for each assignment. Those tables contain numbered lists of requirements including their weights in the grade of this assignment and numbered lists of errors typically made by students. To make grading time-efficient for educators, short numerical codes are used to point to the specific error in the relevant list. This technique makes grading transparent to the students. Additionally, reference to the detailed description of the student’s error prevents many baseless student grade appeals.

Keywords: STEM, Cloud-Based Education, Project-Based Course, Consistent Grading

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Introduction

This contribution summarizes the practical experience of grading three project-based electronic courses: Electronic Instrumentations, Real-Time Digital Signal Processing (RT-DSP), and Image Processing in different semesters: Pre-COVID, COVID, Hybrid, and After-COVID.

The course Electronic Instrumentation is a basic electronic course provided in the electronics department. It is provided after students learned the fundamentals of analog and digital electronics. In the frames of this course, students learned the structure and usage of simple sensors and actuators used in laboratories and industry. In some universities, this course contains frontal lectures, exercises, and laboratories. In Braude College, this course has no laboratory. Instead, pair of students get a specially prepared kit containing an Arduino UNO R3 board with a shield, containing a small matrix, and a set of 37 sensors and actuator modules. By using a set of color wires, students can assemble on small matrix prototypes of the typical electronic instrumentation systems. Important, that those kits enable students not only to build prototypes at their homes but to use their laptops to program the Arduino board. By using programming, students can create advanced projects by using simple and inexpensive components from the kit.

The course Real-Time Digital Signal Processing (RT-DSP) is "*a hard-to-learn course*" for advanced electronics students. It is provided after students of the electronics department learn basic math and physics (including complex numbers and Fourier Transform) and after they have learned basic analog and digital electronics and basic programming (preferably C language). In the frames of RT-DSP students learned the following items: how to make the acquisition of analog voltage signals from different sensors (for example, from a microphone), how to use ADC (Analog to Digital Converter) to convert analog voltage signal to digital signal (sequence of numbers that can be stored in the electronic memory), how to use microcontrollers to do an acquisition, how to process digital signals practically (for example clear human speech from the street noises), and how to do all above fast enough by using specially designed microcontrollers. "Fast enough" in the content of RT-DSP means: in accordance with exact timing criteria described in technical terms for the specific application.

RT-DSP course can be considered as a "pedagogic challenge". It is assumed, that in the frames of this course, students must fortify the theoretical basis learned in the prerequisite courses, and learn on a higher level a set of classical DSP algorithms (like filtration by convolution and by using FFT [Fast Fourier Transform]). Then, students learn advanced RT concepts: timers, hardware interrupts, ring buffers, dual-buffer techniques, and Q-Numbers. It is clear, that learning a "theory only" is not enough for the modern electronic engineer. To make learning closer to the real-life work of the electronic engineer, students, instead of working in the dedicated laboratory, uses a development board "EasyPic Fusion V7." As in the case of the kits for the course Electronic Instrumentation, students get this board with an additional Arduino DUE board. Then, they can program above board by using their PC and/or laptops to test basic and advanced RT-DSP algorithms at their homes. By doing this students achieve minimal practical experience: how to implement classical DSP algorithms by using advanced RT concepts while using real electronic components and development boards, and by using modern software development and simulation tools.

The course Image Processing is another example of a classical course provided in the electronic departments. Our days, we have a huge number of digital cameras in laboratories,

hospitals, factories, on the street, and at home. Students must learn about the basic design and properties of digital cameras and how to write software that can process images by using classical image processing algorithms in order to enhance digital images and analyze their content.

This course contains frontal lectures, exercises, and a laboratory. Before 2020 a dedicated laboratory room was used to provide laboratories. By using the equipment of this dedicated laboratory, pair of students use digital cameras to grab images and develop software that can process those images. Then, expensive equipment must have been used: Silicon Graphics workstations, still experimental digital cameras. In 2005, expensive Silicon Graphics workstations were replaced by inexpensive PC with Windows OS. MS Visual Studio 2005 was used to write image processing assignments by using C/C++ language. The goal of the educator then was to monitor students' activity during the laboratory and assist in solving technical problems. Grading was "plain, instant, and simple". The educator's job was to check manually written paper reports prepared during the laboratory and ask a number of questions in case of need.

Starting in 2015 laptops became inexpensive – hence, most of the students started to use laptops and bring them to campus. Simple for inexperienced user Windows OS became the default OS installed on most PC and laptops. MS Visual Studio becomes free for non-commercial use. An inexpensive WEB camera became a default for every laptop. High-speed Internet became always available. As a result, nearly any computer class can be used to provide Image Processing Laboratory. But, many students prefer to use their laptops. Then, the need for the specialized Image Processing laboratory room has become obsolete. Grading still was "plain, instant, and simple". An educator then checked computer-based reports prepared during the laboratory and ask a number of questions in case of need.

The next step was to evaluate the quality of the student's work in the laboratory by grading their reports and the code. Effectively, those reports can be prepared at any place and at any appropriate time – just some deadlines to send reports must be set. In this situation, "strong monitoring" of the student's work in the laboratory time became obsolete.

Speaking practically: even before "The COVID-19 semesters," Image Processing Laboratory was provided by using Gmail cloud services. Laboratory still was provided in the dedicated room at the dedicated time slot. During this time slot, an educator answers the specific student's questions, but students no more printed their reports – they mailed them to the educator by using the special time-effective format. Grading became dependent mainly on the quality of the student' PowerPoint reports and the code written.

The yet next step was to grade the reports by using clearly described criteria. Practically, detailed Excel forms were created. As a result, while using cloud services, it was possible to provide the Image Processing laboratory practically in the same way in different semesters, while the grading criteria were not changed significantly.

The approach to using specially designed Excel tables, containing clearly defined requirements to work to be done with fixed maximal grades was naturally expanded to all three courses long before the time when COVID-19 restrictions were imposed. Practical details of this approach will be described in the following sections.

Literature Review

Courses Electronic Instrumentation and DSP are classical courses for the electronic engineer, hence many articles were dedicated to the details of teaching these courses. Many educators believe, that working with real electronic components (like amplifiers, microcontrollers, ADC, and DAC) is a must for a course of that kind (Nikolic, 2015). Some educators use only mathematic tools to demonstrate usage of the typical DSP algorithms: “A substantial amount of effort from the teacher is required to deliver mathematical and algorithmic concepts”, hence “specially designed Windows Store App can be used as a teaching aid for an introductory undergraduate DSP course” like “linear convolution, circular convolution, radix-2 Fast Fourier Transform (FFT), and Finite Impulse Response (FIR) filter design” (Diya, 2017). The above authors use non-electronic software emulation of a "hypothetical 16-bit floating-point digital signal processor, with a simple instruction set.” Modern software-based electronic simulators are an advanced tool. The results of their work are very close to the operation of real-life systems. This is why many educators started to use dedicated electronic simulators and software tools (like LabView) for electronic courses (Yi, 2005). Some educators promote the "remote laboratory" concept. In the frames of this concept, students remotely operate specific electronic equipment positioned in the "normal" electronic laboratory. (Auer, 2000). Taking into account that the DSP course contains a lot of sophisticated math, and, thus, is not simple for many students, many educators promote “project-based” learning (Hoffbeck, 2012).

Grading of the student’s projects in the “normal” semesters was plain and simple. COVID-19 significantly changed the organization of many courses, including organization of the electronic courses. In many countries it was found that a significant number of students “perceive a paradigm shift in their learning experience before and after COVID-19” and that a significant number of students had faced “numerous challenges during the COVID-19 online learning, affecting their academic performance” (Acheampong, 2023). Many educators observed “inflation of the grades” as a result of the changes in the course organization. For example: “The increase in grades can be explained by the effort of instructors who are accustomed to face-to-face settings. When they suddenly switch to distant education, they might try to grade higher to compensate for the unforeseen negative circumstances” (Karadag, 2021).

This contribution is attempting to analyze the efforts and practical changes in the course’s organization that were provided to prevent significant changes in the grading of the three project-based electronic courses.

Lectures and Exercises of three courses in a “normal” and in a COVID-19 semester

Common elements of the three Electronic courses are frontal lectures and exercises. In a “normal semester”, lecturers of obligatory basic courses (like math and physics) still use markers and white-board. At the same time, the majority of lecturers of “electronics elective courses” uses pre-written PowerPoint presentations and projectors. Only a small number of lecturers require obligatory presence in the lectures.

When COVID-19 restrictions were enforced, lecturers were asked during 3 days to propose an “alternative”. It so happens that, “the alternative to normal life” in Israeli schools and universities was prepared and tested long before: periodically lecturers and students are forced to remain at their homes in “shelter rooms,” and use ZOOM to provide lectures.

Hence, there were nearly no problems with the frontal lectures. Those days some students have had low-speed Internet. In that cases, they were permitted to switch off their cameras and microphones.

Exercises of the above three courses are mostly provided by using pre-prepared PowerPoint presentations. Additional software is used to demonstrate practical elements. For "Image Processing" exercises "MS Visual Studio" is used. "Arduino IDE" is used for "Electronic Instrumentation." "MikroPIC C" is used for "RT-DSP."

As in the case of Frontal Lectures, there was no problem to use ZOOM services to provide exercises nearly as in the 'normal semesters."

Changes in the Laboratory organization

The real challenge was in the change in the organization of laboratories. Solutions were different for the above three courses. In the end, assignments were practically the same in the "normal semester", in the "COVID-19 semester, in the "HYBRID semester," and in the "Normal Again Semester". This became possible because of the fast progress in the way how computers and cloud services are used our days.

In the case of the Image Processing course, changes were minimal. Practically the same grading tables were used in all the semesters. Important point was to formulate assignment requirements in a clear way. For example, requirement #1 in assignment #11 was formulated as: "Put YOUR resulted image "grayImage11.bmp" and add a short comment of what the educator is expected to see". In this case, the student was forced to add some text describing created test image in scientific terms. Requirement #4 was written as: "Proof that the function "AddGrayRectangle" works as described (use scientific tools)". Again, it was not enough to write the code of the function "AddGrayRectangle", it was necessary to provide solid proof. The grading policy was clear and simple. Every requirement has a maximal grade of 2 points. "Two-point grading" makes possible fast and simple evaluation and grading: '0' – not done; '1' – done but not exactly as required, '2' – done as required. To make this process really fast and simple two-monitor configuration was used. One monitor presented the table with requirements, whereas the second monitor presented the student's report. During the years, student's errors were systemized and a "typical numbered error' list was compiled". The educator in several seconds can evaluate: whether a specific requirement was properly done. Any appeal of the student concerning grade now can be checked in a fast and simple way: "done as required"/"not done as required". This enables fair and consistent grading for the Image Processing Assignments. In the comment to the relevant cell in the grading table, it was necessary only to add the "number" of the specific error. The "price" of every error was obviously the same for all pairs of students. Usage of the numbered list of errors effectively minimized the number of student appeals for the one-digit number of appeals.

In addition to the laboratory assignments, students were asked to do two micro projects: MP1 and MP2. In the "normal semester", students presented their work physically in class. During the "COVID-19 semester presentations were provided by ZOOM. In the "HYBRID semester" – some students were physically present, whereas others were at their homes. It was proved that using high-quality cameras and microphones for the ZOOM sessions makes cloud-based presentations nearly the same as in a "normal semester". (HI-RESOLUTION option was set). In the case of Micro Projects grading was different for the different requirements. For example, simple requirement #2 of the Micro Project #1 (Provide the

description of the algorithm including a description of Input Image(s), algorithm' parameter(s), Output Image(s)/value(s); write what exactly must the algorithm do with input images – what is/are expected output(s)) – has the maximal grade of 1 point. However requirement #3 (create a detailed block chart of the algorithm(s) including all algorithm functions, parameters, input/output/temporary arrays by using the same names as in the code) – has a maximal grade of 6.

All assignments are now stored in the cloud (Gmail service was selected). Then, by comparing the level of students' presentations and the complexity of the code during "COVID-19" semesters with those of "normal" semesters, it can be stated that the level of the presentation and the level of the code' complexity were not significantly changed. This conclusion justifies practically the same typical grades for the different semesters.

For the courses Electronic Instrumentation and RT-DSP, the situation was not simple as in the case of the course Image Processing. In the normal semester, real electronic components were used to implement the assignments. Unfortunately, when COVID-19 restrictions were enforced, it was too late to distribute the kits. After short tests, the TinkerCad simulator was selected as a proper alternative.

Advertisement of the TinkerCad claims that: Tinkercad is a free, easy-to-use (really easy to use) web application (no need to install) that equips the next generation of designers and engineers with the foundational skills for innovation: 3D design (not used in three courses) analog and digital electronics + some microcontrollers, and coding. The community of Tinkercad is ~ 35 million users. Tinkercad is used by many educators for simple school projects. Hence the question was: whether Tinkercad can be used to create sophisticated algorithms learned in the frames of the Electronic Instrumentation and RT-DSP courses.

The answer for the course Electronic Instrumentation was: yes, the assignments that were designed for the real electronic sensor and actuator modules from the kit can be implemented in the TinkerCad practically without changes – because most of the components were found at the TinkerCad palette of electronic components, and the code in the simulator was 100% compatible with the code used to program real Arduino Uno R3 board.

Cloud-based reporting technique (practically the same as with the course Image processing) makes it possible to evaluate the quality of students' work without physical meetings – by grading GMailed reports containing links to the simulations. Additionally, students were able to demonstrate the operation of their simulations by using the "share screen" feature of ZOOM. An additional challenge was to ensure that all students really build and test what was asked to do in the frames of assignments. This is why students were asked to fill a number of tables documenting all steps of the execution of the assignment. It was obvious that a simple copy-paste technique would be immediately revealed.

As the answer to "Students difficulties during COVID-19 semesters", students were permitted to send up to 3 versions for Home Work #1 and for Micro Project #1. The goal of this policy was to motivate students to do "decent work" while learning "the rules of good reporting". Only one version was permitted for Home Works #2 and #3 and Micro Project #2– because students already know the rules and requirements.

For the course RT-DSP it was found that the cloud-based reporting technique, developed for other electronic courses, can be used for remote reporting and grading of the student's RT-

DSP assignments with minor modifications (Kosolapov, 2019, 2022). When simulation became the only possible option, students, as proof of execution, added to their report screenshots of the simulation's screens instead of adding photos of the working system. Additionally, a link to the working stimulation must be added to the first page of the PowerPoint report, so that the educator was able to check remotely all the details: how exactly students executed specific assignments. Unfortunately, the current version of TinkerCad supports only an extremely simple Arduino UNO R3 board. The small size of the RAM limits the size of data that can be processed. However, considering that Arduino UNO R3 has timers and hardware interrupts, and supports direct operation, it was found that most RT-DSP algorithms (like ring buffers, filtration by convolution in the TD and by FFT at FD) can be implemented by using TinkerCad.). Important that Tinker Cad can simulate as analog as digital electronics. Hence Arduino UNO R3 can be programmed by writing standard C code by using integrated into TinkerCad an Arduino simulator. An educator can see the code and check its execution, including graphs of the signals created by the Arduino simulator. Still, the C-code, in that case, was significantly different that the code for the MicroC compiler so that it cannot be stated, that the complexity of the code is the same in both compilers.

Providing courses in the Hybrid semester

It so happens that semester 2021-10 – 2022-03 was started as an online semester, but after three weeks, it became a hydride semester: lectures, exercises, and Micro Projects presentations were provided in-campus, but students had the right to stay at home and continue to use cloud services including ZOOM and Email. In the “normal” semester students were required to present in-class Micro Projects However, with the non-strict presence rules of the hybrid semester, a plurality of situations was created: for example, one student of the pair was physically present in class during the presentations, whereas the second student participated by using ZOOM. This situation created a number of logistics problems, and, thus, some logistics changes needed to be done in order to ensure fair and non-biased grading, as for the students who were physically present during the lectures, exercises, and presentations, as for the students who participated remotely. In any case, in the frames of the three courses, the number of assignments was the same as in other semesters.

Results and Conclusion

During 10 years, different variants of this time-effective cloud-based logistics for the different electronic engineering courses were tested. Some results were published before and reported at a number of international conferences. There were no drastic changes as in the level of the student’ reports, as in their final grades for the three electronic courses. In the semesters when student pools were provided, grades provided by students for this course were in the range {4.23...4.94} (by using a 1-5 scale) and were in most cases 0.5 higher than the mean department’s course grade. In the written comments, most of the students’ remarks were positive, and, the median grade for this course in most of the semesters was 5.0 (of 5). It is assumed that by analyzing the results of the last student pools (still not available), more conclusions will be drawn, and some modifications in the logistics will be provided.

And, some technical conclusion: TinkerCad simulation was found extremely useful for the goals of two courses: Electronic Instrumentation and RT-DSP, hence it will be used in the AFTER-COVID semesters.

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Qualitative Study: Disruption and Violence Among Primary School Students in the Lahore District of Punjab Pakistan

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Abstract
Children's welfare has been impacted by the global problem of school violence. Few studies have examined how school features in public primary schools serve Asian cultures, It poses a serious risk to students' social, familial, and personal well-being. The study's goals were to examine the type and degree of disruption that results in violence among primary school students, which spread to elementary school students, and finally, before entering high school, they stopped attending their schools for odd jobs, becoming the poorest and marginalized group in society, and some of them joining the unfair ideologies that harm others. The research was qualitative, The representative sample for the study was chosen using a stratified cluster random sampling procedure through the interviews with public primary school teachers in Lahore. The findings indicate that teachers perceive disruption in the classroom and verbal and physical aggression among public primary school students are harmful to the future of our kids. They believe that the main causes are a lack of accountability for one's actions, a lack of self-efficacy to engage in productive teaching activities, personal, family, and social factors, the school environment, teaching strategies, classroom management, and school administration are responsible. The future of our children and nations can be saved by the implementation of real monitoring, training, work satisfaction, and long-term educational plans.

Keywords: Student Violence, School Administration, Class Room Management, Primary School Students, Class Room Disruption

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INTRODUCTION

School violence has spread around the globe, posing a threat to kids' well-being. Few studies have looked at how school variables buffer the relationship between personal and family factors and school violence in Asian cultures' primary schools. School violence has become a major social issue in recent decades, hurting the personal, family, and social well-being of kids. The majority of school violence research has thus far concentrated on adolescent data. The demographic of primary school children has received far less attention. Furthermore, numerous studies on the risk variables linked to school violence have been undertaken in Western countries. Although considerable disparities in attitudes, perspectives, and worldviews appear to exist between East and West, a nationally representative sample demonstrating that these risk factors extend to primary school in Asian cultures is lacking.

Additionally, research studies on school violence in primary schools have looked at how children's personal, family, and school experiences influence the persistence of student-on-student violence. According to international research, teachers are also targets of student violence in the classroom, but little is known about how students' personal, social, and school experiences influence student aggression toward teachers in primary school. Few studies have looked at organizational or school variables between personal and family factors and school violence in primary schools to date. Few studies have looked at organizational or school variables that may act as mediators between personal and family factors and school violence in primary schools to date.

Different types of violent behaviors are considered the root causes of violence among primary school students. Physical violence is the intentional use of physical force for causing harm, injury, or disability, It includes scratching, pushing, shoving, throwing objects, biting, shaking, slapping, physical fighting, twisting ears, slapping, hair pulling, pinching, pushing, snatching belongings, biting with teeth, face pinching, and use of strength against another person in school.

The intentional verbal behavior or kind of act which causes aggression, abuse, threats, makes one feel stupid, and mentally disturbed, and negatively affects one’s achievement and confidence is psychological violence in school which consist of stolen belongings, shouting, bullying, name-calling, teasing, and be fooling.

Statement of the problem

In Pakistan, violence among primary school pupils is a serious concern. The purpose of this study was to explore the disruption and violence among primary school students in the Lahore district of Punjab Pakistan.

Objectives of the Study

The objectives of the study were:

1. To explore what sort and intensity of disruption and violence among primary school students.
2. To explore the factors promoting disruption and violence among primary school students as perceived by the teachers.

Research Question

1. What was the nature and extent of violence among students?
2. Which were the factors promoting violence among primary school students as perceived by the teacher?
3. What was the impact of the corporal Punishment law on primary school students?
4. What were the major causes of violence?

LITERATURE REVIEW

Schools are in charge of instilling in kids beneficial social behaviors such as creativity, talent, and critical thinking, as well as life skills, social relations, confidence, and self-esteem. Schools should establish policy patterns that encourage nonviolent behavior and play a role in the development of communication skills, negotiation skills, and support for peaceful dispute resolution. Schools must create a safe atmosphere for kids because it is where they spend the majority of their time (three quarters), learn social conduct, and even develop their objectives and values (Burton & Leoschut, 2013).

Winicki (2010) defined school violence as the act that upsets or negatively affects the schooling process. It can involve criminal acts, aggression, and many other related factors like harsh behavior, teasing, physical fights, and attacks.

According to Ozdemir, (n.d.), school violence covers a wide array of intentional or reckless physical and psychological behavior ranging from bullying to murder. Sexual harassment, school fighting, bullying, verbal threats and intimidation, gang violence, rape, hate crimes, vandalism, and verbal or physical harassment on the way to and from school have also been observed.

School violence is increasing day by day and the feeling of an unsafe school environment is spreading in society. School violence can be defined in many ways but exactly it can be said that violence is all kinds of those behaviors revolving around physical harm, psychological harm to the student, and property damage to the school and students (Llewellyn, 2011).

According to Ridler (2006) most commonly reported physical violence among elementary and secondary school students is slapping on the hand or arm, head or face, twisting of the ear, pulling hair, etc. Psychological types of violence are shouting, threatening with bad remarks, calling names, insulting, making one feel stupid, and stealing others' belongings.

Bullying is common behavior in schools across the world and a survey conducted in 2003 – 2005 in developing countries resulted that one-third of students committing bullying violence on daily basis and most of the victims do not complain to their teachers because they feel shame to repeat it. So they get psychological harm (Ramos-Jimenez et al., 2013).

Child abuse is a highly concerning matter in secondary students. It has been observed that when children feel aggression then they are abused and abused even to their belongings to release depression. Some students abuse to treat other students because they feel secure and use their abusive habit as a tool of defense so they start abusing others even in slighter conflict. Some students learn such social behaviors from peer groups. The company of group members made them habitual to abuse (Dembo, 1998).

Most students avoid informing their school problems to parents. They feel that nobody at home will believe them. They might be having the inner feeling that if they report such incidents to their parents and teachers they may feel they are strengthless or not brave enough. Secondly, they think that reporting teachers or parents will become worried (Burton & Leoschut, 2013).

It is bullying when a student threatens or irritates in aggression by others. It is also bullying when a student makes conflict among the group or with another. In conflict, most students say nasty and unpleasant things to others. It is also bullying when parents or elders at the home hit, kick, or lock children inside the room. So it is established that students bulled in aggression and defense to resolve their aggression (Cornell & Brough, 2004). A significant amount of research has examined that the influence of the home environment is very strong on a child's behavior. Children are first exposed to social problems within the context of family. Relations within the family, parents, siblings, and other family members are role models for how they deal with others and which way they adapt to solve conflict and problems (Stain & Albro, 2001).

Marital conflicts are common in Pakistani society. It also affects children, particularly girls' thinking and behavioral level. They start getting awareness about such kinds of social problems and find out the solutions to such problems by sharing with their peers in the school and on a slighter conflict other members of peers share it with others. So violence or verbal threats come into being and girls verbally tease each other with bad comments. Secondly, girls are so very close to their mothers, and if the mother solves all the problems in the home with strict actions and behaves aggressively then automatically girls adopt that behavior because they think it is the best way to handle the situation (Parveen, 2013).

The physical disability or any other problem of the child makes it target more likely. Similarly, sometimes the problems and disabilities of parents are the sources of the target for students in the school. Such students may be rejected by their friends and schoolmates. Students fall into depression and psychological disorders when their classmates or schoolmates treat them worse due to their family background or give names on school playgrounds or start to whisper about them (Jimenez, Medrano, Villar & Torres, 2013).

Society has to create such an environment where a student may learn how to adopt a non-violent attitude and tolerance for a healthy life and society (Bologa, 2010). Media has a great influence on children's behavior. Children look at people in the media as their role models, especially their favorite celebrities (Jumprasert & KetUm, 2008). Students are not passive recipients of media context; they select and use the media according to their motives. Nevertheless, exposure can affect both what they learn and the way they behave, even though these effects may depend on the characteristics of the teenager. They learn a great deal from the media other than entertainment. Children are typically more attentive to those characters who have high status or power or who are similar to themselves in sex, age, or ethnic background. It was found that 83% of all programs contained violent elements. Boys are fond of violent films and dramas and like to watch such programs which contain a lot of fights. On the other hand, girls like to watch fashion shows and dramas based on romance and house politics. So media affects our values and attitude to a great extent (Wal, 2006).

Students have a great influence on juniors. If they behave violently in school areas and classrooms and mostly show aggressive behaviors with teachers, friends, and other students then the juniors also feel proud to be violent in the school. It is necessary to behave politely

with students and try to promote the values among them. Similarly, the most jammed group of people who are jammed together at the bottom of the social pyramid cannot even think of their future. They contribute to developing aggression, a sense of fed up, and demotivation and contribute a lot to promoting social evils (Avlos, 2001).

Schools are playing a vital role in the personality of students and the development of behavior. The school environment is responsible for violent acts and bullying at schools. Students feel threatened and are often teased by their schoolmates on the way to school. Students who are bullied a lot are mostly low-grade achievers and have less participation in class. School violence mostly occurs on school property, on the way to and from school, or during a school event, or (APHA, 2011).

Some students start skipping classes, especially in grades 9th and 10th due to performing some school duties regarding supervision which makes them overconfident sometimes and they become the reason for violence. Categorization based on academic achievement labeled the students as doing well or doing poorly. Similarly, financial grouping is also creating gaps in students' mix-up habits. Violence also exists in the student's mind but compactions give it power and motivation (Jumprasert & KetUm, 2008). Physical harm is common prevailing violence in classrooms. Mostly those students are victims who are physically weaker and cannot defend themselves. Some students start shouting at others. They release their aggression but others feel psychological disturbance (Jimenez, Medrano, Villar & Torres, 2013).

Most schools focus on academic achievement and excellence. They also train their students how to handle the pressure and tolerate the behaviors. It is only possible if the teaching staff is fully trained. Unqualified teachers neglect their duties, a factor of promoting violent behavior in school. It has been observed that the occurrence rate of violence is high among students who are taught by teachers who are not professionally trained. The ratio of violence is less among those students who are taught by certified teachers (Rose & Gallap, 2007).

Schools should provide appropriate curricula adjusted to suit the local context. Religion and ethics should be a compulsory part of education (Jumprasert & Ket Um, 2008). According to Arter (2000), rural schools have more difficult challenges than urban schools. They have fewer resources in schools and have to achieve a high level of performance with limited resources.

School violence affects not only the violent victim but also those who witness the violence in schools. This creates an atmosphere of fear for learners and disrupts the academic attitude and the possibilities of learning. Every fifth student report that they feel fear of physical fighting near parking areas or school gate and every tenth student report that they have seen or victimization by physical violence at school playgrounds and near toilets (Burton & Leoschut, 2013). Fear and mental disturbance are badly affecting the students learning and success. School-based health centers should form to manage school-based violence. It has needed to introduce anti-bullying and anti-violence programs to improve the school environment (APHA, 2011). The school head should arrange meetings with the problematic student’s parents to give an accurate report of the student and to the discussion of violent behaviors and their effect on their academic achievement (Mills, 2001). It is necessary to ensure that schools adopt the rules for all individuals on an equal basis and also make sure that all the students have equal opportunities to grow and learn. Teachers can conduct Parents

Teacher Meetings to develop school and home collaboration and improve poor family-based relations with strong bounding (CDC, 2013).

To control school violence school principals should overcome school violence risk factors like dropout ratio, poor student-teacher learning bounds, and relationships, problems of the school environment, and association with peer members and change these factors into good student-teacher relations, effective teaching-learning environment, through equal opportunities in academic activities, discipline, and motivation (Burton & Leoschut, 2013). The principal can control school violence by rewarding good behavior, adopting the zero-tolerance policy, training students in anger management, and developing easy ways for parents to be involved in the school activities of students (NCPC, 2013). Now, these days the government of every country is spending millions of dollars to make schools healthy and safe for students and developing different policies to control this social problem by giving equal opportunities for co-curricular activities (Llewellyn, 2011).

Schools should develop individual and group strategies not only for students but also for the teachers and parents to overcome the social problem and also at that level where they take many things from other society members secondary to friends, Usually related factors of school violence at the individual level are lack ness of facilities, low income, large family size, not effective communication with parents and other family members or crime family background or history. Schools should develop individual and group strategies not only for students but also for teachers and parents to overcome the social problem (Piedrahita, Martinez, Vinazco. et, al. 2007).

Methodology:

This study is a descriptive qualitative approach was used for this study. This research is used to explore the disruption and violence among primary school students in the district of Lahore.

Interview Guide Development

A semi-structured interview guide was developed with the help of a literature review. Based on the literature review, different indicators regarding perceptions about student violence and violence are reported in the schools. A theoretical framework based on these themes was developed. The interview Guide was developed based on themes.

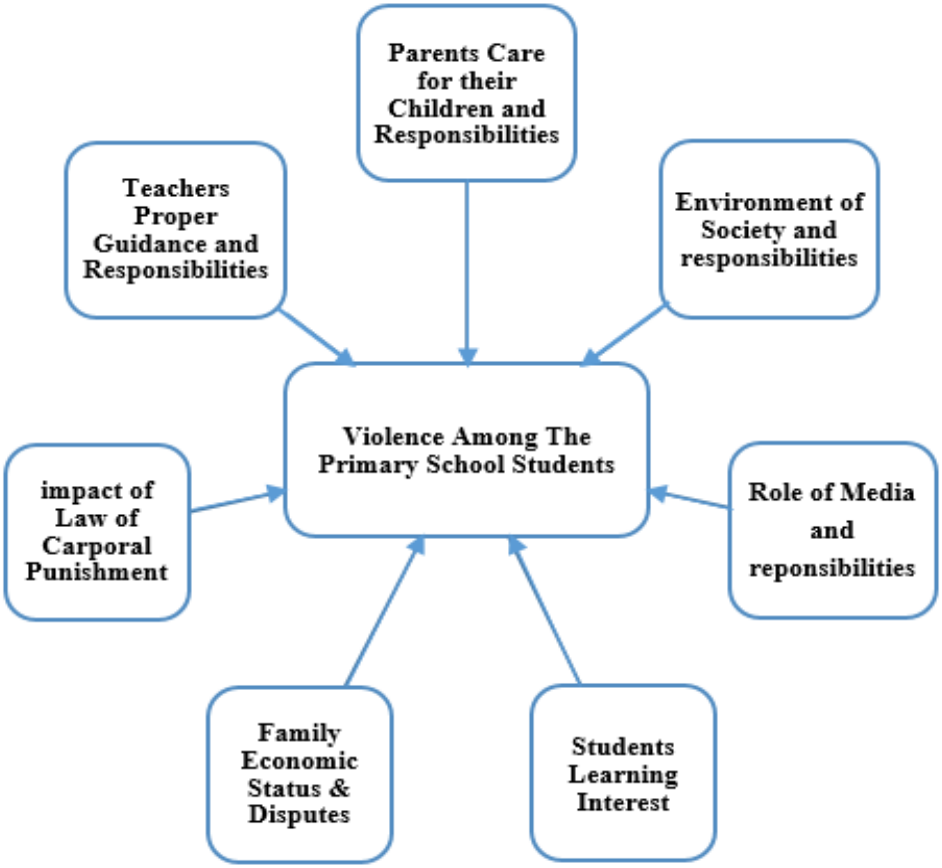


Figure 1: Interview Guide

Interview Guide

The interview guide was divided into two parts. In the first part, the researcher asked for demographic information regarding teachers, such as the name of the interviewee, name of institution, gender, location, marital status, age in years, academic qualification, professional qualification, teaching experience, and job status. The second part of the interview guide consists of semi-structured questions.

Themes of an Interview Guide for Teachers

The researcher asked teachers about:

1. Causes of disruption and violence among primary school students

a. Do you observe aggressive behavior amongst children in primary schools or between students and teachers anyplace in the school?
b. Do you notice them fighting, pushing, splashing, or pinching each other?
c. Do you notice them screaming, calling each other names, pulling their hair, or abusing each other?
d. Have you noticed that kids are willing to fight or tease one another over little things?
e. What are the reasons encouraging student violence?
f. How do students' personalities and the media interact?

2. Students learning interest

a. What kind of disruptive behavior do you see students engaging in during the lecture?
b. What do you believe is causing pupils to lose interest in their studies?
c. Do you believe that the violence among primary school pupils will eventually escalate to the worst possible situation or towards actual violence?

3. Impact of the law of corporal punishment

a. What factors, in your opinion, are responsible for encouraging violence among students, including the statute that forbids physical punishment?
b. How does the law requiring corporal punishment affect people's nature and conduct?

4. Teachers' Proper Guidance and Responsibilities

a. What counsel would you offer to teachers and other educators who are dealing with or seeing this violence?
b. How can they provide excellent instruction or guide kids towards a positive learning environment in the same disruptive atmosphere?
c. Do you believe that teachers are doing their jobs?

5. Parents Care for Their Children and Responsibilities

a. Should teachers involve parents in efforts to reduce student violence?
b. Why, in your opinion, is it necessary to ask parents about the reasons behind their children's aggressive behavior to help them change it?
c. How do you notice that the parents are responding to you in line with your expectations when you talk to them about their child's aggressive behavior?
d. Are their social standing and financial situation impeding their kids' ability to behave well in any way?

6. Environment of Society, community, and their responsibilities

a. Should teachers inform the community about the aggressive behavior of the pupils who attend school so that they can change their behaviors?
b. Based on their expectations, how do you think they will respond to the teacher?
c. How, in your opinion, is our community responding to the issue of student violence?

Validity of Interview Guide

The interview guide developed for the study was presented to the research supervisor of the field for opinion. According to the expert opinion, the interview guide had good content validity. All the questions of the related theme measure the nature and intensity of violence among primary school students. After validation, the suggestions were included in the interview guide after a discussion with the researchers.

Population

Primary school teachers from various primary schools in the district of Lahore Punjab, Pakistan, made up the study's population, which was made up of 80% men and 20% women. Participants in a group that a researcher is interested in studying make up the target population. Since they all share crucial traits, the study's findings can be applied to this community as a whole. The primary school teachers in Lahore are the study's target population.

Procedure

The focus of this study was to explore the disruption and violence among primary school students. Sufficient literature was reviewed to know more about student violence in their schools, based on the literature review, the researcher developed an interview guide to see student violence. The research tool was validated by experts from the field of education. Semi-structured interviews were collected with teachers.

Data Analysis

The interview guide was administered on the scheduled sample and the data obtained were organized, tabulated, and analyzed using a computer package i-e QSR NVIVO. Firstly, all the recorded data were transcribed and shifted into a file according to each theme. After this, all data were coded, and shift the answers were according to the participant's responses.

Results of the Study:

Themes & Responses

Themes	Responses of Teachers
1. Causes of violence among primary school students.	It is concerning to hear about the aggressive and violent behavior observed among primary school students. The teachers' observation that violence is more prevalent when there is less teacher attention is understandable. The factors identified by teachers, such as busy parents, insufficient teacher attention, and media influences, are valid concerns.
2. Students learning interest	It is concerning to hear that students with aggressive and violent behavior are less interested in the learning process and can be a distraction to others in the classroom. This behavior creates a domino effect, leading to other students losing focus and becoming disengaged from the learning process.
3. Impact of the law of corporal punishment	It is concerning to hear that the law of corporal punishment is seen as a contributing factor to the aggressive and violent behavior observed among students. Teachers are correct in stating that punishment is necessary to maintain discipline and create a safe and supportive learning environment. However, the use of corporal punishment can have severe negative consequences on a student's mental and emotional well-being. Research has shown that corporal punishment can lead to increased aggression, anxiety, and depression in children. It can also negatively impact their academic performance and social development.
4. Teachers' Proper Guidance and Responsibilities	The teachers' suggestions and advice seem very reasonable and practical. Teachers need to understand the root cause of violence and disruptive behavior among students and address those issues through communication and collaboration with parents and other relevant stakeholders. Using professional skills and experience to create an engaging and interesting learning environment can also help reduce the incidence of violence in the classroom.

5. Parents Care for Their Children and Responsibilities	It is important to note that while economic factors may play a role in promoting disputes in families, it is not solely responsible for violent behavior among students. There may be various other factors at play, such as the influence of media and peer groups, mental health issues, and exposure to violence in their surroundings. Teachers and parents need to work together to identify and address the underlying causes of violent behavior among students, rather than simply blaming one another. Collaboration and a proactive approach can go a long way in creating a safe and positive learning environment for students.
6. Environment of Society, community, and their responsibilities	It is concerning to hear that the community is not taking responsibility for the behavior of their children and is not willing to cooperate with teachers to address the issue of violence in schools. However, teachers need to continue to reach out to the community and communicate the importance of education and a peaceful learning environment for the students. Teachers can also collaborate with local authorities and organizations to implement programs and initiatives that promote positive behavior and discourage violence. It is a collective effort to create a safe and supportive learning environment for the students, and everyone has a role to play in achieving this goal.

Table 1: Themes & Responses

Discussion

Furthermore, the study found that corporal punishment is not an effective method to reduce violence among primary school students. It can worsen the situation and can lead to physical and emotional harm to the students. The role of teachers, parents, and the community is crucial to reduce violence among primary school students. Teachers should use their professional skills, teaching methodology, and experience to create an interesting and activity-based environment for their students. They should also identify and work on problematic students to reduce violence among them.

Parents should also cooperate with teachers and positively guide their children to promote good behavior. However, some parents are non-cooperative and do not accept the mistakes of their children. They should also take responsibility for their children's actions and not just send them to school for security purposes.

Lastly, the study highlights the importance of the community in reducing violence among primary school students. The community should be aware of the consequences of violence and should take responsibility for the children of their nation. They should work together with teachers and parents to promote a safe and violence-free environment for primary school students.

CONCLUSIONS

In conclusion, it is crucial to address the issue of violence among primary school students. By working together, parents, educators, and policymakers can create a safe and supportive environment that fosters positive behavior and helps prevent violence. It is essential to recognize the negative impact that disruptive behavior can have on the learning environment.

Teachers must take proactive steps to address these behaviors early on and provide support to students who are struggling. Collaboration between parents, teachers, and the community is necessary to create a safe and supportive environment for all students. It is crucial to address the negative impact of corporal punishment on student behavior and well-being. Alternative methods of discipline need to be explored, and teachers need to be provided with the necessary training and resources to manage disruptive behavior effectively. Additionally, there may be a need for flexibility in the law of corporal punishment to ensure that it does not cause physical harm to students. Overall, it is important for all stakeholders in the education system, including teachers, parents, and policymakers, to work together to address the issue of violence among primary school students and create a safe and nurturing learning environment for them. The researcher was limited by the possibility that the study could be conducted in each of Punjab's other provinces in Pakistan.

Recommendations

In light of the above findings and conclusions, the following recommendations are made:

- Parents should be encouraged to participate in school-based programs to help their children develop positive behavior and social skills. Schools should work closely with the community to address the underlying factors that contribute to violent behavior among students. Teachers and parents should be provided with adequate training on how to identify and address violent behavior in children. Schools should have a system in place for reporting and monitoring incidents of violent behavior among students.

- Schools should create a safe and supportive learning environment for all students, including those who may have been victims of violence.

- Students should be taught conflict resolution and problem-solving skills to help them deal with difficult situations. The government should allocate more resources to education, especially in disadvantaged areas, to provide better facilities and resources to schools and students.

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The Development of the ESP Process-Genre Writing Course for Thai Business Administration Undergraduates: The Closer Look at the Student Experiences

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Abstract
In Thailand, English writing is crucial for career advancement and workplace communication. Nevertheless, empirical evidence has suggested that English writing is not typically emphasized in English language curricula offered at Thai universities, and there are limited English writing courses tailored to specific needs of business administration students. Thus, this study aims to develop the ESP writing course based on the process-genre approach for Thai business administration undergraduates. Drawing on the ESP approach and the process-genre pedagogy, the course was developed according to seven course development processes adapted from Graves' (2000) framework of language course development, namely defining the context and articulating beliefs, assessing needs, formulating goals and objectives, conceptualizing content, organizing the course, developing materials, and designing an assessment plan. Following the course development phase, the course was implemented with 40 business administration undergraduates, and their experiences were explored with the use of two main instruments, namely the student logs and semi-structured interviews. The results revealed that the students were satisfied with the course, citing numerous favorable elements of the course and perceived benefits of the course in enhancing their English writing skills. Some unfavorable aspects of the course were also reported for future course refinement. The results imply that the custom-made ESP course is suitable and satisfactory to learners. On this basis, it is encouraged that ESP courses be developed to carter to student needs by primarily focusing on appropriate sub-skills and technical knowledge for each group of students.

Keywords: English for Specific Purposes, Language Course Development, Process-Genre Approach, English Writing Instruction

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Introduction

Considered as the essential communication tool in the business context, English writing skills are undoubtedly pivotal for Thai businesspeople, especially when executing work-related tasks as well as communicating with colleagues and clients (Cheep Aranai et al., 2017; Jitpanich et al., 2022; Ulla & Winitkun, 2017). English writing is also deemed crucial for career advancement in the business administration field (Thitthongkam et al., 2011). Moreover, empirical evidence has indicated that English writing is more frequently exercised in Thai workplace than English speaking considering from the significance of emails for business communication (Hiranburana, 2017; Jitpanich et al., 2022).

In spite of the critical importance of English writing, it has been reported that both Thai businesspeople and students have issues communicating using English writing. To elaborate, Thai businesspeople struggle to communicate effectively using English writing in forming workplace communication (Jitpanich et al., 2022), and English writing is deemed one of the most serious areas of problem for Thai businesspeople (Hiranburana, 2017). In a similar manner, Thai students, especially business administration students, reportedly possess inadequate English writing ability to form effective workplace communication and perform work-related tasks in the business context (Jitpanich et al., 2022; Low, 2020).

In this regard, the insufficient preparation of Thai learners and graduates in their tertiary education could give rise to such inadequate English writing abilities of Thais when pursuing careers in the business field (Dueraman, 2012; Wiriyachitra, 2002). To illustrate, Thai business administration graduates presently pursuing business careers indicate that do not have sufficient training in English writing, particularly writing formal emails and employing linguistic knowledge to write in the formal style (Jitpanich et al., 2022; Low, 2020).

As a result, this highlights the need to better prepare Thai students in terms of their English writing skills for their future business careers. One potential solution is the development of an English writing course based on the English for Specific Purposes approach (ESP) owing to the fact that the ESP approach is mainly involved with catering to student needs and preparing them to utilize English in a specific area of expertise or situation (Dudley-Evans & St. John, 1998; Hutchinson & Waters, 1987). This could be ideal in this regard since the developed ESP writing course could focus specifically on what English writing skills needed for the field of business administration since it is suggested English courses should be designed to be corresponding to student needs (Hutchinson and Waters, 1987; Rahman, 2015), employer expectations (Cheep-Aranai et al., 2017), and target situations (Hutchinson and Waters, 1987).

Moreover, since the majority of English writing classes in Thailand are dominated by the teacher-centered and product pedagogies, it could be interesting to employ the use of a relatively novel approach in the Thai context. In this case, owing to the fact that the process-genre approach combines strong elements of differing writing approaches (Badger & White, 2000), it could be ideal to be used to instructed the developed ESP writing course for business administration students.

Nevertheless, research studies conducted in the Thai context in pursuit of developing English writing courses and modules appear to solely focus on English academic writing (Sanonguthai, 2011; Visser & Sukavatee, 2020). Only one study focused on the ESP writing course development but with a different target student, engineering students in that case

(Changpueng, 2009). To bridge the gap in literature, this study was thus conducted with two main research objectives, as listed below:

1) To design and develop the ESP process-genre writing course based on the English writing needs of Thai undergraduate business administration students
2) To determine Thai undergraduate business administration students' experiences with the developed course

Literature Review

English for Specific Purposes (ESP)

As a response to the demand for English courses customized to serve learners' specific needs, the construct of ESP emerged in the early 1960s (Hutchinson & Waters, 1987). In essence, ESP, according to Hutchinson and Waters (1987), is a communicative approach with relevance to learners' needs rather than a language product, having needs analysis as the central idea for ESP course development. In agreement with this, Dudley-Evans and St. John (1998) perceive needs analysis as the crucial aspect underlying the approach. They deliberate on the ESP characteristics that ESP courses are mostly designed for adult learners and can employ differing teaching methodologies than those used with General English (GE). To elaborate further, ESP has been cited as the opposite of GE in their focuses and learners' reasons for learning. In contrast to GE, which is more exam-oriented and entails the concentration on all four language skills, ESP emphasizes particular language skills and professional knowledge necessary for learners to carry out language-related tasks in particular contexts (Rahman, 2015).

ESP can be divided into various categories. Nevertheless, there are two main types of ESP commonly presented in literature, namely English for occupational purposes (EOP) and English for academic purposes (EAP). Based on its definition and classifications, this study takes into account the main characteristic of ESP, specifically on the primacy of needs analysis to develop a course to correspond to specific learners' needs, and the EOP classification with the focus on English writing for workplace communication.

Process-Genre Approach

Considered as an integrated approach, the process-genre approach incorporates the strengths of different teaching approaches to guide the teaching practice. In details, the process-genre approach basically draws on the key concepts of the genre pedagogy in combination with the process approach (Badger & White, 2000; Gao, 2007; Hyland, 2003; Nordin & Mohammad, 2006; Rusinovci, 2015).

In principle, the process-genre approach highlights the genre elements of writing, namely the analysis of texts in terms of the key linguistic and textual elements associated with the target genres, the explicit instruction of textual and linguistic features dominant in the target genres, and the awareness of the social contexts of writing (Badger & White, 2000; Gao, 2007). Simultaneously, it also focuses on the process aspects of writing, particularly the recursive writing process and the composing skills involved in the writing process (Badger & White, 2000; Nordin & Mohammad, 2006; Rusinovci, 2015).

Framework of Language Course Development by Graves (2000)

Course development is typically defined as a process of designing a course and implementing it, which involves systematic planning (Graves, 2000). There have been several frameworks language course and curriculum design proposed to guide the course design and development processes. One of the most influential frameworks is the framework of language course development by Graves (2000), which contains six main stages. These include assessing needs, formulating goals and objectives, designing an assessment plan, developing materials, organizing the course, and conceptualizing content. In her model, there are two additional aspects serving as the foundation for the aforementioned six stages, particularly defining the context and articulating beliefs. Graves' (2000) model emphasizes two unique features of language course design. First, it is the non-hierarchical nature of language course design, meaning that the course development process can be initiated from any stage in the model based on the target context. Second, Graves' (2000) model focuses on the interconnected relationship between each course development stage.

Adapted Course Development Process

In this study, Graves' (2000) framework of language course development was adapted to fit the context of the study in order guide the course design process. The adaptations made to Graves' (2000) model include two main aspects. First of all, the course development processes employed in the present study followed the linear process, which basically meant that the researcher or course developer developed the course in a sequential order. That is, one step was completed before continuing to other remaining stages. Second, even though all the original six steps in Graves' (2000) were maintained, the two aspects serving as foundation for other stages were combined into one preliminary step, making the course development steps become seven in the present study, as portrayed in Figure 1.

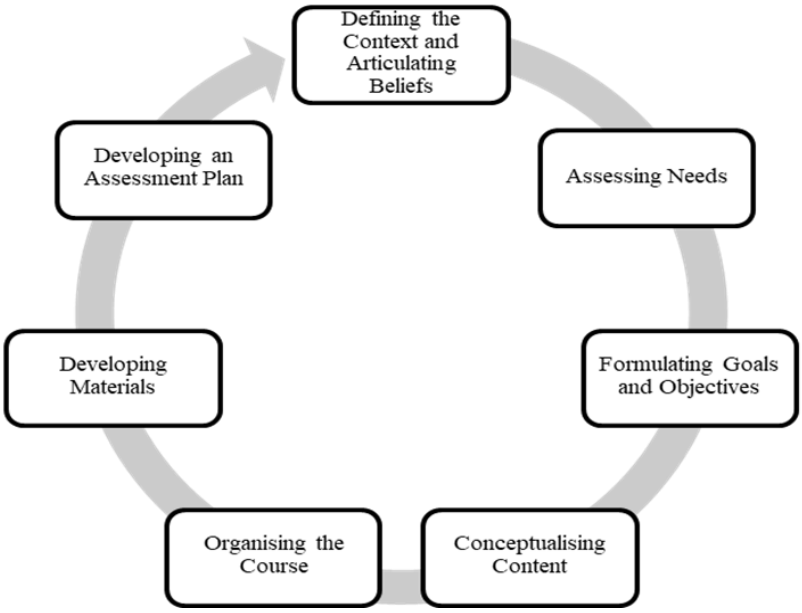


Figure 1: Adapted Course Development Process

As presented in Figure 1, the first step the researcher undertook was to define the context and articulate beliefs. To elaborate, the information regarding the context in which the course was developed was collected by the researcher to gain insights into the timetable, the involved

educational institutes, the physical setting, the instructional resources, and the nature of the course. In addition, in order to inform decision-making in the course development process, the researcher's beliefs regarding how language instruction should be carried out were reflected on. Following that, the needs analysis was performed based on the frameworks of needs analysis of Graves (2000) and Hutchinson and Waters (1987), highlighting three key elements: (a) target situation analysis – required language skills in performing specific target situations, (b) learning situation analysis – efficacious ways of learning language as identified by learners, and (c) present situation analysis – their existing skills and issues in using the language.

This was followed by the stage in which the course goal and objectives were formulated based on the results of the needs analysis with the list of three writing skills, namely the skills to write emails giving information, e-commerce product descriptions, and progress reports. Afterwards, in the conceptualizing content stage, it involved the selection of the content. The final product of this stage was an initial form of syllabus outlining the key themes to be explicitly instructed in the course. In the next stage of organizing the course, the course instructional units were sequenced according to the sequencing principle as suggested by Graves (2000). To elaborate, the course units were organized from the simplest unit to the most complex unit. Therefore, the course sequence became writing emails giving information, writing e-commerce product descriptions, and writing progress reports, respectively. This decision was based on the genre analysis results with the analysis of sample texts.

After that, the researcher designed the teaching materials and the associated lesson plans based on the teaching activities as guided by the adapted process-genre teaching model employed in this study. The adapted teaching model as adapted from Yan (2005) consists of five main teaching phases, namely preparation, modeling and reinforcing, independent constructing, joint constructing, and revising. Finally, the assessment plan used to measure the learning progress of students was developed, employing both formative and summative forms of assessment. That is, three writing assignments assigned at the end of the three instructional units were used to formatively assess student progress in the course, whilst the final examination in the form of a writing test was administered as summative assessment of their learning.

Following the rigorous process of course development, the product was the developed ESP process-genre writing course with the focus on English writing for professional purposes, with three instructional units as identified from the needs analysis, which were writing emails giving information, e-commerce product descriptions, and progress reports. The course was also verified by the experts and pilot tested before actual implementation.

Research Methodology

Research Design

It is imperative to address that this research is part of my PhD project using the mixed-method research design in the overall study. Nonetheless, for this particular part of research reported hereby, it used the qualitative research design with the usage of two qualitative research instruments, namely the semi-structured interview and the student log.

Research Participants

Forty business administration undergraduates enrolling in one intact class from a Thai public university were selected to participate in the study using the purposive sampling method.

Research Instruments and Data Analysis

There are two research instruments utilized to gather data for this study, which include the semi-structured interview and the student log. The first instrument is the semi-structured interview developed according to Graves' (2000) suggested areas of focus when obtaining feedback about the course. There were 17 questions in the interview, soliciting respondents' opinions about their experiences with the ESP process-genre writing course. In addition, the student log, which was adapted from Changpeung (2009), was also utilized to record the student experiences with the course in the written form through the semester. There were eight items in each log, and each student was required to complete three logs throughout the semester, particularly one at the end of each course unit. The data generated from the student logs and the semi-structured interviews were analyzed using inductive thematic analysis (Braun & Clarke, 2006).

Research Findings and Discussion

There were two prominent themes emerging from both the semi-structure interview and the student log, namely the positive experiences and negative experiences. Table 1 encapsulates the main themes along with their sub-themes and the associated codes.

Table 1: List of Themes, Sub-Themes, and Codes

Theme	Sub-Theme	Codes
Positive experiences	Favorable aspects of the course	Relevant and useful content Practical vocabulary and expressions Analysis of model texts Personalized and positive teacher feedback Classroom interaction Abundant English writing practices
	Improvement in English Writing Skills	Greater vocabulary repertoire More accurate use of grammar Improved idea organization Enhanced ability to write properly according to the context Enhanced ability to write the three genres
Negative experiences	Unfavorable aspects of the course	Difficulty of English grammar Challenging peer-review activity Improper time allotment and teaching pace

Positive Experiences

The majority of business administration undergraduates stated that they had positive experiences with the ESP process-genre writing course, specifying various favorable aspects of the course and improvement in their English writing skills in many areas.

Favorable Aspects of the Course

In terms of their favorable aspects of the course, the business administration undergraduates acknowledged the relevant and useful content to their future career in business administration, the practicality of the vocabulary and expressions learned in the course, the analysis of model texts, the personalized and positive teacher feedback, the classroom interaction, and the abundant opportunities to practice English writing as the course aspects that they truly enjoyed. The following interview and log excerpts illustrate the point, as presented in Table 2.

Table 2: Examples of Excerpts for Favorable Aspects of the Course

Code	Example of Log or Interview Excerpt
Relevant and useful content	*"I like learning to write emails. In the future, I think I can use this knowledge learned to write emails properly in my business career." (S1- Log)*
Practical vocabulary and expressions	*"I learned many useful new vocabulary words that I could apply into my writing." (S4- Log)*
Analysis of model texts	*"I enjoyed analysing sample texts. I found it to be very useful for my writing process. It made me become familiar with the structure of the texts that I would soon write on my own" (S12 – Interview)*
Personalized and positive teacher feedback	*"The teacher feedback really helped me to know what my errors were and how I should fix those errors. I really liked it that the teacher took time to comment on my work and explain it afterwards" (S3 - Interview)*
Classroom interaction	*"The class discussions allowed me and my friends to interact in order to reduce our nervousness when writing, which I really enjoyed." (S9 – Interview)*
Abundant English writing practices	*"I got to practice writing in English in this course which really helped me because I did not usually have chances to practice it outside of the class." (S35 - Log)*

Based on the reported findings, it can thus be concluded that the business administration undergraduates had positive experiences with the course, addressing six areas of the course to be favorable. First of all, the marked preference of the students for the relevant course content to the field of business administration could perhaps be explained by the ESP nature of the course, which catered to their needs in learning English writing. This is congruent with the results of the study of Changpueng (2009), which indicated that students possess positive attitudes towards ESP courses since they catered to their needs in learning. Second, the students' preference for the instruction of useful words and phrases for business communication could be the result from their perceived usefulness for their career preparation, which is consistent with the findings from the research of Asyiah (2017) in the aspect that students the instruction of English vocabulary was fondly perceived by learners.

Third, the positive attitudes towards the analysis of model texts employed in the course could be attributed to the perceived practicality of such as activity in assisting them to become familiar with key textual and linguistic features of the target genre. Such findings are compatible with those of Kitajroonchai et al. (2022), which indicated that learners found the analysis of model texts to be beneficial. Fourth, the personalized and positive teacher

feedback provided on students' texts were favorable for the students because such teacher feedback could motivate students to continue writing despite the difficulty of the writing tasks, and the feedback also helped the students in acknowledging their improvement areas in writing. This is consistent with the findings from Zhan (2016) in the sense that students valued the teacher feedback and had positive attitudes towards the teacher feedback.

Fifth, the students' preference for the classroom interaction put forth through collaborative learning and writing activities could be explained by the nervousness the students faced in their writing process due to the perceived difficulty of English writing. In the student view, the classroom interaction could mitigate their nervousness. This is similar to the findings of Zhang (2018), who reported that students expressed positive attitudes towards the interaction with peers in the process-genre writing class. Finally, the abundant opportunities for the students to practice English writing was identified as their favorable aspect of the course due to the fact that the students' insufficient English writing practice, which is congruent to the findings of Kitajroonchai et al. (2022) that the process-genre lessons allowed students chances to practice English writing when being exposed to the recursive process of drafting and revising texts.

Improvement in English Writing Skills

With regard to the students' improvement in English writing skills, the students mentioned five mains areas which they improved their English writing skills the most after attending the ESP process-genre writing course, namely their greater vocabulary repertoire, more accurate use of grammar, improved idea organization, enhanced ability to write properly according to the context, and enhanced ability to write the three genres. Table 3 presents the interview and log excerpts which demonstrate such areas of progress.

Table 3: Examples of Excerpts for Improvement in English Writing Skills

Code	Example of Log or Interview Excerpt
Greater vocabulary repertoire	*"I learned a lot of new words from taking this course, which enabled me to write in English using more various word choices." (S6- Interview)*
More accurate use of grammar	*"This knowledge learned from this unit has expanded my vocabulary knowledge." (S32- Log)*
Improved idea organization	*"I learned to organize details in writing more efficiently, especially after completing the outline." (S14- Log)*
Enhanced ability to write properly according to the context	*"After I acknowledged the purpose of writing and the reader-writer relationship, I could use more proper writing style and writing tone to write accordingly." (S1 – Interview)*
Enhanced ability to write the three genres	*"I think I can now write the emails, the reports, and the product descriptions better because I learned the writing principles from this course." (S10 – Interview)*

In accordance with the reported findings, it can be seen that the business administration undergraduates had positive experiences with the course considering from how they identified numerous benefits of the course in enhancing their English writing skills. Firstly, the enhancement of their vocabulary repertoire could be attributed to the genre elements of the process-genre approach used to instruct the developed course, particularly the analysis of

model texts for their key lexical features and the explicit teaching of key words and expressions associated with the target genre. These findings are consistent with those of Huang and Zhang (2020), which concluded that the process-genre approach could help enhance students' vocabulary repertoire and vocabulary knowledge. Secondly, the improvement in the accurate use of grammar could be the result from the explicit instruction of key grammatical features in the target genre, which is aligned with the results of Huang and Zhang (2020) in the sense that the explicit instruction part of the process-genre approach plays a pivotal role in students' development in their grammatical competence.

Thirdly, the students demonstrated the improved ability to organize ideas and details in writing, which could perhaps be explained by the use of outline as part of the process aspects of the process-genre approach. This is similar to the findings from the research of Kartawijaya (2018), who revealed that the outline technique helped students improve their English writing skills in terms of organizing ideas in writing. Fourthly, the enhanced ability to write appropriately according to the context using the proper style and tone of writing was the positive consequence of the students' development of genre awareness following the completion of the process-genre lessons, which is congruent with the results of Huang and Zhang (2020) in the aspect that the development of genre awareness could positively influence students' selection of rhetoric and language features to be according to the writing context and the communicative purpose. Ultimately, the students' increased ability to write the three target genres could be attributed to the exposure to the process-genre teaching stages, which gradually helped them improve their English writing skills. This is partly similar to the findings of Huang and Zhang (2020), which similarly suggested that the process-genre teaching phases were beneficial in enhancing students' writing performance, especially in the aspect of content.

Negative Experiences

Nonetheless, the business administration undergraduates also stated that they occasionally had negative experiences with the developed ESP process-genre writing course, enumerating their three main unfavorable aspects of the course.

Unfavorable Aspects of the Course

There were three unfavorable aspects of the course as identified by the business administration undergraduates who took the developed ESP process-genre writing course, which included the difficulty of English grammar instructed in the course, the challenging peer-review activity, and the improper time allotment and instructional pace. Table 4 presents the examples of log and interview excerpts which illustrate the unfavorable aspects of the course.

Table 4: Examples of Excerpts for Unfavorable Aspects of the Course

Code	Example of Log or Interview Excerpt
Difficulty of English grammar	*"Grammar is my biggest problem in writing in English, and there was a lot of content about grammar in the course, which made me rather nervous. I was not confident that I could understand how to use grammar correctly." (S6- Interview)*
Challenging peer-review activity	*"I do not really like the peer-review activity. It is rather difficult for me to evaluate my friends' texts. I do not think I am good enough in English to give them useful comments." (S12 – Interview)*
Improper time allotment and teaching pace	*"In Unit 1, the content was way too much for the time we had. The teacher had to rush through a lot of sections in that unit." (S19 – Log)*

According to the reported findings, it can be seen that the students identified a few course elements to be favorable in their learning experiences. First of all, the reason underlying why the business administration undergraduates disliked the difficult grammar could be their limited confidence in their ability to use grammar in writing, which is somewhat consistent to the findings of Jitpanich et al. (2022), which revealed that most of the business administration students and graduates English grammar found English grammar to be the most difficult element in English writing.

In addition to this, the peer-review activity was identified to be challenging for the students, and most of them did not seem to like doing this activity. This occurrence could be a result of their limited confidence in their English writing ability since they believed that they did not have sufficient ability to evaluate texts of their peers, and they were also skeptical of their friends' ability to provide comments on their texts. The findings are somewhat consistent with those of Moneypenny et al. (2018) in the sense that students, especially those with limited experience with peer reviewing, had negative attitudes towards the peer-review activity. Ultimately, the improper time allotment and the slow teaching pace were another unfavorable aspect of the course for the students owing to the fact that the difficulty of English writing in the view of the students, which would require substantial amount of time for them to understand the learned writing principles and practice the writing skills. The slow teaching was mainly due to the excessive and heavy focus on vocabulary teaching in the course. The findings of the present study are somewhat similar to those of Viriya and Wasanasomsithi (2017) in the sense that learners would become dissatisfied because of the excessive amount of content.

Conclusion

This study was mainly related to the development of the ESP process-genre writing course based on the English writing needs for professional purposes of Thai business administration undergraduates and the exploration of the student experiences with the developed course. The findings revealed that the students had relatively positive experiences with the ESP process-genre writing course. This is because they specified various aspects of the course to be favorable for them, namely the relevant course content to their future career in business administration, the usefulness of the vocabulary and expressions learned in the course, the analysis of model texts, the personalized and positive teacher feedback, the classroom interaction, and the plentiful opportunities to practice English writing. They also developed their English writing skills in various ways after attending the course, particularly their

greater vocabulary repertoire, more accurate use of grammar, improved idea organization, enhanced ability to write properly according to the context, and enhanced ability to write the three genres. Nevertheless, the negative experiences of the students were also reported in their unfavorable aspects of the course, which are crucial to be considered for course refinement for future course implementation. These included the difficulty of English grammar instructed in the course, the challenging peer-review activity, and the improper time allotment and instructional pace.

The findings of this study offer pedagogical implications for both English writing teachers and ESP course designers. For English writing teachers, the findings highlight the use of the process-genre approach in English writing classes, as it has been proven to enhance learners' learning experiences in this study. As for the ESP course designers, it is recommended that English writing courses should be designed based on the learner needs in order to maximize their learning experiences.

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Promoting Student Interaction in Online Educational Environments With Engageli

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Abstract
Online educational scenarios are characterized by major challenges concerning the promotion of interaction, both between instructors and students and among students themselves. Traditional videoconferencing tools do not favor interaction as they have been designed for a more lecture-based format. Therefore, it is necessary to look for additional technologies that encourage active learning methodologies in online educational scenarios. This article presents a large-scale pilot of using Engageli at Universidad Carlos III de Madrid (UC3M) in the 2021/2022 academic year. Engageli is a tool specifically designed to promote interaction in online and hybrid learning environments, starting with the assignment of students to virtual tables since the moment they connect to a live session. Engageli has been used on a large scale at UC3M mainly in two subjects on Digital Literacy and Digital Numeracy. This first pilot year revealed the potential of Engageli to promote interaction in online educational scenarios and showed the opportunities to implement complex collaborative learning situations in online environments. Nevertheless, this first pilot year has also served to identify the importance of carrying out extensive training with instructors on the use of Engageli with a focus on the specific technology, but also on the learning situations that can be implemented to get the most out of the tool.

Keywords: Student Interaction, Active Learning, Engagement, Online Education, Engageli

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Introduction

The COVID-19 pandemic has accelerated the adoption of new models of online and hybrid education at numerous universities around the world (Nikolopoulou, 2022). The adoption of these models was divided in four phases by Phil Hill in his revised outlook of the response to COVID-19 by Higher Education Institutions (Hill, 2020). The first phase was the rapid transition to emergency remote teaching and learning around March 2020 (Bond et al., 2021); this was due to the urgency of the lockdowns across the globe and the need to continue teaching synchronous classes, but online, using the resources available at the educational institutions. The second phase involved the full continuation of online teaching and learning until the end of the 2019/2020 school year but taking care of additional essential elements; these included the asynchronous components of learning (e.g., production of videos and complementary materials by educators) (Boté-Vericad, 2021), or the training on the use of the necessary technologies for online education (e.g., videoconferencing tools, polling tools, shared whiteboards, etc.). The third phase involved the extension of online teaching and learning during a period of uncertainty (2020/2021 school year), scheduling critical face-to-face activities (e.g., those of a practical nature) whenever possible; this phase entailed a more thoughtful and planned online teaching unlike the previous two phases, and the implementation of different hybrid education models (Benito et al., 2021). The fourth phase was the transition to the new normal with a greater presence of online and hybrid models on a regular basis and a greater adoption of technology as a cornerstone for teaching and learning; the cultural change towards a more positive perception of online and hybrid teaching and learning in many students and instructors prevails here (Díaz-Noguera et al., 2022).

Numerous technologies are facilitating the transition to online (and hybrid) teaching and learning. Perhaps the most important of all are videoconferencing tools, which enable synchronous online sessions between instructors and students (Wiyono et al., 2021). As of today, instructors have become familiar with Zoom, Google Meet, Microsoft Teams, Blackboard Collaborate, Jitsi, etc. Nevertheless, these tools were not designed for teaching online classes, but rather for presentations, which are much more passive in nature. Gradually, these videoconferencing tools added functionality aimed for more interaction, such as the possibility of sharing a collaborative whiteboard with students, launching polls, or creating groups (breakout groups / rooms) to implement collaborative activities (Rucker et al., 2020). However, there is still plenty of room for technology to effectively support active learning in online (and hybrid) educational environments.

In this context, tools specifically designed to promote active learning in such educational environments emerge. For example, Class (Class, n.d.) (formerly Class for Zoom) from Class Technologies Inc. is a tool built as an additional layer in Zoom and designed to promote interaction and collaboration. Class allows instructor to manage multiple breakout rooms at the same time and monitor student attention by identifying those who do not use Class as their primary application, among other relevant features. Engageli (Engageli, n.d.) is another tool designed to promote interaction and collaboration in online and hybrid scenarios but developed from the ground up. Engageli is based on the idea that students should by default be seated at virtual tables, with peers with whom they can discuss while listening to the instructor (Brunetto & Cangiotti, 2021). Engageli supports the use of shared collaborative documents automatically distributed per virtual table and provides instructors with visual indicators on the level of engagement of each student and of the class, among other relevant features. Both Class and Engageli are strongly committed to reinforce instructor's awareness on the level of interaction of the class through specific reports on how many times students

write in the chat, how often they answer polls, how often they raise hands, or how long they speak during class time (Robertson, 2022).

The objective of this paper is to present the experience of using Engageli for teaching online courses as part of a large-scale pilot in the 2021/2022 school year. This tool represents an important paradigm shift in relation to other traditional videoconferencing tools currently used for online education in higher education, so it is important to share experiences and lessons learned. The next section presents an overview of the large-scale pilot. Next, there are a set of five use cases that could be implemented thanks to the technological support of Engageli. The article finishes with the conclusions and future work.

Large-Scale Pilot with Engageli

Engageli was used in a first large-scale pilot at Universidad Carlos III de Madrid (UC3M) throughout the school year 2021/2022 (Avida & Kolodny, 2021). Two transversal subjects on digital skills were chosen for this pilot: Digital Literacy (Information Skills) and Digital Numeracy (Intermediate/Advanced Knowledge of Spreadsheets). These two subjects are taught in all undergraduate degree programs at UC3M. Engageli was also piloted in several additional courses that participated in a novel call for Active Learning in Digital Teaching at UC3M; the purpose of this novel call was to promote active and participatory learning through the use of technology and at the same time to promote flexibility in instruction by delivering the selected courses in a fully online or hybrid form. These additional courses were Supply Chain Management I and II, Criminal Procedural Law, and Regulation of Energy Markets and Cost-Benefit Analysis (CBA).

Table 1 summarizes the overall data on the use of Engageli at UC3M in the school year 2021/2022. In the first semester (fall semester) Engageli was used by 3397 students and 48 instructors in 85 different sections; this means an average of 38.2 students per section. In the second semester (spring semester) Engageli was used by 2552 students and 47 instructors in 88 different sections; this means an average of 29 students per section. Some instructors delivered several sections in the same semester and even repeated in both semesters because they taught the same subject multiple times. Some students repeated in both semesters because they took several of the subjects in which Engageli was piloted. It is worth mentioning that the instructors had varying levels of proficiency in relation to digital skills and that no one had used Engageli before (as it was a recently developed tool). UC3M organized several training workshops on the use of this tool, with technical and pedagogical orientations, prior to the start of the classes (in both fall and spring semesters). Both instructors and students received specific documents with guides on how to use the tool and the Engageli support team was at their disposal during the synchronous online sessions.

Engageli was integrated with the institutional LMS at UC3M, Moodle, through the 1EdTech LTI (Learning Tools Interoperability) standard (1EdTech, 2019), so that this tool could be launched directly within the LMS for each course. Students accessed their regular course in Moodle, clicked on the Engageli link with the student role, and launched Engageli as a web application in their browser. In the case of instructors, they had to install a desktop application locally. They could open this desktop application directly or launch it through Moodle, using the same Engageli link available, but with the instructor role.

The use of Engageli in the first semester was conditioned by some technical problems that were identified for the first time in this large-scale pilot of the tool. These technical problems

were mainly related to the use of the desktop version of the tool by instructors. This desktop version turned out to be quite resource demanding, which led to disruptions in the communication between instructors and students, especially when simultaneously using other tools that were essential for the session. A web version was developed in the second semester also for the instructor with slightly more limited functionality but much less resource demanding. Some additional problems related to the usability of the tool were also detected and progressively solved by the Engageli team.

Table 1. Total number of instructors, students, and sections in which Engageli was used as part of a large-scale pilot in 2021/2022.

Semester	Total number of instructors	Total number of students	Subjects	Number of sections	Total number of sections
First	48	3397	Digital Literacy	53	85
			Digital Numeracy	30	
			Supply Chain Management I	1	
			Regulation of Energy Markets and CBA	1	
Second	47	2552	Digital Literacy	22	88
			Digital Numeracy	64	
			Supply Chain Management II	1	
			Criminal Procedural Law	1	

The technical problems identified particularly in the fall semester also conditioned the evaluation of Engageli by the instructors. In the first semester, the overall evaluation (N = 16 instructors) showed an average of 45.2 points (out of 100), while the usability evaluation using the System Usability Scale (SUS) (Bangor et al., 2008) showed an average of 52.7 points. In addition, several instructors could not teach their classes through Engageli properly and had to switch to the alternative videoconferencing tool used at UC3M, which was Blackboard Collaborate. In the second semester, the overall evaluation (N = 28 instructors) showed an average of 62.9 points, while the usability evaluation showed an average of 56 points. This improvement in the perception of the instructors is aligned with the improvements that occurred in Engageli in the second semester to overcome the technical limitations found in the first semester. Similar results were obtained in the case of the students. In the first semester the overall evaluation by students (N = 127 students) was 45.8 and the usability evaluation was 50.9. In the second semester the overall evaluation (N = 84 students) was 53.3 and the usability evaluation was 54.9.

Use cases

The large-scale pilot served to implement multiple educational scenarios in which interaction among students was promoted. This section presents five representative use cases that could be implemented with the support of Engageli.

1. Playback Room: Interaction in asynchronous education

One significant feature of Engageli is that it allows students to watch the videos with the recorded lessons again both individually and in groups. This has different implications. A student can watch a recorded lesson individually, as is the case with most videoconferencing platforms, but also several students can join to watch the recorded lesson at the same time (simultaneously) and even at the same virtual table in Engageli, being able to do at that very precise moment the activities initially planned when the class was recorded. This is called Playback Room in Engageli. For example, in the second semester 350 students accessed

Engageli to review lessons that had been recorded previously, spending a total of 1431 hours in the Playback Room. This number is higher than the number of hours spent by instructors teaching live sessions in Engageli (1342 hours). The Playback Room can be used for different purposes. For example, the instructor can schedule certain virtual office hours for students to watch a recorded lesson (again or for the first time) with the support of the instructor in the backchannel (or moving between virtual tables). Students can also self-organize themselves independently of the instructor, agreeing on when to join to watch a recorded lesson simultaneously. There may even be an incidental situation where two or more students join the Playback Room at the same time and then watch a recorded lesson together.

The key to the Playback Room is that students not only can interact with each other in the present but also replicate activities that took place originally in the past. For example, if the instructor used a poll on Engageli at the time of recording the lesson students could answer the poll again, and even see the answers provided by their peers to the original poll (in case these answers were shown when the lessons was recorded). Students can interact with each other through an oral conversation at the virtual table, or comment in the chat or in the Q&A section of the recorded session. It is also possible for a group of students to watch the recorded lesson at their own pace, e.g., stopping, playing back, fast forwarding, or rewinding. The ability to control the playback allows for more interaction by stopping the recording when students wish to comment or discuss on what the instructor has explained. In the Playback Room students can also take notes in the same way they would do during the live section (and they are able to download them), and also open a shared whiteboard for brainstorming, or to create sketches or diagrams. In the course about Data Numeracy, this feature was used and students were encouraged to use the Playback room to either (1) watch classes they missed or (2) review the concepts they struggled with. For example, in this course, instructors usually solved exercises about spreadsheets sharing their screen and students could use these recordings to review the steps or the options in the application they had to use to solve the same (or other similar) exercises. Nevertheless, it is important to note that this feature was not exempt from privacy issues and some instructors were reluctant to record their classes.

2. Peer Instruction: Polls and discussion aligned

Engageli supports the use of live polls during a session, as is the case with most videoconferencing tools used for classes. Nevertheless, Engageli also incorporates an interesting functionality that is implemented together with the use of polls, supporting the reorganization of students into virtual tables according to the results of the poll. This allows, for example, the implementation of peer instruction (Lasry, Mazur, & Watkins, 2008). For example, if the instructor detects that a question has very varied answers (e.g., correct answers are between 30% and 70%), then students with different answers can be confronted at the same virtual table to discuss and reason why they chose their answer. This has a two-fold effect to improve the understanding of the concept related to that poll. Those who got the answer correctly get a better comprehension of the concept by explaining the reasoning to others. Those who failed can reflect on the aspects they did not consider. The implementation of peer instruction is possible thanks to the dynamic arrangement of virtual tables supported by Engageli.

Regarding the design of these polls, Engageli has defined a set of QR codes that represent different type of questions (e.g., multiple-choice questions with one possible correct answer, with several possible correct answers, and short-answer questions). Instructors can

copy/paster these codes in their materials (e.g., slides) to launch the questions at a certain moment during the session. For example, they can copy the QR code of a multiple-choice question with one possible correct answer four times to create a question with four possible answers. When instructors share the materials where questions are, the QR codes are automatically converted to clickable items so that students can answer the question. In that moment, instructors can view the distribution of answers. When they decide to show the correct answer, they can prevent students to continue. Once the correct answer is selected, Engageli can compute statistics about whether students answered the question right or not.

In the case of Digital Numeracy, a polling tool used at the institutional level and called Wooclap was mainly used in the school year 2021/22, instead of the built-in poll tool provided by Engageli. This was also possible as instructors could share their screen with the questions in an external tools and students could connect to the external tool to answer the questions. This is particularly relevant, not only for the polls, but for the usage of any other educational tools that could also be integrated in a class using Engageli. For the case of the polls, the usage of the built-in poll tool in Engageli can be beneficial because students can also answer the polls when using the Playback Room (see the first use case). Future plans include the adaptation of existing polls from Wooclap to the build-in poll tool in Engageli.

3. Shared Documents: Synchronous resolution of activities

An interesting feature of Engageli is that it allows independent documents to be assigned to each virtual table so that students sitting at the same virtual table can work collaboratively on these documents to carry out a given activity and generate a shared output. Currently Engageli supports the assignment of documents of two types: Google Docs (text) and Google Sheets (spreadsheet). The assignment of independent documents per group automatically according to preset group settings to facilitate the implementation of collaborative activities has been previously implemented in other platforms (Alario-Hoyos et al., 2022). Nevertheless, Engageli facilitates both the distribution and withdrawal of shared documents by the instructor. Beforehand, the instructor must go to the Engageli dashboard and assign an instance of Google Docs/Sheets per table (see Figure 1). It is possible to create multiple sets of instances of Google Docs/Sheets to be used as supporting documents at independent activities/sessions per group. The responsibility for setting the right permissions to each instance of Google Docs/Sheets (view/edit permissions) falls on the instructor. During the session the instructor can automatically distribute the documents to the virtual tables and these will appear seamlessly on students' screen depending on the virtual table they are sitting at. This automatic distribution can be done by clicking a button on the Engageli interface or by means of a QR code that the instructor can add to his/her slides. Then, at any time the instructor can collect the documents and the students will no longer be able to modify them. It is important to note that the student is never aware of the URL of the document. In conclusion, this is an appropriate feature to request time-bound collaborative tasks with an intended output during a synchronous session.

The automatic distribution of Google Sheets per virtual table is very appropriate in the context of a course on Digital Numeracy whose purpose is to get students to master the use of spreadsheets. The instructor can take a spreadsheet with a certain dataset, upload it to Google Sheets, make copies of the spreadsheet in Google Sheets, and assign the URL of each instance of the spreadsheet per virtual table before the session. Then, during the session the instructor can distribute the instances and ask students to work collaboratively to solve a set of questions related to the dataset of the spreadsheet. Students at the same table can discuss

the best way to solve the problem, and even divide the task to be performed using several approaches while working simultaneously in the shared document. For example, some students may focus on applying certain mathematical formulas to process the data, others may create a pivot table with the dataset, and others may add some charts to better understand the data. Then, students can combine the three approaches to draw conclusions and solve the proposed questions. The instructor can give a limited time to do this activity and then collect the shared documents and even use them as evidence for the summative assessment of the students. In the particular case of the 2021/22 school year, this functionality of Engageli was used only in some sections of Digital Numeracy and in a limited way, although it is planned that in the future there will be more collaborative activities that take advantage of this functionality.

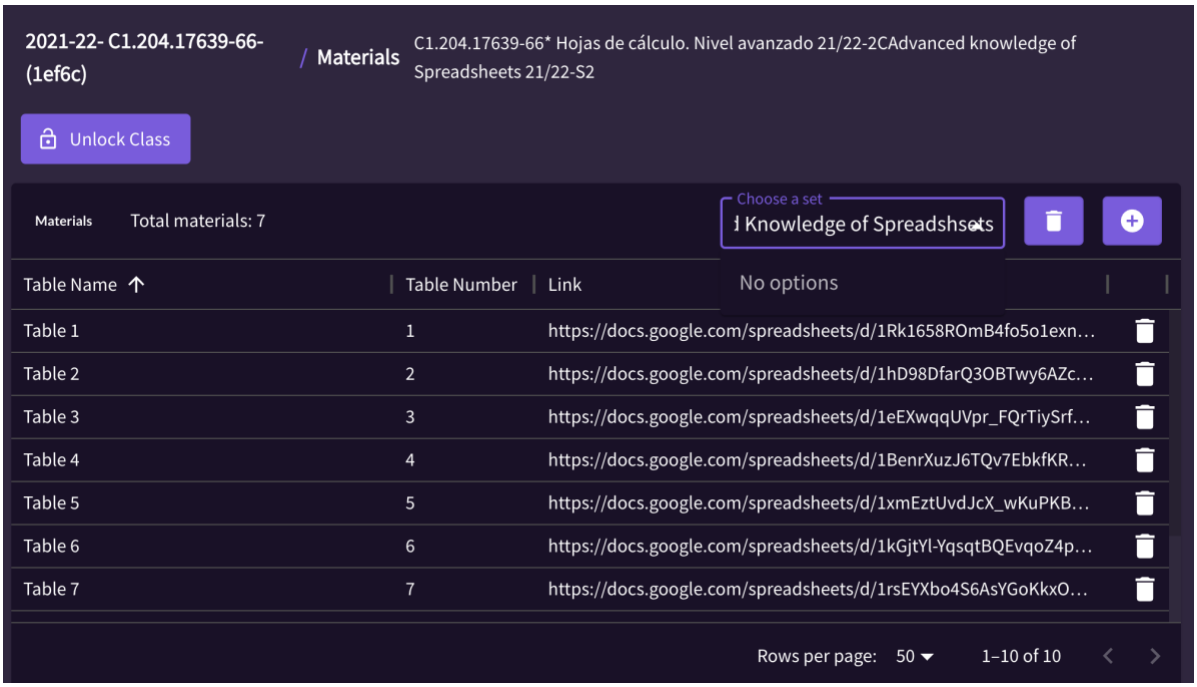


Figure 1: Engageli interface for the assignment of Google Sheets to virtual tables before the start of the synchronous session.

4. Evolving Virtual Tables: Collaborative patterns implemented

The flexibility provided by the virtual tables in Engageli allows for different configurations (see Figure 2). For example, the instructor can allow each student to sit where he/she wants (free seating), the instructor can choose where each student sits (instructor chosen) or each student can be assigned to a randomized table. However, these configurations can evolve over the course of a single session. This allows, for example, to implement known collaborative learning flow patterns, such as jigsaw or pyramid (Hernández-Leo et al., 2008).

In the case of jigsaw, a complex problem that needs to be solved is divided into subproblems of similar complexity. Each member in the virtual table studies and specializes in a subproblem and then joins a virtual table with other experts, when this student returns to his original table, he or she reports to the rest of the group what was learned in such a way that all table members become an essential piece of the jigsaw. For example, in Digital Numeracy a dataset could be assigned to each table with certain questions that can be solved in various ways: (1) applying formulas, (2) applying filters, (3) applying pivot tables, (4) applying visualizations). In this case each virtual table would have four members. Each table member

then meets with the experts in formulas, filters, pivot tables or visualizations from the other virtual tables. When each table member returns to the original virtual table, he or she contributes what was learned and they all reach the same solution to the complex problem, but in different ways.

In the case of pyramid, a complex problem needs to be solved in several iterations (phases) with groups increasing in size by merging smaller groups from previous phases. For example, in Digital Numeracy a complex optimization problem can be solved with a tool called Solver. In a first iteration the groups are initially three members per table, then they merged into groups of six (two three-member groups) and into groups of 12 members (two sex-member groups). In the process they all evolve until they reach the desired solution.

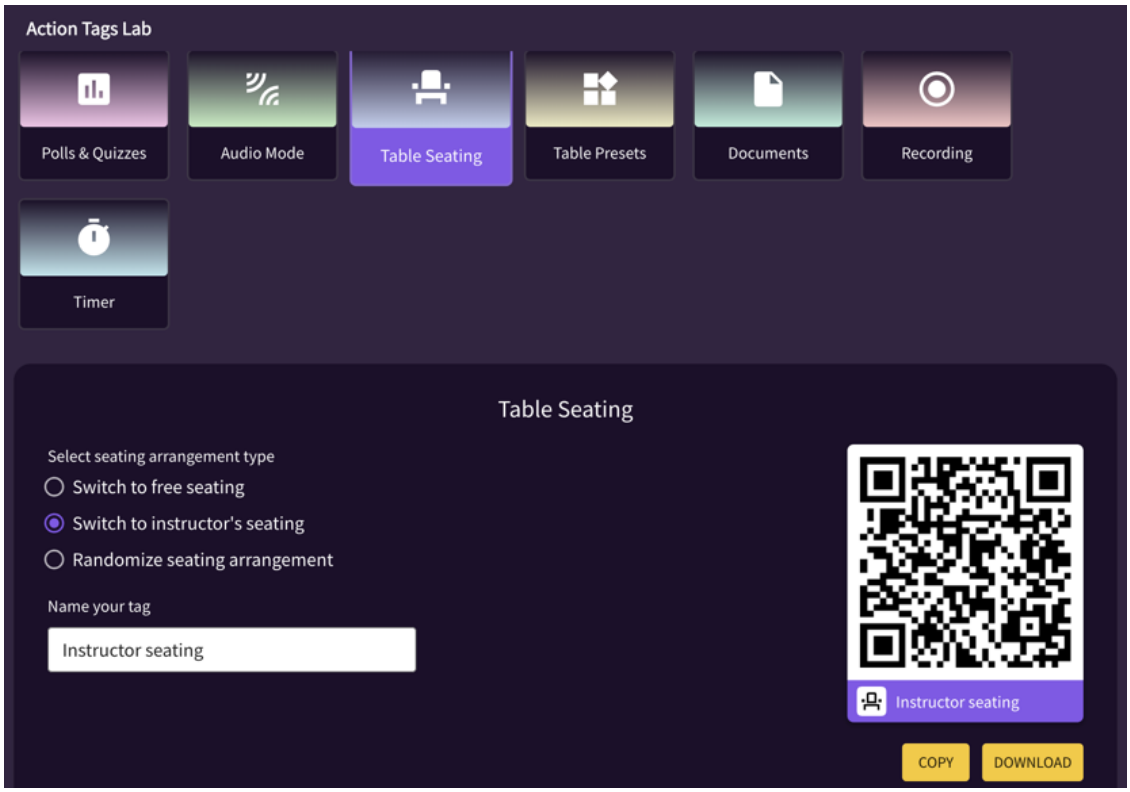


Figure 2: Engageli interface for the seating arrangements in the virtual tables (e.g., free seating, chosen by the instructor, or randomized).

5. Onsite-Online Collaboration: Hybrid education deployed

Engageli can also be used to foster collaboration in hybrid educational scenarios where some students are physically in the classroom while some others are simultaneously following the session online. In this case, each virtual table may contain some students who are onsite and some students who are online. The proportion of students of each type can be determined by the instructor or by the students themselves depending on the context. In that hybrid educational scenario, oral communication is possible although it is more challenging and requires additional measures to avoid the overlapping in the conversations among groups. Written communication via chat is always preferred in hybrid educational scenarios. The use of peer instruction, shared documents, and collaborative patterns as detailed in scenarios 2-4 is also possible here.

Hybrid educational scenarios require more attention as they place an additional overload on instructors to orchestrate such educational scenarios. especially in the case of using collaborative activities with a certain complexity (Carruana-Martín, et al., 2022). These include the above mentioned activities where onsite and online students needed to communicate to solve problems (either combining or without combining onsite and online students).

In the case of Digital Numeracy, the Advanced version of the course was fully online, while the Intermediate version of the course was 67% online and 33% onsite. The delivery mode (online/onsite) was the same for all the students regardless of the section in which they were enrolled. Nevertheless, to foster international mobility and avoid delays when students move abroad for a semester, mobility students were allowed to take 100% of the classes online. This means that there could be onsite and online students in the case of the Intermediate version of Digital Numeracy if there were mobility students in that section. In those cases, instructors used Engageli to allow mobility students to follow the class and instructors could solve doubts either asked in class or posted in Engageli.

Moreover, as Digital Numeracy was a course where it is very important to follow the steps of the instructor in order solve the exercises, Engageli was also used as a complement to onsite lessons. Particularly, Engageli was used to enable screen sharing and recording so as to make it easier for students to follow the steps to solve exercises with spreadsheets and enable the possibility to use the Playback Room later if students missed any step. In addition, considering this approach, it would be possible to support onsite classes with Engageli with the usage of live digital polls and shared documents (cases 2 and 3), so that there could be a relationship between a physical and online table. In that case, a group of students in a physical table could be given a shared document through Engageli (using a virtual table) to be completed in class. The interaction would be onsite unless groups combine onsite and online students (as previously mentioned), but Engageli technologies would enhance the learning experience.

Conclusions and Future Work

This paper has presented a large-scale pilot of the tool Engageli (with almost 6,000 students and 95 instructors) to support online educational environments. This tool was specifically designed for online teaching, unlike other videoconference tools. Moreover, Engageli can be integrated in the LMS and support innovative use cases that enhance online learning experiences. Particularly, this paper has reviewed five possible uses cases: (1) usage of the playback room to allow interactions between students in an asynchronous scenario where, for example, several students could be watching a recording of a previous lecture, (2) usage of integrated polls that can be embedded in the session materials and can enhance peer instruction and foster discussion among students, (3) usage of shared documents to enable synchronous resolution of activities assigned by the instructors in online contexts (e.g., filling a shared document or spreadsheet in a group), (4) implementation of collaborative patterns by modifying the students in each working virtual table depending on several settings (e.g., free seating, based on the performance of the students, random groups, etc.), and (5) deployment of hybrid education scenarios where there can be students both onsite and online, or even where the usage of online elements with Engageli could be used as a complement to boost the learning experience in the onsite class.

Engageli was tested in several courses, with several sessions. Some of the use cases presented here serve to highlight the potential of this tool. However, the pilot carried out at UC3M during the school year 2021/22 had some limitations that are worth mentioning. First, there were several technical issues in the first semester that limited the possibility of using many features at first. Moreover, instructors' capabilities in online teaching and educational technologies also entailed a barrier and, while a vast amount of training and resources was provided, adaptation to new technologies also required time to fully exploit all the capabilities. Similarly, students were not used to be involved in online collaborative activities and that also hindered the deployment of several of the above-mentioned use cases. But in this case, the goal was to promote collaboration with the help of this tool.

For future work, it would be relevant to carry out more experiences using all the proposed use cases, including those that had not been previously tested or tested in a limited scope. In addition, it would be relevant to carry out analyses to measure the impact of the tool and also the impact of each use cases individually to better understand how online learning can be improved. In this line, the analysis of log data would be also important to better understand students' behaviors in these contexts and gather insights that could serve to adapt the proposed activities in these settings or to create new ones.

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Gender Analysis for the Pre-university Education Sector in Albania

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Abstract
Gender equality concept is unquestionably linked to the quality in the education system, as the foundations of the intellectual and social development of children. Achievement of gender equality in education system is an important challenge not only for the children but also for all responsible government institutions and their respective education and social policies. While schools may seem as "the Albanian society in miniature" i.e. undeniably loaded with gender stereotypes imparted through school and hidden curricula, educators have distinguished role to teach their students those intrinsic layers of “biological sex” versus “socially constructed gender” and that being a boy or a girl should not impact their perspectives in life. It is the government’s responsibility to ensure for all children access to quality education as it is high time to give gender equality the place it deserves foremost in education system and Albanian schools, from social to exact science subjects, from kindergarten to universities, from general to vocational schools. The analysis was carried out during the period February-May 2022, and it explored the following two questions: What are the main gender gaps in Albania’s pre-university education system? How can the national policies and interventions address the identified gender gaps to maximize its intended impact? Analysis is based on a desk study of internal and external gender assessments, reports, and surveys relevant to the purpose. While the analysis is primarily concerned with examining the gender gaps in the pre-university education sector, it also explores linkages and correlations with other sectors.

Keywords: Gender Mainstreaming, Pre-university Education System, Citizenship Education

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I. Introduction

It is widely recognized the important role and the impact that education has for the socio-cultural development of the society. Education provides the individuals, regardless of their gender, with the opportunity to emancipate them and improve their social and economic status, for a better future. Nowadays it is essential to educate young people beyond any gender, racial, and cultural prejudice in order to build secure foundations for our society.

Gender equality concept is unquestionably linked to the quality in education system, as the foundations of the intellectual and social development of the children. Achievement of gender equality in education system is an important challenge not only for the children but also for all responsible government institutions and their respective education and social policies.

The school and family are the most important institutions contributing to the development of the children's personality by creating the necessary spaces to overcome any social barrier or prejudice and to design their future in accordance with their abilities and goals. It is unquestionable that educating the younger generation about gender equality in school is a way to give them the ability to understand gender equality, gender stereotypes and to avoid any kind of violence against girls and contributing overall to narrow the gender equality gap in any dimension.

While schools may seem as “the Albanian society in miniature” i.e. undeniably loaded with gender stereotypes imparted through school and hidden curricula, educators have distinguished role to teach their students those intrinsic layers of “biological sex” versus “socially constructed gender” and that being a boy or a girl should not impact their perspectives in life.

This study undertakes a gender analysis of multiple aspects of pre-university education sector in Albania, namely policy and legal framework; statistics related to enrollment of boys and girls; and an observance of gender issues in schools.

The recent European Commission (EC) Report for Albania[1], has noted a persistent funding gap which hindered the implementation of previous strategy and action plan on gender equality (2016-2020) calling for new efforts at central and local level to ensure adequate state funding for the implementation of new strategy on gender equality 2021-2030. In addition, all national strategies at central and local level should be gender mainstreamed and apply gender responsive budgeting.

The first Gender Equality Index for Albania, published in 2020[2], reached 60.4 points, indicating a gender gap of 7.4 points below EU average. The domain of knowledge is among six core domains where the largest gaps are observed, compared to EU average. The index shows a large gap on enrolment in preschool education between Albania with enrollment rate at 76.3% and EU member states where 95.4% of children enroll in preschool education. While in EU member states the enrolment rate among boys and girls is almost equal, in Albania there is a higher enrolment rate of boys (81.6%) versus girls (78.9%).

[1]Albania 2021 Report, available at:https://ec.europa.eu/neighbourhood-enlargement/albania-report-2021_en;
[2]http://www.instat.gov.al/media/6657/gender_equality_index_for_the_republic_of_albania_2020_alb.pdf;

This analysis is based on the most recent available data, mainly provided by INSTAT through Gender Equality Index (2020) and "Women and Men in Albania" (2021) as well as other available data on situation in Albania and other countries.

II. National framework

Being part of fundamental rights, gender equality is protected at the level of *Constitution*[3],asserting that such rights are indivisible, inalienable and inviolable and stand at the foundation of the legal order. The public bodies, while rendering their tasks, shall observe such rights and contribute to their realization. Equality before the law and non-discrimination on the ground of gender are among basic principles promoted by the Constitution. On the other hand, everyone has the right to education[4]. The compulsory education and higher secondary education are offered for free at public schools. Education of children and youngsters is amongst core social objectives of the state.

The principles on the ground of the functioning of the pre-university education system include respect, protection and promotion of human rights in general and student's rights in particular, all-inclusiveness as well as the right to quality education and equal chances for education. The principle of equality among individuals and students in opportunities, quality, enjoyment, conditions and achievements is embodied throughout the law provisions. The law regulates explicitly that the curriculum, which is a system composed of several elements such as frame curriculum, education programs and assessment, ensures quality and equal education for every member of the society regardless of gender.

Regarding the tasks and responsibilities of involved actors, the education institution has an important role of creating a friendly environment for students as well as providing opportunities that each student can display and develop the individuality and fulfill his/her potential according to the law[5], in addition to the notable role of the ministry of education regarding drafting of policies, programs and projects aiming at the development of pre-university education system.

Education is an important ingredient of child protection and participation, especially for children in risk, children in vulnerable conditions and during emergency situations such as that caused by COVID-19. The right and access to quality and free education on the basis of equal and non-discriminatory opportunities is also regulated by the *law on child rights and protection*[6]. Highest interest of the child as the primary consideration as well as equality and non-discrimination are among main principles of the law. Children with disabilities and children belonging to an ethnic, religious and language minority are addressed in particular by this law.

In addition to obligation to ensure quality education through adequate curriculum, teaching programs, infrastructure, financing and continuous evaluation of teaching personnel, the law charges the ministry responsible for education and its subordinated institutions with responsibilities to enable the child access to preschool education as well as free compulsory education even in cases when they have passed the age but have been unable to attend education.

[3]Law No. 8417, date 21.10.1998, as amended "Constitution of the Republic of Albania";
[4]Article 57 of the Constitution of the Republic of Albania;
[5]Article 32 of the Law No. 69/2012 "On pre-university education system", as amended;
[6]Article 18 of the Law No. 18/2017 "On the rights and protection of the child";

The available education statistics from the Institute of Statistics in the Republic of Albania (INSTAT), present data on girls' and boys' participation in the education system in the country, as shown in the tables and figure below.

Table 1: *Students enrolled by programmes and gender*[7]

Programme	2016-2017		2017-2018		2018-2019		2019-2020		2020-2021	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Pre-primary	42.295	38.899	42.314	38.712	41.221	37.721	40.466	37.392	37.016	34.316
Primary	92.380	82.456	89.835	81.026	87.762	79.342	84.734	77.436	82.707	75.821
Lower secondary	80.842	72.422	78.348	70.462	73.705	65.721	70.210	62.499	67.560	60.398
Upper secondary	67.528	59.586	63.901	56.161	62.177	54.469	58.290	51.243	57.270	50.719

III. Gender statistics in pre-primary education

Early childhood education, or otherwise referred as pre-primary education, in Albania is optional and offered for children of age 3–6 years. The education offered in pre-primary is organized in three groups based on age: 3-4; 4-5 and 5-6-years old children. Children on the age of 5, who have not attended kindergarten for various reasons or due to the lack of kindergartens near their place of residence, can attend preparatory classes, in order to facilitate their integration into compulsory education.[8] These preparatory classes take place in primary schools. The unification of pre-primary classes in all education institutions has been long discussed, but not yet achieved.

Table 2: *Participation in education, by education level /gross enrollment ratio (GER)*[9]

Programme	2016-2017		2017-2018		2018-2019		2019-2020		2020-2021	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Pre-primary	81,8	81,3	81,6	78,9	80,3	76,3	81,9	77,9	78,5	75,2
Primary + Lower secondary	101,6	99,2	102,1	99,2	102,6	97,2	100,7	95,5	99,9	94,2
Upper secondary	98,9	91,3	97,4	90,1	100,8	92,0	95,0	88,6	96,8	90,1

The net enrolment rate at the pre-primary level in Albania has greatly increased since 2000, reaching about 81% in 2016 (UIS, 2020). The rate in 2017 was about 80%, lower than the average in the OECD countries (84%) and the EU member states (87%). However, such rate is higher than in Serbia (61%) and Montenegro (60%).

[7]INSTAT, 2021. Women and Men in Albania 2021, Tirana, Albania, available at http://www.instat.gov.al/media/8713/burra-dhe-gra.pdf

[8]DCM No. 621, dated 22.10.2021 "For the approval of National Strategy for Education 2021-2026 and the Action Plan on its implementation";

[9] INSTAT, 2021. Women and Men in Albania 2021, Tirana, Albania, available at http://www.instat.gov.al/media/8713/burra-dhe-gra.pdf

As it can be seen on Table 2 above, during the academic year 2020-2021, 78.5% of boys and 75.2% of girls attended pre-primary education. There has been a reduction in the number of children attending pre-primary education programme compared to preceding academic years.

Table 3: *Number of children enrolled in preschool education, by gender, 2021*

Gender	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021
Total	81.194	81.026	78.942	77.858	71.332
Boys	42.295	42.314	41.221	40.466	37.016
Girls	38.899	38.712	37.721	37.392	34.316
% of girls	47.9	47.8	47.8	48	51.9

A new preschool education curriculum has been developed, which includes the curriculum framework document, development and learning standards, programs for each age group as well as monitoring the framework for assessing preschool education. Also, for the first time, are drafted development and learning standards for ages 0–3. MoES has approved the Professional Training Standards for General Education of Preschool Teachers as well as Preschool Education Programs for the age of 3-4 years.

IV. Gender statistics in primary and lower secondary education

In the law on pre-university education system, under Chapter III, have been defined the levels of pre-university education. According to the law, primary and lower secondary education are included under the name of "Basic Education".[10] Basic education starts at the age of 6 and ends at the age of 16 years old and is compulsory. This education is composed by two levels: primary education level, which consists in 5 classes, starting from first till fifth grade; and lower secondary education level, consisting in 4 classes, sixth till ninth grade. The basic education aims the social, intellectual and physical development of every student, teaching the rules of conduct as well as the education of values, health care and sufficient preparation for the continuation of the upper secondary education or the labour market.

In the academic year 2020-2021, 286,486 children were enrolled in basic education, 55.3 % in primary education and 44.7 % in lower secondary education. Compared to the school year 2019-2020, it was noted a decrease of 2.8 % children participating in basic education this year.[11]

According to the INSTAT data, the number of children attending primary education is decreasing during last year's. This decrease can probably be attributed to the demographic trend regarding decline of natality which has been reflected in the reduction of primary education generations. The difference in number of boys and girls attending primary education reflects the gender differences among children in the general population.

[10]Article 22 of theLaw No. 69/2012 "On pre-university education system", as amended;
[11]INSTAT, Enrollment statistics, 2020-2021, Tirana, Albania, available at:http://www.instat.gov.al/media/8187/press-release-enrollments-statistics-2020-21eng.pdf

Table 4: *Students enrolled in primary education*[12]

Gender	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021
Total	174.836	170.861	167.104	162.170	158.528
Boys	92.380	89.835	87.762	84.734	82.707
Girls	82.456	81.026	79.342	77.436	75.821
% of girls	47.2	47.4	47.5	47.700	47.8

As the data on UIS indicate, the total net enrolment rate[13] for primary education in 2020 was high (96.16%), with a 3.61% difference between girls and boys. The total percentage of out of school children for 2020, in the legal age to be enrolled in primary education, is 3.7% (6221 children), 0.9% of which are girls and 2.8% are boys. There is no specific available data providing information on the attendance and drop-out rate for children belonging to Roma community, not only for primary education, but also for every level of education. This lack of data prohibits us from realizing the percentage of Roma children enrolled in each level of education and those belonging in the "out of school" category.

According to UIS, the number of repeaters in primary education in Albania is 1143 students, consisting mostly on boys (660 boys and 483 girls).

The number of primary education students enrolled in private education institutions is 14.653 students, out of which there are 6.793 (46.4%) girls and 7.860 (53.6%) boys.

According to the data available on INSTAT, 127.958 students enrolled in lower secondary education for the academic year 2020-2021- 60.398 girls (47.2%) and 67.560 boys (52.8%).

Table 5:*Students enrolled in lower secondary education*[14]

Gender	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021
Total	153.264	148.810	139.426	132.709	127.958
Boys	80.842	78.348	73.705	70.210	67.560
Girls	72.422	70.462	65.721	62.499	60.398
% of girls	47.3	47.4	47.1	47.1	47.2

As the data on UIS indicate, the total net enrolment rate on lower secondary education in 2020 is 96.45%, which is considerably a high level. There is a 4.18% difference between girls and boys (respectively 98.7% for girls and 94.52% for boys). The total percentage of out of school adolescents for 2020, in the legal age to be enrolled in lower secondary education, is 3.5% (4823 students), 0.6% of which are girls and 2.9% are boys. The number of repeaters in lower secondary education in Albania is 1045 students, consisting mostly of boys (735 boys and 310 girls).

The number of lower secondary education students enrolled in private education institutions is 10.053 students, 4.819 (47.9%) of which are girls and 5.234 boys (52.1%).

[12]INSTAT, 2021. Women and Men in Albania 2021, Tirana, Albania, available at http://www.instat.gov.al/media/8713/burra-dhe-gra.pdf;
[13]Total number of students of the official age group for a given level of education who are enrolled in any level of education, expressed as a percentage of the corresponding population
[14]INSTAT, 2021. Women and Men in Albania 2021, Tirana, Albania, available at http://www.instat.gov.al/media/8713/burra-dhe-gra.pdf

Table 6: *Participation in Basic Education /gross enrollment ratio (GER)*[15]

Programme	2016-2017		2017-2018		2018-2019		2019-2020		2020-2021	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Primary + Lower secondary (in %)	101,6	99,2	102,1	99,2	102,6	97,2	100,7	95,5	99,9	94,2

In the academic year 2020-2021, 91.4 % of basic education students were enrolled in public education institutions and 8.6 % in private ones. Among the students enrolled in basic education, girls constitute 47.5 % of the total.[16]

Data on gender parity in basic education[17] are available for the academic year 2020-2021 and Gender parity index[18] is 0.94 indicating that there is no difference in the attendance of girls and boys in this level of education.

Table 7: *Gender Parity Index (on GER)*[19]

Programme	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021
Primary + Lower secondary (in %)	0,98	0,97	0,95	0,95	0,94

In 2019, 34.982 students graduated from basic education, corresponding to 96.4% of ninth graders for the academic year 2018-2019, marking an increase of graduation rate by 1%, compared to the pervious academic year. In this level of education, 52.6% of the graduated students were boys and 47.4% were girls.[20]During the academic year 2019-2020, 33.618 students graduated from basic education, out of which 52.3% were boys and 47.7% were girls.

Table 8: *Graduations in Basic Education* [21]

Gender	Academic year		
	2017-2018	2018-2019	2019-2020
Girls	48.9%	47.4%	47.7%
Boys	51.1%	52.6%	52.3%

[15]INSTAT, 2021. Women and Men in Albania 2021, Tirana, Albania, available at http://www.instat.gov.al/media/8713/burra-dhe-gra.pdf
[16]INSTAT, Enrollment statistics, 2020-2021, Tirana, Albania, available at: http://www.instat.gov.al/media/8187/press-release-enrollments-statistics-2020-21eng.pdf
[17]INSTAT, 2021. Women and Men in Albania 2021, Tirana, Albania, available at http://www.instat.gov.al/media/8713/burra-dhe-gra.pdf
[18] Ratio of adjusted net attendance ratios of girls to boys
[19]INSTAT, 2021. Women and Men in Albania 2021, Tirana, Albania, available at http://www.instat.gov.al/media/8713/burra-dhe-gra.pdf
[20]INSTAT, Statistics of graduations, 2018-2019, Tirana, Albania, available at: http://www.instat.gov.al/media/6957/diplomimet.pdf
[21]INSTAT, Statistics of graduations, 2019-2020, Tirana, Albania, available at: http://www.instat.gov.al/media/8334/statistika-te-diplomimeve_2019-20_juna-formatim.pdf

V. Gender statistics in upper secondary education

In the academic year 2020-2021, 103,001 students were enrolled in upper secondary education, marking a decrease of 6.0 %, compared to the previous year. Out of these students, 48,801 (47.4%), are girls and 54,200 (52.6%), are boys. The majority of students in upper secondary education are enrolled in gymnasiums and socio-cultural schools (81.5 %). This proportion has remained almost at the same level during the last three years. Most of the students enrolled in upper secondary education attend public education institutions (86.5 %).

Table 9: *Students enrolled in upper secondary education*[22]

School/academic year	2018-2019	2019-2020	2020-2021
Upper secondary	116,646	109,533	103,001
Gymnasium & Socio-Culture	95,359	89,869	83,977
Vocational	21,289	19,664	19,024

The number of teachers in upper secondary education is 8,584, of which 68.4 % are women. The student-teacher ratio in upper secondary public education is 12.7 and 8.9 in private education institutions.

Data on gender parity in upper secondary education is available for the academic year 2020-2021 and Gender parity index[23] is 0.93 indicating that there is no difference in the attendance of girls and boys in this level of education.

Table 10: *Gender Parity Index (on GER)*[24]

Programme	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021
Upper secondary	0,93	0,93	0,91	0,93	0,93

In 2019, 34,021 students graduated from upper secondary education, marking a decrease of 3.6%, compared to 2018. Out of the students that graduate, 47.9% were boys and 52.1% were girls. Vocational education graduates made 11.2% of total graduates in secondary education.

In 2020, 31,662 students graduated upper secondary education, marking an additional decrease of 6.9%, compared to the previous school year. Out of the graduated students, 51.1% were boys and 48.9% were girls. 4,862 students graduated in upper secondary vocational education. This number is 27.7% higher, then the number of students that graduated at the endof 2018-2019 academic year. Vocational education graduates make up 15.4% of the total upper secondary education graduates. The gross graduation ratio in upper secondary education was 81.5%. [25]

Upper secondary vocational education in Albania is provided in about 53 schools, of which 9 are private, mainly located in urban areas. According to official figures, enrollment in public

[22]INSTAT, Enrollment statistics, 2020-2021, Tirana, Albania, available at: http://www.instat.gov.al/media/8187/press-release-enrollments-statistics-2020-21eng.pdf
[23]Ratio of adjusted net attendance ratios of girls to boys
[24]INSTAT, 2021. Women and Men in Albania 2021, Tirana, Albania, available at http://www.instat.gov.al/media/8713/burra-dhe-gra.pdf
[25]INSTAT, Statistics of graduations, 2018-2019, Tirana, Albania, available at:http://www.instat.gov.al/media/6957/diplomimet.pdf

vocational high schools in the 2020-2021 academic year has dropped to 17,000 students from 18,164 who were enrolled in the 2019-2020 academic year. The 2022-2024 economic reform document adopted by the government states that demographic trends are mainly the cause of this decline.

Boys make up the majority of upper secondary vocational education students. According to official data, most girls use upper secondary vocational education as a path leading towards higher education (over 79% of girls graduating from vocational education enroll in universities, compared to 39.2% of boys), while boys mainly use the upper secondary vocational education as a bridge to enter the labor market after graduation.[26]

VI. Gender equality issues in educational programs, curricula and teaching methods

The law on pre-university education system defines the curricula as a system made of various elements such as: the curricular framework, the core curricula, education programmers, assessment programmers, which, being interconnected, allow the orientation and functioning of the educational system, through education and administrative plans. The curricula provide quality and equal education for every member of the society, despite their ethnicity, gender and social status.

This law also identified the curricular framework as the main document of the curricula, which describes its general goals, main competences, expected results for students, in terms of knowledge, skills and attitudes in the end of primary and secondary education, their goals in learning and the general principles of the teaching-learning process, and student assessment. The core curriculum is a joint curriculum for all students in the same level of studies in the educational system.

Primary education level in Albania consists of five classes, starting from the first grade till fifth grade. Gender education is included in the content of a social subject named "Citizenship" (Qytetaria). This subject aims to educate students on the basic concepts regarding individuals and groups, gender equality and non-discrimination, society and culture etc. One of the goals of this subject is to empower students and encourage them into participating in activities that promote cultural, ethic, religious and gender tolerance and diversity, at school or in community at large.

The education program is implemented through school textbooks, teaching materials and the influence of school environment. The latter is also known as *hidden curricula*.[27] Every society influenced by their gender beliefs and stereotypes has prevailing images of portrayal of man and women on the education programme. When children enter school environments, the images of boys and girls portrayed on books influence their concept of gender affiliation and gender roles expectations.

Students get influenced by both the official and the hidden curricula. It is very important to analyse textbooks and the hidden curricula, because they play a crucial role in the process of gender identity formation in children. Studies show that even school text books images can

[26]Top Channel, "Unemployed / 35% with vocational education, 10% with gymnasium", 2021, available at: https://top-channel.tv/2021/12/29/te-papunet-35-me-arsim-profesional-10-me-gjimnaz/
[27]Dode E., Doctoral Dissertation "Analysis of the integration process for gender education in the education system. Special educational needs assessment for boys and girls", p.32

convey powerful messages, just like the written text[28]. The way male and female characters are shown in the content and designs of textbooks influences the way children develop their gender affiliation in society, which can bring negative or positive effects, reflected in their attitude towards themselves and/or others. For this reason, textbooks should depict genders as equal as possible because the images that boys and girls see in school textbooks instil their self-perception and views about themselves.

According to the law on pre-university education, textbooks are part of the written and implemented curricula. The textbook is the tool of the learning and teaching process, developed in the frame of implementation of the subject syllabus. In Albania, the textbook is the main source for the learning process, at school and other learning environments. In order to maintain gender balance, textbooks should represent both genders in a fair and logical ratio. It is also relevant to analyse the gender ratio of the authors whose textbooks are selected by school academic boards to be taught in schools.

In order for teachers to be able to contribute to gender equality in the society, they need first to be aware of their gender biases and subsequently to be equipped with gender education competences. Although some progress is made, gender equality issues are still not part of the subjects for pre-service teacher training.

Another area for consideration would be the socialisation process in the schools and duringthe extracurricular activities. Such process can greatly benefit from a gender-sensitive approach, where teachers ensure a spirit of equality in the interactions between boys and girls not just in class, but also in the decision-making bodies of the schools such as the students' government and board of the school.

VII. Conclusions

The available data disaggregated by gender is not complete. Therefore, it is necessary to further develop the available data for various aspects and levels of education. Regarding participation in education, disaggregated by gender, it is necessary to not only have data on the total number of children enrolled at each level of education, and the ratio of boys and girls enrolled, as we currently have, but this data should be enriched and should involve information on participation in education compared to the total number of children in the age to attend that level of education. To elaborate, the data should include the comparison of all children enrolled in one education level, compared with the total number of children in the age to attend that education level, and also disaggregate this data by gender. That would make it possible to realize how many children that should be in that level of education are not enrolled in schools, and what is the share of boys and girls in this group of children.

Also, data on children from vulnerable groups are extremely restricted, so it would be very useful if some of the data would be collected through regular administrative data in order to screen the situation among children from national minorities, Roma, children from rural areas etc.

Related to data collection, it is important to state that there is poor data available on employment in education disaggregated by gender and the % of leadership positions in each education level disaggregated by gender (particularly principals and vice principals).

[28]GDAC, "Gender Perspective of School Textbooks in Albania", Tirana, 2008.

Since the available data show that there is a gender gap in the attendance of each level of education, it is of key importance to investigate the reasons of this gender gap, and coming with ways to reduce this gender gap, by tackling the reasons leading to this gap.

Regarding the content of the curricula, it would be very beneficial to conduct new analysis on content of education curricula and materials, including gender education since many new textbooks were adopted after previous studies were published, and a new curriculum based on competences has been adopted for the pre-university education.

The subject of Citizenship, used in primary, lower secondary and upper secondary education, could be used as an opportunity to introduce systematic education and awareness rising in gender equality and gender-based violence, but with the support of appropriate learning materials and textbooks. It is important to introduce regular monitoring and evaluation of knowledge and attitudes of students on gender equality.

Since textbooks in Albania are the main source of the learning process, the textbooks should represent both genders in a fair ratio, not only in text, but also in illustrations. Therefore, it is important to conduct an analysis of school textbooks, as part of the hidden curricula, to screen the fair representation of girls and boys, and also to eliminate any gender stereotyped concept of the roles and attitudes of men and women at all levels of education.

It would also be very beneficial to conduct the analysis of the new pre-primary education curricula including the learning materials used towards advancing the knowledge and attitudes of children regarding gender equality. The methods used should be in accordance with their age. In this manner some prospective occupations should be introduced to children with the message that different opportunities are equally suitable and available for both, girls and boys. Here, education classes can serve as a suitable entry point for gender education topics in the class.

Therefore, to offset the aforementioned, pre-service and in-service gender equality training programs should take place for teaching and management staff in pre-university education institutions. Gender equality competences should also be part of the staff performance criteria.

The socialisation process in schools can greatly benefit from a gender-sensitive approach, where teachers ensure a spirit of equality in the interactions between boys and girls not just in class, but also in the decision-making bodies of the schools such as the students' government, and the extracurricular activities.

Gender segregation in education should be a priority, part of education, gender equality, youth and employment related policies. Promotion of non-traditional occupations for boys and girls should be one of the regular activities in schools, as part of career orientation and guidance.

It is of great importance to realize that gender segregation on the labour market should be addressed with carefully tailored measures in order to increase employment of men in all education levels, especially in pre-primary and primary education, and to empower women employed in education to undertake leadership positions. Therefore, efforts here should include gender-sensitive career orientation and guidance elements.

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Examining the Relationships Between Distance Education Students' Self-Efficacy and Their Achievement

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Abstract
This study aimed to examine the relationships between students' self-efficacy (SSE) and students' achievement (SA) in distance education. The instruments were administered to 100 undergraduate students in a distance university who work as migrant workers in Taiwan to gather data, while their SA scores were obtained from the university. The semi-structured interviews for 8 participants consisted of questions that showed the specific conditions of SSE and SA. The findings of this study were reported as follows: There was a significantly positive correlation between targeted SSE (overall scales and general self-efficacy) and SA. Targeted students' self-efficacy effectively predicted their achievement; besides, general self-efficacy had the most significant influence. In the qualitative findings, four themes were extracted for those students with lower self-efficacy but higher achievement—physical and emotional condition, teaching and learning strategy, positive social interaction, and intrinsic motivation. Moreover, three themes were extracted for those students with moderate or higher self-efficacy but lower achievement—more time for leisure (not hard-working), less social interaction, and external excuses. Providing effective learning environments, social interactions, and teaching and learning strategies are suggested in distance education.

Keywords: Distance Education, Self-Efficacy, General Self-Efficacy, Academic Self-Efficacy, Students' Achievement, Migrant Worker

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Introduction

For decades, educational researchers have been studying self-efficacy as a construct to determine its impact on students' academic motivation (Zimmerman, 2000), learning strategies (Phan, 2011), perseverance in the face of academic setbacks (Caprara et al., 2008), and students' achievement (Prat-Sala & Redford, 2012). Students' self-efficacy is related to the belief that students have to manage and perform a given task well. It influences how students approach their task, their persistence to accomplish the objectives, and their confidence to manage their studies. This concept has a role in human functioning through social cognitive, self-esteem, motivational selective, and affective processes.

Students with high self-efficacy intend to persevere longer, search for deeper meaning across learning tasks, report lower anxiety, and have higher achievement in school (Bandura, 1997). Commonly, students with high self-efficacy can maintain their studies well. It affects their daily learning activities. As a result, they preserve longer than students with low self-efficacy.

Several studies examine the relationships between the level of self-efficacy and achievement in university students. Prat-sala and Redford (2012) found the importance of the concept of self-efficacy in relation to student performance. They discussed the relevance of self-efficacy on students' perceptions and self-regulation in an undergraduate student. Other studies also have proved that self-efficacy could have a positive impact in many aspects, including students' achievement (Kluemper et al., 2009; Siddique et al., 2006). However, few studies were done on distance universities. This study will contribute to fulfilling the role of self-efficacy on the achievement for distance learners.

Nowadays, technology supports education through the internet. It changes the way of learning in the classroom into learning in an online system. Some universities open classes by using an online learning system. It requires students' greater autonomy and a higher level of persistence and effort in the learning tasks. To be aware and know the degree of self-efficacy of students seems particularly relevant (Goulau, 2014). This study stated that students' self-efficacy has positively impacted the students' achievement even learning process is done by using an online application.

Furthermore, Bandura (1997) has introduced the theory of self-efficacy, which states that self-efficacy expectations are based on four significant sources of information: (1) performance accomplishments, (2) vicarious experience, (3) verbal persuasion, and (4) physiological states. As one of the topics in social cognitive theory, self-efficacy sources indicated that the environment influences students' self-efficacy. Therefore, distance learning environments become challenging for non-traditional students.

Concerning migrant workers getting higher education, the Indonesian government provides education through Indonesian Open University. This distance university aims to provide higher education services for migrant workers who cannot continue their education at face-to-face tertiary institutions for work or other reasons. This policy promotes the rights of Indonesian citizen to get an education wherever they are and help people with a lower social economic status that cannot continue their higher education without working because they need financial support. However, working abroad and studying in a distance learning program, both of these conditions might affect the students' self-efficacy and achievement.

Most of the previous studies discussed the relationship between self-efficacy and achievement in primary and secondary education. Yet, few are discussed in tertiary education, particularly distance education. Therefore, this study examined the relationships between students' self-efficacy and the achievement of distance learners. The findings of this study could fill the information as follows: Does students' self-efficacy correlate to students' achievement in distance education? Is self-efficacy able to predict students' achievement in distance education? And why do distance learners have specific conditions regarding self-efficacy and achievement?

Literature Review

Distance education for Indonesian migrant workers

Distance education has allowed non-traditional learners to acquire skills and knowledge with flexibility and convenience, which are essential for their families and work responsibilities. These non-traditional learners have specific characteristics, including part-time or full-time enrollment, delayed post-secondary enrollment, independence for financial assistance purposes, employment over 35 hours per week, dependents' primary caregiver, and a completed high school diploma (Stephen et al., 2020). The population of non-traditional learners in online courses has grown steadily over the years, with the number of 25-year-olds increasing their enrollment in distance programs by 35 between 2001 and 2015. Non-traditional learners are expected to grow by 11% by 2026 (Hussar & Bailey, 2018).

The Indonesian government facilitated higher education through Indonesian Open University to migrant workers to get their rights to access education. Based on *Indonesia Open University Catalog (2019)*, this university entirely uses a distance education mode of learning. It has been designed to be a flexible and inexpensive university focusing on serving people who lack the opportunity to attend face-to-face mode of the higher education system due to various constraints, including lack of funding, living in isolated and rural areas or abroad, and working as migrant workers. The system has continued to evolve and improve its teaching and learning systems, management, and support services for students. It applies a learning management system (LMS) to facilitate teachers' and students' interaction, an online library to access learning content, and several online applications to support their study.

Students' self-efficacy in the distance education context

Bandura (1997) defined self-efficacy as belief in one's capabilities to organize and execute the courses of action required to produce given attainments. It shows the level of confidence that students have to learn and perform in the classroom. Therefore, this concept strongly influences the approach to the task, the persistence to accomplish it, and the level of effort to achieve the goals. Students with high self-efficacy persevere longer, search for deeper meaning across learning tasks, report lower anxiety and have higher achievement at school (Pajares & Schunk, 2005). On the other hand, students with low self-efficacy may have lower achievement. This study separated self-efficacy into general self-efficacy and academic self-efficacy. General self-efficacy is the belief in one's competence to cope with a broad range of stressful or challenging demands (Luszczynska et al., 2005). While academic self-efficacy poses that human achievement depends upon interactions between the person's behaviors and personal factors such as abilities, beliefs, motivation, and environmental conditions (Bandura, 1997).

Various factors enhanced self-efficacy and provided evidence of significant sources of self-efficacy in the context of distance learning. Many of the learners who resort to distance learning, in general, are no longer youths, and they have their jobs and their families. Moreover, the investigation guides further research in designing online learning environments to enhance the self-efficacy of learners (Peechapol et al., 2018). Based on Rovai's (2003) model and previous research demonstrating the importance of non-traditional learners' needs, skills, and characteristics for online persistence, he assumed that self-efficacy predicted the enhancement of non-traditional distance learners. Self-efficacy is important for persistence and requires learners to structure the environment, set goals, manage time, seek help, use task strategies, and self-assess, and a comprehensive understanding of self-regulation as it relates to perseverance is incomplete without self-efficacy (Stephen et al., 2020). Learners' beliefs about their ability to succeed in time management, technology use, and learning are predictors of persistence (Robbins et al., 2004). Finally, given the highly independent nature of the distance education environment, it can be argued that self-efficacy is essential to the success of distance learners.

Factors affecting students' achievement

Menon (2016) considered that learning achievement was an indicator to evaluate students' absorption of course contents, and teachers' teaching effectiveness could be judged according to students' test performance. As a tool of evaluation, the achievement score indicates how effective the learning process is. Shadiev et al. (2015) regarded learning achievement as the learning outcome and performance during participation in activities. They explained that achievement is obtained result of what students perform in the class. Huang et al. (2013) referred to learning achievement as the evaluation or test of learners after completing learning activities to understand the achievement of the learned contents. It means achievement can be obtained from tests and other assessments.

Some factors have a potential effect on the quality of students' achievement. The theory of Educational Productivity determined three groups of nine factors based on affective, cognitive, and behavioral skills for optimization of learning that affect the quality of academic performance: Aptitude (ability, development, and motivation); instruction (amount and quality); environment (home, classroom, peers, and television) (Walberg, 1982), including distance learning environment. Jurecska et al. (2012) suggested that culture may influence the pathways between poverty, self-efficacy, and achievement. The need to assimilate content to develop students' emotional self-efficacy is highlighted. In the context of distance education for migrant workers, the students adjust to the culture in the country and regulations in the places they work.

Self-efficacy influences students' achievement

Many researchers have explored the relationships between students' self-efficacy and achievement with various samples in various settings (e.g., Bates & Khasawneh, 2007; Cascio et al., 2013). While past performance is helpful in forming predictions about students, students' own self-efficacy beliefs are more reliable in predicting future performance. Wigfield and Eccles (2000) found similar results of beliefs in which study participants' beliefs better predicted grades than students' previous grades. Bandura (1976) stated that although previous achievements affect self-efficacy, students also consider their own personal standards when evaluating themselves, pushing themselves to reach new goals. A meta-analysis revealed significant relationships were present between self-efficacy and

performance of high schools and college students than younger students, and relatively weak relationships were founded between self-efficacy and performance of younger students than high schools and college students (Multon et al. 1991).

In contrast, a study has revealed no significant relationship between self-efficacy and academic performance (Cho & Shen, 2013). This case probably happens because people have significantly different conditions, cultures, and goals in learning. Operationalization of self-efficacy, the timing of measurement, and cultural differences have been proposed as reasons (Honicke & Broadbent, 2016). Currently, it has been assumed that self-efficacy is one of the most important factors or predictors for learners to achieve learning success (Ugwuanyi et al., 2020). This may mean that if a student's self-efficacy is enhanced, the student may be able to achieve higher academic results in an online learning context (Yokoyama, 2019).

Materials and methods

Development of research instrument

A developed questionnaire was adopted as the major instrument for data collection, including two major sections. The first section collected participants' socio-demographic background information and the second section was designed to collect distance learners' perceptions of their self-efficacy. The second section was divided into 21 100-point scales of general self-efficacy and 24 100-point scales of academic self-efficacy. The instructions and standard response format of self-efficacy are promoted by (Bandura, 2006): The strength of self-efficacy on a 100-point scale, ranging in 10-unit intervals from 0 (cannot do); through intermediate degrees of assurance, 50 (moderately certain can do); to complete assurance, 100 (Highly certain can do). While their GPA was obtained from the university. The semi-structured interviews for the case study consisted of questions to confirm the specific conditions of students.

Validity and reliability

The validity of the questionnaire was determined by content validity, where the draft of the questionnaire was reviewed by three scholars to ensure the questions' accuracy, completion, mutual exclusivity, and measuring of what they claimed to measure. Cronbach's alpha was used to determine the reliability; the results were .90 for general students' self-efficacy, 97 for academic students' self-efficacy", and .97 for the total score of two subscales. The results are higher than the cutoff score of .7, indicating the questions achieved a high degree of internal consistency.

Data gathering procedure

Target respondents. In order to ensure that the participants were qualified to answer the research questions and to ensure a high responding rate, we corporate with Indonesian Open University. The students should participate in distance learning programs for more than one academic semester and have professions as migrant workers in Taiwan. After collecting the data, semi-structured interviews were used to gather follow-up data from those students who had specific conditions based on their responses (i.e., rating of students' self-efficacy and achievement scores). Targeted students who had two specific conditions were purposefully selected; the first group is six students with lower self-efficacy ratings but higher achievement scores (ID: S007, S010, S025, S048, S072, and S078) and the second group is

two students with moderate/higher self-efficacy ratings but lower achievement score (ID: S073 and S093). Contacting them via messenger that they frequently used was made for inviting them to the interview. All of the questions were designed based on their answers in the survey. An interview is considered an effective tool to enable the researcher to obtain in-depth explanations from participants (Kumar, 2014).

Responding rate. The questionnaires were sent out to entire 169 students at Indonesian Open University Taiwan Branch, and 100 valid questionnaires were retrieved, resulting in a 59.17% response rate. The percentage of demography backgrounds of 100 participants is 19% males and 81% females; 30% factory employees, 22% of housemaids, and 48% of caregivers.

Statistical analysis

The quantitative data were analyzed by using SPSS. Pearson's product-moment correlation and regression analysis were applied. Then, the qualitative data were organized and pre-analyzed using the following steps (Thomas, 2006): Preparation of raw data files, closed reading of the text, creation of categories, overlapping coding and uncoded text, and continuing revision and refinement of the category system. The template analytic techniques (Crabtree & Miller, 1999) were then employed for further analyses. The analytic editing system, applying the organizing code topics (i.e., related to students' self-efficacy and achievement), was used to ensure that the analyses focused on learning at a distance university.

Results

The relationship of students' self-efficacy and achievement

As illustrated in Table 1, there was a significantly positive correlation between students' self-efficacy (both "total score" and general self-efficacy) and their achievement. However, there was no significant correlation between students' academic self-efficacy and their achievement in distance learning. It indicates that belief in one's competence to cope with a broad range of stressful or challenging demands correlated with students' academic scores (e.g., Metcalf & Wiener, 2018; Tang & Westwood, 2012).

Table 1: *Correlation between Students' Self-Efficacy and Achievement in Distance Education*

Factors	General self-efficacy	Academic self-efficacy	Self-efficacy (total score)
General self-efficacy			
Academic self-efficacy	.78***		
Self-efficacy (total score)	.92***	.97***	
Students' achievement	.29**	.18	.24*

Note. *$p < .05$; **$p < .01$; ***$p < .001$

The findings from multiple regression analysis revealed that students' self-efficacy (total score) significantly predicted their achievement (F (1, 91) = 5.48, $p < .05$), with 5.7% of the variance in achievement explained by students' self-efficacy (i.e. total score). The standardized regression coefficient indicated that students' self-efficacy (i.e. total score) (β = .24, t = 2.34, $p < .05$) had significant effects on their achievement. Accordingly, the

targeted students with higher students' self-efficacy (i.e. total score) had positive influences on their achievement. Furthermore, with a more detailed inspection of two subscales of students' self-efficacy (i.e. general self-efficacy and academic self-efficacy), the result showed that the two subscales together significantly predicted their achievement (F (2, 90) = 4.47, $p < .05$), with 9.0% of the variance. The standardized regression coefficients showed that students' "general self-efficacy" ($\beta = .37$, $t = 2.40$, $p < .05$) had significant effects on their achievement. Tladi (2017) stated that distance education students' self-efficacy explained 10% of the variation in academic achievement. While there were no significant effects of students' "academic self-efficacy" ($\beta = -.10$, $t = -.67$, $p > .05$) on their achievement (see Table 2 for details). This finding was in contrast to several studies that reported academic self-efficacy is a strong predictor for students' achievement (e.g., Dogan, 2017).

Table 2: *Predictors of Students' Achievement in Distance Education*

Factors	*B*	*SE*	*β*	*t*
(constant)	53.49	10.84		4.94***
General self-efficacy	.54	.22	.37	2.40**
Academic self-efficacy	-.11	.17	-.10	-.67

Note. **= $p < .01$; ***= $p < .001$

Based on the finding above, general self-efficacy is more suitable to measure and predict students' achievement in the distance education context. The possible reason is that the sample in this study was collected from different majors with different courses. Therefore, academic self-efficacy concerning the specific course or academic cannot predict students' achievement. Recent studies usually used academic self-efficacy for measuring or predicting students' achievement in one subject, such as Mathematics (Chang, 2015).

Interviews of students with specific conditions

Students with lower self-efficacy but higher achievement

Based on the interview results, four themes were extracted for those students with lower self-efficacy but higher achievement.

First theme: Physical and emotional condition

The main reason why they had low self-efficacy was the "distraction" of their physical and emotional conditions. S010 explained, "I work as an elderly caregiver. Sometimes, I want to do homework, grandmother that I care for suddenly wakes up, and I need to care for her." Working time as a caregiver requires them to care for the elderly for the whole day. S025 also had a similar thought:

> I am tired of working, so I cannot focus on my study. I look after the elderly, it is like working 24 hours, because the elderly usually wakes up at night every two hours, to urinate, so I need to wake up to care for them.

As a result of their busy working time, they felt fatigued, and they did not have extra time to review the class. "Due to lack of free time and fatigue at work, I sometimes use my free time to rest. After the online classes are over, I still do many e-learning assignments.", said S072.

S078 realized that she was a student at a distance university as well as a migrant worker in Taiwan. It made her more difficult to manage her time, she said:

> I have to adjust between work and homework; it is not easy. I can do my homework after work at 10 PM. I have to choose to work, study online, or do an assignment first. I cannot use my computer while working, so I am stuck doing homework.

In addition, S078 also stated that "Sleepiness, that is the problem. I do my assignments at midnight. I sleep late, then I work at 7 am."

Either physical or emotional distraction could make students feel less efficacious; that is, they might be less confident in their future learning tasks. As S025 responded, "My problem is because I take care of the elderly, who are often angry or screaming, so I have to focus on her whole days." Similarly, S078 also expressed her feeling: "Nervous makes me not confident to do it. I get difficulty concentrating because I am tired". Further, she indicated that:

> Students like us become different from students who do not work as migrant workers. I lack confidence because of the stress of facing a lot of homeworks and information when not attending class. Therefore, I try always to be present.

Accordingly, she gradually realizes the risk of doing two things together, i.e., studying and working simultaneously. In fact, if one is in a lousy mood and restless, she/he will become more anxious and temperamental which may lead to no or less accomplishment in her school works.

Second theme: Teaching and learning strategy

Students have various kinds of interests and employ different ways in learning. Therefore, strategies they may apply for studying and practicing vary; especially, they will be different while confronting distance learning. S010 said, "The point is I have prepared, even though I do not think it is optimal. for example, there are 10 points to be learned, I only read 5 points. There is not enough learning time."

In this distance university, there were intensive interactions between the tutors and students that were essential for some students if they need discussions, even though some students prefer to learn by themselves. S010 claimed, "I prefer learning by myself. Maybe I can read more books or search for specific information." In contrast with S010, S025 held different opinions about her way of learning. She indicated that, "My ideas usually arise with more pressure from people around me. Interesting learning motivates me to do better, then I will be able to achieve my learning goals. If none motivates me; maybe I cannot do it well."

In addition, S025 said, "I often hear or watch learning videos given by tutors, rather than reading books while working." However, she stated, "If the grandmother was sick or fussy, she was undoubtedly unable to focus on what the teachers explained."

S072 expressed her thought on why she had a lower self-efficacy rating, "When I am tired after working if the teachers gave uninteresting lectures, that makes me feel bored and did not want to learn at all." In short, some students did like to have more interactions while learning.

Third theme: Positive social interaction

Echoing Bandura's (1997, 2000) social learning theory, social interactions are essential for positively promoting the development of one's self-efficacy, which, in turn, may result in better learning achievement. However, some of these students did not have enough interactions with their peers. S001 realized that fewer social interactions with friends or classmates were ineffective; more social interactions would be helpful for her learning. "When I do not understand or have questions, I look for a way to solve it by myself. I realize that learning online has an obstacle to interacting with friends since our time is so limited freely," said S001.

Once they lack interactions with peers or the teachers, they may feel that the class tasks or home works are more difficult to be finished. As S078 indicated, "I am lazy to ask questions in class and I rarely contact tutors after class." She added that "I am more comfortable while learning by myself. If I study with others, I feel afraid that I cannot express my opinions or thoughts well so that they cannot understand." However, this lack of social interaction may not only lower these students' self-efficacy but also decrease positive opportunities to work with or learn from others.

Fourth theme: Intrinsic motivation

Even though they had lower self-efficacy, they got good grades. Therefore, it was so important to discover how they could get better grades compared to other students. S001 claimed that "I do not know. I always feel motivated while learning, especially while I finish some learning tasks." Through this kind of intrinsic motivation, they did better than others. S025 indicated that "I always try my best, I know my capacity. It is lucky to get good grades. I always do my work as best I can". In addition, S048 and S072 expressed that they always try to be active in online classes; for example, they always participate in online activities and ask or answer questions in class. They always attend class and submit assignments on time. Likewise, "I have to be more focused even though my time is limited. Moreover, I think I am always motivated", said S078. In fact, intrinsic motivation is beneficial for one's learning, which will promote them to keep learning and persist longer while facing obstacles. As Bandura (1997, 2000) argued, "mastery experience" is one of the essential resources for self-efficacy development, and it will also cyclically influence the development of one's learning achievement (Zimmerman, 2000). Consequently, since these six students had better achievement scores now, it may cyclically promote their self-efficacy positively in the near future.

Students with moderate/higher self-efficacy but lower achievement

Three themes were extracted for those students with moderate/higher self-efficacy but lower achievement. However, since only two students were interviewed, the findings needed to be confirmed by future studies. Here are some preliminary results.

First theme: More time for leisure (not hard-working)

As S073 claimed, he spent a great deal of time for leisure, such as going out with friends during weekends or playing games during break hours. He said, "I have much free time. Compared to my friends, my working hours are less than theirs". He further explained that "Once I have free time, I actually do not spend my free time on learning. But, I think that I

can handle my school tasks." However, spending less time on learning for him (S073) led to lower grades. For S093, he claimed that he did not spend much time learning either. She mentioned that "Instead of studying hard, I rather rest more if I have free time. I think I just need a regular grade. I go study because I could make more friends". In short, for both of them, spending less time on learning or not working hard for tasks became one of the reasons for getting lower grades in school.

Second theme: Less social interaction

As indicated in the previous section, those students with higher self-efficacy would like to interact with peers or teachers, where these positive interactions were beneficial for their self-efficacy development. However, the two students with moderate/higher self-efficacy, both had less interaction with peers or teachers about their school works. S073 indicated that "As I said before, I do not spend much time on my school works. In fact, I do not like to interact with others while learning since it is boring. S093 also mentioned that "I do not study hard. I have fewer interactions with my classmates or teachers." In brief, the missing of positive social interactions with peers or tutors while learning might be the reason that they had lower achievement.

Third theme: External excuses

Based on Bandura's (1997) perspective, a "sense of control" is one of the crucial factors in one's self-efficacy development. These two students actually did not fit this perspective, where they usually attributed their lower grades to external excuses (Chang, 2010). For example, S073 realized his achievement was not good, but he thought that "I do my best while learning. I just do not know why my grades were not good enough. Maybe the content is too difficult for me". S079 had similar conditions, and he said, "Maybe other classmates are better than me. You know, I think I am not that smart so I do not get better grades." In short, these two students did not fit in the "sense of control" theory, but they had moderate/higher self-efficacy. Thus, it needs more empirical pieces of evidence to confirm these kinds of findings.

Conclusions

The overriding of this study was to examine the relationships between students' self-efficacy and their achievement in distance education. Based on data analysis, three main findings were obtained in this study: (1) There was a significantly positive correlation between targeted students' self-efficacy and their achievement (whole scales and general self-efficacy), while there was no significant correlation between targeted students' academic self-efficacy and their achievement. (2) Targeted students' self-efficacy effectively predicted their achievement, with 5.7% (the whole scale) and 9.0% (two sub-scales) variance explained; besides, the general self-efficacy had the most significant influence (β = .372), while the effect of the academic self-efficacy was not significant. (3) According to the qualitative findings, four themes were extracted for those students with lower self-efficacy but higher achievement: Physical and emotional condition, teaching and learning strategy, positive social interaction, and intrinsic motivation. In addition, three themes were extracted for those students with moderate/higher self-efficacy but lower achievement: More time for leisure (not hard-working), less social interaction, and external excuses.

Based on the findings and discussions, along with these limitations, concrete recommendations were proposed for targeted students as well as for future studies: Indonesian Open University (i.e., not only the one in Taiwan but also others in different countries), the findings of this study inform us of two main things: (1) Since the average rating of targeted students' self-efficacy was comparatively lower (only 73.41% of confidence in their future learning in distance education), it is recommended that the faculty members need to find out how to promote these students' self-efficacy belief for future learning. (2) Targeted students' achievement scores were acceptable (i.e., 85.09, out of 100 points). In addition, targeted students' self-efficacy effectively predicted their achievement, adding to the qualitative findings (themes that were influential for students' self-efficacy and achievement). Therefore, for the purpose of long-term development, it is suggested that distance education needs to provide a more effective learning environment (e.g., more social interactions, employing more teaching and learning strategies) for these students to be successful in distance learning.

Finally, many interesting and important phenomena were explored in this research, yet we could not find many reasonable explanations for the results. Several suggestions remain. For instance, employing more participants in future quantitative studies, conducting this kind of study on different campuses (in different countries) of distance universities, and conducting similar qualitative studies to collect rich data for the purpose of finding out how to promote targeted students' self-efficacy and achievement while studying online.

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Implementing Stop Motion in Learning Quadratic Functions to Develop Mathematical and Global Competence for Students in Vietnam for the Sustainable Development Goals

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Abstract
In this research, 10th - grade students at To Van On high school in Vietnam participated in a Project Based Learning (PBL) with three stages. In the first stage, the students collaborated together to do some research on quadratic functions and Stop Motion technique as well. In the second stage, the students studied the local social problems focusing on the environment and discussed the suitable solution for the problems. In the last stage, the students used the application Stop Motion Studio combined with their own knowledge of the quadratic functions to create videos which conveyed things such as "Climate Action", "Life below Water", and "Life on Land". They are three of seventeen goals of the Global Goals, were adopted by the United Nationals in 2015. From the research process, we knew that the students were not only demonstrating their understanding about mathematical knowledge but also giving their standpoints and helping raise community awareness on the mentioned goals of Sustainable Development Goals. Participating in the project helped the students develop mathematical modeling skills, enhance digital skills as well as thrive global competence. This research can be seen as an interesting reference for teachers, who want to implement digital technology and global competence in their own practices.

Keywords: Digital Technology, Global Competence, Quadratic Functions, Stop Motion, Sustainable Development Goals

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Introduction

The context of global education of the 21st century demands to educate our next generation students to become global citizens associated with developing global competence and digital skills. The Asia society determines that global competence articulates the knowledge and skills students need in the contemporary world which consists of four following domains:

Investigate the world: Students investigate the world beyond their immediate environment.
Recognize perspectives: Students recognize their own and others' perspectives.
Communicate ideas: Students communicate their ideas effectively with diverse audience.
Take action: Students translate their ideas into appropriate action to improve conditions.
(Asia Society 2005, p. 13)



Figure 1: Global Competence by Asia Society 2005.

Global competence helps connect students' learning process with real world experiences and in addition well equip students with the necessary skills such as: cross-communication, critical thinking, problem solving, collaboration and team work skills. "Global competence thus supports the Sustainable Development Goals both by proving the vision of education the SDSs advocate for, and by encouraging young people to act in the general interest of collective-wellbeing and sustainable development that the SDGs embody." (OECD, PISA 2018, para. 2).

Moreover, we are living in the digital era. Understanding digital technology therefore is a significantly vital purpose in training global citizens and global workforce. This leads to teaching and learning digital skills is an inevitable educational trend in an ever-changing world. "The changes have highlighted the need for school to ensure that all students are prepared for the contemporary digital world. The need to provide digital skills for all students means that digital technology can no longer be taught only as a specialist subject area but rather needs to be embedded in all subjects across the curriculum." (Parsons, MacCallum, Schofield, and Johnstone, 2020).

This very need has required that "Teachers and students will need to work together in new forms of "partnering" in which students do what they do best - for example, using technology, find information, and create products that demonstrate their understanding." (Marc Prensky, 2011).

In terms of teaching mathematics at secondary levels, implementing Stop Motion Studio Application to depict an animate picture of a graph of a function allows the two learning

processes “learning is relearning” (Kolb, 1984, p. 30) and “learning by making” (Papert and Harel, 1991) to be happened simultaneously. Moreover, “each step in creating an animation is important to learning the underpinning science as each activity explores the same concept but in a different mode. This creates a cumulative semiotic progression with meaning building from one representation to the next to promote learning” (Wishart, 2017).

Additionally, “When learners generate an animation about a science concept, they experience the process of clarifying, checking and refining their understanding.” (Hoban, Nielsen and Carceller, 2010’s). Therefore, using stop motion technique in teaching quadratic functions not only motivates students access digital technique and apply it in their own learning, but also maximizes their understanding of the properties and graph of the functions. Furthermore, in this research, Stop Motion Studio is also an actually effective tool which was creatively used by students to convey their messages about the sustainable development goals to other people.

Reference Theories

In this research we used the anthropological theory of didactics by Yves Chevallard in order to determine praxeologies associated with knowledge object quadratic functions in the mathematics curriculum for 10th grades in Vietnam from 2007-2022. We also applied the concept of didactic engineering of Michele Artigue to construct a didactic project which is a PBL focused on developing mathematical modeling, digital, and global competencies for students whilst they learn quadratic functions. Besides that, Eight Big Ideas Behind the Constructionist Learning Lab of Seymour Papert, Asia Society’s Global competency framework, and Solution plan for modelling tasks of Blum and Ferri are used as reference theories.

Praxeologies Associated with Quadratic Functions in the Mathematics Curriculum for 10th Grades in Vietnam from 2007 to 2022

In this period, the concept of quadratic functions in the algebraic curriculum for 10th grades in Vietnam was displayed completely in mathematical context. Integrating digital skills and developing global competence for students has not been appeared in textbooks and in references used by teachers for planning lessons, constructing tests to evaluate students’ abilities.

Through a research process based on *Algebra 10 Textbook*, *Algebra 10 Teacher-book*, and *Algebra 10 Workbook* which were used to teach Vietnamese students nationally in this time, we found that there are five praxeologies relating to quadratic function.

Task T_1: “Finding the vertex I of a given quadratic function.”

Technique τ_1: Student implements the formula of the vertex $I\left(-\frac{b}{2a};-\frac{\Delta}{4a}\right)$.

Task T_2: “Finding the y-axis and x-axis (if any) of a given quadratic function.”

Technique $\tau_{2.1}$: Student implements the formula of the y-axis is $A(0;\mathrm{c})$ to find the y-axis.

Technique $\tau_{2.2}$: Student solves the quadratic equation $ax^2+bx+c=0$ to find the x-axis.

Task T_3: “Finding the values of a,b,c in the parabola $y=ax^2+bx+c$, which is suitable some given conditions.”

Technique τ_3: Student solves for $a, b,$ and/or c the simultaneous linear functions.

Task T_4: "Creating a table illustrating the monotonicity properties and sketching the graph of a given quadratic function."

Technique τ_4: Student follows the process: First, is to determine sign of a. Second is to draw a monotone indicating table (illustrated in Algebra 10 Textbook, page 45). Third is to state increasing and decreasing open intervals of the function. Fourth is to determine the coordinate of the vertex I. Fifth is to sketch the axis of symmetry $x = -\frac{b}{2a}$. Sixth is determine the y-intercept and x-intercept (if any), and other points belonging to the graph. And last is sketching the parabola passing through the determined points.

Empirical Research

Project

We constructed and studied a PBL because "PBL is an active student-centered form of instruction which is characterised by students' autonomy, constructive investigations, goalsetting, collaboration, communication and reflection within real-world practices." (Kokotsaki, Menzies, and Wiggins, 2016). The project was expected to pave the way for the emergence and development of knowledge, competencies and skills "through invention and reinvention, through the restless, impatient, continuing, hopeful inquiry men pursue in the world, with the world, and with each other" (Paulo Friere, 1974). More specifically, our research focuses on developing students' understanding on quadratic functions. Also students use these insights to create videos that convey the sustainability goals. Participating in the project helps students develop two core competencies of the 21st century education as digital literacy and global competence.

PBL's opened question: "***What realistic movements orbiting a parabola can convey messages about the United Nations' Sustainable Development Goals (SDGs)?***"

Introductions for students:

> **Stage 1:** Students implement process of re-learning the knowledge of quadratic functions and learning how to create video using the Stop Motion Studio application.
> **Stage 2:** Students undertake research on the Seventeen SDGs, followed by observing the outside world to seek parabolic movements associated with the SDGs. After that they use the knowledge learned to build a mathematical design for the selected motion.
> **Stage 3:** Students use the Stop Motion Studio app to produce a short video and write a short essay to voice their standpoints and raise public awareness on the ongoing issues. Students then take practical actions to improve the issues.

The output of the PBL is uploaded to the Padlet at https://padlet.com/lctonc3tvon/i4wroln-fdk9eayv. Students organize discussions on their products via Google Meet to collaborate to correct mathematically and share their messages and visions. During these discussions we are observers and coordinators.

A Priory Analysis

In terms of developing mathematical modelling competence

Strategy S_{GtoF}: Students follow the four steps to solve a modeling task suggested by Blum and Ferri.

"Step 1. **Understanding task**: Read the text precisely and imagine the situation clearly; Make a sketch." Students study the project question and discover parabolic movement in the real world which is suitable to the requirement of the question. They then partially do the task T_4 depicting a chosen movement on paper with Oxy plane.

"Step 2**. Establishing model**: Look for the data you need. If necessary: make assumptions; Look for mathematical relations." Students note down general form of parabola $y = ax^2 + bx + c$.

"Step 3. **Using mathematics**: Use appropriate procedures; Write down your mathematical result." In this step students completely practice the task T_4 combined with the tasks: T_1, T_2, and T_3 in order to determine correctly the values of the parameters a, b, and c.

"Step 4. **Explaining result**: Students round off and link the result to the task. If necessary, go back to step first; Write down your final answer." With the equation found in the previous step, students re-do the task T_4 and display the solution of the task as their mathematical design of the movement. Also, they compare the graph to the real orbit to understand necessity to constrain the values of x on a closed interval which helps their established mathematical model illustrate the orbit more appropriately. Nevertheless, solving quadratic inequalities will be taught in the next semester, hence determining a suitable function without restraint on the values of x is still considered as a valid answer.

This is an optimal strategy expected to happen; however, students are anticipated to face challenges in Step 3. This is able to lead to the appearance of a suboptimal strategy S_{FtoG}.

Strategy S_{FtoG}: Students do Step 1 and Step 2 of the modelling process, and at the end of Step 2 they decide to write a specific quadratic function and skip Step 3. They after that do Step 4 by solving the task T_4. With S_{FtoG}, the chosen function could not illustrate effectively the real movement; however, it will be able to appear with higher proportion compared to S_{GtoF}.

In terms of developing digital skills

Students actively access the Internet to explore the Stop Motion Studio App and install the app on their smartphone. To make a short film using this application, students experience a four phase process of "Planning, storyboarding, construction, and reconstruction" (The Mind Lap, 2020). As a matter of fact, students work together in the environment of paper and pen to construct a movie background that focuses on the movement of object with the parabolic orbit whose graph is designed earlier. They then place the object at different positions on the graph following the direction of motion. At each position, students take a photo by Stop Motion Studio application. Last, in the environment of Stop Motion Studio, they create and

edit their video. The whole process poses challenges for students by virtue of high requirements for the smoothness of video and accuracy of movement. This is a comprehensive process of expressing and re-expressing students' knowledge in practical environment.

In terms of developing global competence

In the question of the PBL we highlight the aim of the didactic project is to convey messages about the United Nations' Sustainable Development Goals via realistic movements whose orbit are parabolas. This stimulates students to study the goals on the Internet and investigate the local or regional issues vis-à-vis their chosen goals. The goals: "Climate Action", "Life below Water", and "Life on Land" are looked ahead to be targeted by many students. Additionally, they initially exchange and recognize perspectives about these problems together. Furthermore, they communicate proactively their standpoints to others and act positively to improve the current issues.

A Posteriori Analysis

This PBL was conducted in November 2021, in the context of COVID 19 pandemic and in Vietnam, students had to learn online. The project had participation of 40 students in grade 10A11 at To Van On high school located at an under-resourced community. The students have diverse backgrounds and many of them with low achievement and motivation in math. The teacher's instructions were delivered via email and Google Meet.

In terms of developing mathematical modelling competence

Based on the provided drafts and students' presentations in the discussions there were seven group chose and succeeded with the strategy S_{GtoF}. The strategy S_{FtoG} was picked by the remaining groups. Although six of them initially selected S_{GtoF}, the difficulties expected earlier in Step 3 forced members of the groups to abandon this strategy. This result was obviously evident that mathematical modelling competence was established and the students implemented it to build successfully mathematical design for parabolic orbits. Accompanying with thriving mathematical modelling competence, our experiment created opportunities for students to develop other skills such as creative thinking skills, problem solving skills, and scientific debate skills.

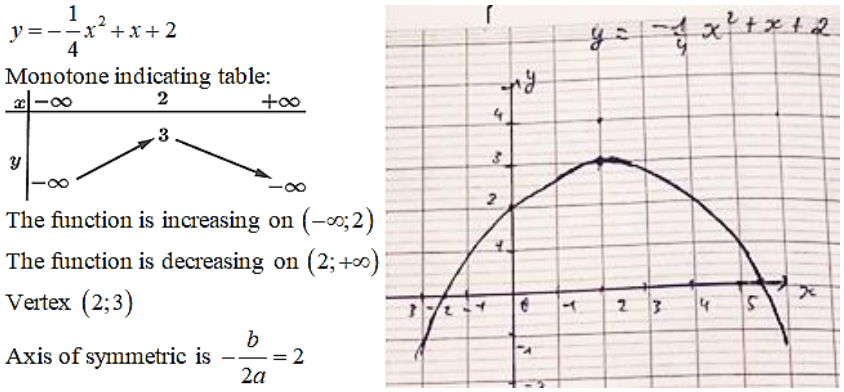


Figure 2: A mathematical design completed by a group with the strategy S_{GtoF}.

In terms of developing digital skills

The filmmaking process of students showed that this is an interesting process in which students actually experienced and implemented at least seven of eight ideas suggested in the work **Eight Big Ideas Behind the Constructionist Learning Lab**. Those ideas are: "learning by doing", "technology as building material", "hard fun", "learning to learn", "taking time – the proper time for the job", "you can't get it right without getting it wrong", and "we are entering a digital world where knowing about digital technology is as important as reading and writing". Not only does the project aim to develop digital skills for students, but it also aims to take advantage of the Stop Motion Studio app as an effective tool to comprehend quadratic functions as well as convey the necessary messages to other audiences.



Figure 3: A screen capture of students' video depicting the collection of garbage that belongs to the goal "Climate Action."



Figure 4: A screen capture of students' video picturing dolphins jumping out of the water that belongs to the goal "Life below Water."

In terms of developing global competence

The number of groups choosing the goals "Climate Action", "Life below Water", and "Life on Land" were twelve, three, and five respectively.

Investigate the world: Students have really studied practical issues such as environmental pollution, the effects of climate change with their lens, understanding, and responsibility. Students were well aware that this is not just a local or national problem, but a global problem for which each individual and organization must be responsible.

Recognize perspectives: Students understood and critically absorbed positive and negative viewpoints on their chosen issues and communicated their viewpoints.

Communicate ideas: In each group, individuals contributed, collaborated and critiqued ideas from which to implement the project. In the classroom, students shared and commented on

ideas and messages from the groups' products. At home, students called for responsibility among members for the issues they were interested in and chosen.

Take action: In addition to conveying the message through videos and short essays with diverse viewers, students participating in the project ran an environmentally friendly campaign with the slogan "*Each student one green tree"*. They were also pioneers in planting and taking care for trees.

Message one: "*Let's dispose of garbage in the right place to protect the environment and also protect human health. The environment is our place to live. Protecting the environment is protecting life. It is the duty of every citizen to fulfill."*

Message two: "*Please protect the marine environment because the sea is a very rich and diverse place in terms of resources, full of potential for diverse economic development. Not only that, the sea is also an easy place to develop tourism and develop the aquaculture industry. Let's join hands to prevent marine pollution; you will see its inherent potentials."*

Conclusions

We notice that undertaking a PBL in order to help students in grade 10^{th} in Vietnam to develop mathematical modeling competence, global competence and digital skills while teaching and learning the concept of quadratic function is achievable.

The project can foster productively differentiated and student-centered activities. Moreover, it also assisted students in developing critical thinking, creative thinking, problem solving, communicating and collaborating skills.

Students expressed themselves in the roles of designers, directors, art creators, and makers of products oriented towards sustainable development goals.

PBL and Stop Motion technique are able to create opportunities for teaching mathematical knowledge in both online and face-to-face teaching contexts such as: Vectors, Functions, Coordinate Geometry.

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The Influence of Financial Assistance on Student's Academic Achievement: A Case-Based Research Study

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Abstract
Purpose: The motive of this inductive research study was to explore the influence of financial assistance in the form of scholarship and to identify the factors that affect the academic achievement of university students. This study also aims to compare the academic achievement of scholarship and non-scholarship students.
Methodology: 26 Semi-structured interviews and purposive sampling techniques were used to collect data from the University's scholarship and non-scholarship undergraduate students.
Findings: Analysis of the data elicited that both scholarship and non-scholarship students work hard to improve their academic achievement. Students consider the scholarship as motivation and achievement. However, factors such as; financial, psychological, emotional stress, anxiety, and language barriers affect the academic achievement of scholarship students. Finance was a significant problem for scholarship-seeking students. It was also explored that scholarship-holding students need to be more participative in other academic activities, such as sports events, social societies, music, art, and drama society, compared to non-scholarship-holding students.
Research Implication: The university should design flexible criteria for availing scholarships. Future research should be done on overcoming factors that cause low academic achievement among university students. Universities should plan strategies to overcome students' financial and emotional stress and anxiety. More attention should be paid to students who belong to remote areas to overcome the language barrier and improve academic achievement. Another foresight was that the proposed model should be tested empirically.

Keywords: Academic Achievement, Case Study, Financial Assistance, Student's Perception

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Introduction

In this contemporary period, education, science, and technology are competitive advantages for organizations. Predominantly, organizations and governments focus on these core elements to achieve a competitive advantage. The country's system that provides free education to students through various forms of financial assistance, such as tuition fees, merit scholarships, and need-based scholarships, builds a robust economic backbone (Noor, Rifat, & Huma, 2016). The standardized formula for the scholarship was designed to identify the financial needs of students (Zhang, Min, Frillman, Anderson, & Ohland, 2006).

Merit-based scholarships are considered one of the instruments for selecting students with high academic achievement (Lynch, 2019). The number of need-based scholarships increased more rapidly than merit-based scholarships at all the academic institutions during the late nineteen. However, increases in merit-based scholarships had only sometimes been at the expense of need-based scholarships. Instead, the merit-based criteria influenced the selection of need-based scholarships.

Scholarships awarded to students motivate them to improve and maintain their GPA (Grade Point Average) (Zhang et al., 2006). According to Rubin and Lisa Melanie (2014), individuals become responsible when scholarships are awarded, creating extrinsic motivation (Rubin & Rosser, 2014). Though, it was not free from the cynic implication as students might delay their degree by reducing the number of credit hours, i.e., withdrawing from the course to maintain the required GPA for the eligibility scholarship awarded. Additionally, some students may elect to leave the chosen field and can be asked to switch towards a perceived, more flexible area of study to achieve better grades to meet the scholarship requirements.

This study aims to analyze and compare the academic achievement of university students availing of financial assistance in the form of scholarships and to identify the factors affecting academic achievement. Financial assistance in the form of scholarships is considered financial support and motivation in the academic career of university students (Baker, 2010). Simultaneously, it causes stress, anxiety, and emotional queasiness among students (Shaikh et al., 2004)—the Scholarship increase enrollment but not the completion of the degree (Bettinger, 2004). Policymakers highlight the financial issue for students to complete their higher education (Lynch, 2019).

According to the world bank report, awarding a scholarship to students not only increases enrollment and attendance but also enhances the academic achievement of scholarship students (Patel & Rudd, 2012). Such contradictory research studies have been identified throughout the literature. The study aims to analyze and compare the academic achievement of scholarship and non-scholarship students.

Similarly, this study identifies factors such as; educational policy, financial issues, or emotional instability, affecting academic achievement among university students (Ganem & Manasse, 2011). Based on the theory of Tinto's (1993) student integration theory, the objectives have been designed to investigate that does financial assistance improves the academic achievement of students who belong to Sukkur IBA University. This inductive research study compares the academic achievement of scholarship and non-scholarship university students and also explores the factors which affect the academic achievement of university students.

Theoretical Approach

Tinto's (1993) integration theory is used to understand the behavior of university students (Chrysikos, Ahmed, & Ward, 2017). A series of research studies were conducted to analyze the behavior of students from entry to exit, which means from enrollment to completion of a degree program. An increase in the tuition fees of university programs and economic challenges creates pressure on students to select the program of their choice (Chrysikos et al., 2017). Students' academic achievement depends on integrating students into the policies and practices of the University (Beekhoven, De Jong, & Van Hout, 2002). Undergraduate students of HEIs specifically use the theory of integration.

Ganem and Manasse (2011) highlighted in their research study that student integration theory asserts students' academic achievement and persistence for long-term firmly based on the financial assistance in the form of scholarships provided by the University. In their early academic careers, university students work hard to maintain that scholarship to achieve and accomplish their academic goals (Beekhoven et al., 2002; Ganem & Manasse, 2011).

Literature Review

A quality education system remains a priority for policymakers around the globe, but a successful education system also needs quality teachers, financial assistance, and good infrastructure to enhance students' learning (Salmi, 2009). The student's academic achievement in higher education can be augmented by supporting students with financial aid through scholarships. Awarding scholarships enhances the academic achievement of students. Students put more effort into maintaining their grades and having financial assistance through scholarships (Lynch, 2019). At the same time, institutional financial support significantly impacted the students' overall success (Ganem & Manasse, 2011). However, it has inevitable opposite consequences, such as students reducing the number of credit hours to reduce the workload. This increases the time for completion of any program or degree, and students willingly change the area of their interest in maintaining their GPA to avail of scholarships consistently (Zhang et al., 2006).

Financial hardship significantly impacts students' academics, and there is a need for financial support from the government, universities, communities, and philanthropist trusties (Milne, Creedy, & West, 2016). Universities are updating their education system and policies to compete globally. Specifically, the Higher Education Commission of Pakistan (HEC) is inclined to invest more in education and increase the number of financial assistance programs to create a knowledge economy (HEC, 2015-2016). According to a meta-analysis, financial retention programs have small and short-term benefits for undergraduate students (Valentine et al., 2011). This research-based case study was conducted at Sukkur Institute of business administration University. This University was recognized as a business education entity in 1994. Originally it was associated with the central or head University at Karachi; in 2006, it got a degree-granting institute charter. It gained a university charter and became University in 2017 (University, 2019). The University is a public sector degree-awarding institute chartered by the Government of Sindh and recognized by the Higher Education Commission Pakistan.

This University has five leading central departments; Electrical Engineering, Computer Science, Business Administration, Department of Education, and Mathematics (University, 2019). The University offers scholarships for every program with the extended support of governmental donors, non-governmental donors, and individual philanthropists and trusts.

The management of the University encourages the students to avail the opportunity of scholarships from every province of Pakistan to have better education and career opportunities. There are two types of scholarship programs, i.e., Institutional merit-based scholarship programs and Institutional needs-based Scholarship Programs, offered by the University. Both have different policies for awarding scholarships to students. In the Institutional merit-based scholarship program, two essential scholarships are awarded to students from each program offered by the five leading departments at the University.

The eligibility criteria for awarding merit-based scholarships account for top GPA (Grade Point Average) holders from different programs based on fall semester results and that scholarship only covers tuition fees. In the need-based scholarship program, students are shortlisted by the CDC and interviewed by committee members. If the student cannot maintain the required GPA at the end of the semester, then two chances of prohibition are given to those students. Failing to maintain academic achievement leads student enrolment to be ceased; consequently, the scholarship would be withdrawn and redirected to other needy or deserving students. The University has two prominent donors of scholarships one is OGDCL (Oil and Gas Development Company Limited), and the second is the Sindh Endowment scholarship. OGDCL provides 75 seats of scholarship for every four provinces (Sindh, Punjab, Baluchistan, and (KPK) Khaibar Pakhtun-Khan) of Pakistan.

OGDCL offer a scholarship to students based on CSR (corporate social responsibility) where they have their oil exploration operation. Scholarship of OGDCL is awarded to students who secure a 2.2 GPA and 75% class attendance. OGDCL offers complete fees along with Rupees 5000 stipend per month. Sindh endowment scholarship provides 100 scholarships per year to students with a Sindh domicile along with a 2.5 GPA, income level up to 1.2 million per year, and scholarships offered to all departments of the University except B.Ed. Department. Sindh endowment donates total tuition fees and admission fees.

PAK-USAID Merit & Needs Based Scholarship Program provide scholarship for undergraduate (BBA) and graduates (MBA) only. PAK-USAID scholarship is awarded through ISAC (Institution Scholarship Awarding Committee) comprises internal and external members. They conduct interviews with students before awarding the scholarship. MPLC (Mari Petroleum Company Limited) is an oil exploration in district Ghotki, and it is a fully-funded scholarship, and the stipend is also paid to students.

Other private donors include LU-Continental Biscuit Ltd scholarship program and Ayesha Memon Scholarship, and Abdul Fatah Memon Scholarship, have their criteria for awarding the scholarship. A student must have a minimum of 3 GPAs, which cover tuition fees only.

The student's academic achievement and continued persistence within the institute can measure the success of an educational institute. Financial aid in the form of tuition fees reemission, scholarship either merit-based or need-based, facilitates student's success. Higher education from 1995-2005 has increased the total expenditure by 89% to support students in higher education (Ganem & Manasse, 2011). Education, specifically higher education, is the backbone of any country. Higher education provides individuals with a better future with the support of their expertise, intelligence, and success. According to the report of Afshan (2016), Pakistan's higher education commission (HEC) offered a third-party scholarship program from 2012-2013. Fourteen sampled universities have offered 6,222 scholarships awarded to students for a better career and better future (Noor et al., 2016).

Methodology

Research Design and Selection Approach

This qualitative research study aims to create a model by maintaining an attached approach with respondents. The qualitative approach is associated with elaborating situations and context and analyzing social setup with inductive reasoning. The purposive sampling method has been used to collect the data from undergraduate students of the University, which could serve the purpose of the research study. An interview technique has been used to identify and explore the academic achievement of university students who are availing of scholarships and those who are not. According to Potter (2015b) interview technique is an efficient way to utilize resources and time to get in-depth information about the reality and lived experience of participants in naturally occurring data from the field, instead of asking a participant to comment on it (Silverman, 2015b).

Sample Size

The research study sample was undergraduate students of five leading departments of the University. The interview was conducted from 26 respondents because small samples can provide in-depth information about social phenomena in the qualitative data collection method. Specifically, small samples and open-ended questions provide the open-door facility to respond to express their feelings, thoughts, and emotions. It facilitates the researcher with in-depth information about the issue affecting social behaviors (Yilmaz, 2013). Eleven interviews were conducted with non-scholarship students and fifteen interviews with scholarship students to overcome the theoretical saturation. Further, to maintain the reliability and validity of a study, factual data on students availing scholarships have been collected from the CDC (Career Development Center), and record of students' academic achievement has been collected from the examination department of the University.

Data Collection and Data Analyses

The interview was based on the information provided by CDC. The meeting with students under consideration of two main aspects, firstly to take interviews from undergraduate students belonging to the second, third, fifth, sixth, and seventh semesters of all five departments of the University. Secondly, scholarship donor criteria. We took an interview with students belonging to B.S. (A&F), BBA, B.Ed. And B.E. under the head of six scholarship donors, such as Sindh Endowment scholarship, PAK-USAID, MPCL (Mari Petroleum Company Limited), L.U. Continental, Late Ayesha Memon, and Abdul Ghaffar Bhadelia.

A semi-structured interview was conducted with students, and oral consent was taken before the interview for ethical consideration. All interviews from scholarship and non-scholarship students were audio-recorded to maintain the record, reliability, and respondent validity of the research study. In the interview, students were first asked about the introduction, educational background, and the University (e.g., How did you come to know about the University?).

Secondly, students were enquired about the selection criteria for a scholarship, which scholarship they have and how they are maintaining such scholarship, etc. (e.g., How much GPA you need to keep to continue awarded scholarship?). Thirdly, students were investigated

about their GPA for the previous the current semester and the reasons they have declined their GPA instead of having no financial burden. The first part of the interview with non-scholarship students is the same as above.

In the second part, students were asked about the reason for not availing of any scholarship, how many times they have tried or applied for the scholarship, and which scholarship; (Merit or need-based). In the third part, students were enquired about their achievements based on the GPA of the previous and current semesters. Students were also enquired about their parental involvement in their academic activities and result progress. In the last, students were asked to compare overall academic achievement with non-scholarship students and vice versa to investigate the emotions, perceptions, and experiences of students affecting their academic achievement.

Inductive studies involve three steps in data analysis; first, content analysis; second, grounded theory; and third, narrative analysis (Silverman, 2015a). Analysis of this research study is based on the grounded theory introduced by Straus and Corbin (1994), in which a systematical procedure is followed to interpret the data collected from respondents (Strauss & Corbin, 1994).

The audio interview data were transcribed into the text and then organized in three steps to interpret the findings, first-order or empirical order data, second-order or conceptual order data, and the third step analytical order data. We assigned code to each response in first-order data and built some categories. According to Gioia (2013), first-order data analysis distilled the categories and sought to differentiate between similar and different categories (Gioia et al., 2013). In second-order data analysis, we have built themes from relevant categories that theoretically answer the critical question. Once we had workable themes and concepts, then the process of concept development emerged, which means third-order data analyses in which we had the "aggregate dimension" of a research study. Then we proceed to data Structure (Gioia et al., 2013).

1st order code	**Theoretical Categories**	**Aggregated Theoretical Dimension**
Intermediate from Khairpur city Intermediated from SZABIST Larkana school and college. I belong to Sukkur I belong to Raheem-Yar khan Punjab. Intermediate from Gilgit Baltistan.	Students belong to the interior Sindh, Punjab, and Gilgit-Baltistan	Academic background of students
' 'I'm studying in B.Ed. program 6th semester B.S. Accounting and Finance (A&F) 3rd semester Studying in the 3rd semester of B.E. ' 'I'm studying in BBA 5th semester	Bachelor Program	Undergraduate students

I came to know through social networks and banners of IBA Sukkur I saw an advertisement in the newspaper. I came to know about IBA through my brother. A ' 'father's friend told him that it's a good business institute.	Awareness about the institute through social media, friends and family	Knowledge about institute
I have no moral support, but sometimes my uncle helps me financially Yes, they are supporting me morally and financially. I have moral and financial support. Yes, my family supports me a lot.	Students belong to the Middle and lower middle classes	Less Financial Burden
Yes, my uncle asks about my GPA. No, they know that ' 'I'm studying No, the thing that they believe in me. They do not pressurize me, but they are a concern. Nobody asks me.	Low/No family check and balance	Low parental involvement
Yes, I have applied, for both need-based and merit-based. Yes, I have tried, but I got rejected. I have not improved my academic achievement due to depression. My GPA was 2.5, then I improve by 2.8, and now it is 2.97. My previous GPA was 2.5, and now it's 2.9. One of my class fellows is a 3.0GPA, and he is working hard to maintain it; otherwise, he will lose the scholarship.	Awareness about institutional Policy criteria.	Awareness about self and Institution
The scholarship is like a feeling of achievement. The scholarship is a motivation for students. Once I have a scholarship, I will work harder to maintain my GPA. In SIBA competition	The sense of distinguishes	Sense of achievement
I was O.C. in "dice Vice." In the welfare and Go green society, I participated in Global village, declamation and anchoring.	Participate in Activities to build confidence and other skills	More participative in other academic activities

Table: 1 The data structure of Non-Scholarship Students

My family supports me morally, but not financially. A stipend is enough for me and my whole semester. My family supports me morally, but financially they don't have enough money. There is no pressure because they know that ' 'I'm hardworking and responsible.	Motivated, hardworking, and reduced financial burden from family	Self-motivated, emotionally sensitive, and hardworking
No, my previous semester's GPA was 2.9, but my current GPA is 2.5 due to my health issues. Initially, it was 3.67 then 3.38 and 3.4 and now my current CGPA is 3.5. My GPA was 3.56 and then started decreasing to 3.28, 3.4, and currently, it is 3.33.	Awareness about institutional Policy criteria to maintain GPA for continuing availing of scholarship	Academic Achievement
Yes 100%, at IBA I will quit and seek any other option where I can afford my financial expenses. I felt it burden that I have to maintain my GPA either I will lose my scholarship We work hard not because we want grades but as a scholarship holder	Students suffer from desperation and psychological stress	Low emotional stability
Yes, I have joined societies and other competitors such as the IEEE community of IBA No, I 'don't participate in any activity Due to lots of pressure in studies. Every year I participate in the mathematics Olympiad	Participate less in academic activities due to fear of loss of scholarship	Less participative

Table: 1.1 Data structure of Scholarship Students

Findings

The interpretative approach has been used to analyze the attached feedback from respondents. The finding of all 26 interviews presented in Table 1 and Table 1.1, respectively. Table 1 represents the students who were not availing of scholarships, and Table 1.1 represents students who were availing the scholarship. They all belonged to Sukkur city, the interior Sindh region, and a few students belonged to Rahim-Yar khan and Gilgit-Baltistan. All students had an indigent educational background, and they had done their intermediate from their city town.

They came to know about university either through social media or either through their family, friends, and neighbors. The same response we have received from scholarship students. Non-scholarship students said that they had joined the University due to quality education, and some said because the University is close to their access. Some even said that we did not know anything about the University. My cousin and brother suggested I be admitted here because I have no other option for further study as I belong to a pre-medical background.

> *"I did not know about it as I told you that "I'm from pre-medical, so I did not know anything about the University, and I have no other option for study. So, I'm here due to my cousin and brother's suggestion."* (Student Response)

Scholarship students have different opinions regarding joining the University. Most students at the University were from the Middle or lower-middle class. They need help to afford their financial expenses of admission fees, hostel fees, or even food expenses. While interviewing scholarship students, they told us they had joined the University because of the scholarship.

> *"I am here due to a scholarship; if I would not be awarded the scholarship, I might be at home doing something else."* (Student Response)

Students from the engineering department have different opinions that there were few numbers scholarships for the engineering department, which awarded top GPA holder students.

> *"There is a minimal number of scholarships for E.E. department which are awarded to top merit-based students as a merit-based scholarship that's why I did not get any scholarship."* (Student Response)

Students who belong to Gilgit-Baltistan also have different opinions regarding not availing of any scholarship because there is no quota for their province.

> *"Yes, I tried in the first semester when my GPA was 3.3. I went to CDC, and directly they refused and said there is no seat for Gilgit Baltistan."* (Student Response)

In contrast to non-scholarship students, only some scholarship students told us that we applied for the scholarship, the committee conducted the interview, and we got selected.

Further, scholarship students told us that they have moral support but not financial and non-scholarship students said they have both moral and financial support. Regarding parental involvement, scholarship students told us that they ask and make us realize that we do our best as we are availing of the scholarship. Whereas non-scholarship students told us they did ask but did not force us to study. Some even said that our parents didn't have any involvement in our academic affairs.

> *"No, they know that I am studying, and another thing is that the policy of the University is that the student is on prohibition or either he/she got a drop from any program he/she will go back to their home. If I am studying so, they feel I'm studying and my career is moving on smoothly. They never interfere and never ask about my study, which means they are satisfied with me."* (Student Response)

We investigate their academic achievement and their GPA. Non-scholarship students told us they did not improve their GPA, but overall communication, presentation, and confidence have developed. Some non-scholarship students said that they had improved in both areas: their GPA has been enhanced in academics, and their soft skills also improved.

> *"According to my GPA, I have not improved. In my 1st semester, and my GPA was 3.53; in 2nd semester, my CGPA was 3.29."* (Student Response)

> *"Yes, of course, in my 1st semester, my GPA was 2.5 then I improve 2.8GPA, and now it is 2.97GPA."* (Student Response)

The students told us that certain other factors affect our academic achievement. Once a year, I can visit my family and my hometown because we are from Gilgit Baltistan; other factors such as weather and hostel/mess food do not sustain my health, so my GPA declined.

> *"I have not improved my academic achievement due to depression, and I have a migraine. As final exams come near, I start taking tense that I will pay the fees. In the last semester, I fainted and was hospitalized due to tension, and I withdrew from one subject. Last semester my GPA was 3.33, and it is 2.8 now."* (Student Response)

> *"No, my previous semester GPA was 2.9, but my current GPA is 2.5 due to health issues."* (Student Response)

Whereas scholarship students told us that they had improved their academic achievement, and we worked hard to maintain our GPA so we could have the scholarship.

> *"My previous semester GPA was 2.44, and currently, it is 3.39."* (Student Response)

> *"Of course, my previous semester GPA was 3.3, but my current GPA is 3.5."* (Student Response)

To get in-depth information about students' perceptions, we ask non-scholarship students if the scholarship is given to them, will you work hard or will your achievement be improved? We also enquire scholarship students to compare their struggle and hard work with non-scholarship students. They replied that they did not find any difference between being a scholarship or a non-scholarship student, and if the scholarship is given to us, then we will study as much as we are currently studying. Few students said that; they work hard and they are bound to study; they even cannot participate in extra-academic activities. Further, they said that if the scholarship is given to us, we will work hard and try to maintain consistently availing of that scholarship.

> *"I cannot feel any difference between scholarship and non-scholarship students, just that financially those students need to avail the scholarship. They study as much as we are studying."* (Student Response)

> *"I think scholarship and non-scholarship students both are working hard because everybody knows the kick-out system of the University."* (Student Response)

We enquired from scholarship students whether they would quit their studies if they had no scholarship. Most students said yes, 100%. I would quit my studies because my family could not afford my study expense. Few said we would leave University and will go for the option where my family can afford the financial cost. Few said we would try to have any other source to continue our studies.

> *"Yes, it was in my mind that if I could not avail myself of the scholarship, I will quit my studies. There are not that many fees for the B.Ed. program but even that my family could not afford for four years."* (Student Response)

> *"No, I will not quit; I will find any other source to continue my studies, like giving tuition."* (Student Response)

Students have differing opinions about scholarship students. Further, non-scholarship students said they participate in almost every event, such as; sports, social societies, music, art, and drama society, as any financial pressure of fees or family pressure does not bind them. They did not participate, and they were just good at academic achievement.

> *"Yes, in sports and social societies, and I have been executive of society once, and currently I'm a coordinator of the community welfare society."* (Student Response)

> *"Scholarship students are not active in extracurricular activities. Toppers in my class are very weak in practical work. They can easily memorize and write it in exams, but non-scholarship students participate in extracurricular activities that try to balance practical and academic work."* (Student Response)

On the other-hand scholarship, students told us that initially, we were focusing on our studies. I had fear in my mind that I could lose my scholarship and will lose my studies. After a few semesters, I participate in some other academic activities.

> *"Yes, when I was in THP, I won Math Olympiad national competition, I took part in the book review competition, and our group was in 6th number through that; I won a MAC Icore7 laptop and what else I need. Due to lots of pressure in studies, my influence in such activities is not that much, but when there is an essay writing or creative writing competition, then I participate."* (Student Response)

> *"Being a scholarship student, we are unable to participate in other activities; if we participate, then it becomes risky for our studies, but we have to manage everything."* (Student Response)

Last, we asked scholarship students to compare their achievements with non-scholarship students. They told us we work hard due to so many factors; due to lack of financial support from family, we set specified goals not to lose our scholarship, so they believe they work hard compared to non-scholarship students.

> *"Parents of those students who could afford their children's finances have no burden or tension. And those students who are poor and could not afford their fees work hard to avail the scholarship."* (Student Response)

> *"Well, if I compare myself with them, I am more dedicated. I want to share my experience that I am following a very tough schedule for my studies. I know that I can only achieve my goals by working hard. So many of my classmates and friends taunt me that you are mad; how can you study the whole day, why don't you participate in social activities and enjoy your life? But I have witnessed those friends who said to me like this, either dropped out, got F in two or three subjects, and transferred to a different University. I know that if I do not work hard then I will go back to my home, I have no other option but they have the option; they know that they have a sound financial background and their father can support them. However, I have not any financial support."* (Student Response)

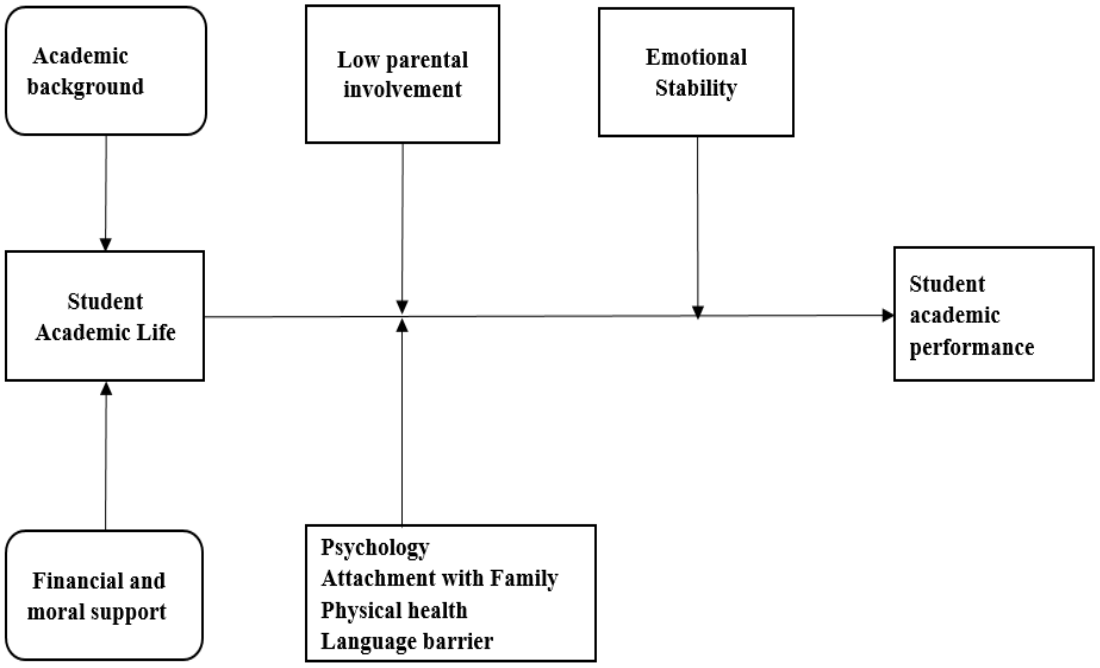


Figure 1: The Proposed Framework Derived from themes

Discussion

This study elaborated on the importance of financial assistance for university students. This study highlights scholarship and non-scholarship students. Also, it identifies the factors which affect students' academic achievement and compares the academic achievement of scholarship and non-scholarship students. Scholarship and non-scholarship students belong to the middle and lower-middle-class of Sukkur city, interior Sindh, Rahim-Yar Khan, and few students belong to Gilgit-Baltistan. Both students (Scholarship and non-scholarship) were very much aware of the policies of the University, from admission, applying for scholarships, and grading criteria to clear any subject or semester, to dropping out a policy of the University. Finance remains a significant issue for scholarship students. Scholarship students contemplate quitting University if they have no scholarship, and they also believe that a scholarship is an achievement or a source of motivation to work hard. The difference was analyzed in the performance and academic achievement of scholarship and non-scholarship students.

We analyzed the GPA record of undergraduate students in the 2nd, 3rd, 5th, and seventh semesters of both scholarship and non-scholarship students. The GPA record collected from the CDC (Career Development Center) and the exam office of the University reveals that two critical factors affect the academic achievement of scholarship students, first, the personal factors associated with students' academic life, and second, the scholarship donor criteria. Due to individual elements, the academic achievement of scholarship students has consistently declined every next semester due to low morale and financial support from family, homesickness (students belonging to Gilgit-Baltistan), and health issues.

The reason for the decline in academic achievement was the emotions of students. They work hard to meet the scholarship donor criteria and remain less participative in other academic activities, clubs, social societies, sports, etc. However, most scholarship students must improve their grades/GPA the following semester. The human emotional agency generally suggests that a student's emotions have an impact on the achievement, physical health, psychology, and academic achievement of the student (Pekrun, Goetz, Titz, & Perry, 2002). There were very few scholarship students whose academic achievement had consistently improved, but those students needed to be more participative in other academic activities. They remain under stress and fear of loss of scholarship.

Conclusion

After conducting this lengthy procedure, we concluded that students' academic life is affected by several factors such as the educational background of students, moral and financial support, low parental involvement, physical health, the psychology of students, language barer, and low emotional stability. All these factors' collectivity affects the student's academic achievement and students' academic achievement will be improved if they have support (Milne et al., 2016). Numerous meta-analysis studies conclude that parental involvement positively impacts students' academic achievement (Fan & Chen, 2001; Jeynes, 2017). Low parental involvement means low academic achievement. The majority of students at the University belong to an indigent educational background. They also need help with language; because of that, they need help understanding the lecture. Moral and financial problems also create stress, anxiety, and fear of losing a scholarship or being a failure among students. Parents and teachers both act as a bridge between students' academic life. Low parental involvement means no checks and balances on students' academic achievement, which also influences them. Students in remote areas such as; Gilgit-Baltistan, Rahim-Yar Khan need help with health, weather, and communication issues. More attention should be paid to Baluchistan and Gilgit-Baltistan students for better academic achievement (Noor et al., 2016).

Limitations, Recommendations, and Future Directions

In this research study, we have identified factors that affect the academic achievement of students who belongs to the undergraduate program of this University only, which is the limitation of the study; the scope of the research study can be broadened. For the current research study, ungraduated students were considered only. Research scholars can involve parents to get rich insights into parents and family issues affecting students' academic careers. Universities should focus on life-long learning and technological facilities because technology impacts student learning (Khalil-Ur-Rehman, Farooq, & Younas, 2018). The higher education commission (HEC) should focus on university students' emotional well-being and financial assistance. Universities should design flexible scholarship criteria as most students belong to remote and underprivileged areas and have fewer opportunities for higher studies. Universities should plan strategies to over students' financial and emotional stress and anxiety. Another foresight is that the proposed model should be tested empirically. Future research should be done on overcoming those factors that cause low academic achievement in university students.

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The Study Conceptual of Professional Learning Community and Teacher's Practice in School in Thailand

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Abstract
The research aims to study the concept of the teacher professional learning community and the practice of using the teacher professional learning community process. This research collects data from 360 teachers by using online questionnaires. Questionnaires consist of multiple choices about general information, the concept of teacher professional learning community, and rating scale questions about the practice of using the teacher professional learning community. According to the results, teachers have the proper perspective on the professional learning community process. The percentage of "yes" respondents is up from 85%. However, some issues show that teachers need to be more aware of the Professional learning community process and that implementing discussion results in teaching and learning needs to be followed up with only 54.7%. Secondly, the Teacher's Practice in the Professional Learning Community process was moderate. Only some issues are practised at a high level, namely, working together in friendship, trusting, and helping each other. Empowering and empowering each other in solving problems with students and creating encouragement to work together to solve the issues and welcome each other in success.

Keywords: Professional Learning Community, Teacher's Practice, Thailand

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Introduction

Education in Thailand states that all learners could be learned and develop themselves and must provide an education that develops learners naturally and to their full potential. All teachers must seek ways to enable all students to discover following the spirit of the Act. The innovation teachers must know the Professional Learning Community (PLC), where PLC stands for Professional Learning Community, which means Community of Practice (CoP). It is beneficial to society and the nation. "Teachers" are an essential mechanism to drive the quality of education. To be the frontline in developing the quality of the nation's population to have potential. Competitiveness in the international arena to keep pace with the changing world in the 21 century.

A professional learning community was a process. Create change by learning from the work of groups of people who come together to work together and support each other. Set learning goals for learners and monitor and reflect on personal and overall performance through the learning exchange process. Criticism, collaboration, a collaboration by focusing on promoting the learning process holistically with at least five actions as follows: 1) Have a common goal of managing learning/developing learners to their full potential 2) Exchange learning from the work site / actual situation of the class 3) All parties involved in learning and joining forces / supporting the creation of change according to the goals 4) Criticism reflects the results of student development and 5) HOPE was created for the team consisting of (1) honesty & humanity. (2) Option & Openness is the selection of the best for the learner and is ready to reveal/ (3) Patience & persistence is the development of patience and determination. (4) Efficacy & enthusiasm built confidence in the results of learning management methods that are appropriate for learners to learn and are eager to develop themselves (Rewadee Chaichawarat, 2015) thoroughly.

Key attributes that contribute to professional learning communities, any school with a PLC must be composed of members of the group mentioned above of individuals. Gathering of members The professional learning community must also include key features, with various key features that will contribute to PLCs. However, it could summarize the key features that make PLCs could be formed in five ways: 1) shared values and vision, 2) collective responsibility for students learning, 3) reflective professional inquiry, 4) collaboration and 5) supportive structural arrangements and collegial relationships (Hord, Roussin & Sommers, 2009).

Research objectives

1. To study the concept of the professional learning community of teachers
2. To study the practice of using the professional learning community process of teachers
3. To compare the conceptions and practices of teachers' professional learning community processes

Scope of research

Variable scope

General data variables included: Teaching experience, School size and academic level of the teacher.

Professional Learning Community Process consists of 1) the teacher's vision; 2) The practice of teachers in the process of professional learning communities; there are four stages: work planning, implementing solutions or encouraging students, Monitoring the implementation of problem-solving or promoting students and improving work plans.

Scope of demographics and samples

The population for this research is teachers who teach in schools, including elementary, middle and high schools throughout Thailand. In order to analyze the research data, consisting of comparative analysis of t-test mean and F-test, the researchers determined various values using F-test analysis, which defined effect size f as 0.25, the tolerance level of 0.05, the number of 8 groups, and the number of respondents was 360 samples.

The research methodology

Research tools

The questionnaire consists of 3 parts:

Part 1 General information includes: Grade Level Taught Teaching experience, teacher status, subject group, and school size.

Part 2: Teachers' Views on Professional Learning Communities There are three responses: yes, no, and unsure.

Part 3 Teacher Practice in the Professional Learning Community Process Five of the 15 items are estimated levels. Work Planning Implementing solutions or encouraging students Monitoring the implementation of problem-solving or promoting students and improving work plans.

Data Collection

This research collected data by submitting an online questionnaire courtesy letter to the school director and determining the number of respondents in each school to distribute to all subject groups, checking the completeness of the questionnaires received. Once 360 copies of complete responses have been received, the online questionnaire system will be turned off.

Data Analysis

This research is quantitative, so the data is analyzed with statistics, consisting of narrative statistics and inferential statistics, in order to answer the research objectives as follows: A study of teachers' professional learning communities. First, analyze data with descriptive statistics. Second, Analyze data with inferential statistics.

Results

This research presented the findings in three parts: 1) the results of the general data analysis of the respondents, 2) the results of the study of the teacher's professional learning community, and 3) the comparative effects of the teacher's professional learning community

process when teachers have different teaching experiences, subject groups and school sizes vary. Detail as follows:

Parts 1: The results of the general data analysis of the respondents

Most teachers have less than ten years of teaching experience, followed by 11-20 years of experience—in primary and high school, respectively. Most subjects are taught in mathematics, followed by science and technology learning and religious and cultural studies, respectively. Teacher's Academic Status It was found that most teachers have a particular education level, followed by skilled teachers. In terms of school size, most of them teach in extra-large schools, followed by medium-sized ones.

Part 2: Analysis of teachers' views and practices in the professional learning community

In this section, the researchers presented the results of the analysis of teachers' ideas to the professional learning community. The teacher considers the question and answers yes, no, or unsure. If a teacher chooses a "yes" answer, it reflects the teacher's mindset towards the teacher's professional learning community. The results of the analysis were presented as shown in Table 1.

Table 1: Teachers' Views on Professional Learning Communities

Teachers' views on professional learning communities	Percentage of response		
	Yes	No	Not sure
Development of learning management based on principles PLC teachers need to have a discussion together.	98.1	0.3	1.7
PLC group members must set goals for learning management in the same direction.	88.3	7.5	4.2
The main goal of PLC is teacher development.	60.8	29.7	9.4
PLC's main goal is to develop learners.	94.4	2.5	3.9
PLC members must assume leadership and follower roles in the exchange of learning.	88.3	8.1	3.6
After solving problems in class Teachers and PLC members must discuss the results.	95.8	1.4	2.8
PLC activities require observation of teaching by peers.	85.8	5.6	8.6
Reflection of teaching observations is necessary in the PLC process.	91.7	4.7	3.6
Once the results of the discussion have been applied in the course of the course, it is necessary to follow up on the results.	54.7	37.8	92.5
Performance must always be recorded.	92.8	3.9	3.3

Table 1 shows that teachers have the right mindset towards the professional learning community process. The percentage of "yes" responses is 85 per cent or higher. However, some issues show teachers must understand the professional learning community process. Applying the discussion results to the teaching and learning needs to be followed up. Teachers agree only a hundred 54.7.

Teachers' practice of PLC found that they are implementing solutions or encouraging students Monitoring the implementation of problem-solving or promoting students, and improving the work plan, which has a range of points. For example, 1.00 – 2.33 means

common practice, 2.34 – 3.66 means reasonable practice 3.67 – 5.00 means much practice. The results of the analysis are shown in Table 2.

Table 2: Teachers' Practices in Professional Learning Community Processes

Compliance with professional learning community processes	Mean	SD
You analyze student needs to plan your collaboration with PLC members.	3.47	1.009
You and PLC members jointly set group performance goals in both the shaky and long-term phases.	3.52	.990
You and members PLC jointly researches information from various sources for use in planning work.	3.51	1.042
You and PLC members work together in a friendly way. Have trust and help each other.	3.76	1.059
You solve student learning problems according to the plan set out with PLC members.	3.56	1.002
You collect student data during problem-solving operations, such as observing, discussing, etc.	3.60	1.024
The solution is reviewed and monitored for collaboration with PLC members.	3.53	.993
You and plc members empower each other to build confidence and encouragement to take action against students.	3.67	1.006
He observed the teaching of PLC group members as an accompaniment to the review of student problem solving.	3.51	1.012
You propose the results of the solution to plc group members for discussion and review together.	3.54	1.001
You and PLC members jointly analyze the strengths and weaknesses of the solution applied to students.	3.56	1.003
You improve your plan to work with PLC members based on student learning outcomes data after receiving a solution.	3.54	.987
You are constantly improving your approach or problem-solving model.	3.53	1.018
You and your members seek to review solutions and seek new approaches to solve problems.	3.56	1.038
You and your members encourage you to work together to solve problems and rejoice in your success.	3.71	1.052

Table 2 shows the teachers' practice of professional learning communities was observed. Most of them are moderate, with only some issues practised to a large extent, including friendly collaboration, trust and mutual support. Empowering and encouraging each other to take action to solve problems with students, and encouraging them to work together to solve problems and rejoice in each other in their success.

Part 3: Comparative results of teachers' professional learning community processes When teachers have teaching experience, the subject groups that teach the school size and academic level are different. Details are shown in Tables 3 and 4.

Table 3: Comparison of teachers' professional learning community mindsets
(When teachers have different teaching experiences, subject groups and school sizes vary.)

Teaching experience	SS	df	MS	F	Sig.
Between groups	75.001	36	2.083	.936	.578
Within a group	718.974	323	2.226		
total	793.975	359			
Grade Level Taught					
Between groups	.055	2	.027	.012	.988
Within a group	793.920	357	2.224		
total	793.975	359			
Strands					
Between groups	13.160	6	2.193	.992	.431
Within a group	780.815	353	2.212		
total	793.975	359			
Academic Level					
Between groups	7.117	2	3.559	1.615	.200
Within a group	786.858	357	2.204		
total	793.975	359			

Table 3 shows that when comparing teachers' views to professional learning communities, they were classified as teaching experience, School size and academic level. Not all variables were found.

Table 4: Comparison of teachers' use of professional learning community processes
(When teachers have different teaching experience, subject groups and school sizes vary.)

Comparative results of teachers' practice in using professional learning community processes Classified by variables					
Teaching experience	SS	df	MS	F	Sig.
Between groups	35.489	36	.986	1.144	.269
Within a group	278.301	323	.862		
total	313.791	359			
Grade Level Taught					
Between groups	.053	2	.026	.030	.970
Within a group	313.738	357	.879		
total	313.791	359			
Strands					
Between groups	1.149	6	.191	.216	.972
Within a group	312.642	353	.886		
total	313.791	359			
Academic Level					
Between groups	.797	2	.398	.454	.635
Within a group	312.994	357	.877		
total	313.791	359			

Table 4 shows that when comparing teachers' practices in using professional learning community processes classified by Teaching experience, School size and academic level, Not all variables were found.

Conclusion and discussion the findings

This research summarized and discussed the findings in order by research objectives. Details are as follows:

Objective 1: To study the concept of professional learning communities of teachers. In conclusion, teachers have an essentially correct view of the professional learning community, determined by the teacher answering the questions correctly. There are only some issues where teachers need more accurate views, such as monitoring teaching performance after discussions on improving teaching and learning due to the practice of teaching and learning in educational institutions. Most of them have a teaching style based on the content set out in the textbook. As a result, the teaching method must be adjusted according to the content of each subject. Once the teaching development guidelines are discussed and implemented, there is no follow-up.

In addition, in the big picture, Teachers have a strong view of the professional learning community due to the Office of the Basic Education Commission by the Office of Teacher Development and Basic Education Personnel conducting training to drive the PLC (Professional Learning Community) process "Professional Learning Community" to educational institutions for in-service education with a total of 687 students. It can expand the results for relevant persons and design supervision, monitoring, and encourage school administrators and teachers to implement the PLC (Professional Learning Community) process, professional learning community, into practice in educational institutions. The most effective way to the school is concrete. Therefore, the Office of the Basic Education Commission asked the school district office to appoint a steering committee. PLC process "Professional Learning Community" to educational institutions at the level of school district offices and send six representatives of each school district to attend workshops to drive the PLC process "Professional Learning Community" to educational institutions. It can be extended to individuals involved in the agency and jointly plan the drive. PLC process, a professional learning community effectively implement in educational institutions and sustainably develop the quality of education.

Objective 2: To study the practice of using teachers' professional learning community process. Teachers were mainly moderate, reflecting that teachers may not have fully implemented the learning community process on all issues. Although this may be due to the integration of learning, any change or policy to drive the whole system was challenging. Therefore, schools need to create PLCs that align with the school's professional nature and have a strong community (Senge, 1990). Have consensus and faith in work. "Teachers for Students Together" Therefore, the atmosphere of coexistence is an atmosphere of "academic community" (Surapon Thamromdee, Thasanee Chanin, and Kongkrit Traiyawong, 2010) characterized by a community of generosity based on "professional power" and "moral power" (Sergiovanni, 1994).

In addition, there was a high level of teacher practice, including friendly collaboration, trust and mutual support. Empowering each other to solve problems with students and encouraging them to work together to solve problems and rejoice in each other in success, all of which are

part of building morale and empowering each other because PLC affects teachers. The teacher's teaching work increases the sense of commitment to the school's mission and goals by increasing the enthusiasm to fulfil the mission actively, resulting in the desire to learn together and take responsibility for the overall development of the students. In other words, knowledge and beliefs about teaching methods and learners are discovered through observation, attention, and understanding of the subject matter that must be managed to become more aware of the role and teaching behaviours that will help students learn best. In addition, the broader and faster acknowledgement of the information necessary for the profession has a positive effect on improving professional development at any time, resulting in an inspiration to develop and dedicate the profession to the students, which is both valuable and morale for the betterment of the work. More importantly, it can also reduce the leave rate compared to schools. The old model has also found progress in adapting how learning is managed following the learner's characteristics. Moreover, faster than in traditional schools, there is a bond to create new changes to appear (Office of the Basic Education Commission, Ministry of Education, 2017).

Objective 3: To compare the views and practices of teachers' professional learning community processes. When the teacher has teaching experience, the subject group teaches. Different school sizes and academic levels showed whether the teachers had teaching experience and the subject groups taught. The mindset and practice of using teachers' professional learning community process were the same due to the continued expansion and follow-up of studies.

In conclusion, PLC is based on the concept of the business sector about The ability of organizations to learn (Thompson, Gregg, & Niska, 2004) is the introduction of the organizational concept of learning is applied by explaining that comparing a school to an "organization" is probably inappropriate and correct. Indeed, schools are more "community" than an organization, which is "organization" versus "community." There is a difference in that community is internally tied together by values; the opposite of "organization" that involves relationships between members in a way that is based on a descending level. It has a control mechanism, and a tight structure filled with The rules and culture of the exercise of power are primary. While the "community" will use the influence of having shared values and objectives, it is a relationship between professional members who are academically friendly and based on interdependent principles. A collaborative approach to work that aims to improve learners' learning is a priority. In addition, "organization" also creates certain features, such as reducing the friendliness of each other. Therefore, if the school is viewed as such an organization, it will give the school a formal style that creates a feeling. The greater the interpersonal distance, there are many control mechanisms, and often a focus on the subject as a technical task. On the other hand, if the school is accepted as having a community-based status, then the atmosphere that follows is that the members are Bonding with each other with a common purpose that involves building intimate relationships and creating an atmosphere where everyone expresses concern for each other and helps to see and care for their mutual well-being (Sergiovanni, 1994). Shared care of learning and the community's shared responsibility is to improve learners' learning.

The importance of PLC based on findings by Hord (1997) confirms that the implementation of the PLC model leads to qualitative changes in both professional and student achievement by synthesizing research reports on schools with PLC establishments, using the question of what outcomes are different from those of conventional schools without professional communities and, if different, how can they benefit teachers and students?

Issue 1: Good for teachers to reduce isolation in teaching work. There is a consolidation, unity, a collaboration of teachers. Administrators and educators in schools As Sergiovanni (1994) has said, PLC is a place for "interaction", reducing the "isolation" of the mass of professional members of the school to work to improve student performance or school academic work, which Hord (1997) viewed in the same perspective. It signifies teachers' collective leadership or allows them to be "presidents" for change (Critic Panich, 2012). Having shared values and shared vision Collaborative learning and creative application of what we learn This form of incorporation is driven primarily by the needs and interests of plc members for learning and professional development toward student learning standards (Senge, 1990). Professional development as a "teacher for students" (Critique Panich, 2012) by seeing it as "our disciple" rather than as "my disciple". Change the quality of learning management that starts from "teacher learning" as the starting point. Learn to see improvements change. Develop their learning management for the learners as a priority.

Issue 2: Good for learners Found that PLC affects learners; that is, it can reduce the rate of dropping classes and the number of classes that need to be postponed or delay learning arrangements. The absenteeism rate is decreasing. The academic field in historical science and reading is significantly higher. Compared to the old school. Finally, there is a clear difference in academic achievement between groups of students with different backgrounds and an apparent decrease.

In short, PLC has evolved from a level strategy. Organizations that focus on adapting to The rapid change of society begin with the concept of the learning organization and adapt it to be in line with the school context and collaborative learning in a professional way that has an important function, namely the responsibility of learning of learners together, according to several studies of schools in the country. In the United States, plc operations have been found to have a positive effect on both the teaching profession and learners, focusing on learners' development.

Recommendations for the implementation

This research looked at teachers' perspectives and practices towards professional learning communities. Users of the findings may consider designing PLC processes based on a list of different issues in this study, which will benefit teachers in reducing their sense of isolation in their teaching work. First, increase a sense of commitment to the school's mission and goals. By increasing enthusiasm to actively fulfil the mission, feeling that they need to take responsibility for the overall development of the students and jointly take responsibility as a group for the success of the students, they feel the so-called "powerful learning", which results in a better performance of teaching in their classrooms. In other words, new knowledge and beliefs were discovered in the way they teach and the learner himself, who was not previously observed or interested. A better understanding of the subject matter to be taught and knowing the role and behaviour of teaching will help students achieve the best learning according to the expected criteria. Good results to improve their professional development at any time. Teachers are inspired to inspire and continue to learn for students, increase satisfaction, increase morale and reduce leave rates. Progress has been made in adapting teaching methods to reflect the characteristics of learners more prominently and faster than those found in traditional schools. There is an obligation to make new changes visible and sustainable. It wishes to bring about systematic change to the fundamentals of the aspect.

Recommendations for the subsequent research

PLC process models should be studied from abroad and led to the design and development of various PLC processes following the conditions of the educational institution. Teacher attributes Course attributes and learner characteristics to make appropriate choices for different contexts.

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The Promotion of Technology-Based Analytical Problem-Solving Skills (aPSS) Based on the Cognitive Apprenticeship Approach and Through Adaptive Tutorial Feedback

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Abstract
The need to promote the aPSS of trainees in the technical-commercial sector results from various reasons. On the one hand, the digitalisation and automation of industrial production processes has led to increased demands on future maintenance staff. On the other hand, at the end of the dual initial training of electronics technicians for automation technology, there was a discrepancy between the curricular requirements and the actual existing competences. This results in a need for support, which is to be countered in the sub-study of the TechKom research project. The aim of the project is to investigate the influence of adaptive tutorial feedback (ATF) and cognitive modelling on the development of aPSS. ATF is understood to be information and assistance that adapts to the learning need situationally and provides only what is actually needed. Based on the need for support and the aim of the project, the following hypothesis is investigated: Trainees who only have access to the video for cognitive modelling in the "modelling" phase acquire less aPSS than trainees who receive ATF in the computer simulation while working on problems. To acquire aPSS, an automation system was digitally simulated. The trainees use the simulation of an industrial automation plant to carry out strategy-guided troubleshooting. Learning videos (CA approach) and the ATF were implemented within the digital automation system. In the further course, the first results about the influence of the adaptive-tutorial feedback will be presented.

Keywords: Analytical Problem-Solving Skills, Adaptive Tutorial Feedback, Cognitive Apprenticeship-Approach, Computer-Based Environment, Simulated Industrial Automation System

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Introduction

1) Theoretical preliminary overview

a) Excursus: Industry 4.0 and VET research in Germany

With the arrival of Industry 4.0 in the 2010s came a plethora of expectations, promises, benefits and technologies, but also increased demands on workers in the industrial sector. Internet of things, Smart Factory, Intelligence Sensors, Artificial Intelligence (AI) or Virtual/Augmented Reality (VR/AR) are just a few examples that are listed as key technologies in Industry 4.0 and pick up on the previously mentioned concepts (Kamarul Bahrin, Othman, Nor Azli, & Talib, 2016, p. 138; Wichmann, Eisenbart, & Gericke, 2019, p. 2131).

Technological changes in the industrial sector have led to the emergence of new professions, the revision of existing professions or the need to retrain workers (Schäfer, Link, & Walker, 2020, pp. 131–132).

In recent years, due to technological and educational policy developments in Germany, there have been many efforts to investigate and empirically confirm a competence model for the training occupation of electronics technician for automation technology (Schäfer & Walker, 2018, p. 68), as the vocational training sector in particular has received little attention to date (Beck, Landenberger, & Oser, 2016, pp. 9–10).

Within the nationwide research initiative ASCOT[1], the sub-project KOKO EA[2] was integrated, which investigated and validated the competence structure of electronics technicians for automation technology (Walker et al., 2016, 160, 162-163). This showed that the professional competences are made up of two sub-competences (Expert knowledge and problem-solving skills, see Figure 1).

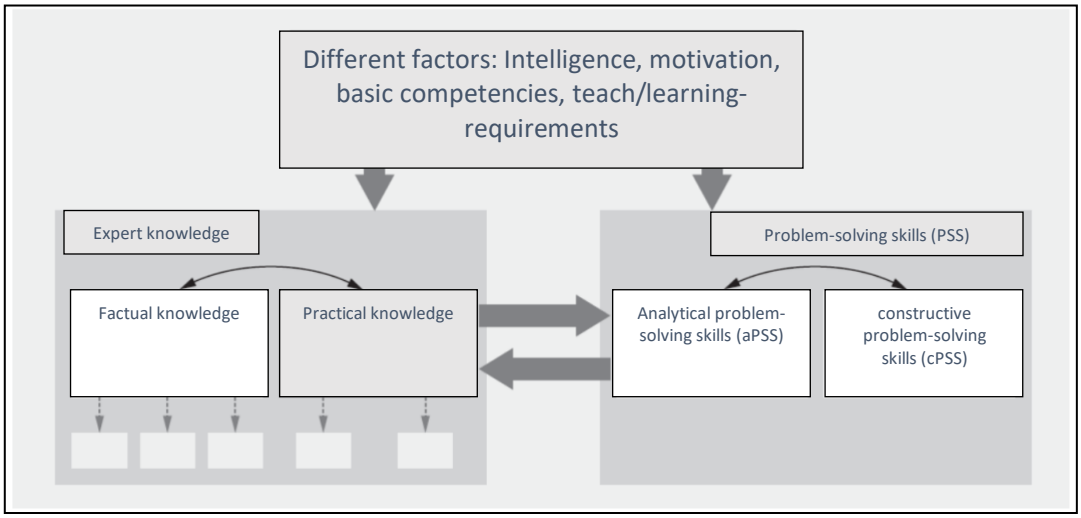


Figure 1: Competence model of professional knowledge (Walker et al., 2016, p. 142)

[1] Technology-based Assessment of Skills and Competences in Vocacional Education and Training (Research project from 2011-2015 in Germany).
[2] Competency measurement and modeling for electronics technicians for automation technology.

In addition, the sub-competences addressed can be further differentiated: The factual knowledge and the practical knowledge form the expert knowledge and the analytical and constructive problem-solving skills form the superordinate problem-solving competence. Studies conducted in the KOKO EA project also showed that the participants had weaknesses in the aPSS, as one third of the participating trainees did not have the curricular requirements and thus there was a discrepancy between the expected and the actual competences (Walker et al., 2016, p. 163).

Since the study conducted is specifically concerned with researching and promoting analytical problem-solving competence, no further differentiation of the competence model is made, and the focus is placed on the PSS term. PSS is understood as the application of expert knowledge in problematic action situations (Walker, Link, & Nickolaus, 2015, p. 224). With this understanding it follows that the expert knowledge is to be regarded as a prerequisite for successful troubleshooting or the software-side expansion of a programmable logic controller (PLC). Thus, troubleshooting represents the aPSS and the concrete use of knowledge about PLCs - e.g. programming a PLC program - represents the constructive sub-dimension. The assumption that expert knowledge must be available to be able to deal with a problematic situation was confirmed by the high influence of specialist knowledge in the areas of automation technology (AT)/PLC on fault diagnosis (Walker et al., 2016, p. 163). Furthermore, it was shown that the analytical and constructive PSS can not only be explained based on expert knowledge but can also be assumed as independent dimensions with a correlation value *r* of 0.58 (Walker et al., 2016, p. 163).

With the confirmation of the competence model presented above as well as the analytical problem-solving competence standing on its own and the special need for support located in it, the follow-up project TechKom[3] resulted, which is embedded in the nationwide transfer initiative ASCOT+[4].

b) Training in computer-based learning environment: Troubleshooting in simulation systems

To reduce the deficits in aPSS and to address the complexity of error cases, a web-based simulated industrial automation system (SIAS) was developed with which trainees can process various error cases and practice troubleshooting on automation systems. Furthermore, it was shown that a simulation system can also be used to promote analytical problem-solving skills (Walker et al., 2016, p. 159).

The error cases implemented in the simulation system cover the areas of mechanics, electrical engineering and PLC to realistically represent professional reality. A real system (see Figure 2), which produces a cube from two individual metal pieces in an error-free environment, served as the basis for development.

[3] Technology-based assessment and promotion of competences.
[4] Follow-up project of the ASCOT project.

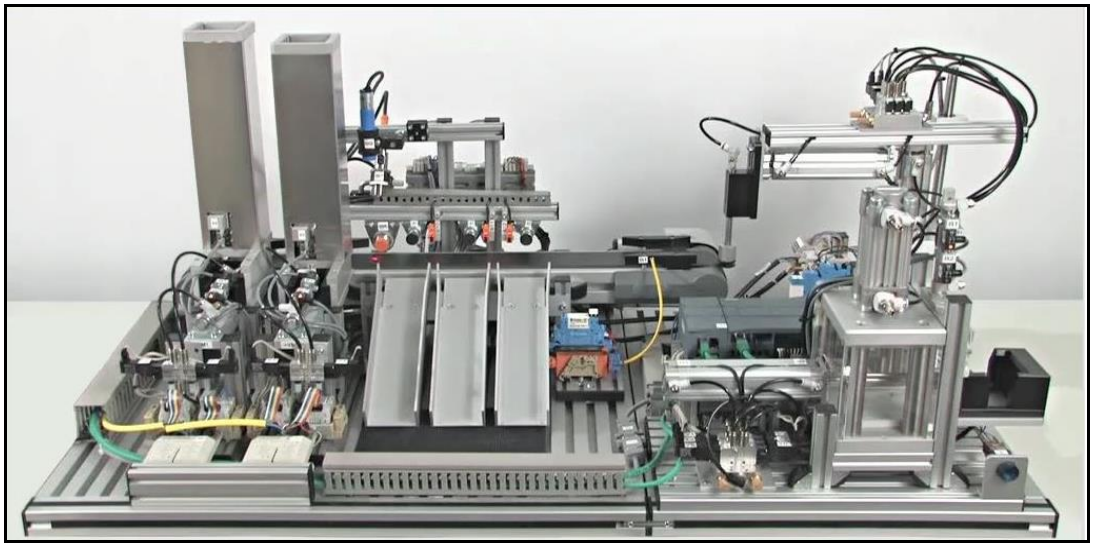


Figure 2: Real model from industrial automation system (Own illustration)

Generally, error diagnosis is understood as the process of identifying and interpreting situations that differ from the nominal situation. For the project, this means that the simulation system deviates from its nominal state in the individual error cases and the subjects must make a diagnosis of the actual situation. The need for training in problem-solving skills is not only evident in the findings on curricular discrepancies. In the past two decades, a number of studies have shown that trainees were inadequately prepared with regard to fault diagnosis in electrical and metal engineering fields (Matthes, Schmidt, Kybart, & Spangenberger, 2021, p. 32). In particular, the studies by Walker, Link, Mohr and Schäfer (2018), Abele, Walker and Nickolaus (2014) and Becker (2009) have shown that there is a need to promote error diagnosis skills in the form of training.

The web-based simulation system used can be seen in the figure below.

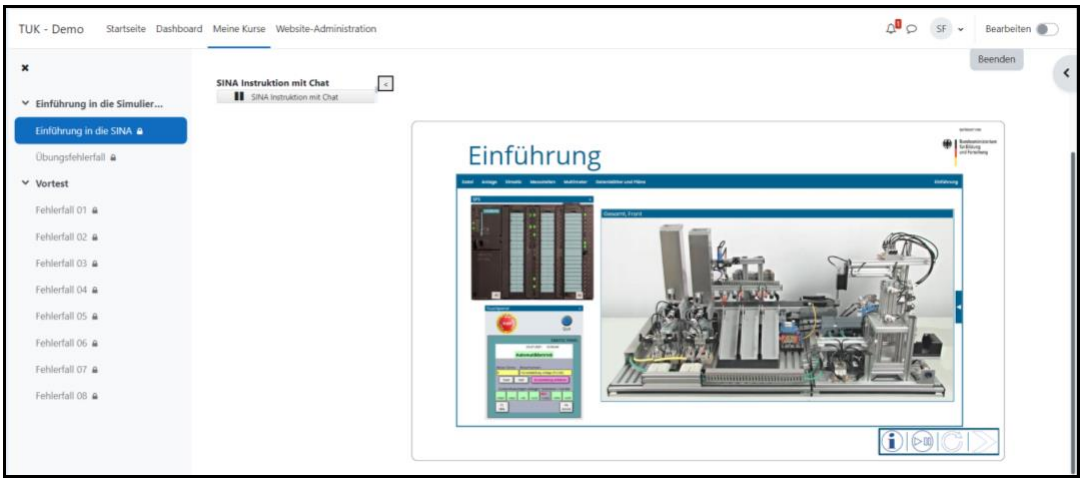


Figure 3: Implemented web-based SIAS - Introduction in LMS (Own illustration)

c) Adaptive tutorial Feedback (ATF)

In addition to the error cases, adaptive tutorial feedback (ATF) is implemented. The study uses the feedback concept according to Narciss (2006). Narciss understands the term feedback to mean information that is intended to help learners solve a task correctly, which is why Narciss also speaks of informative feedback. Informative feedback can be combined

with adaptive learning environments, which are teaching systems that adapt to the needs of the learners (Marschner, 2011). The ATF follows from the combination of informative feedback and adaptive learning environments. The ATF was chosen because previous research showed that feedback has a positive impact on student achievement (Butler, Godbole, & Marsh, 2013; Hattie, 2009). In addition, Sweller, van Merrienboer and Paas (1998) found that the working memory is less stressed when information is provided according to the situation. Finally, the results of Schaper, Hochholdinger and Sonntag (2004) should be mentioned, in which the effectiveness of ATF was tested and confirmed.

ATF is presented in the form of a chat. Here, the participants who are assigned to the experimental group (EG) receive written information from the maintenance manager about the source of the error (see Figure 4).

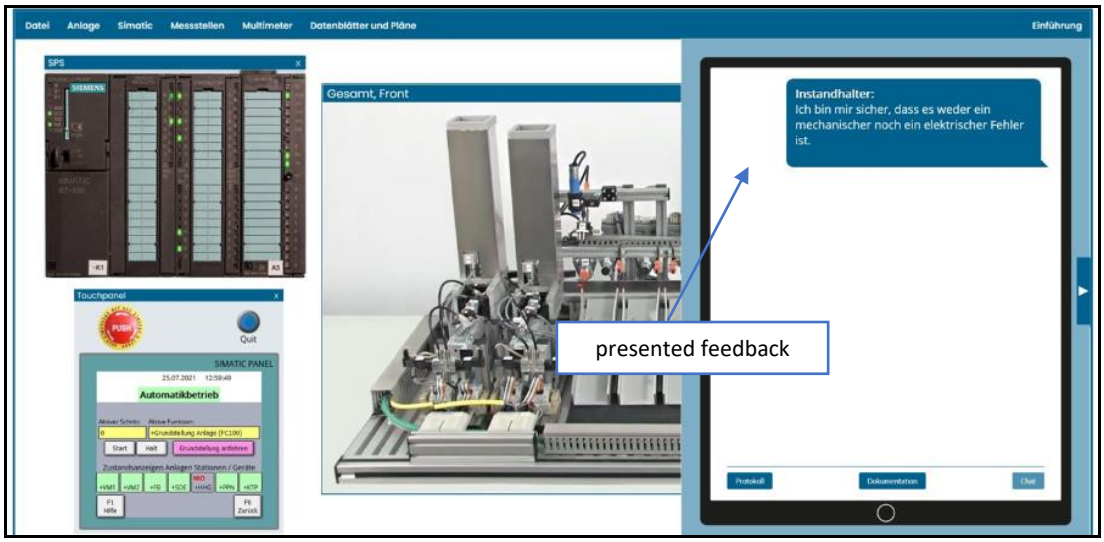


Figure 4: Implemented ATF in LMS.
Here: Presented feedback "I am sure it is neither a mechanical nor an electrical error case." (Own illustration)

For the design of the ATF, the design principles according to Narciss (2006) were used. For example, the subjects are given the opportunity to think about the possible cause of the error after the help has been given (see Figure 4). In addition, the ATF is only displayed via the chat function when a counter, which is active in the background of the browser, recognizes the necessity. In addition, the help is provided in a gradation that leads the subjects to the source of the error in a more and more targeted manner with a correspondingly high processing time. In this way, the application of the help is always brought to the fore.

d) Troubleshooting strategies according to the Cognitive Apprenticeship-Approach (CAA)

In the study, solution videos were integrated according to the cognitive apprenticeship-approach (CAA) of Collins, Brown and Newman (1989). Here, an expert demonstrates a procedure to pass on the expert knowledge to learners, who are supposed to acquire the practical knowledge and apply it independently. Within the teaching method (six phases in total), the expert recedes more and more into the background, so that the learner independently carries out the demonstrated approach. These solution videos are intended to bridge the gap between expert knowledge and the application of this knowledge to problems, which is not always successful, especially with learners (Collins et al., 1989, p. 454). The

CAA is associated with improved performance in diagnostic competence in a wide range of disciplines, including medicine (e.g. Gräsel & Mandl, 1993), nursing (e.g. Küng, Staudacher, & Panfil, 2018) and technology (e.g. Gschwendtner & Geißel, 2020). Furthermore, long-term competence acquisition, individual support and clear lesson structuring have been documented.

At the beginning of the study, video-based support was provided in the modelling phase. The expert introduced the concept of the simulated industrial plant to help build the mental model. Subsequently, the participants worked on a practice task ('practice error case') within the computer-based learning environment. Within the practice error case, coaching is provided by the expert. Thus, the first two phases first show the procedure within the simulation system before feedback is given to the test persons. Subsequently, both in the pre-test and in the intervention phase, the existing error cases were worked on independently. After the cause of the error has been diagnosed, the error case is documented in the articulation phase within an error log. After the articulation of the fault, the above-mentioned expert comes to the fore again in the form of video-based support and describes the concrete procedure of fault diagnosis for the corresponding fault case.

All error cases follow the same procedure, which can be summarized as follows:

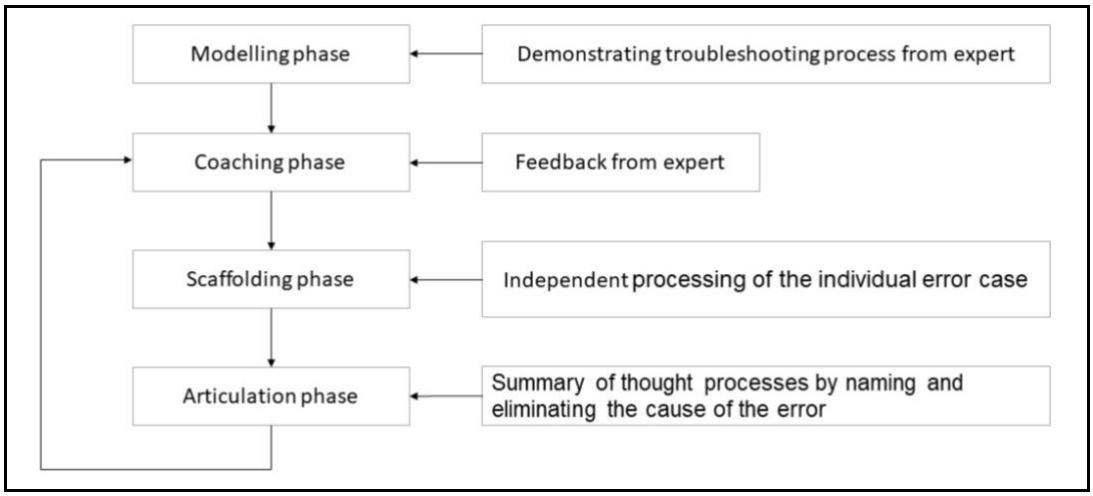


Figure 5: Cycle of the first four phases of the CAA.
Here: Implemented method in connection with troubleshooting in the LMS (Own illustration).

In the study conducted, only the first four phases are used. The ATF is made available to the trainees during the scaffolding phase.

2) Study: Technology-based assessment and promotion of competences (TechKom) in electrical and metal-technical vocational education and training

The simulation system used was embedded in a Learning Management System (LMS). This had the advantage that trainees could access the system from anywhere and thus work on the error cases either in the company or from home. Furthermore, log files and the answers could be extracted by the LMS and its backend, so that the exact clicking behavior of the participants could be investigated in the future. Figure 6 shows the LMS.



Figure 6: Implemented web-based SIAS in LMS (Own Illustration)

a) Hypothesis

Trainees who only have access to the video for cognitive modelling in the "modelling" phase acquire less aPSS than trainees who receive ATF in the computer simulation while working on problems.

b) Research design

The study features a pretest-intervention-posttest Experimental-Control-Group design (see Figure 7). In Measuring time 1 (MT1, Pre-test), general test items and eight professional test items were first inquired among all participants in the form of error cases on the aPSS. Subsequently, the participants were divided into a Control Group (CG) and Experimental Group (EG) for the processing phase (intervention phase). After completion of the intervention phase, the participants received eight test items on the second day in Measuring time 2 (MT2, Post-test), which were identical to those from the Pre-test.

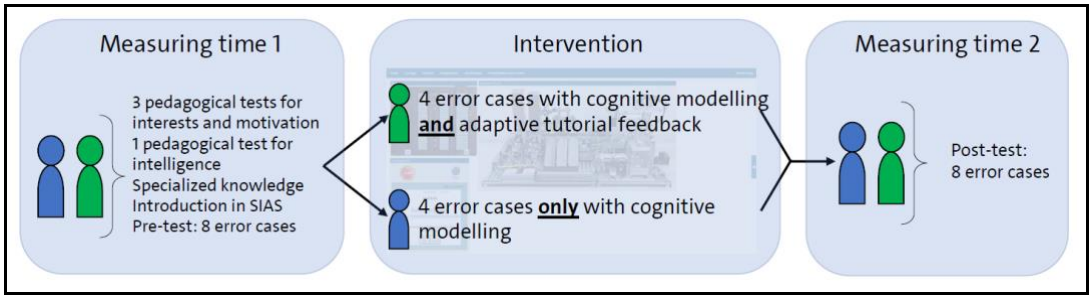


Figure 7: Research Design (Own illustration)

c) Method

The methodology behind the study is by means of hypothesis testing in a longitudinal CG-EG design. Hypothesis testing was conducted using a general analysis of variance (ANOVA) and a t-Test for independent groups.

To be able to test the hypothesis, two procedures of ANOVA were used: (1) the General Linear Model (GLM) with repeated measures and the Univariate Analysis of Variance (UAV). The first procedure was used to be able to include the temporal influence in the data

analysis. The t-test was used to be able to analyze the mean value of both groups of the Pre- and Post-test.

Conclusion

1) Results

Of the total 102 trainees who participated, 97 subjects took the demographic test. Of these 97, 83 stated that they were male and 12 females. In addition, two respondents indicated neither / nor, which includes non-binary. The age range of the subjects was about 17 to 25 years and the average age was about 20 years and 5 months. Of the 97 subjects, 54 stated that they were training to become mechatronics technicians and the remaining 43 to become electronics technicians for automation technology. For the overall analysis, the IQ value of 91 tended to be below average.

a) t-Test of independent groups

In Table 1 you can see the group statistics.

Group Statistics

	Control- or Experimental-group (CG/EG)	N	Mean (MV)	Std. Deviation (SD)	Std. error mean
Total score SIAS – error cases Pre-test (MT1)	CG	51	4,16	2,461	,345
	EG	48	3,71	2,212	,319
Total score SIAS – error cases Post-test (MT2)	CG	50	5,36	2,848	,403
	EG	45	5,49	3,181	,474

Table 1: t-Test for independent random sample.
Here: Comparison from the achieved Mean of EG/CG in Pre- and Post-test

On the horizontal axis, the achieved points of the Pre-test (MT1) are plotted with the Post-test (MT2), while the groups CG and EG are found on the vertical axis. The *MV* reflects the average error cases solved in SIAS. A *MV* of 4.12 indicates that subjects assigned to the CG were able to achieve an average of four (rounded down) points in the MT1. In contrast, in EG only slightly less than four (*MV* = 3.76 points). The average *MV* was 3.95 points in the Pre-test and 5.42 points in the Post-test (MT2). If the *MV*'s of the two groups are compared between the MT1 and MT2, then it is noticeable that both groups were able to generate an increase in the average total points achieved. The largest increase can be found within the EG, which increased their *MV* by +1.73 points to 5.49. The CG increased their *MV* (= 5.36) by +1.24 points.

b) Analysis of variance (ANOVA)

b.1) General Linear Model (GLM) with repeated measures

After the group statistic, the ANOVA test was performed using the GLM with repeated measures. This was performed with the Within-Subjects Contrasts (see Table 2) and Between-Subject Effects (see Table 3).

Tests of Within-Subjects Contrasts
Maß: MASS_1

Source	Error_cases	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Error_cases	Linear	104,693	1	104,693	26,899	<,001	,224
Error_cases* Group (CG/EG)	Linear	2,882	1	2,882	,741	,392	,008
Error(Error_cases)	Linear	361,960	93	3,892			

Table 2: General Linear Model (GLM) with repeated measures. Here: Tests of Within-Subjects Contrasts

With a significance value of $p < .001$*** and thus highly significant, it shows that the repeated measures have a high influence on the data. Furthermore, the partial Eta-square (η2) indicates the effect size. With a value of $\eta 2 = .224$, which is above the threshold of .14 for large effects, it again shows a large effect of repeated measures on error detection. If the two values for the pairing Error_cases*Group (CG/EG) are analyzed, then it is noticeable that the significance ($p = .392$) increases significantly and the η2 (= .008) drops by a multiple. Thus, because of the exceeded significance threshold and the fallen effect size, the group membership does not take a statistically significant influence on the error diagnosis.

In another analysis, the influence of Between-Subjects Effects was examined. The analysis took fault finding as a constant variable and examined the statistical influence of group membership. Here, it can again be seen that repeated measures exerts a highly significant influence ($p < .001$*** and $\eta 2 = .807$ in Table 3) on the Post-test score obtained, while group membership again exerts no influence on the Post-test.

Tests of Between-Subjects Effects
Measure: MEASURE_1
Transformed Variable: Average

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	4151,899	1	4151,899	388,303	<,001	,807
Group (CG/EG)	,657	1	,657	,061	,805	,001
Error	994,396	93	10,692			

Table 3: General Linear Model (GLM) with repeated measures. Here: Tests of Between-Subjects Effects

b.2) Univariate Analysis of Variance (UAV)

Tests of Between-Subjects Effects
Dependent Variable: Total score SIAS – error cases Post-test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	277,201[a]	10	27,720	4,114	<,001	,329
Intercept	213,948	1	213,948	31,754	<,001	,274
Group (CG/EG)	3,054	1	3,054	,453	,503	,005
Score_Pre-test	276,808	9	30,756	4,565	<,001	,328
Error	565,957	84	6,738			
Total	3635,000	95				
Corrected Total	843,158	94				

a. R Squared = ,329 (Adjusted R Squared = ,249)

Table 4: Univariate Analysis of Variance (UAV). Here: Tests of Between-Subjects Effects

As in the previous presentations of results, the significance and the η2 are again considered (see Table 4). First, the corrected model is highly significant ($p < .001$***) and has a high effect size ($\eta 2 = .329$). Furthermore, significant statements can be made about the sources 'Score_Pre-test'. The Pre-test has a significant influence ($p < .001$***) on the total score achieved in the Post-test. Moreover, because of the partial eta-square, MT1 is shown to take a large effect size ($\eta 2 = .328$) on performance in the MT2.

2) Discussions

The mean values showed that there were differences between the groups of participants (CG vs EG). While in MT1 the CG was minimally 'better' (+.36) than the EG in *MV*, in MT2 it was the other way around. Thus, the EG took the minimally better results with a *MV* of 5.49 compared to the CG (*MV* = 5.36). The increase in the *MV* achieved in each case also shows that both groups were able to increase their performance in terms of error diagnosis. With the high increase in the score within the EG, it is evident that at first glance individuals with a poorer starting position were able to benefit particularly from training with the simulation system.

With the analysis of variance, a much broader interpretation and discussion of the test results is possible. First, it was shown that the repeated measures, in the form of the two error diagnoses performed, has a statistically highly significant influence on the test results obtained. In contrast, it was found that the group influence on the two tests performed was not statistically significant. Thus, it was shown that the repeated measures have a direct effect and the group membership has no direct effect on the results of the Pre- and Post-test. Based on these findings, further possible interpretations can be formulated. Due to the high effect of the repeated measures and the increase in performance of both groups of persons, the statement can be made that the CA-approach and the CBL in the form of the SIAS contribute to the increase in the problem-solving ability of trainees. Based on the non-significant effects in relation to group membership (CG without ATF; EG with ATF), the statement can be made that the ATF has a statistically non-significant influence on the test results of the participating trainees and thus the division into CG and EG is not statistically relevant for successful error diagnosis.

With the results and the associated discussion, the hypothesis that was established cannot be statistically confirmed. Nevertheless, a medium effect size was shown in an analysis of covariance between the group with the ATF and the points achieved in the post-test, which is not shown here, making further analysis of the data and a further survey with a broader sample necessary.

3) Limitations

There are some limitations to the results. First, the small number of participants should be mentioned, which does not allow any statistically reliable statements. Especially with the fact that the already small sample of 102 trainees was further divided by the CG-EG design and within the group allocation the group was further reduced by invalid statements. The loss of subjects was not only observed in the intervention phase, but also in the first measurement point in the general test parts. Here, a high loss of results was recorded in the intelligence test. The third limitation was the usability problems of the simulation system. Here, server problems, blockages by the firewall or the internet speed were significant limiting factors on the part of the technology. The last point to mention is that no analysis of the log data was made, but the answers were compared with an evaluation template. A log file analysis of the problem-solving process would additionally validate the results, as the subjects' log files can be used to check whether and to what extent the test persons responded to the ATF.

4) Outlook

To statistically validate the results, the main survey was launched in October 2022 and will be completed in May 2023. The aim of the main survey was to achieve a sample size of n = 300. In addition, we worked on the usability problems and reduced the number of error cases to be processed from eight to six. We have worked with partners from industry and the education sector. Because of the cooperation, there was a high level of interest in the research project and the simulation system on the part of the industry community. The broad use of the simulation system for other industrial areas (e.g. process and control engineering) and the added value of training systems in problem-solving were given as positive feedback to us. The trainees also reported back that the training was a good idea. In addition, further usability problems were addressed.

Finally, in the future, we will focus on log file analysis to be able to analyze the problem-solving behavior of the subjects more precisely.

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Reducing Inequalities in East Asia: Challenge and Solution of Women in Modern China

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Abstract
In this essay, the effects of patriarchy on gender inequities are examined, along with methods for alleviating them in contemporary East Asian society. This study examines how gender equality has evolved in contemporary China, the social and political movements that have influenced it, as well as the developments in female education and economic reform that have helped to lessen gender disparities there. It does so by using a historical qualitative research methodology. The case study seeks to lessen inequality in China by examining the problems and solutions faced by Chinese women from the time the Communist Party came to power in 1949 to the present. According to the study, patriarchy, a set of interpersonal norms, values, and beliefs that established a society dominated by men and was ingrained in political and socioeconomic structures, once prevailed in East Asian civilization. Man and woman experience gender inequality because of it. Yet, compared to other East Asian nations, particularly South Korea, China currently has superior conditions for women's rights. According to the report, one of the key elements in lowering patriarchy is the social revolution of the Chinese Communist Party. Importantly, the Party promoted gender equality during Mao Zedong's rule by abolishing traditional patriarchal social norms and expanding the role of women in the nation's development. The Chinese government's reform policies, which support economic and social reforms, particularly those that support education, are the second major element in lowering gender inequality in China.

Keywords: Inequalities, Women, East Asia, China

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Introduction

More than a century ago, East Asian society was still under norms of Confucianism which were roots of people's way of life, culture and values, and marriage and family values. These contributed to the society of patriarchy which is a system from five human relationships in Confucianism, emphasized on social and family hierarchy in which male centered and controlled. The role of patriarchy's social values has still seriously controlled in countries as Korea and Japan. On the other hand, in China, an origin place of Confucianism, the role of patriarchy had gradually decreased. Chinese women today have more rights than Korean and Japanese women, despite the fact that the Chinese society still upholds the idea that the man is the family's head and the primary decision-maker.

This work examines the development and factors that impact on reducing inequalities in East Asia, taking China as a case study. Although in the 21st century women's status in terms of occupation, education and income are still lower than men, there are many changes that support reducing gender inequality in China. This study thus analyzes factors that support the reducing inequality of Chinese women through the processes of educational development and social revolution of China since the rule of the Chinese Communist Party. Also, challenge and solution of women in modern China will be stated. The qualitative research methodology in history was used through a study of document. Historical approaches on socio-cultural history and microhistory are applied in the study. Statistics dealing with women and education in China and women's movement and change of women's status are main sources in analyzing the process and progress of reducing gender inequality in contemporary China. The finding of the study may contribute to solution for unequal society or stimulate people to realize more on social justice and gender equality.

Discussion

1. Gender Inequalities in East Asia: Past and Present

In traditional East Asian countries, China, Korea, and Japan, through Confucian thought, the society and people's relationship were formed through a system of five human relationships in Confucianism, emphasized on social and family hierarchy. Confucian influences led to a strongly hierarchical social structure and a stress on the family as the basic social unit. [1] The family contains the most significant relationships for individuals and forms the roots of all social organization. Moreover, this principle contributed to the society of patriarchy, where male is a center in all socio-political organizations. By incorporating Confucianism into traditional society, the roles of the ruler and the ruled, husband and wife, parent and kid, and older brother and younger brother were all clearly defined. A father or husband is required to treat his wife with dominance and kindness in exchange for her love and obedience, to provide his children with safety and guidance, and to respect and obey their parents and elders. Filial piety is the society's core virtue.

The traditional family structure was ruled by patriarchy. The father or oldest son was the family breadwinner. Traditionally, the mother's job was to handle domestic duties including caring for kids or elderly relatives, cleaning, and cooking. Usually, the immediate family and

[1] Insook H. and L.J.Cho. (1995). Confucianism and the Korean Family. *Journal of Comparative Family Studies*, 26: 117-118.

the extended family lived together. Only very remote cities still make use of this form of construction nowadays. As a result, gender equality has gained acceptance. The guy was the head of the family and had the responsibility of supporting his family according to the hierarchical structure of the traditional Chinese family. This responsibility gave him unlimited control and the final say in all family problems. Women could only work and exercise as a result of family obligations.

Yet, modern East Asian civilization has seen certain changes. Modernization, which began in East Asian countries in the 19th century, brought new practices and evolving customs. The 20th century did, however, see a number of developments brought about by political and social revolutions, economic expansion, and educational reforms, all of which helped movements for women's rights advance.

Confucianism is still a powerfully significant religion in modern East Asia. Yet, women may be more in charge of the home than males in some urban regions, like as Beijing and Shanghai.[2] Also, a lot of women who live in big cities will work to ease their husband's financial load. Nonetheless, there is still a gender imbalance in both industry and politics. Women are also expected to take care of the household chores and the children.

2. China and Reducing Gender Inequalities

2.1 The Turn of the 20th Century and a Chance of Women's Rights in China

In the 1910s and 1920s, Chinese scholars launched a campaign that was both an intellectual revolution and a socio-political reform to rebuild society and change old Chinese cultures. There were numerous activities and movements during these times that attempted to rebuild Chinese society and culture from the ground up. [3] Criticism of China's traditions was widely published, and the movement called "New Thought" was launched. One is advocating for greater gender equality.The development of educational opportunities for women and female liberation were instituted. As Mitter Rana, a historian and political scientist who specializes in the history of modern China, said, this time was more open and helpful to women's rights.[4]

Throughout these times, reformers and activists sought to elevate the dignity of the country and change the fundamental makeup of Chinese society. They promoted a new Chinese culture based on contemporary and Western scientific and democratic viewpoints while simultaneously criticizing traditional Chinese beliefs and practices. Also, these male reformers attacked patriarchal norms and gender disparities in society. Despite the fact that the movement only had a small impact on some women who resided in metropolitan areas and large cities like Beijing and Shanghai, women had greater access to university education and employment opportunities in the 1910s than ever before. Hence, the May Fourth Movement, often known as the first feminist movement, took place in 1919 on May 4th, when female students and women protested in Beijing. Public awareness of gender equality and women's liberation issues increased.[5]

[2] Paul J. Treutel. 2011. Confucianism and the Modern East Asian, p. 35.
[3] *Ibid.*
[4] Rana Mitter. (2004). *A Bitter Revolution.* p.147.
[5] Li Changli. (2010). The Social Consequences of the May Fourth Movement: The Establishment of Women's Property Rights. *Chinese Studies in History*, 43(4): 20.

Nonetheless, women continued to strive for their freedom from maternal desires and forced parenthood as well as their rights to vote, receive a divorce, work, and refuse having blind marriages. [6]

2.2 The Communist Social Revolution and Reducing Gender Inequalities

Since 1949, when the Chinese Communist Party (CCP) came to power, China's society has seen significant change. Traditional standards were being eradicated in an effort to shift logical knowledge to social practice. Examples of this include outlawing outdated and feudal conventions and forbidding religious practices.[7] The CCP also aimed to advance women's freedom and gender equality.[8]

There were attempts to enhance women's status throughout social movements and law revision, for instance. As a Chinese scholar, Lin Chun, said:

> *Women's liberation had been highlighted in the communist agenda from the outset and, in that sense, the Chinese revolution was simultaneously a women's revolution, and Chinese socialism a women's cause.* [9]

To liberate women, the Communist Party launched a radical, extreme agenda. The 1950 Marriage Law, which was passed within the first year of the new government's administration, provided the first hint of this reform. The Chinese Communists' experience with marriage reform in the "red areas" and the manifestation of their concept of gender equality peaked with the promulgation of the 1950 Marriage Law. The first article ended the archaic practice of "supremacy of man over woman" and established one of the most pro-feminist marriage laws ever. The People's Republic of China's Marriage Law was officially adopted on May 1 of that year. The "feudal marriage system" was attacked. According to the law, "marriages should be based on the free choice of the partners, on monogamy, equal rights for both sexes and on the protection of the lawful interests of women and children." It also addresses child marriage, concubine use, polygamy prohibition, and divorce freedom. [10] This law affected how women and girls were viewed in society.

Under Mao Zedong's direction, the CCP started the "Cultural Revolution" in 1966 with the goal of eradicating the "impure" components of Chinese society, such as antiquated beliefs and customs. The Four Cleanups Movement persisted in criticizing the "Four Olds" aspects of Chinese society—old concepts, old traditions, old ways of life, and old culture—during the Cultural Revolution.[11] The goal of this movement was to eliminate "the old," such as patriarchal family ideals and family hierarchy. Chinese society has incorporated both old Confucian values and "the modern," such as individualism, individual rights, nationalism, liberalism, women's rights, and belief in "science."

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[6] Sybilla G. Dorros. (1978). The Status of Women in The People's Republic of China. p.2. online.
[7] Mao Zedong. (1968). *Four Essays on Philosophy*. Online.
[8] Li Yuhui. (2013). Women's Movement and Changes of Women's Status in China. *Journal of International Women's Studies*, 1(1): 30.
[9] Lin Chun. (2006). *The Transformation of Chinese Socialism.* p.113.
[10] Ilaria Storelli. (2021, 28 June). Marriage in Contemporary China and its Complexities. *European Guanxi.* online
[11] Jonathan D. Spence. (2013). *The Search for Modern China.* p. 545.

2.3 Economic Reforms and the Improvement of Women's Status

The Chinese government has started a variety of initiatives and campaigns since the implementation of reform measures in China in 1978 with the goal of making China a middle-income nation and boosting its gross national product (GNP) by the year 2000. The family was abandoned as a unit of production as the Chinese economy changed. The transition from arranged to free-choice marriages was facilitated by the industrialization and growth of education during those years. Communist officials in China had argued for giving young people more leeway when it came to dating. But they opposed fostering a culture of dating and trying out premarital sex.[12] The 1980 Marriage Law backed the 1979 one-child policy, strengthened the Law of 1950, and stressed the significance of giving women and children preference when dividing property in the event of a divorce.

China has rapidly advanced from being a developing country to a country with a middle income. The Chinese economy grew swiftly. Foreign commerce and investment were primarily to blame for the high growth rates. The GDP increased from 7.6% in 1979 to 13.5% in 1985. In the 1980s, the growth rate of agricultural goods increased by a factor of 2.5. Between 1983 and 1985, China had a huge wave of foreign investment that fueled the expansion of non-state businesses. 40,000 projects were sponsored between 1979 and 1991 by collaborative investments from Chinese and foreign partners.[13]

Between the 1990s and the 2000s, the Chinese economy and living standards both increased steadily. China has become the "world's factory" since its economy has continued to expand quickly. In 2012, China's GDP overtook that of the United States to claim second position. Chinese women were also impacted by the economic growth. The second-largest economy in the world right now is China's. China is making the transition from being a developing country to one with a high income and an upper middle-income status. China will successfully eradicate its extreme poverty in 2022, according to the World Bank.[14]

2.4 Educational Equality and Female Education as a Chance of Reducing Gender Inequalities

The rise of Communist rule in 1949 and the implementation of economic reform in 1978 were two crucial turning points in the history of Chinese women. In Chinese traditional society, there used to be a proverb that declared, "Too much learning does not make a virtuous woman." Women at this time made major sacrifices for their families and gave domestic work and reproduction a high priority. As a result, they had restricted access to schooling. The Communist Party then, as previously mentioned, attempted to enhance the status of women by the legislation passed in 1950 and 1980. In addition to lowering income inequality and improving living conditions, the national economic reform programs sought to increase people's levels of education.

To reduce inequality, government funds and private investment were relocated to rural cities. Social welfare and service improvements were undertaken to boost peoples' levels of living.

[12] Xu Xiaohe & Martin K. Whyte (1990). Love Matches and Arranged Marriages: A Chinese Replication. *Journal of Marriage and Family.* 52(3): 714.
[13] *Ibid.* p. 417.
[14] World Bank. (2022, 1 April). Lifting 800 Million People Out of Poverty – New Report Looks at Lessons from China's Experience. Online.

The opening of schools and colleges as well as the distribution of scholarships to students across the country increased the number of graduate students enrolled in higher education, which in turn increased their employability and opportunities.

To lessen inequality in urban and rural China, foster economic sustainability, and enhance people's well-being, a number of strategies were developed and put into practice. In an effort to end poverty, raise living standards, and develop human resources, the government has focused on closing the economic gap as well as the need to provide basic assistance. Building and funding for colleges and universities. To raise the quality of education in the nation, educational officials were dispatched to numerous rural locations to assist in creating local curricula and train local academic staff. Supporting female education is a crucial step.

To improve the nation's food supply when the PRC was founded in 1949, the Communist Party mandated that women participate in social production. Figure 1 illustrates the proverb "Women hold up half the sky," which gained popularity.[15] When more women start voting in their communities, socioeconomic changes will result from the increased representation of women in the workforce in agricultural production and economic diversification. Chinese women have been freed from "the shackles of tradition" during Communist control.[16]

After that, the Chinese government supported equal education by giving girls access to education and starting a literacy program. Only 20% of Chinese citizens could read and write in 1949.[17] As a result, many teachers have been dispatched throughout China, significantly lowering rural illiteracy.[18] As a result, from less than 30% in the 1940s to 66% in 1978, the literacy rate significantly increased. In accordance with an education law passed in 1986, all children must attend school for a minimum of nine years. All around China, compulsory schools have been established. The general literacy rate has also steadily increased, from 20% in 1950 to more than 85% in 2001, according to the Ministry of Education. The number of illiterate Chinese decreased by 40 million between 1990 and 2000.[19]

[15] *Ibid*.
[16] Louise Edwards. (2000). Women in the People's Republic of China: new challenges to the grand gender narrative. In L. Edwards & M. Roces (Eds). *Women in Asia: Tradition, Modernity and Globalisation*. p.59.
[17] Xinhuanet.com. (2019, 25 September). How China Can improve its literacy rate to nearly 100 pct. Online.
[18] Ted Plafker. (2001, 12 February). China's Long-but Uneven- March to Literacy. *The New York Times*. online.
[19] *Ibid.*



Figure 1: Propaganda posters "Women Hold Up Half the Sky"
Source: https://expandedanimation.net/2015/03/15/women-hold-up-half-the-sky/

Industrialization and the shift to a market economy have given competent female workers exceptional opportunities. Rural populations moved into urban areas in significant numbers as a result of the high demand for inexpensive labor in coastal areas. Women with educations benefited from landing a job. Young women from rural cities flocked to urban areas to work in factories because they made more money than people in other occupations, which allowed them to become independent from their families.

Then, in the 1980s, the One Child Policy of 1980 and the Compulsory Educational Law of 1986 were put into effect, having an impact on Chinese women. The one-child rule frequently altered the mentality of parents. Children, whether girls or boys, were equally nurtured and treasured because each household only had one child. Moreover, girls received more attention. The Compulsory Educational Law boosted literacy rates and continued to balance out educational disparity. 150 million pupils attended the more than 210,000 compulsory schools that existed in 2018. With 291 million students registered, China had 529,300 educational institutions of various sizes and levels in 2021. There were 18,443,700 full-time teachers employed. In 2021, there were 207,200 compulsory schools nationwide, with 158 million registered students, 34,880,200 new pupils enrolled, and 10,571,900 full-time teachers. [20] China and Chinese women will therefore change as a result of these gains in educational development and educational equality.

Figure 2 demonstrates a consistent rise in the proportion of girls enrolled in pre-primary education. In basic and primary education, the gender pay gap has been gradually closing. Elementary school enrolment reached 100% in 2018, while the gender gap between boys and girls narrowed. 46.5% of kids enrolled in obligatory school were female. Indicator ranged between 46.4% and 46.6% in 2019-2020, showing consistency.

[20] Xinhuanet.com. (2019, 25 September). *op.cit.*

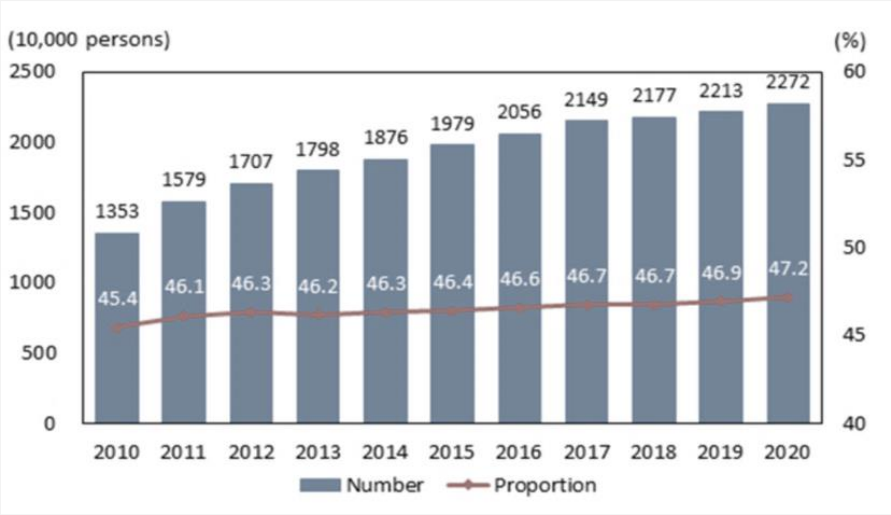


Figure 2: Number and Proportion of Girls in Pre-primary Education, 2010-2020
Source: National Bureau of Statistics of China, 2021, *Final Statistical Monitoring Report on the Implementation of China National Program for Women's Development (2011-2020),* online

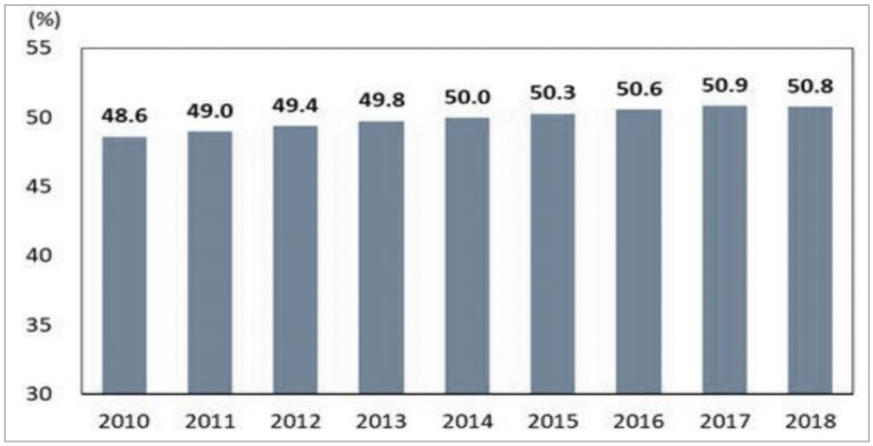


Figure 3: Proportion of Girls in Regular Senior Secondary Education, 2010–2018
Source: http://www.stats.gov.cn/english/PressRelease/202001/t20200103_1721237.htmlX

In addition, there are more girls enrolling in senior secondary schools. 18.65 million girls were enrolled in senior secondary education in 2018, making up 47.4% of all enrolled pupils, an increase of 0.3 percentage points from 2010. The senior secondary enrollment ratio increased by 6.3 percentage points from 82.5% in 2010 to 88.8% in 2018. In ordinary senior secondary school, the percentage of female students has increased by more than half since 2015. According to Figure 3, it increased by 2.2 points from 2010 to 50.8% in 2018.

In China, "the National Program for Women's Development" (NPA) was continuously carried out between 1995 and 2000, 2001 and 2010, and 2011 and 2020. The primary goals of the NPAs are to advance women's position and rights in six different spheres: the economics, participation in management and decision-making, education, health, law, and environment.[21]

[21] All-China Women's Federation. (2011). "2NPAS", *Women in China*. online.

The program's two most significant goals are to advance women's development and to promote gender equality.

Increasing gender equality is an aim of the process of women's educational growth since it is a symbol of social development and civilization. The ongoing effort to educate women has contributed to more women having access to higher education. The effort has made a significantly above-average contribution to the quick advancement and achievement of women's education in China and elsewhere. Since 2010, more students have enrolled in higher education than ever before, from 26.5% in 2010 to 48.1% in 2018, and since 2015, the NPA target of 40% has been achieved earlier than anticipated before the 2020 deadline.

In 2018, 1.36 million female graduate students, or 49.6% of all graduate students, were enrolled in higher education. In colleges and universities, there were 14.87 million female students, accounting for 52.5% of total students, up 1.6 percentage points from 2010. Additionally, from 2010 to 2015, the proportion of female students in adult programs at colleges and universities rose by 6.2 percentage points, reaching 3.51 million, or 59.4% of all students enrolled.[22] The growing number of female undergraduate and graduate students in China's compulsory and higher education systems reflects the expanding social and economic prospects for women in the country.

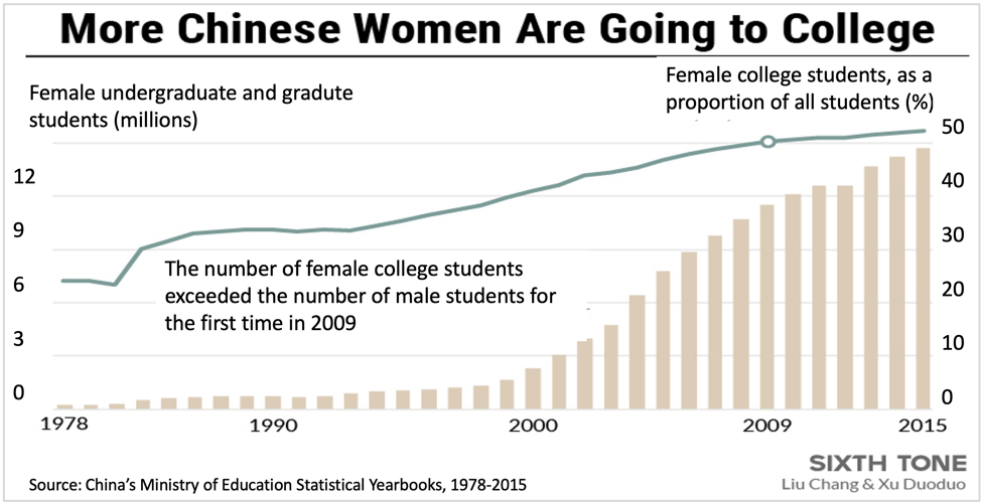


Figure 4: Proportion of female students entering higher education level 1978-2015
Source: https://www.sixthtone.com/news/1002051/is-gender-equality-at-chinese-colleges-a-sham%3F

In metropolitan regions, it appears that Chinese men and women can now access school on an equal footing. Yet inequality still exists in rural regions. After elementary school, the enrolment rate for girls is still low in rural areas, highlighting the divide between these places and urban areas in China.[23] This disparity has been fully acknowledged by the Chinese government, which has been working to close it in accordance with its policy on income and wealth inequality.

[22] *Ibid*.
[23] Siriporn Dabphet. (2016). China's Economic Development: Income Inequality and Ethnicity. *Proceedings of the 2016 ICBTS International Social Sciences Humanities and Education Research Conference.* pp. 87 - 94.

Conclusion

Gender equality has benefited from the PRC's processes for economic and educational growth. Women who are educated are more aware of the importance of gender equality, and more educated women are questioning established conventions. China implements rules and regulations to grant men and women equal rights to education. People gain from the government's strategy of putting education first and developing it, and it contributes to closing the educational gap between urban and rural areas. Women's educational situation increased, greatly boosting their educational level, with the support of balanced development of compulsory education and other educational measures. It is incredible how well the goal of eradicating female illiteracy has been achieved. When the PRC was established in 1949, the illiteracy rate for women was significantly greater than it was for men. China has succeeded in increasing literacy and eliminating illiteracy nationally as a result of numerous efforts, including the first national education conference held in 1949, the 1956 Resolution to Eradicate Illiteracy, the Law of Compulsory Education, and the NPAs between 1990 and 2020. As education has advanced, women's social status and equality have improved.

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Learning Material by Augmented Reality Technology About Korfball for Health

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Abstract
This research aimed to 1) develop the learning material by augmented reality technology about korfball for health according to the performance criteria of 80/80 and 2) study the students' satisfaction after learning with the developed learning material. The samples in this research were the 50-1st year student in Physical Education and Health Education Faculty of Education and Development Sciences Kasetsart University Kamphaeng Saen Campus, by voluntarily. The research instruments included the learning material by augmented reality technology about korfball, the performance evaluation of electronic media by using augmented reality and a questionnaire on student's satisfaction. The statistics used in this research was the E1/E2, mean and standard deviation. The result of this research found that the efficiency of the developed instruction media was at 80.52/84.06, which was higher than the specified criteria of 80/80 and the students' satisfaction was at a highest level ($\overline{x}$ = 4.87, S.D. = 0.34).

Keywords: Learning Material, Augmented Reality Technology, Korfball, Health

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Introduction

AR technology is an extension of Virtual Reality (VR) technology, which allows users to see the virtual generated model objects in the background of the real environment. It has been applied to military, medical, education, entertainment and other aspects. This interaction technology is based on the real world and is enhanced by virtual data which provides people a better way to display the learning content, and also builds a space for learners to explore independently with a more appropriate way. AR technology is very instructive for the presentation of abstract content. Because of its characteristics, AR technology has great potential and opportunity for development in education field. The characteristics of AR technical simulation and interaction can display the abstract and obscure knowledge in a more vivid, intuitive and comprehensive way, and can enhance students' sense of immersion.

Augmented reality (AR) has been slowly but surely following its predecessor virtual reality in changing the education sector digitizing classroom learning, and making training more diverse and interactive. In this section, current studies in the literature in recent years on the integration of augmented reality applications into education are given. When these studies are examined;

Çetin (2022) investigated the effect of augmented reality-based stories on reading skills in his research. In the research, augmented reality-based story text samples were presented to primary school 3rd grade students (Figure 1).



Figure 1. Augmented reality-based story text samples.

A scoring key was developed for the answers given to the questions prepared by the researcher to measure the skills of expressing what they read in writing. As a result of the research, it was observed that the augmented reality-based stories did not have a significant effect on the reading motivation and reading comprehension skill levels of the students, but they created a positive significant difference on their ability to tell what they read in written and verbal form. In addition, as a result of the research, it was observed that the reactions of the students towards the texts increased.

As a similar study Baysan and Uluyol (2016) the effect of the use of augmented reality books (AR-books) on the academic success of the students and the students'opinions about the environment were investigated in his study. The AR-based teaching material developed by the HITLibHZ-BuildAR program was used in the laboratory environment for the experimental group of 22 people and the course was taught by the researcher. As a result; according to the qualitative data obtained from the students, AR is a promising technology. Educational AR applications should be used in areas that require 3D spatial visualization such as Geometry and Geography rather than technology education. Participants support the

use of AR in Computer Hardware training, with better developed platforms and more professional designs (Figure 2).



Figure 2. Augmented reality application book sample.

Almusawi et al. (2021) in their study, they discussed innovation in physical education: teacher's perspectives on readiness for wearable technology integration. The study is a case study and includes semi-structured interviews with 38 public school physical education teachers. The following scheme was used in the study (Figure 3).

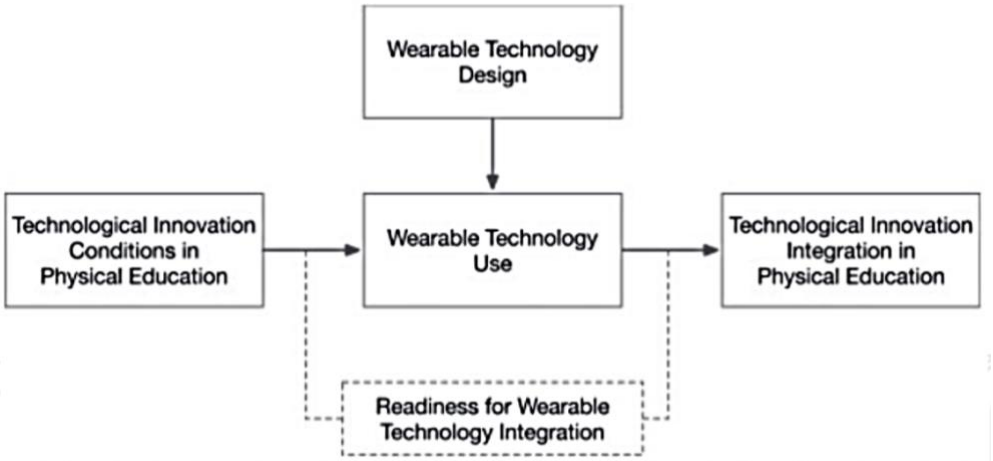


Figure 3. Augmented reality application book sample.

The findings show that physical education teachers have concerns about the design aspects of wearable technologies in terms of material design and device suitability for physical education. To eliminate these concerns, it is proposed to provide innovative learning environments that impact technology through collaborative, competitive, engaging and evidence-based learning experiences through wearable technologies that provide comfort, enhanced wear ability and injury prevention in physical education.

It is understood from the existence of studies in the literature that augmented reality technologies have been used frequently in medical education recently. When the relevant studies in the literature are examined (Figure 4).

Kucuk et al. (2015) a new perspective in medical education multimedia applications: augmented reality has been studied in their research. As a result, it is difficult to understand the subjects including the structure of the brain and vessels such as neuroanatomy in medical courses, in this direction, it was emphasized that AR applications could be developed to

facilitate the learning processes of students in such subjects. Considering the characteristics of today's students in the digital citizen group, it has been suggested in the study that students should be supported with various technological solutions in this process, at this point, the dissemination of medical augmented reality applications that are based on the learning approach anytime and anywhere and support individual learning.

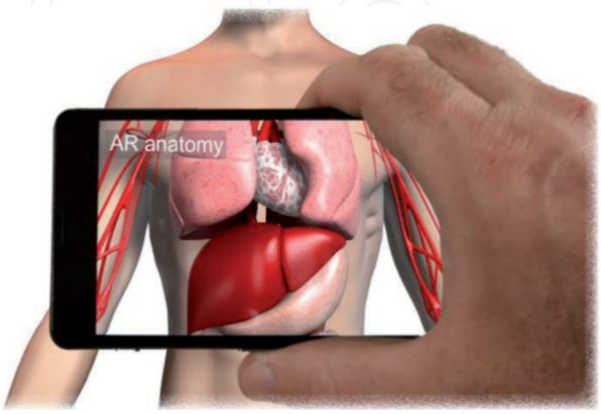


Figure 4. Use of augmented reality technologies in medical education.

The mobile AR system can strengthen the ubiquitous cooperative and scene learning with the help of virtual objects in the real environment. Everything in real life can become a prop for AR learning, achieving convenience, interactivity, situation, connectivity and personalization. With the coming of the shallow reading age, more and more learners become less dependent on books and more inclined to the shallow reading of electronics. AR technology can take content out of the screen and books with more entertainment and interactivity. AR digital publishing will become an explosive opportunity for the culture education industry.

Korfball is a new sport that has arrived in Thailand for less than 5 years. It is regarded as an equal sport that can be played by both males and females. and modern, interesting in students to learn and apply the skills of Korfball to play for fun, field and good health. Due to the COVID-19 epidemic situation, the application of media and technology to use in learning is therefore very important and necessary. In addition, augmented reality technology (AR) can be counted as creating a virtual learning experience. And it is interesting to access learning. Researcher as a Korfball academic and coach Therefore, he was interested in developing learning materials with augmented reality technology about healthy Korfball for the benefit of education and health development for students and other interested parties.

Methods

1. Study and collect information; from the study and analysis the information has been designed as a Augmented Reality aid. (AR) defines the format Lessons to be a role model.
2. Construction of research tools; by ADDIE MODEL. (Analysis Design Development Implementation Evaluation)

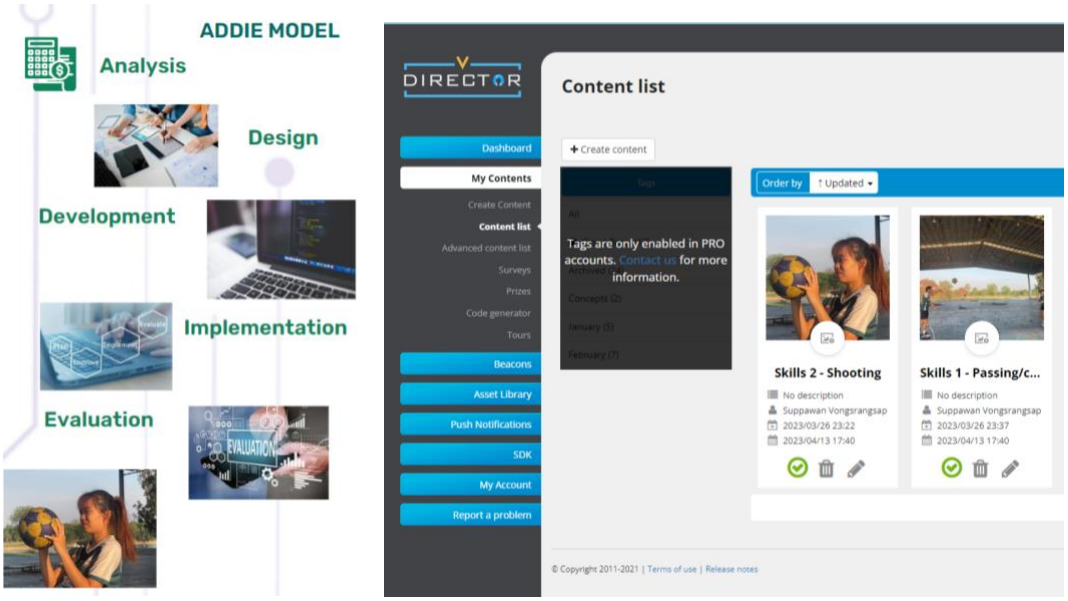


Figure 5: Research Process.

Conclusions

1) Quality augmented reality technology media in terms of content and production techniques, the overall media production was at a very good level (Mean=4.65, S.D.=0.29) by content quality in a very good level (Mean=4.85, S.D.=0.17)and the quality of media production techniques is at a good level (Mean=4.94, S.D.=0.29). The efficiency of the developed instruction media was at 80.52/84.06, which was higher than the specified criteria of 80/80.

One of the most important sectors in which augmented reality technologies are used is the education area. Augmented reality applications help students understand abstract concepts in the learning and teaching process; it provides environments where students can share information within the group. In addition, it has been supported by studies in the literature that these environments significantly increase students' learning. In addition, it was emphasized that augmented reality increases the interests, motivations and experiences of students in the field of education and plays a role in transferring the knowledge and skills gained in the virtual environment to real environments. In all this context; increasing the use of learning environments of augmented reality environments and applications, where the effectiveness of its use in education has been determined to this degree, in different levels and course contents is the most important suggestions of this research **(**Ezgi Pelin Yildiz, 2021**)**.

2) The students' satisfaction was at a highest level. ($\overline{x}$ = 4.87, S.D. = 0.34) In this research, a detailed analysis of the augmented reality environments and applications that are frequently used in the design of learning and teaching environments in the education sector with the digitalization process is included. As the general results of the research; today, with the introduction of technologies into educational environments, different tools and materials have begun to be used in teaching methods. In this context, it is seen that the inclusion of mobile tools and mobile applications in learning environments has become widespread recently. With this rapid development in mobile technologies, new media environments, in which interactivity increases, offer an increasing number of services to the user. One of the environments where this interaction is provided and which can integrate objects in virtual environments with real objects is technologies that offer "Augmented Reality (AR)". These

technologies allow virtual objects to be superimposed on real images. AR tools consist of camera, computer infrastructure, a marker and tangible objects.

AR applications play a crucial role in gaining desired behaviors in learning and teaching processsince students are in an interactive and collaborative environment, they learn through doing andexperiencing, it helps students to develop positive attitudes towards lectures and it enables studentsto reveal different perspectives about topics. When the future of augmented reality is considered, itwas predicted that AG technology will be one of the technologies which affect education in the nearfuture and it was also expected that AR technology will play an important role in education conductedwith wearable technology since 2013 and mobile devices since 2010 in the Horizon report.

The use of AR in sports initially focused on bringing, it applies to athletes and training. Especially with professional athletes and excelling by creating realistic images in training. Athletes will be able to train in simulated environments that are suitable and controlled. This is because the actual physical environment can be complex and difficult to control. And may have to travel long distances. It also reduces the risk of injury. and helps reduce damage or deterioration of sports equipment.

Expensive in training as well, for example, in motor sports, AR technology is used in training using a virtual simulator that provides an experience close to the real track environment, coupled with equipment that can accelerate and set the car on the track. Yes (Noury, Polman, Maloney, & Gorman, 2022).

Although AR technology is currently not a mainstream technology and is widely used, it tends to be applied to work in each industry more and more. play a greater role Although at present it is still a new alternative technology in the sports industry. But in the future, this technology will be important. It is important and plays an important role in helping to drive the sports industry in terms of sports science and sports business industry. The application of this technology to athletes, clubs and various sports organizations will have the opportunity to occur directly or indirectly (Sawan et al., 2020).

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An Investigation on Role of Modern Management in Cultural Values and Spirituality for Organizational Development

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Abstract
One of the foremost organizational challenges of the future of work is how to maintain a culture when most, if not all, the employees are virtually distributed and may not even be employed by the organization in traditional ways. Spiritual values of the personnel are the prerequisites for the organizational health and development. This fact has made many organizations to think that personnel spiritual values be viewed as a potential resource in organization rather than as something to be ignored. There are very few studies that have investigated the role of spirituality as a yardstick for psychological change of personnel. The diagnostic questionnaire therefore has items with each item in this questionnaire being rated ranging from agree strongly to disagree strongly. The present study signifies that when working with personnel who are spiritually inclined, human resource managers promote better functioning by appealing to adopt more spiritually oriented values to guide their work and productivity. The findings with the experts and participants imply that workplace spirituality is one of the factors considered in organizational theory. Organizations must pay attention to employees spiritual needs to bring their entire self into the organization. In contrast, empirical findings prove the critical role of workplace spirituality in mediating the spiritual influence of leadership and organizational commitment. Thus, workplace spirituality can become a revolutionary antidote in overcoming contemporary human resource problems. This activity can increase employee loyalty, commitment, and performance.

Keywords: Development, Leadership, Management, Organization, Spirituality

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1. Introduction

Organisational Effectiveness is a critical factor to measure the success of an organization. Researchers and practitioners have studied, presented and practiced various models for the Organisational Effectiveness. After critical analysis, it is identified that all those models fail to answer prominent questions of inner life and higher self of an individual. In purview of Organisational Effectiveness, a conceptual model representing Spiritual Intelligence and organization effectiveness ecosystem is essential for any modern management. The ecosystem will be helpful in understanding the effectiveness of an organization holistically. This form of new spiritually inclined organization will identify, develop and present quantifiable methodological framework to generate index of Spiritual Intelligence and Organisational Effectiveness for an organization. The personal exploration of spirituality involves the recognition of a feeling or sense or belief that there is something greater than myself, something more to being human than sensory experience and that the greater whole of which we are part is cosmic or divine in nature. Spirituality means knowing that our lives have significance in a context beyond a mundane everyday existence at the level of biological needs that drive selfishness and aggression. It means knowing that we are a significant part of a purposeful unfolding of Life in our universe. Spirituality involves exploring certain universal themes like love, compassion, altruism, life after death, wisdom and truth, with the knowledge that some people such as saints or enlightened individuals have achieved and manifested higher levels of development than the ordinary person. Aspiring to manifest the attributes of such inspirational examples often becomes an important part of the journey through life for spiritually inclined people. The spiritual journey involves first healing and affirming the ego so that positive states are experienced; with secure self-esteem, belief in self-worth and a capacity for love and generosity, a person becomes less constrained by ego defences. The development of spirituality is generally recognised as requiring some sort of practice or discipline in order to make ‘progress'. This can involve the aspirant in paradoxes such as non-striving, the gateless gate or coming home to oneself. Contemplative practices such as prayer and meditation are the common denominator of many religions and the foundation of spirituality. Without them, personal growth is much slower and haphazard. A teacher or mentor is usually recommended. In outlining a way to overcome reacting to the world limited by our self-preserving instincts and prior conditioning, Lord Buddha (Fig 1) advised spirituality as a direction that surpasses the confines of religious doctrine and as such may be perhaps part of the fundamental definition of spirituality.



Fig 1: Lord Buddha – The Buddhist spiritualism beyond religion

Lord Buddha's (Fig 1) path of buddhism is the new form of spiritualism that is beyond religion. The Four Noble Truths about true spiritualism are all life is suffering, suffering is caused by desire, suffering can be ended and the end of suffering is NIRVANA. Life involves suffering, regardless of one's position or status in life. The constant attachment to things, or even people, will produce suffering in one's life. The only true way to end this suffering is to extinguish it, or to reach nirvana. Nirvana is achieved through the Eightfold Path. The Eightfold Path represents good behaviour. In order to achieve nirvana, one must have the "right" or proper morality, wisdom, and mental discipline which consists of right understanding, right thought, right speech, right action, right livelihood, right effort, right mindfulness and right concentration. The Eightfold Path is sometimes represented as a wheel in which all the spokes of the wheel must be present for the wheel to function effectively. The path to nirvana involves proper thinking, causing no harm to others, not overindulging, not having improper thoughts or intentions, being mindful of each moment and what we do, and practicing mental concentration or meditation. So, The Five Precepts of Buddhist spiritualism are broad based and provide the foundation for the path to enlightenment and are abstain from destroying life, abstain from stealing, abstain from sexual misconduct, abstain from false speech and abstain from intoxicants. The Buddhist spiritual teachings and practices can help the modern management for a successful organizational development. The Buddhist spiritual approach is to bring awareness to these problems and say this is suffering and there is a cure. Then we get to work in a clear, directed and harmless way to resolve issues, eliminate problems and achieve goals. According to (Guruge., 2006) and (Field., 2007), managers can apply buddhist spiritual teachings to managerial functions. The primary function is to ensure employees right livelihood by giving them appropriate workloads, proper compensations, company supported health insurance, paid vacations and leave and time off (Payutto., 1994; Essen., 2010; Zsolnai., 2013). Also, the modern management should support in developing mindfulness for the organization by improving employees job satisfaction, job enrichment, job security, self-improvement and self-leadership. It also repeatedly emphasizes the importance of maintaining sufficient profit to compensate employees, invest for growth, save for the future and support our societies (Schumacher., 1973) In management principles, appropriate profit allocations are equally crucial to healthy profit earning. The modern management is expected to allocate profits wisely to bring happiness to a firm, employees and all stakeholders. Particularly, happiness will come from making a firm secure against misfortunes and continuing philanthropic activities through adequate profit allocations. It is endorsed that the maximization of profit, business expansion, and organization size in extreme directions would create the wrong desire in human beings. Instead of the extreme orientations, it is suggested that the total profit optimization to maximize all stake holder overall well-being, including nature, to prevent the lousy desire. It is said that spiritual leaders must not encourage employee materialism. Mathieu and Peeter et al., 2016 discussed that all products and services should give consumers five types of happiness: the happiness of appropriate material comfort, using, being harmless to others and nature, buying and applying for a long time. Generally, it is believed that business cannot be managed following ethics and human values and spirituality do not hold any importance in the sphere of running a business. Whenever we talk about Spirituality, we talk about the execution of our acts following religions, ethics with human values. In fact, Spirituality is nothing but doing our acts as per the rules and regulations made by the Divine Supreme power of which we are all a part. We all know that for managing any organization, although the role of every member is important, the role of a leader is the most important because the leader is the person who shows the right path to his team members. The major conclusions which emerged from a survey are productivity will improve by 30 to 40% without any extra finance or make any technological development by improving spiritual leadership ability of

students, leadership styles taught in schools are not very useful, but the practical approach to leadership should be the basis for any training. This shows that spiritual leadership plays a very important role in the management of any organization. If we look at the history of various organizations, we can see that no organization survived for a long time that violated the principles of nature. Even the modern Management Thinkers are realizing today that only those organizations can survive and compete in the 21st century that will follow business ethics, human values and are sincerely responsible for society and environment. From this, it can be deduced that the best and stable way of Management is the Spiritual way instead of a Materialistic way. Earlier, there was a general belief that people to be successful needed to have higher Intelligence Quotient. Gradually this concept gave way to the thinking that presence of high emotional quotient is required to be successful. But now it is understood that real success and happiness can be achieved only when a person is spiritually intelligent and a good human being, that is, a person who sees himself in others and others in himself and is guided by larger good. In conclusion, it can be said that managerial effectiveness is the crux of any successful organization. Based on the literature review and discussion, the importance of spirituality cannot be ignored and it is highly crucial in today's times as the stress level and other negative feelings among people have soared which in turn has given rise to too many challenges at the workplace. Spirituality is one thing which can guide people towards being more empathetic and compassionate towards each other while attaining organizational goals with happiness and contentment. However, this is just an initial level study in Indian context, hence Spiritual Intelligence (SI) directly and indirectly impacts upon the contextual and task performances of employees and effects organizational effectiveness (Fig 2) (Upadhayay S., 2012). SI relates to the multiple ways of knowing and to the integration of inner life of mind and spirit with the outer life of work in the world. After the dominance of Intelligence Quotient (IQ) for almost decades, Daniel Goleman propounded a very significant type of human intelligence known as Emotional Quotient (EQ). EQ as juxtaposed to IQ relied solely on an individual's ability to identify assess and control the emotions of oneself, of others and of groups. A lot of research had been conducted on EQ in relation to performance management and management effectiveness. However, as IQ fails to understand the intricacies of human intelligence (Gavrilla., 2005). EQ fails to miserably to answer the call for creativity in the human spirit. EQ does equip an individual to effectively cope with and manage emotions but it does not make one realize whether to be in a particular situation. SI enable a person to make such choices and to take responsibility for a deeper meaning to transform by integrating with the inner self.

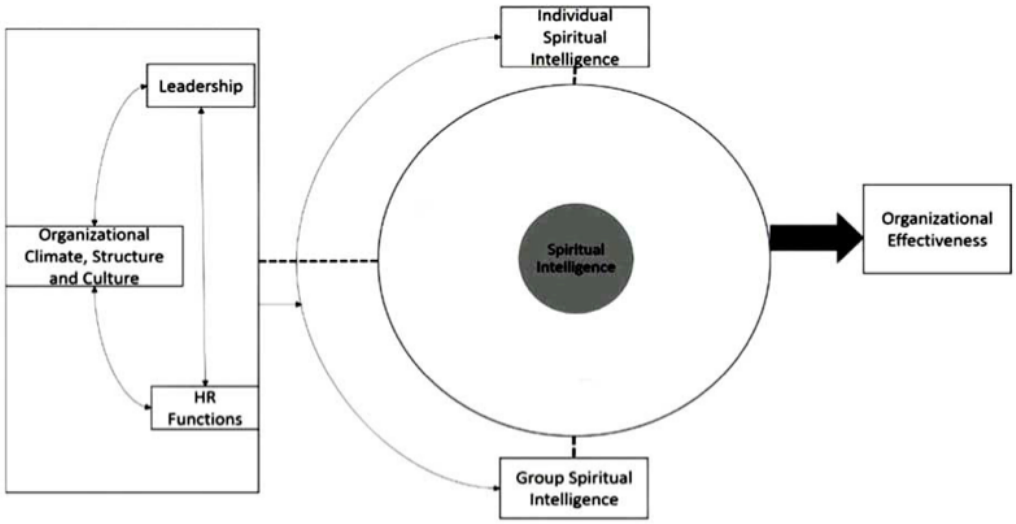


Fig 2: Spiritual Intelligence and Organisational Effectiveness

The spirituality is the indefinable urge to reach beyond the limits of ordinary human existence that is bounded by unconscious forces and self-interest, and to discover higher values in ourselves and to live them consistently in our relationships and roles. It involves developing practices that aid us in rising and expanding, perhaps beyond the merely good to the transcendent, in the process of looking inwards rather than outwards for our own morality and guidance. Above all, it means becoming a more loving and compassionate human being, in thought, word and deed. The spiritual development requires successive degrees of freedom based on the realisation that thoughts are not facts but simply transient mental phenomena, as indeed are our emotions. Spiritual leadership is thus a predictor of organizational commitment and an effort to improve organizational performance. Spiritual leadership is a leadership concept that aims to motivate and inspire through company vision and culture.

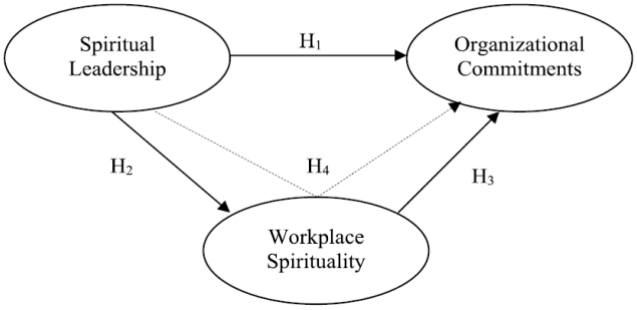


Fig 3: Hypothesis of Employees involvement

Spiritual leadership with organizational commitment will strive to facilitate a conducive work environment so that employees can achieve spiritual goals which increase workplace spirituality (Fig 3) thus are mutually interrelated. Individuals who have a high organizational commitment remain members of the organization and believe in accepting the organization values with goals have an instinct to make great efforts (Rustiarini et al., 2021).

2. Research Methodology

The study was conducted among the employees of private colleges majoring in Educational Institutions. The study comprised 35% women and 65% men, aged 30–40 years. The research was carried out in southern & Northern India. After obtaining the consent of the management and the employees on a designated day, the researchers asked to fill in a set of questionnaires. Each study lasted 30 min on average. After completing the questionnaires, the collected data were transferred to a spreadsheet and double-checked. The spiritual leadership questionnaire consists of statements adapted from previous studies (Fry & Cohen., 2009). Measuring spiritual leadership uses five indicators, including vision, altruistic love, meaning, calling and membership. Participant responses are measured using a five-point Likert scale with answers that strongly disagree = 1 to strongly agree = 5. The workplace spirituality variable consists of statements adapted from the research of (Ashmos & Duchon., 2000). The questionnaire contains three dimensions of variables, namely a sense of inner life, meaningful work and a sense of community. Participants responses are measured using a five-point Likert Scale with answers that strongly disagree = 1 to strongly agree = 5. The organizational commitment questionnaire consists of 4 item questions adapted from (Fry & Matherly., 2006). This study contains four indicators, namely: organizations as part of the family, happy to spend the rest of their careers in organizations, organizations as appropriate places to work and assume

organizational problems as own problems. Participants responses are measured using a five-point Likert Scale with answers that strongly disagree = 1 to strongly agree = 5.

3. Results

The results indicated that the spiritual leadership, workplace spirituality and organizational commitment were directly related with psychological well-being ($p < 0.001$). Workplace spirituality showed a positive relationship with health-related behaviours ($p < 0.001$). An indirect path of spirituality on psychological well-being through organizational commitment was also distinguished ($p < 0.001$). The indirect relationship quantified the changes in well-being which are predicted by health-related behaviours associated with spirituality aside from the direct relationship (Alwin et al., 1975). Although no direct relationship between psychological well-being and type of education was found, indirect relationships were with spirituality ($p < 0.001$) and both spirituality and health-related behaviour ($p < 0.001$), but not with health-related behaviour alone. The results suggest that acquiring education on psychosocial health and the human mind might be associated with a stronger relationship of spiritual leadership and workplace spirituality with organizational commitment. The study revealed significant relationships between spirituality, health-related behaviours, and psychological well-being, in terms of the type of acquired education. The results indicate that both spirituality and health-related behaviours were associated with psychological well-being. The research findings may be a valid contribution to the discussion on the development of study programs focused on improving and maintaining various dimensions of human health and well-being. As demonstrated by (Cotton et al., 2009), spiritual well-being is positively correlated with emotional and existential well-being in adolescents. In contrast, (Jafari et al., 2010) noted a significant relationship between spiritual well-being and mental health. Therefore, the results of the present study may find some practical application in the area of education. The findings of the study supplement the existing literature by indicting that multiple pro-health behaviours are positively related to psychological well-being. The study provides valuable information for employees responsible for curriculum development not only in the context of higher education but also for the enhancement of the contents of their educational programs with activities encouraging young people to lead a healthy lifestyle and build a healthy and resourceful society. The results of this study imply that these findings support the spiritual leadership theory and confirms the importance of a spiritual workplace in the organization thus workplace spirituality can enhance employee loyalty and commitment to the organization.

4. Discussion

This study attempts to examine the relationship between organizational culture traits (involvement, consistency, adaptability and mission), workplace spirituality dimensions (meaningful work, sense of community) and alignment with organizational values. The study considers knowledge sharing as a significant trait of organizational culture as it is imposed by the rapidness, creativity, technological advancements and other characteristics that distinguish our global economy nowadays. The results of this study highlight a positive relationship between knowledge sharing and work place spirituality dimensions. Such positive relationship urges to consider knowledge sharing as a vital trait of organizational culture. Moreover, instead of relying on teacher intentions to exchange knowledge and their work-related experience with each other, schools are required to design a planned approach to accelerate such exchange of experiences (Luthans F., 2011). This may occur through in-house training and coaching activities. The study results reveal that spiritual leadership

affects organizational commitment. The spiritual leadership will manage resources holistically by integrating the four elemental essences of human existence: body, heart, mind, and soul (Moxley., 2000). Also, spiritual leadership is needed to meet spiritual needs. Thus, employees will feel the meaning of life more and feel more understood and valued (Fry & Matherly., 2006). Employees will feel they have a community, so they are willing to be involved in a spiritual organization's climate. There are opportunities for employees to develop the self will actively foster psychological attachment to the organization. The most important thing is that employees become more committed and productive (Djafri & Noordin., 2017). The employees consider spiritual needs as inherent and personal aspects based on personal values and philosophies, not determined by others. A leader with spiritual leadership characteristics will encourage and help employees find work meaningful for themselves, others and society (Hudson., 2014). This character will motivate employees to think about themselves and pay attention to the balance between the natural and social environment. Spiritual leadership will focus on the meaningfulness of work, altruism, togetherness, and higher life goals (Afsar et al., 2016). They will make a community consisting of individuals with the same traditions, values and beliefs. These activities create harmony in the work environment. Thus, spiritual leadership will create workplace spirituality. This study states that workplace spirituality has a positive effect on organizational commitment. Organizational commitment is the psychological attachment of individuals to the organization. The stronger the engagement, the smaller the employee intends to leave the organization (Garg., 2018b) empirical exploration results to prove the existence of a relationship between workplace spirituality and organizational commitment. When employees have a deep sense of meaning and purpose at work, they will be creative and more committed to the organization (Djafri & Noordin., 2017).

5. Conclusion

This study formulates a concept that clearly represents the essence, qualities and attributes of organizational spirituality and finally it systematizes, categorizes the analysed content. There is a shift in the organization focus from purely economic and social activities towards spiritual development. Leaders cannot rely solely on employee arms but must also understand their minds. Workplace spirituality and spiritual leadership become one to align the vision and values of employees with organizational goals. The empirical result reveals that workplace spirituality can mediate the relationship between spiritual leadership and organizational commitment. It can further be empirically tested and validated. The sample size could be increased to understand and validate the findings that could also be added to have a broader understanding and more integrated understanding. The discussions generated as the outcome of this study may be helpful in boosting the moral fences of the organizational members as well as creating positive attitudinal change. This study can pave a way for developing effective models and techniques for development of spiritualistic management styles to manage the organizational affairs for achieving goals of the organization through better happiness and contentment. Buddhist education aims at purity of character.

6. New Concept Proposition

Individual spirituality is the primary component of organizational spirituality (Neng Tang et al., 2019) and this mainly refers to the spirituality of the leader. Individual spirituality is a personal identity, a way of life that represents habits, the pursuit of meaning and purpose, search for transcendence and connection with divinity. Individual spirituality is also a component of workplace spirituality because interactions of spirituality within the

organization occur in the workplace as the members search for meaning in their work so, too, the work itself is also part of organizational spirituality. The presence of spiritual values (Khari & Sinha., 2018) that are visible in the mission, vision, and organizational values are also part of spirituality because organizational practices and discourse must be compatible with spirituality (Pawar., 2017). Alignment between members and organizational spirituality must exist. In other words, members should identify themselves with the organization, so it is necessary that members (Kokalan., 2019) and management perceive organizational spirituality. Once spirituality presents itself as a phenomenon that brings connection between individuals, enlightening the purpose of their lives, it also connects individuals with other communities and generations. Thus, organizational spirituality must create social good and generate value. The benefits to organization members are indubitable (Thakur & Singh., 2016), but they ought to be extended to society as a whole and future generations and not just to stakeholders.

7. Future Research Suggestions

The directions for future research suggest areas for further study that would help overcome these limitations and enrich the field of organizational spirituality research. The future research should focus on empirically test existing theoretical models and concepts of organizational spirituality, including the concept proposed in this study. Also, because of the need to understand the basic movement, future research should use alternative and mixed methodologies to deepen the study of organizational spirituality, entering deeper into the phenomenon and its results for individuals, the organization, community, and future generations. The use of samples and measures that allow the generalization of results should also be considered. The study also indicate that the current research direction focuses on workplace spirituality, which leaves a gap on the other levels of organizational spirituality individual and organizational. To fill this gap, the effects of a change in leadership, from non-spiritual leadership to spiritual leadership and vice versa should be investigated along with changes in members spirituality after this leadership change.

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Taiwanese University Teachers' Motivation and Language Choice for Scholarly Publishing

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Abstract
Within a global trend of academic publishing in English, publication in indigenous languages, nevertheless, in many contexts, continues to thrive. Multilingual scholars often need to negotiate international engagement and local commitment by publishing both in English and their first language. The study, based on individual in-depth semi-structured interviews with university bilingual teachers from social sciences in Taiwan, focuses on examining their motivation and language choice (i.e., first language only, English only, or both English and first language) for publishing their research articles, and factors that may influence their motivation and language choice. The study showed that (1) against the widely-held view of utility in getting published in English as the single most important driving force, it pointed to a complex picture of Taiwanese university teachers' motivation and language choice for scholarly publishing; (2) the privilege attached to publishing in internationally indexed journals stood out as the major factor orienting Taiwanese university teachers toward writing in English and using various strategies to facilitate successful publication; (3) international publication in English nonetheless increases, but Chinese would still retain its position as the language of research and publication; and (4) the tension in the negotiation was likely to grow with the continuous push toward the globalization of the academia which had a great impact on university teachers. This study provides useful insight into understanding university teachers' motivation and language choice for scholarly publishing. Some recommendations are made when guiding school planners for helping university teachers to cope with international publication versus local publication.

Keywords: Bi/Multilingual, Motivation, Language Choice, Scholarly Publication

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Introduction

As English becomes the global language of scholarship, the past few decades have witnessed an increasing interest in the research about researchers who use English as a foreign language (EFL) (e.g., Ferguson, 2007; Flowerdew, 2019; Lillis & Curry, 2010; Luo & Hyland, 2016; Salager-Meyer, 2008; Smirnova et al., 2021). The trend of internationalization in academia has significant implications particularly in the language choice between English language and the local language in writing for scholarly publication. It is mainly shown in internationalizing higher education, and marketizing academia (Altbach, 2009; Mok, 2006; Smirnova et al., 2021). Such changes exert a great impact on researchers. First, the internationalization of the higher education usually denotes an increasingly policy-explicit and assessment-driven requirement for researchers to get articles published in English. Second, it also leads to the favoring of international journal databases, including A&HCI, SCI, and SSCI. The marketization of academia indicates not only closer links between universities and business world, but also quality assurance of academic performance and educational services provided by universities (Mok, 2006; Postiglione, 2005; Smirnova et al., 2021). In view of this, universities are at the forefront of these movements, and internationally indexed databases increasingly become indicators in the assessment criteria for researchers.

Nonetheless, despite the internationalization and spread of English in writing for scholarly publication, researchers in EFL contexts may still want to write and get their articles published in local languages. Past studies show that writing for bi/multilingual scholarly publication takes place in different EFL countries, such as China, Hungary, Japan, Poland, Portugal, Romania, Slovakia, and Spain (Casanave, 1998; Duszak & Lewkowicz, 2008; Lillis & Curry, 2010; Muresan & Pérez-Llantada, 2014; Zheng & Gao, 2016). According to Altbach (2009), apart from the need to "function in the international languages of science and scholarship," universities should also "have a responsibility to disseminate research and analysis in local languages" and "play a key role in supporting and developing local languages" (p. 25). In addition, previous studies also reveal the importance for multilingual researchers to get their articles published in their local languages besides publishing in English in order to engage with and contribute to different communities (Casanave, 1998; Curry & Lillis, 2004).

Given that the internationalization of academic publishing in the global world tends to be negotiated in the local society, a central question in the context of Taiwan is what the situation in getting articles published in English and Chinese might be for Taiwanese researchers. As suggested by Gnutzmann and Rabe (2014) and López-Navarro et al. (2015), relatively little attention in previous research was paid specifically to EFL researchers' motivation and language choice in getting articles published. EFL researchers may be motivated to get articles published for different reasons, and different disciplines may influence their motivation and language choice (Baldauf, 2001; López-Navarro et al., 2015). In light of this, the present study seeks to extend the findings from previous studies to explore Taiwanese university teachers' motivation and language choice in writing for scholarly publication in English and Chinese from social sciences.

Literature Review

Due to the consideration of the primacy of English and the preference of international journal databases in research assessment, international English publication is usually more admired compared with local language publication (Salager-Meyer, 2014). Past studies reveal that

EFL researchers' motivations to get articles published in English are related to utility, self-concept, cost, and intrinsic satisfaction (López-Navarro et al., 2015). For instance, first of all, their motivations to get articles published in English tend to be linked to utility, such as having promotion (Martín et al., 2014), gaining international recognition (Luo & Hyland, 2019), and receiving monetary incentives (Hanauer & Englander, 2011). Other than utility, EFL researchers may also get articles published in English to build international networks (Curry & Lillis, 2010).

Nonetheless, EFL researchers' self-concept and perceived cost may deter them to get articles published in English in spite of utility (Lillis & Curry, 2010). For example, in the past, a large body of literature shows language disadvantages of writing for scholarly publication in English perceived by EFL researchers (e.g., Burgess et al., 2014; Flowerdew, 1999; Li, 2002; López-Navarro et al., 2015). For example, a majority of the doctoral students in mainland China (Li, 2002) and the researchers in Hong Kong (Flowerdew, 1999) reported feeling disadvantaged in comparison with native English-speaking researchers.

Moreover, research shows that getting articles published in English could be extra burdens for EFL researchers since writing English research articles tends to be more difficult and challenging (Hanauer & Englander, 2011; Shin et al., 2014) and also having the abilities necessary to get articles published in English entails additional time and effort (Burgess et al., 2014; Salager-Meyer, 2008). Despite such facts, some research indicates that EFL researchers do not essentially feel disadvantaged (Ferguson et al., 2011; Hyland, 2016). Native English researchers may encounter challenges alike since writing for scholarly publication is more connected with specialty than with language (Hyland, 2016; Swales & Feak, 2012).

Unlike utilitarian motivations for getting articles published in English, EFL researchers in getting articles published in their first language tend to be linked to intrinsic satisfaction (Hanauer & Englander, 2011). For example, while researchers could be extrinsically motivated for its "greater symbolic capital in terms of recognition" in getting articles published in English, Gentil and Séror (2014) indicated that researchers could be intrinsically motivated for "the intellectual satisfaction of developing deeper insights through bilingual work" (p. 23). Moreover, EFL researchers may want to get their articles published in their first language due to their connection to their home countries (McGrath, 2014; Salager-Meyer, 2014).

In sum, in spite of previous research on EFL researchers' motivations in writing for scholarly publication, what remains unknown is between the privileging of English publication and the potential development of local publication in Chinese (i.e. the perceptions of Taiwanese researchers toward writing for scholarly publication in English versus Chinese). First, despite past research revealing EFL researchers' motivation to publish in different languages (e.g., Burgess et al., 2014; Hanauer & Englander, 2011; Martín et al., 2014), it is unclear about their motivation for getting articles published in English versus Chinese. In addition, there is a need for more research into the factors influencing EFL researchers' language choice in writing for bi/multilingual scholarly publication and most importantly, their rationales of language choices in writing for scholarly publication (Gnutzmann & Rabe, 2014; Huang, 2011; López-Navarro et al., 2015). In response to this call, the present study aims to explore Taiwanese university teachers' motivation and language choice in writing for scholarly publication, and factors that may affect their motivation and language choice in writing for scholarly publication for Taiwanese researchers. This study sets out to address the following scholarly publication for Taiwanese researchers. This study sets out to address the following

two research questions:

1. What are Taiwanese university teachers' motivation for research writing in English and Chinese?
2. What are their rationales of language choices in writing for scholarly publication?

Research Method

The method adopted to answer the research questions comprised individual in-depth semi-structured interviews. The interviews were used to explore Taiwanese university teachers' motivation and language choice in writing for scholarly publication. Ten university teachers from social sciences, including business administration, finance, political science, sociology, and social work in northern Taiwan participated in the interviews. They all had study abroad experiences and earned their doctoral degrees in English speaking countries, including United States, United Kingdom, Australia, and Canada. The length of each interview ranged from one to two hours. Since each teacher was from different school, the location of the interview varied. In this study, each interview was prefaced with an informed consent statement informing participants of the purpose of the study, their rights not to participate, and the commitment to protect confidentiality and anonymity. Pseudonyms were used for teachers to protect their anonymity.

Data Collection

University teachers were invited to participate in the present study. In contacting potential participants, the study began by viewing the webpages accessed through the link of 'staff' found on the respective departments' homepage at universities. In order to gain as wide a spectrum of participants as possible, the researcher took into consideration the potential participants' disciplines, age, academic rank, as well as their research productivity (as seen in the publication list and information of research activities provided of the person at his/her homepage). The researcher also included, where possible, some acquaintances in the potential pool due to convenient access. Emails were sent to the potential participants explaining the research purpose and inviting them to participate in the research by accepting an interview at a time of their convenience.

To examine the influence of publication language, background, and study abroad experience on teachers' research writing motivation, in-depth semi-structured interviews were conducted. Open-ended explanatory questions were used for teachers to reflect on motivation for research writing in their language choice, either in Chinese only, English only, or in both Chinese and English. The interview questions ranged from teachers' disciplinary backgrounds, study abroad experiences, motivation and language choice in writing for scholarly publication, to opportunities and constraints for their scholarly endeavors in the context of academic internationalization.

Data Analysis

Qualitative interviews were analyzed and interpreted in an attempt to understand Taiwanese university teachers' motivation and language choice in writing for scholarly publication. Miles and Huberman (1994) argued that one major feature of qualitative research is its focus on "naturally occurring, ordinary events in natural settings" so researchers and those reading the work have a good sense of what "real life" is like" (p. 10). Data were analyzed using a

general inductive approach for qualitative data analysis (Thomas, 2006). The goal of data analysis was to identify and generate categories in response to research questions, grounded in the data. The next stage was to manipulate the categories, identifying segments that were then dispersed into different relevant categories and/or research questions or text that was not relevant to those areas. This analysis process provided appropriate quotes from the research to identify specific factors related to motivation and language choice in writing for scholarly publication specified by each teacher.

To make the study credible and rigorous, two different techniques were achieved using participation review and coding consistency check. First, participation review was achieved by presenting teachers' voices under each theme and by providing detailed description of each of the cases. Triangulation were used consistently with each teacher in general. Each of the teacher interviewed was asked to review the transcribed interviews to add, delete, or amend any statements made. The transcribed interview documents were then emailed to each teacher and requested an email response with any comments included in their interview document. To make sure validity and reliability (Merriam, 2002), member checks were used by sending interpretations back to teachers by email or via hardcopy to ensure that they were accurate. In this return email each teacher was asked to give consent that the information provided in the transcribed interview document was accurate and aligned with their views and opinions.

Results

The comments made by the teachers about motivation and language choice in writing for scholarly publication were explored. In the study, the following two main categories resulting from the transcription and coding of teachers' responses in the interview data showed motivation and language choice in writing for scholarly publication from the teachers' perspectives.

Getting Articles Published in English/internationally indexed journals

In the discussion of getting articles published in English/internationally indexed journals, the teachers tended to refer to their motivations and the strategies they used. They also articulated some criticisms of the status quo.

Motivations

The teachers' motivations for getting articles published in English/internationally indexed journals can be categorized into three major purposes, i.e. to fulfill the assessment criteria, to reach a wide readership, and to target for a high standard.

Assessments are required for teachers who are expected to be proactive in research productivity. The expectation on teachers to get articles published in internationally indexed journals is explicit. It is generally well understood and is assimilated by new teachers. As the teacher, Jenny put it:

> When our colleagues discuss with each other, naturally the topic would come up. Potentially there is pressure coming from the school. Therefore, we may refer to, which journal did you submit to? I say I submitted to this journal. 'The journal is not SSCI,' they respond. Such a piece of advice is passed down to a new teacher.

When it is about the time to report research output or apply for a grant, teachers are aware of the importance of having internationally indexed journal articles to report. For instance, as Bill put it, "I know which publications really count. The common response to the need to get articles published in internationally indexed journals is to fulfill assessment criteria." He further stated:

> Generally, I aim to submit my articles to the top internationally indexed journal, and preferably, the best journal. However, while I am occupied with loads of teaching and bulk of service, time is limited for me. As I do not have much time and there are many things to do, I do not avoid submitting my work to local journals.

In light of Bill's situation, promotion tends to be an urgent need for him. He further made such a remark: "If submitting to local journals leads to promotion and a salary rise, then I would do it. Since submitting to local journals also achieves similar objectives, submitting to internationally indexed journals may not be the necessary option."

Apart from striving to fulfill the assessment criteria, the internationally indexed journal is usually the optimal choice in view of reaching a wider readership. For example, John indicated: "When I write an article, I need to think about where to submit in order to appeal to a wide readership with academic rigor." For John, getting articles published in internationally indexed journals becomes gradually necessary, mainly because of the assessment pressure and his consciousness of the need to interact with researchers worldwide:

> I feel I should let more researchers know my thoughts and let those who are interested in the topic see my work all over the world. Getting articles published in internationally indexed journals would be an easier avenue for them to read my work.

In addition, getting articles published in internationally indexed journals is an indication of a high quality of research. As noted by Sue, "it is good for Taiwanese researchers to have their articles published in the world's top-notch journals in their field since it shows the scholarship can reach the world's high-quality level."

Strategies

The strategies adopted by teachers about the ways that they positioned themselves were through the use of Anglo-American research framework. Three kinds of strategies included researching issues related to Greater China, using Anglo-American frameworks for exploring research issues, and enhancing Anglo-American theories.

First, when asked about how Janice chose her research topic, she suggested that Taiwan may not be of interest to the academia in the global world. "Taiwan is a small island. Researchers may not be much interested if your research topic is about Taiwan. On the contrary, Greater China could be of great international interest." Janice added:

> Taiwan may not grab much attention in the globe. Anything that happens in Taiwan could be unique, but not many researchers may cite it. Nonetheless, if you conduct a study related to Greater China, a large number of people might be interested in reading what is happening since their government may have trade with Greater China. They want to know more about it.

Second, in order to get published in internationally indexed journals, a strategy mentioned by Tom is that he should redesign and conduct the research based on Anglo-American theories. He commented his approach in writing articles in economics. “In order to get my articles published in internationally indexed journals, the studies of local issues need to be framed by Anglo-American theories.”

Finally, Bob noted the importance of enhancing Anglo-American theories. “If I just show some results, I will not get my articles published.” To get articles published in journals in his field (political science), he intended to enhance theories by explaining the uniqueness found in Taiwan:

> In the field of political science, the political climate may vary from region to region. For example, what happens in Eastern societies may not be similar in Western societies. I put much emphasis on this aspect, something absent in Western societies but existing in Taiwan. This could be a big selling point and thus enhance theories.

The above three strategies can be interpreted that universities demand teachers to get their works published in internationally indexed journals. However, as suggested by Braine (2005), such journals usually center on audiences in Anglo-American contexts and may not be much interested in research from non-Western contexts. Since researching issues related to Greater China, using Anglo-American frameworks for exploring research issues, and enhancing Anglo-American theories are highlighted in particular, it seems to indicate that practicing such strategies may be significant for the peripheral participation (Lave & Wenger, 1991) in the international academic community.

Struggle

As stated in the previous section, getting articles published in internationally indexed journals increasingly becomes a requirement. However, it could also be a struggle in response to such assessment. For example, Jenny indicated concern about the veneration of internationally indexed journals. “Some of the research topics fit within the Chinese context can be best written in Chinese rather than in English. Also, not all articles published in English are of an international standard.” The idea of what is ‘international’ may also denote hegemony. Jenny added:

> In the English speaking countries such as UK and US, markets are large enough to be international, although most of the articles published in social sciences are basically about research in the local context. Certainly, there is a kind of hegemony due to language and scale of the research community. Consequently, people from other places need to be affiliated with such research community in order to be international.

On the other hand, Alice argued that internationally indexed journals may not be all appropriate for social sciences researchers. She indicated that it is questionable to privilege getting articles published in internationally indexed journals. Such board criteria adopted in natural sciences (i.e. SCI) are applicable, but may blindly extend across social sciences (i.e. SSCI). In other words, the means of evaluation in the scholarship of social sciences could be different from those in natural sciences. For instance, Alice noted:

> I think adopting SSCI as the only criterion may somehow be inappropriate. In social sciences, a lot of research is on local issues and thus should use local discourses to

> exchange among colleagues. A single-minded concern with publishing in these indexed journals may impede disinterested quest of scholarship and limit academic vision.

Being under pressure to publish particularly in the internationally indexed journals makes James feel perplexed. The feeling was articulated by him as follows:

> It is hard to escape from the evaluation yardstick. The pressure comes all the way from the school research and development division to the department. In order to survive, I need to set a good example to my younger colleagues and get articles published in internationally indexed journals. It is very difficult to break out of this dilemma.

Getting Articles Published in Chinese

Although getting articles published in internationally indexed English journals is almost the default target that university teachers aimed at for evaluation, nevertheless, they held a positive attitude toward getting articles published in Chinese. It is noted that generally university teachers had different purposes in mind.

To bring in western perspectives and transform the local academia

Helen, apart from seeking to get articles published in English, also wrote in Chinese and submitted papers to journals in Taiwan. She pointed out that she wanted her work to be seen by international as well as local readers. She felt the need to get articles published in journals in Taiwan since it would help to bring western perspectives into Taiwan:

> I think there is a need of writing in Chinese for journals in Taiwan. I hope Taiwanese will know about western perspectives. They can compare and contrast similarities and differences between east and west, and gain some insights to make changes. Different perspectives can be complementary.

In view of this, her commitment to the local academia is clear. She aimed to participate in the conversation in the local academia, by targeting to make a difference, in particular on the research in Taiwan. In other words, it was important for her to write in Chinese to bring in western perspectives and to transform the local academia.

To influence policy making

Another motivation to write in Chinese is articulated by Sandy, hoping her research to facilitate discussion and have an influence on policy making in Taiwan. “I hope that I can get my articles published in Taiwan and play a role in policy making. Since my research interest is in such an area, it may expedite discussion in Taiwan.”

Sandy has got her articles published in a number of journals written in Chinese. In addition, she wrote articles in local magazines and newspapers. She also served on several committees for the university as well as the government. In other words, she was keen to take part in the local society and her publications in Chinese showed what she aimed to promote in policy making.

To guide practice for local readers

Jason pointed out that in addition to fulfilling the requirement in getting articles published in internationally indexed journals, due his own personal interest, he also wrote guidebooks in Chinese for local readers:

> I do not care much about whether guidebooks written in Chinese are counted by the university or not. Nevertheless, writing guidebooks helps me earn reputations for local societies. I feel a need to propagate my research and ideas to local readers.

Indeed, Jason considered that writing in Chinese allowed him to fulfill his own personal aspiration and delivered messages to local readers. He derived great satisfaction from a collegial link to local societies.

To serve and educate Taiwanese people

Jean served as a member of the academic board in a Chinese research journal in Taiwan. Although the journal was faced with the difficulty of survival, nonetheless, she put stress on its importance in educating Taiwanese people. "Although the concepts of globalization and internationalization are vital, nevertheless, the importance of localization cannot be overemphasized. After all, many people are reading Chinese. We need to produce some Chinese materials to serve and educate people, and let them read and learn." With her service-mindedness, she tried to forge the nexus between research and education. By reaching a wide readership in the local society, she foresaw the possibility of nurturing the readership, fostering discussion, and making an impact.

It is noted that the Jean did not regard English and Chinese publications as mutually exclusive. In particular, she stated that Chinese scholarship had much to offer to the West. For example, recently she had a publication of a translated version of her Chinese book into English. She hoped that the English version could serve as a reference for potential English readers. As she pointed out, "I do not think that only the West has theories to provide. Taiwan can offer a lot to be explored." The above comment obviously aimed to change the status quo that marginalized non-English scholarship. She believed her translated book (from Chinese to English) could facilitate mutual understandings between East and West scholarship.

Discussion and Conclusion

The purpose of the study is to investigate Taiwanese university teachers' motivation and language choice in writing for scholarly publication. The findings indicate that getting articles published in internationally indexed journals was a major reason leading the Taiwanese university teachers to write in English, despite the fact that the teachers also wanted to have their publications reaching as wide a readership as possible and showing a high quality scholarship. A number of strategies were adopted with the aim of successful publication in internationally indexed journals, including researching issues related to Greater China, using Anglo-American frameworks for exploring research issues, and enhancing Anglo-American theories. However, there was an obvious struggle in response to assessment to get articles published in internationally indexed journals. What the teachers considered that this struggle was the adoption of Western criteria or criteria in internationally indexed journals more suitable for natural sciences than for social sciences. Meanwhile, the teachers sought to get articles published in Chinese to bring in western perspectives and transform the

local academia, to influence policy making, to guide practice for local readers, or to serve and educate Taiwanese people.

The above results can be explained and interpreted as follows. First, apparently, getting articles published in internationally indexed journals is the process of the internationalization of the academia in response to globalization of higher education (Mok, 2006; Smirnova et al., 2021). In the case of Taiwan, this may denote a reproduction of Western criteria in evaluating scholarship since getting articles published in Anglo-American journals is usually viewed a higher status than local publication. In spite of this, it is particularly worth noting that the teachers in the study also tried to get articles published in Chinese, for the purpose of serving Taiwanese society. In particular, they may also seek to get articles published in local magazines and newspapers with insights mainly from their research disciplines. The result coincides with what Altbach (2009) indicates the university's responsibility "to disseminate research and analysis in local languages" (p. 25). To enhance visibility of scholarship such as Taiwanese scholarship in the global world with the center in Anglo-American academia (Galtung, 1971), efforts can be made such as encouraging researchers' participation in international academia, with particular reference to Greater China.

Second, although university teachers need to accommodate the assessment that favors internationally indexed journals over local journals (Chou, 2008; Chou & Ching, 2012), nonetheless, it seems that publication in English may be encouraged without either sacrificing their beliefs in getting articles published in Chinese or eroding Chinese as an academic language. This is not to deny the problem about the struggle in seeking to get articles published in internationally indexed journals for Taiwanese university teachers and in overcoming the English language obstacles encountered by them when it comes to writing for publication in English. The finding of the study also indicates that the university teachers would try to strike a balance between international participation and engagement "in civic discourse on topics of societal importance" (Altbach, 2009, p. 22) in the local society.

Finally, despite the spread of English as an international language for research (Liu, 2017), Chinese still remains to be a vibrant language for publication for Taiwanese university teachers, and getting articles published in English and Chinese tends to be a common practice. Their past study abroad experiences coupled with their abilities to write in English were likely to be the major reasons leading university teachers to get articles published in English. However, it is worth noting that in spite of such tendency, the teachers did not to get their articles published in English only. This may in turn suggests that English has not replaced Chinese as the language for publication for Taiwanese university teachers (Huang, 2011). Publishing in languages other than English in academic writing thus deserves attention, in view of the fact that the publishing activities in different languages all over the world are vibrant (Curry & Lillis, 2022). Along with other findings discussed earlier, the current study offers evidence against the spread of English for scholarly publication and the widely-held view of utility as the single most important driving force, and reveals a complex picture of Taiwanese university teachers' motivation and language choice in writing for scholarly publication.

The findings of this study can provide some useful implications. First, the connections between past study abroad experiences and abilities to write in English provide Taiwanese university teachers with the possibility of getting articles published in both Chinese and English rather than in Chinese only. In addition, against the backdrop of international scholarship, as noted in this study, because of the assessment pressure to get articles

published in internationally indexed journals, Taiwanese university teachers need to prioritize writing in English, which could lead to inform a wider pubic and make an impact in the global world. They also start to use Anglo-American frameworks for exploring research issues and enhancing Anglo-American theories. The ideological gap between Eastern and Western scholarship may therefore gradually be reduced.

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A Perception Study of Multicultural Values: Applying Hofstede's Values Survey Module in the Thai Setting

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Abstract
This paper aims to track the changes in Thailand's cultural dimension score over a decade. The research methodology includes the target dissemination of Hofstede's Value Survey Module 2013 to collect data online from corporate employees with 264 usable responses. Demographic data of respondents are majority female (54%), age 36 years and above (77%), graduated with a master's degree (66%), and having a managerial title (54%). Data analysis consists of the formula calculation of mean scores into the dimensions, including power distance, individualism, masculinity, uncertainty avoidance, long-term orientation, and indulgence. The dimension scores further require a designated constant computed from the shift, using seven particular Asian countries as a reference region. The final dimension score results show an increase and decrease from the originals. The surveyed power distance score is 40, a 24 points reduction from the original score of 64, indicating a shift in the lower value of seniority and hierarchy among the respondents. The remaining dimensions have higher scores than the previous, ranging from 8 to 34. The highest changed score is masculinity changing from the original 34 to 68, reflecting an increase in competitive and winning value. The minimal change score is uncertainty avoidance, from 64 to 72, indicating a slight increase in how people value the necessity of rules. Perceived benefits of this study include updated perceptions of Thai respondents as a fresher view after the original and how to apply the VSM formula index to obtain a new score in the future study.

Keywords**:** Multicultural Dimensions, Hofstede's VSM, Thailand's Cultural Dimension Scores

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Introduction

As time passes along with significant disruptions and changes, such as financial instability, pandemic, and political conflicts, it may be time to reinvestigate how people's perceptions may have changed. Therefore, this research assumes that changes may inevitably occur during the past decade. Hofstede's Multicultural Dimensions has been popular among those interested in learning about cross-cultural values. Six dimensions include power distance, individualism, masculinity, uncertainty avoidance, long-term orientation, and indulgence. A set of questions and manual of Value Survey Module or VSM 2013 have been available for researchers to conduct a replicate study.

Research Methodology

The study aims to track the changes in the cross-cultural perception of Thai people over time. The research uses a survey question from Hofstede's Value Survey Module or VSM 2013, a 30-item questionnaire developed by Geert Hofstede and Michael Minkov, to compare culturally influenced values of countries. The manual clearly stated that the VSM2013 is not for the individual level, not for comparing organizations, nor for disapproving the published scores. The reason is that comparisons must use matched respondents from an original IBM subsidiary population. All questions require the target groups to give their perception rating on a five-point scale (1-5). There are formulas set to compute each dimension as follows:

1. Power Distance Index (*PDI*)
The extent to which the less powerful members of institutions and organizations within a society expect and accept that power is distributed unequally.

Index Formula: PDI = 35(m07 – m02) + 25(m20 – m23) + C(pd)
Note: C(pd) is a constant (positive or negative) chosen to shift the found PDI scores to values between 0 and 100.

2. Individualism Index (*IDV*)
Individualism reflects a loose tie between individuals; a person is expected to look after themself and their immediate family only; Opposite is collectivism, in which people from birth onwards are integrated into strong, cohesive in-groups, which continue to protect them throughout their lifetime in exchange for unquestioning loyalty.

Index Formula: DV = 35(m04 – m01) + 35(m09 – m06) + C(ic)
Note: C(ic) is a constant (positive or negative) chosen to shift the found IDV scores to values between 0 and 100.

3. Masculinity Index (*MAS*)
A society in which social gender roles are distinct: men are supposed to be more assertive, challenging, and focused on material success; women are supposed to be more modest, tender, and concerned with the quality of life.

Index Formula: MAS = 35(m05 – m03) + 35(m08 – m10) + C(mf)
Note: C(mf) is a constant (positive or negative) chosen to shift the found MAS scores to values between 0 and 100.

4. Uncertainty Avoidance Index (*UAI*)
The extent to which the members of institutions and organizations within a society feel threatened by uncertain, unknown, ambiguous, or unstructured situations.

Index Formula: UAI = 40(m18 - m15) + 25(m21 – m24) + C(ua)
Note: C(ua) is a constant (positive or negative) chosen to shift the found UAI scores to values between 0 and 100.

5. Long-Term Orientation Index (*LTO*)
A society that fosters virtues oriented towards future rewards, in particular, adaptation, perseverance, and thrift; the Opposite is a short-term orientation that enables virtues related to the past and present, in particular, respect for tradition and fulfilling social obligations

Index Formula: LTO = 40(m13 – m14) + 25(m19 – m22) + C(ls)
Note: C(ls) is a constant (positive or negative) chosen to shift the found LTO scores to values between 0 and 100.

6. Indulgence versus Restraint Index (*IVR*)
A society that allows relatively free gratification of some desires and feelings, especially leisure, merrymaking with friends, spending, and consumption; restraining is a society that controls such gratification and where people feel less able to enjoy their lives

Index Formula: IVR = 35(m12 – m11) + 40(m17 – m16) + C(ir)
Note: C(ir) is a constant (positive or negative) chosen to shift the found IVR scores to values between 0 and 100.

Demographic of Respondents

The total 264 respondent profiles are as follows:
Gender: Male 121 (46%) ; Female 143 (54%)
Age: 21 -35 Years 202 (77%); 36 Years and above 62 (23%)
Education: Bachelor Degree 89 (34%); Master Degree and higher 175 (66%)
Position: Operational Staff 121 (46%); Managerial Staff 143 (54%)

Data Gathering and Analysis

The questionnaires were administered online to company employees, with a total usable response of 264. Data analysis includes each question's mean score and the index formula calculation.

The sample calculation is as follows:
Notes: VSM recommends a two-decimal mean score.

Q7	Be consulted by your boss in a decision involving your work	Mean score = 3.43
Q2	Have a boss you can trust	Mean score = 1.00
Q20	Subordinates afraid to contradict their boss	Mean score = 4.48
Q23	Two bosses should be avoided at all costs	Mean score = 1.53

Formula Index for PDI = 35(m07 – m02) + 25(m20 – m23) + C(pd)

The first score derived from the formula for Power Distance without the constant C(pd) is 159.

As the VSM manual recommends applying a constant to shift the score to values between 0 and 100, the researcher has to calculate the constant through reference to others. For the PDI index, the reference score used is 76, thus making the constant C(pd) equal to minus 119. The final PDI score becomes 159 + (-119) = 40. In this regard, the newfound PDI for Thailand is 40, which is less than the original Hofstede score of 64.

Details of dimension index constant and final scores are shown in the following tables.

PDI	Shift +?	Thailand	Reference Others
Found Scores		159	76
Shift + ?	25	183	100
Hofstede Scores		64	
Distracted to get Constant		– 119	

PDI	Mean Score	Constant C(pd)	NEW PDI	H.PDI	Difference
Q7 PDI_be consulted by your boss in decisions involving your work	3.43				
Q2 PDI_ have a boss you can respect	1.00				
Q20 PDI_subordinates afraid to contradict their boss_	4.48				
Q23 PDI_two bosses should be avoided at all costs	1.53				
Net PDI Scores	159	–119	40	64	25

Table 1: Calculation of Power Distance Dimension Scores

IDV	Shift +?	Thailand	Reference Others
Found Scores		97	25
Shift + ?	–25	72	0
Hofstede Scores		20	
Distracted to get Constant		– 52	

IDV	Mean Score	Constant C(pd)	NEW IDV	H.IDV	Difference
Q4 IDV_have security of employment	2.90				
Q1 IDV_have sufficient time for your personal or home life	1.50				
Q9 IDV_have a job respected by your family and friends	3.40				
Q6 IDV_do work that is interesting	1.50				
Net IDV Scores	97	–52	45	20	–25

Table 2: Calculation of Individualism Dimension Scores

MAS	Shift +?	Thailand	Reference Others
Found Scores		114	34
Shift + ?	–34	80	0
Hofstede Scores		34	
Distracted to get Constant		– 46	

MAS	Mean Score	Constant C(pd)	NEW MAS	H.MAS	Difference
Q5 MAS_have pleasant people to work with	3.40				
Q3 MAS_get recognition for good performance	1.50				
Q8 MAS_live in a desirable area	3.40				
Q10 MAS_have chances for promotion	1.50				
Net MAS Scores	114	–46	68	34	–34

Table 3: Calculation of Masculinity Dimension Scores

UAI	Shift +?	Thailand	Reference Others
Found Scores		127	8
Shift + ?	–8	119	0
Hofstede Scores		64	
Distracted to get Constant		– 55	

UAI	Mean Score	Constant C(pd)	NEW UAI	H.UAI	Difference
Q18 UAI_your state of health these days	3.90				
Q15 UAI_feel nervous or tense	2.00				
Q21 UAI_be a good manager without answer to subordinate's question	3.90				
Q24 UAI_rules should not be broken even for the company's interest	1.50				
Net UAI Scores	127	–55	72	64	–8

Table 4: Calculation of Uncertainty Avoidance Dimension Scores

LTO	Shift +?	Thailand	Reference Others
Found Scores		139	30
Shift + ?	–30	110	0
Hofstede Scores		32	
Distracted to get Constant		– 78	

LTO	Mean Score	Constant C(pd)	NEW LTO	H.LTO	Difference
Q13 LTO_do a service to a friend	2.90				
Q14 LTO_thrift (not spending more than needed)	1.00				
Q19 LTO_proud to be a citizen of your country	4.40				
Q22 LTO_persistent efforts are the surest way to results	1.50				
Net LTO Scores	139	–78	62	32	–30

Table 5: Calculation of Long-term Orientation Dimension Scores

IVR	Shift +?	Thailand	Reference Others
Found Scores		127	31
Shift + ?	–31	96	0
Hofstede Scores		45	
Distracted to get Constant		– 51	

IVR	Mean Score	Constant C(pd)	NEW IVR	H.IVR	Difference
Q12 IVR_have security of employment	2.90				
Q11 IVR_have security of employment	1.00				
Q17 IVR_have security of employment	3.90				
Q16 IVR_have security of employment	1.50				
Net IVR Scores	127	–51	76	45	–31

Table 6: Calculation of Indulgence vs. Restraint Dimension Scores

Results and Discussions

The final result of the study is shown in the followings:

Cultural Index Score	This study	Hofstede Score
Power Distance Index (PDI)	40	64
Individualism Index (IDV)	45	20
Masculinity Index (MAS)	68	34
Uncertainty Avoidance Index (UAI)	72	64
Long Term Orientation Index (LTO)	62	32
Indulgence vs. Restraint Index (IVR)	76	45

Table 7: Summary of New Found Index Scores

Perception of 264 respondents showed a 24 score decrease from the original Hofstede in the power distance index, indicating less acceptance of the distribution of power in society. Concerning the individualism index, the respondents moved toward a loose tie in the community where the concentration is on their immediate family, not all others. The masculinity index score increased toward a more assertive, competitive, and concerned-for material. The uncertainty avoidance index showed a slight increase from an already moderately high threat of risks. The long-term orientation index was on the rise to a more concern towards the future. Lastly, the indulgence versus restraint index showed increased leisure and free gratifications.

Conclusion

As reminded by the VSM, the results found are not comparable to published scores due to the changing time, places, and sample groups. It is, therefore, virtually impossible to make a complete comparison. However, the VSM is still a good tool for enthusiastic researchers to explore cultural dimensions following Hofstede's trail of thought. Though there is no means to change the original score, the researcher thinks this study may serve as a preview of what has been happening in society. As the faithful witness of the world, the researcher agrees with the found scores in all six dimensions. Much appreciation for the VSM tool; there should be more studies of this kind elsewhere in the future.

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Developing Students' Transferable Skills Through Service Leadership of Inclusive Learning Community

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Abstract
One important aim of higher education is to develop students' attributes and skills that can be applied in their future career. Apart from contributing to employability, the skills students gain during university experience can enhance personal and social capacity and prepare students to take leadership roles in the community. This paper presents a study examining the development of university students' transferable skills through active participation in an inclusive learning community consisting of adolescents with and without special educational needs. University students received training to take service leadership role of the learning community as part of a general education capstone course. The study adopted a mixed-methods design. Pre- and post-course questionnaire survey and follow-up interviews were conducted with a sample of 27 university students enrolled in the course. Data analysis revealed a statistically significant increase in the scores of attributes related to appreciation of diversity, respect, contribution to society, and civic engagement after completing the course. Thematic analysis of the qualitative data indicated demonstration of service leadership skills, enhanced understanding of social inclusion, and cultivation of community engagement values. Students demonstrated empathy, respect and effective communication. They delegated roles to others and reflected on their leadership experience. Results of the study highlight the importance of empowering university students to undertake leadership of learning community involving diverse populations in real-life settings. This authentic experience contributes to the development of important skills and attributes for students' personal and social development.

Keywords: Transferable Skills, Service Leadership, Learning Community, Higher Education, Hong Kong

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Introduction

Graduates of universities must now have a set of skills that enhance both their personal life and employability. As the number of graduates continues to rise and job market competition intensifies, it has become crucial to exhibit and substantiate skills that exceed the technical and subject-specific knowledge. These skills are known as transferable skills and they include interpersonal and intrapersonal skills, critical thinking, problem solving communication, teamwork and leadership (Mello & Wattret, 2021; Yate, 2017). Nowadays, graduates are not only expected to master these skills but also to demonstrate social values and respect to others (Hinchliffe & Jolly, 2011). While there is an increasing need for these skills, there remains a gap between skills that graduates possess and what employers require (Heaviside, Manley & Hudson, 2018). To best develop transferable skills there is a need for employing experiential and student-centered approaches (Calvaho, 2016). Mello and Wattret (2021) argue that the development of transferable skills requires the incorporation of student self-reflection process. Moreover, these skills can be best acquired if learning takes place outside the classroom through community engagement (Hinchliffe & Jolly, 2011).

Studies investigating the development of transferable skills were mainly conducted on specific discipline subjects (e.g., Carvalho, 2016; Valero et al., 2020). While these studies indicated a positive impact on students' skills such as information searching and teamwork in these disciplines, a need exists to find out more about the development of skills across the disciplines, especially in preparation of graduates for global working environment (Malm et al., 2022). One study conducted by Collins-Nelsen and associates (2022) examined students' development of transferable skills utilizing experiential learning beyond discipline-specific context. Results of the study indicated an increase in students' self-assessment of leadership, problem solving, knowledge translation, and knowledge mobilization. The research team recommended to further study the context in which the learning activities are held. They also raised the need for more pre- and post-learning research utilizing interviews to elicit students' voices about their learning process and the development of transferable skills.

The present study aimed to respond to these recommendations by examining an interdisciplinary university course incorporating experiential learning in the community and its contributions to students' development of transferable skills. Taking on board the importance of active engagement in learning community, students were involved in establishing and leading a learning community outside the campus. We further utilized a before-and-after research design to gauge changes in students' leadership skills and community engagement values.

Leadership entails a combination of numerous transferable skills and a demonstration of professional values highly sought by employers (Yate, 2017). The present study focused on the model of service leadership which is much needed to cater for the growth in the service industry (Shek & Lin, 2015). In this model, service leaders provide service to everyone they come in contact with including themselves, others, communities, systems and environments (Shek & Lin, 2015). Educating students to become service leaders involves the development of leadership competencies, moral characters and caring disposition (Shek & Li, 2015). These three elements align closely with social values and respect for others that are sought after by employers (Hinchliffe & Jolly, 2011). Service learning activities have been highly recommended for the development of caring disposition (Shek & Li, 2015). Service learning refers to students' engagement in experiential and authentic community service which benefits both the recipients and the students (Furco, 1996). Service leadership and

community engagement components were incorporated in the interdisciplinary course examined in the present study. We investigated students' development of service leadership characteristics, understanding and appreciation of social inclusion, and community engagement values.

The study was conducted on a semester credit bearing course entitled "Service Leadership in Learning Communities" which is a general education capstone course offered by a major university in Hong Kong. According to the university's descriptions, capstone courses aim to equip students with broad-based knowledge, transferable skills and a deeper understanding of people and issues through making connections at different levels. Students attending these courses are coming from different disciplines and they are required to apply their discipline knowledge to address real-life issues faced by the local, regional, and global community through engagement in teamwork. The course "Service Leadership in Learning Communities" integrates theories from psychology, sociology, and education, and employs experiential and action-learning approaches both in and outside of the classroom. It provides students with the opportunities to develop service leadership skills by applying elements of leadership, service-learning, and learning community in designing and implementing learning activities. Students plan and implement inclusive learning activities together with adolescents with and without special educational needs (SEN). Apart from learning the theories and concepts of service leadership, learning community, action learning and youth development, students participate in a workshop on social inclusion and special educational needs and pay a visit to a special school for adolescents with special educational needs. The present study aimed to investigate the contribution of the course to students' development of service leadership qualities, understanding of social inclusion, and cultivation of community engagement values.

Methods

Research Design

A mixed-methods design was adopted combining elements of quantitative and qualitative research. Questionnaire surveys and individual and focus group interviews were conducted before the course and after its completion.

Sample

The sample consisted of two cohorts of students (N = 27) who enrolled in the general education capstone course "Service Leadership in Learning Communities" in academic year 2021-2022. These were students in their third and fourth year of study and they came from different disciplines: Arts, Business, Communication, Creative Arts, Science, Chinese Medicine, and Social Sciences. Participation in the study was on a voluntary basis. Students gave inform consent and they were briefed and obtained a cash coupon upon completion of the study. All research procedures were reviewed and approved by the Research Ethics Committee of the university.

Data Collection and Analysis

The data were collected before the beginning of the course and after its completion using questionnaire survey and individual and focus group interviews.

Questionnaire. A 23-item research instrument was designed and administered to the sample. The questionnaire included seven dimensions related to leadership qualities, social inclusion and civic engagement: diversity; respect; teamwork; inclusiveness; emotional sensitivity;

contribution; and civic engagement. The 23 items were designed with reference made to existing scales including Teamwork Scale for Youth (Lower, Newman, & Anderson-Butcher, 2015) Positive Youth Development Inventory (PYDI) (Arnold, Nott, & Meinhold, 2012), and Civic Engagement Scale (Doolittle & Faul, 2013). Each item was rated by the respondents on a five-point scale (1 = "not like me at all" and 5 = "very much like me"). Scores for each subscale were calculated by averaging the rating of respective items. Higher score indicates a higher self-perceived competency in that dimension. The Cronbach's alpha of the entire 23-item instrument was .89, varying between .55 and .86 among the subscales.

Individual/Focus Group Interview. Individual and focused group interviews were conducted with the participants to elicit their understanding of service leadership and social inclusion, perception of SEN youth, and their personal development. Interviews were conducted face-to-face or online via Zoom by a trained researcher. All interviews were audiotaped with respondents' consent.

Results

Data collected through the pre- and post-course questionnaire surveys were analyzed using IBM SPSS version 27. Both descriptive and inferential analyses were conducted. Dependent-sample t-tests were performed to compare self-report ratings of the seven dimensions of service leadership before the course and after its completion. There was a statistically significant increase in the scores of diversity, respect, contribution, and civic engagement dimensions after completing the course. Slight but insignificant improvement in teamwork and inclusiveness were reported.

The qualitative data collected through individual and focus group interviews were analyzed using thematic analysis (Braun & Clarke, 2006). After familiarization with the data, an open coding process was conducted. Codes with similar content were then combined to form initial themes of the three foci of the study: development of service leadership qualities, understanding of social inclusion, and cultivation of community engagement values. The initial themes were further reviewed and discussed within the research team. Quotations that enriched and solidified the themes were identified. Students' accounts indicated an enhanced understanding of service leadership and demonstration of these skills in their activities. There was a change in their perceptions of social inclusion and knowledge of special needs youth. Students also expressed their motivation to become involved in the community and undertake leadership role. The main themes and examples of corresponding quotations are presented in Table 1 below.

Main Themes	Quotations
Development of Service Leadership Qualities	1) "Being a service leader has changed my idea of what a service leader is like. It is more about patience, willingness to listen to others, giving the rights and powers to others to be involved in the decision-making process instead of you making all the decision. This is not about dominance. This is not about intelligence. It is more about social intelligence and how you encourage others to be part of it. These are more crucial." (Student K1) 2) "I now like to listen to others' opinion first before expressing mine. I think I have learnt to be an active listener and learn from others. It has nothing to do with the theories in the paper. I am willing to listen to others' and assimilate their ideas into mine." (Student B2)
Understanding of Social Inclusion	1) "The society really needs to let go of its prejudice towards SEN youth. There were things that we thought they could not do or that they needed our help." (Student E1) 2) "Social inclusion is not about giving SEN youth preferential treatment. You don't need to see them as special. You just need to offer them respect and treat them like the way you treat everyone else. You don't have to label and isolate them. No one wants to be seen as 'problematic'. This is about finding a balance and having mutual respect." (Student I2)
Cultivation of community engagement values	1) "I would like to do more. I think we have a better understanding of each other. It is great for both sides. Regardless of what we - both myself, secondary school students and SEN youth - will do in the future, we have grown because of this experience. This experience of working together helps." (Student C2) 2) I gained this sense of satisfaction, and it enriched my life experience. I would like to work with people of different backgrounds. This allows me to connect to other people in the society and I learn more about myself." (Student D2)

Table 1: Themes and corresponding students' quotations

Conclusion

This study examined the contribution of an interdisciplinary general education course to the development of students' transferable skills related to leadership, social values and respect to others. Results of the study indicated the development of service leadership qualities, understanding of social inclusion and acquisition of community engagement values among university students who participated in the course. Undertaking a leadership role in planning and implementing inclusive activities in a learning community involving adolescents with and without special educational needs provided an opportunity for university students to learn about others' needs and exhibit the caring disposition which is an important element of service leadership. The positive results of the study confirmed the importance of engaging

university students in experiential learning within the community for the development of transferable skills. The results also support the use of action learning to facilitate students' reflection and thus the acquisition of these skills. It is recommended to offer more courses of this kind and to examine their contribution to the development of transferable skills across different disciplines and contexts.

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Exploring Chinese Secondary Teachers' Perception of Critical Thinking in Mathematics Teaching

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Abstract
The significance of developing students' critical thinking has been widely recognized by educators. Critical thinking has been regarded as an important and necessary educational achievement as it empowers students to creatively contribute to their future chosen careers. Quantitative and qualitative methods are used in this study to examine the definition of critical thinking espoused by teachers in China. This study aims to further investigate teachers' perceptions of critical thinking skills within their teaching, and how they promote critical thinking among their students. This study expects to provide significant insight into critical thinking within different educational cultures.

Keywords: Critical Thinking, Critical Thinking in China, Chinese Education Culture

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Introduction

Critical thinking

The history of critical thinking

Critical thinking can be traced back to Socrates, over 2500 years ago in ancient Greece. By a method of probing questions, Socrates demonstrated that people could think profoundly before they accept ideas and can justify their claims of knowledge by asking deep questions. In the 20th century, William Graham Sumner recognized the urgent need for critical thinking throughout life and education. In her book, *Folkways* (1906), Sumner stated: "Education in the critical faculty is the only education of which it can be truly said that it makes good citizens" (Paul, Elder, & Bartell, 1997, p.633). Early philosophers did not form a formal definition of critical thinking, however, contemporary scholars have since developed their own. Contemporarily, strands of critical thinking are defined differently in different fields, such as philosophy, psychology, and education (Coney, 2015). For this particular study, the discussion and definition of critical thinking are in the strand of education.

Recent development in critical thinking

From Socrates to contemporary scholars, critical thinking as an educational ideal has been consistently regarded as essential and necessary for educational achievement (Forawi, 2016; Howe, 2004; Siegel, 2010). Although the term critical thinking is widely used in Western countries, the definition of critical thinking is an ongoing theoretical debate amongst many scholars of different cultures. Dewey (1938) argued that learning to think is the fundamental objective of education. Critical thinking is reflective thinking—the thinker determines the implication of ideas after actively questioning and considering them (Dewey, 1938). Ennis (1962) initially defined critical thinking as "the correct assessing of statements" (p. 83). Later Ennis was critical of his early work (Ennis,1996) in which he modified the definition to "critical thinking is reasonable reflective thinking focused on deciding what to believe or do" (Ennis, 1993, p. 180). Dewey (1938) and Ennis (1996) addressed that critical thinking is reflective thinking, but the weakness is that the definitions do not point out how to process information before making a decision. Glaser (1941) ascribed three main elements of critical thinking: considering issues and concerns within one's experiences, knowing how to reason, and using reasoning methods for problem-solving. Facione (1990, p.6) defined critical thinking as "purposeful, self-regulatory, judgment, which results in interpretation, analysis, evaluation, and inference, as well as an explanation of evidential, conceptual, methodological, or contextual considerations upon which that judgment is based." Facione (2013) later distinguished the definition of critical thinking using six core skills: interpretation, analysis, explanation, evaluation, self-regulation, and inference. Frequently, the notion of critical thinking is defined as the development and evaluation of arguments (Facione,1984). Critical thinking through "purposeful, reflective judgment, increases the chances of producing a logical conclusion to an argument or solution to a problem" (Dwyer, Hogan & Stewart, 2014, p.13). Critical thinking includes abilities such as applying available information to new situations, analysing causes or motives for situations, and evaluating opinions on subjects (Cheng & Wan, 2017). Considering definitions of critical thinking that Facione (1984), Dwyer et al. (2014), and Cheng and Wan (2017) formulated, in this study, critical thinking is understood as skills that make individuals think, question and challenge ideas, generate solutions to problems and make intelligent decisions based on analysis and evidence. In mathematics, critical thinking may involve logical reasoning and skills while

separating facts from opinions. Individuals who think critically can understand logical connections between ideas, detect mistakes in induction and deduction reasoning, and come to a logical decision while solving problems.

Chinese culture and critical thinking

In this section, two contradictory opinions about how to develop critical thinking skills in students are discussed. Some scholars agreed that critical thinking is a western cultural term and is not adapted to Chinese culture, while others believe that rather than culture, nurturing is a more impactful method of developing these skills.

According to Ku and Ho (2010), cultural heritage is a great obstacle while nurturing critical-minded citizens. In the Western context, diversity in opinion is respected and valued, judgment is characterized as analysis. Contrasting, traditional Chinese Confucian ideas place a higher value on respect towards authority, tradition, and harmony (Chen, 2017). Under this educational culture, students tend to prioritize consensus and avoid arguments (Liu, He & Li, 2015). Although researchers and scholars do not explicitly claim that Chinese culture lacks elements of critical thinking, their arguments suggest that critical thinking is culturally based and a typically Western term (Tian & Low,2011). For example, multiple scholars (McBride, Xiang, Wittenburg, & Shen, 2002; Tiwari, Avery, & Lai, 2003) have demonstrated that Chinese students scored lower than Western students in most dispositions of critical thinking through the use of the California Critical Thinking Dispositions Inventory (CCTDI). As education in the Chinese classroom is heavily teacher-guided, students are thought to be rote learners. Therefore, those researchers (Clark & Gieve, 2006; Heng, 2016, as cited in Chen, 2017) question whether critical thinking can be applied to Chinese educational culture.

Tian and Low (2011) expressed different opinions. They pointed out how CCTDI was developed in the United States, so it is impossible to eliminate social and cultural prejudice within it. Hence, test results may undervalue Chinese students because the results are paradoxical to the finding that show Chinese students perform better in mathematics and other scientific subjects (Cai & Hwang, 2002; Turner, 2006). For example, Chinese students have higher achievement scores compared to US students in solving complex mathematical problems (Cai & Hwang, 2002). Complex mathematical problems need students to have the ability to draw inferences and evaluate the judgements and methods they use while solving problems. All these skills are attributes of critical thinking. Also, high-ability students can deal with complex problems and tasks in flexible and creative ways, and cannot be considered rote learners (Wolfle,1986). Critical thinking is an unconsciously developed social product, it is related to cultural thinking and is a kind of social practice (Atkinson,1997). If Chinese students are quiet, and hesitant to ask questions in class, this does not mean that they are inevitably uncritical in the way they think (Tian & Low, 2011).

Nurture

According to Paton (2005), rather than culture, nurturing is a larger key factor that affects Chinese students' critical thinking. Kenney (2013,) further echoed that critical thinking is not an inherent skill but is an inclusion of both skills and habit (Cheng & Wan, 2017). For this reason, not only Chinese students but also students from all countries need to be nurtured to be able to apply critical thinking skills (Tian & Low, 2011). Both Bruner and Vygotsky (Wood, Bruner, & Ross, 1976) emphasize a child's environment, particularly social environments. Both agree that adults should play an active role in assisting a child's learning.

Schools, colleges, and universities are the main educational environments that develop these skills in students (Alwadai, 2014). Developing students' critical thinking requires teachers who possess critical thinking skills themselves and are well-educated in terms of content knowledge and pedagogical skills (Aktaş & Ünlü, 2013). For example, teachers who possess advanced critical thinking strategies may, in turn, improve the critical analytical skills of their students (Mei-Yun, Swee, Jung, & Leah, 2003; Paul et al., 1997).

Many studies show that teachers who understand the concepts and teaching strategies of critical thinking perform better in teaching critical thinking skills (Onosko,1992; Semmar & Fakhro, 2009; Zhang, 2001). Onosko (1992) found that teachers who reflect on their practice, value their thinking, and emphasize the depth of content often create a thought-provoking atmosphere in the classroom. Onosko (1992) suggested that investigating how teachers think about critical thinking may provide data for teaching theory, which in turn can provide information for pedagogical practices Zhang (2001) found a relationship between teaching methods and the way of thinking in teaching. Teachers who value and commit to critical thinking within teaching are more likely to demonstrate reflective teaching methods. Studies that collected teachers' perceptions of critical thinking found that although most teachers indicated that critical thinking was a part of their teaching, many people could not express how to effectively teach it (Howe, 2000; Paul et al.,1997). Since there is a lack of explanation of, and guidelines on critical thinking for both teachers and students (Bissell & Lemons,2006; Turner,2006), the method of teaching critical thinking is repeatedly reported as a concern. In this case, teachers are advised to use different teaching methods to support and enhance students' critical and logical thinking, as well as problem-solving skills. To meet this requirement, teacher education programs should aim to improve these skills for teacher candidates (Incikabi, Tuna, & Biber, 2013). Teachers need the training to be more effective as they teach critical thinking skills (Innabi & Sheikh, 2006). In this context, to support teachers that are infusing critical thinking skills within mathematics, future teacher education programs should allocate more courses for critical thinking. In this way, prospective teachers can become models of critical thinking and make the subject easier and more understandable for the students.

Research questions

As critical thinking is a western expression, are Chinese teachers committed to thinking critically to the same degree as western teachers? How do Chinese mathematics teachers define critical thinking? How do those teachers promote critical thinking in their mathematics lessons? These research questions attempt to investigate critical thinking within the Chinese educational culture and explore how teachers in Chinese mainland schools interpret critical thinking. This will provide a springboard for future discussion and research, such as teaching approaches, pedagogies, curriculum, and policy reform within China's education.

Methods

Quantitative and qualitative research methods are used collaboratively in this study. Quantitative data was collected via survey. The survey method was utilized to obtain a representation of Chinese teachers' definitions of critical thinking. Distribution of values, such as mean, median and mode were utilized to seek out the average of the distribution with SPSS. Qualitative data was collected via questionnaires and interviews. The importance of critical thinking was explored through a questionnaire to collect a broad range of perceptions

of critical thinking within mathematics. Data were categorised based on skills. An in-depth interview was applied to obtain further details about participants' responses, which highlights information about their understanding of critical thinking.

The participants of this study are all secondary school mathematics teachers from China. An invitation email and snowballing were used to recruit participants. Eventually, 98 secondary mathematics teachers responded to the survey, but 46 were excluded due to missing data. Therefore, only the data of 52 teachers were included in the final analysis.

Results and discussion

1: How do Chinese mathematics teachers define critical thinking?

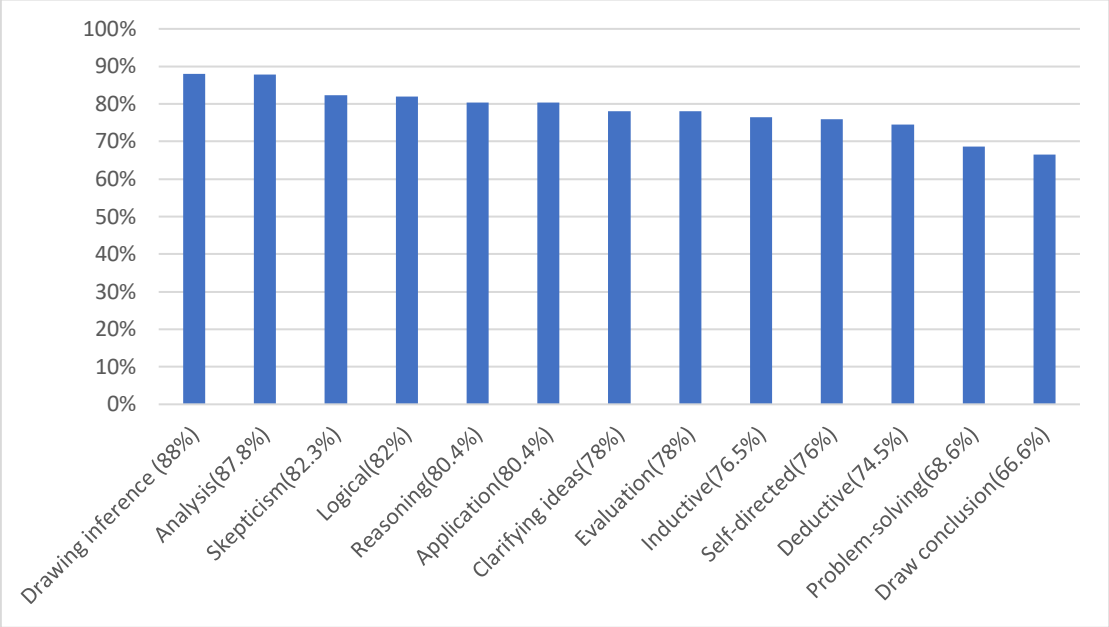


Figure 1. Chinese secondary mathematics teachers' definitions of critical thinking

Figure 1 shows the different definitions of critical thinking that teachers in China value. Each of the definitions is sorted in descending order. The top five definitions were drawing inferences (88%), analysis (87.8%), scepticism (82.3%), logical (82%), reasoning(80.4%) and application (80.4%).

Table 1 Mean and Standard Deviation (SD) of definitions of critical thinking

		Analysis	Reasoning	Drawing inferences	Problem-solving	Logical	Clarifying ideas	Draw conclusion	Scepticism	Inductive	Deductive	Application	Self-directed	Evaluation
N	Valid	49	51	51	50	50	50	51	511	51	51	51	50	50
	Missing	3	1	1	2	2	2	1	1	1	1	1	2	2
Mean		4.18	3.98	4.14	3.90	4.02	3.98	3.71	4.16	3.96	3.92	4.10	3.98	3.94
Std. Deviation		.755	.812	.670	.831	.820	.937	.965	.857	.891	.891	.878	.915	.913

As can be seen from Table 1, participants expressed their strong agreement (M=4.18) with the definition 'analysis', with the second highest mean (M=4.16) being for the definition 'scepticism'. With a high mean score of (M=4.14), participants agreed with 'drawing inferences'. In addition to this, a high agreement (M=4.10) was recorded for 'application.'

Chinese secondary mathematics teachers were found to hold positive opinions on critical thinking. Chinese teachers' definitions of critical thinking are consistent with the definitions of Facione's (1990), they tended to emphasize skills that incorporate deeper understanding such as drawing inferences, and reasoning. This analysis supports the view of Howe's (2004) study that shows Japanese teachers' conceptions of critical thinking correlate with concrete learning outcomes. Chinese teachers also endorse scepticism and logic while defining critical thinking, showing that Chinese mathematics teachers encourage probing questions and critical responses.

The qualitative data from subsidiary question one was collected regarding teachers' opinions on the importance of critical thinking (Innabi & Sheikh,2006., Howe,2004).

A broader view of their opinion could be obtained by investigating the ranking of the top 5 definitions. Results were sorted into four categories as shown in Table 2.

Table 2 Teachers' explanation of the importance of critical thinking

Category	Board understanding	Themed phrases
Thinking	Helps to develop students' logical thinking Improves mathematical thinking ability Practice independent thinking Can cultivate the ability to think independently Practice independent thinking This is an important indicator of rational thinking Can improve the quality of students' thinking To guide students to think creatively Helps develop students' divergent thinking skills Improve students' thinking ability With critical thinking, we can start solving problems Solve problems independently	logical thinking mathematical thinking independent thinking rational thinking creative thinking thinking skills thinking ability problem -solving
Processes	Cultivate students' logical thinking Improved ability to analyse problems Draw inferences about other cases from one instance Study the issue from all sides Questioning, analyzing, and concluding are the most important learning skills Critical thinking is the process of questioning and demonstrating unity	logical analysis drawing inferences drawing a conclusion questioning & demonstrating

Learning	It is a learning ability Learning is inheriting existing knowledge since it is inheritance, a certain degree of critical thinking helps students better understand the nature of learning Knowledge comes from practice	learning ability understand the nature of learning practice
Dispositions	The spirit of doubt and criticism Questioning, not blindly obeying authority Thinking independently, and having an academic spirit, not blindly obeying authority With the ability to think critically can an independent personality be formed Can better improve the ability to distinguish between right and wrong	scepticism innovate detect mistakes

Responding to the subsidiary question, a considerable percentage of teachers showed a restricted or inadequate understanding of some of the above-mentioned aspects of critical thinking. The results present the teachers' four ways of perceiving critical thinking. A majority of teachers perceive that critical thinking is a method of thinking, such as creative thinking, and mathematical thinking. Other teachers think critical thinking involves the process of reasoning, such as analysis, drawing inferences and conclusions, which in turn helps students improve their learning ability. The results show that Chinese teachers are more focused on students acquiring knowledge and learning to reason and analyse rather than them reflecting and making a judgment. This finding is in line with the previous finding of Howe (2004). Howe found out that compared with Canadian teachers who related critical thinking more to the cognitive domain, Japanese teachers tended to correlate critical thinking with concrete learning outcomes.

A very interesting finding is that Chinese teachers favour application as a definition of critical thinking, which is not established as a definition of critical thinking within other studies (e.g. Duron et al., 2006; Howe,2004; Riddell, 2007). This implies that the Chinese teacher's definition of critical thinking is a tool to help students in applying their mathematical knowledge into practice. This further verifies Chinese teachers' opinions that critical thinking can be used as a tool in enriching students' knowledge and learning outcomes. To avoid common mistakes, students need to practice until the information is retained.

2. *How do teachers promote critical thinking in their mathematics lessons?*

Different key phrases from research question two were provided by teachers. These responses are grouped into three categories. The first category includes all the strategies that teachers usually apply in mathematics classes, that are not closely related to critical thinking. The second category includes strategies that are related to critical thinking. Teachers in this category are considered to have a good understanding of critical thinking and can apply strategies within teaching to improve students' critical thinking. The third category includes strategizing that is not connected to critical thinking and reflects a lack of knowledge of it.

Table 3. Teachers' strategies in promoting critical thinking skills

Category	Related phrases
General strategies (34%)	Motivate students Individual/ group work Provides a problem/pose a question Application Peer teaching and assessment, Demonstrate problem-solving methods for students. Using different teaching methods or strategies. Providing students enough time to think Discussion Providing students with direct instructions about how to analyse and solve the problem
Strategies related to critical thinking (52%)	Cultivate students' logical thinking abilities Students are asked to express their opinions through discussions Analysis, reasoning in detecting the mistakes Giving the wrong solutions and asking students to detect the error Posing questions, asking students to analyse and make judgments Clarify all points and provide evidence to support the judgment Pointing out mistakes made by teachers or peers and providing evidence Combine known information, make inferences and draw conclusions Multiple solutions, draw inferences from one instance Infuse critical thinking skills in mathematics thinking, through making evaluations and reflecting
critical thinking (14%)	Students improve thinking skills through practices

Table 3 shows that only 52% of teachers' strategies that are applied in mathematics classes are connected to critical thinking. This reflects that nearly half of the teachers do not have adequate knowledge and understanding of critical thinking, they lack strategies that assist students in learning and developing critical thinking skills. The results of this study are in line with other studies (Bissell & Lemons, 2006; Turner, 2006) that demonstrate a lack of explanation and guidelines for teachers to follow while teaching students critical thinking skills. Furthermore, 14% of teachers thought that critical thinking can be developed through lots of practice. This result reveals that Chinese teachers do not have adequate knowledge of how to teach critical thinking. This finding is consistent with other studies (Alwadai, 2014; Gashan, 2015; Howe, 2004; Innabi & Sheikh, 2006) that point out that in a culture in which critical thinking is not the dominant cultural paradigm, teachers require more support in developing their knowledge on it.

Scepticism and independent thinking are the most frequently appearing terms in teachers' responses. Chinese teachers place more importance on scepticism, which counters the stereotypical notions that criticism is always connected with scepticism, challenge, doubt and questioning (Shao, 2013). Chinese teachers hold the disposition that critical thinking is needed only when there is a conflict or when different opinions are opposed, they do not view critical thinking as a habit of the mind. This finding is consistent with the findings of other studies (Alwadai, 2014; Gashan, 2015; Howe, 2004; Innabi & Sheikh, 2006). This view reflects how cultural patterns dominate teachers' beliefs.

Conclusion

The study found that the majority of secondary school mathematics teachers that participated in the survey do not have a comprehensive view of critical thinking. There were about 47% of participants did not respond to the first questionnaire on the definition of critical thinking, demonstrating that critical thinking is not a familiar term for everyone in a secondary Chinese education setting. About half of the Chinese teachers could not identify strategies essential to critical thinking, their responses reveal that they are more focused on students acquiring knowledge. They believe critical thinking is a tool to improve students' learning but not an essential part of it. Critical thinking is more frequently thought to be scepticism, which shows that teachers' perceptions of critical thinking are influenced by their culture.

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Work From Home and Distance Learning: Its Impact on Working Students' Performance

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Abstract
This study aims to analyze the impact of work from home and distance learning on working students' performance directly or mediated by work motivation, job satisfaction, and work life balance. The analysis is based on quantitative method. The population was working students at the Business and Economy Faculty in Indonesia Postgraduate Program, and had worked for more than six months, both permanent and contract employees. Data collection techniques through surveys, with research instruments using questionnaires. The sampling technique is proportionate stratified random sampling. The analysis technique used descriptive analysis, multiple linear analysis, and path analysis. The results show that work from home have positive and significant influence on working students' performance directly or mediated by work motivation, job satisfaction, and work-life balance. distance learning has positive and significant influence on working students' performance directly or mediated by work motivation, job satisfaction, and work life balance. Work motivation mediates the impact of work from home on working students' performance, but job satisfaction and work-life balance have no role in mediating the impact of work from home and distance learning on working students' performance. These findings in relation to the extant literature and its implication for companies providing working student with opportunities to manage their priorities between work, study, and personal life better.

Keywords: Work From Home, Distance Learning, Working Students' Performance

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Introduction

COVID-19 spread quickly around the world and became a pandemic. The large-scale outbreak of this pandemic affects human health, and various aspects of human life in a significant way (Huang et al., 2020). In Indonesia, issued a government regulation to close schools in the second week of March 2020. Some schools continue teaching with different motors. Interim lessons of face-to-face learning due to an emergency crisis are called remote emergency learning (Hodges et al., 2020).

Work from home has become a mainstay of many companies as an alternative strategic policy to break the chain of transmission of COVID-19. This policy certainly has the same obligations and responsibilities as working from an office. Work from home creates flexibility in time and place. However, Work from home has drawbacks such as poor team performance and less than optimal supervisory systems by managers (van der Lippe & Lippényi, 2020).

Within the scope of higher education, it is important for educational institutions to properly implement online learning models and support students (Daumiller et al., 2021). Distance learning has similarities with work from home, because learning is also done remotely. The implementation of distance learning gave birth to several variations of distance learning programs such as virtual schooling, cyber schooling, online charter schooling, to blended learning programs (Hasler-Waters et al., 2017).

In the context of the effect of work from home and distance learning, three variables are assumed to be able to partially mediate the effect of work from home and distance learning on working students' performance (Chaney et al., 2017; Farooq & Sultana, 2021; Omar et al., 2018; Prasetyaning et al., 2021; Timsal & Awais, 2016). The three intermediary variables are presented in this model, because it is interesting to know whether work from home and distance learning influence work motivation, job satisfaction, and work-life balance.

Literature Review

Research on the productivity and involvement of remote and on-site workers, found that enjoyment of work locations or comfortable Work from home was positively and significantly correlated with better performance than working at work (Amador et al., 2016). Work from home can increase work productivity (Noonan & Glass, 2012). Across Europe working professionals find their new working conditions mostly positive as they appreciate the benefits of work from home, whereas managers find the situation more challenging (Ipsen et al., 2021).

In research to determine the correlation between job satisfaction and job performance, proving a positive and significant relationship between job satisfaction and job performance (Judge et al., 2001). There is positive social relationships is another factor associated with having a positive work-life balance. In a study based in Sri Lanka, found relationship between work-life balance and working students' performance (Malalasekara, 2019).

There are many studies regarding the impact of work from home on working students' performance (Amador et al., 2016; Mardianah et al., 2020; Noonan & Glass, 2012; Rawat et al., 2021). However, there is a research gap between these researchers proving that work from home has a positive and significant effect on working students' performance (Amador

et al., 2016; Mardianah et al., 2020; Noonan & Glass, 2012). A different effect for work from home on working students' performance, because it depends on employee intention as a mediator variable (Rawat et al., 2021).

The need for a mediator variable between work from home and working students' performance (Rawat et al., 2021). Researchers present three intermediary variables, namely job satisfaction, work motivation, and work-life balance. The justification for using these three variables as intermediary variables is due to several reasons. First, the need for a mediating variable between work from home and working students' performance. The second and third variables (job satisfaction, work motivation, and work-life balance) have been partially proven in previous research to affect working students' performance. Job satisfaction is proven to affect working students' performance (Judge et al., 2001), Work-life balance is proven to affect working students' performance (Malalasekara, 2019). Work motivation is proven to affect working students' performance (Hanaysha & Majid, 2018; Firdiansyah & Pamungkas, 2021; Widyaningrum & Hamdan, 2018; Priarso et al., 2019; Sembiring et al., 2020; Chien et al., 2020; Izzah et al., 2020; Thamrin & Riyanto, 2020; Suryani et al., 2021).

Another impact of work from home on work-life balance, as empirically proven by (Crosbie & Moore, 2004; Gajendran & Harrison, 2007) that work from home is useful in supporting balance between work and work-life balance. Distance learning has a positive effect on working students' performance. Distance learning is proven make students feel more comfortable in learning compared to face-to-face learning systems, and motivates students to learn further (Caroline et al., 2015). Distance learning provide flexibility for employees to manage time so that they can work more productively than working while having to attend lectures at campus.

The role of mediation, assumptions of work motivation, job satisfaction, and the mediating effect of work-life balance on work from home on working students' performance. In addition, job satisfaction and work-life balance mediate the effect of distance learning on working students' performance. The causality model with a path analysis format consists of two independent variables or exogenous variables, three endogenous intermediary variables: work motivation, job satisfaction, and work-life balance; and endogenous variable: working students' performance.

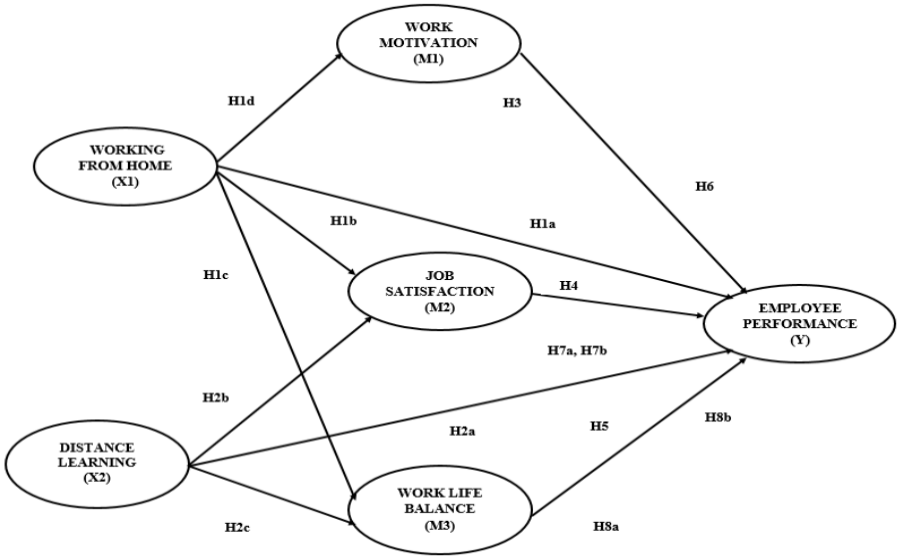


Figure 1: Research Framework

Methods

The analysis is based on quantitative method. The population was working students at the Business and Economy Faculty in Indonesia Postgraduate Program, and had worked for more than six months, both permanent and contract employees. Data collection techniques through surveys, with research instruments using questionnaires. The population was 750 working students' students. The sampling technique is proportionate stratified random sampling, the minimum sample size is 109 respondents. The analysis technique used descriptive analysis, multiple linear analysis, and path analysis using Partial Least Square (PLS) SEM Analysis.

Result

Reliability Indicator

All outer loading indicators are > 0.70, so outer loading is sufficient.

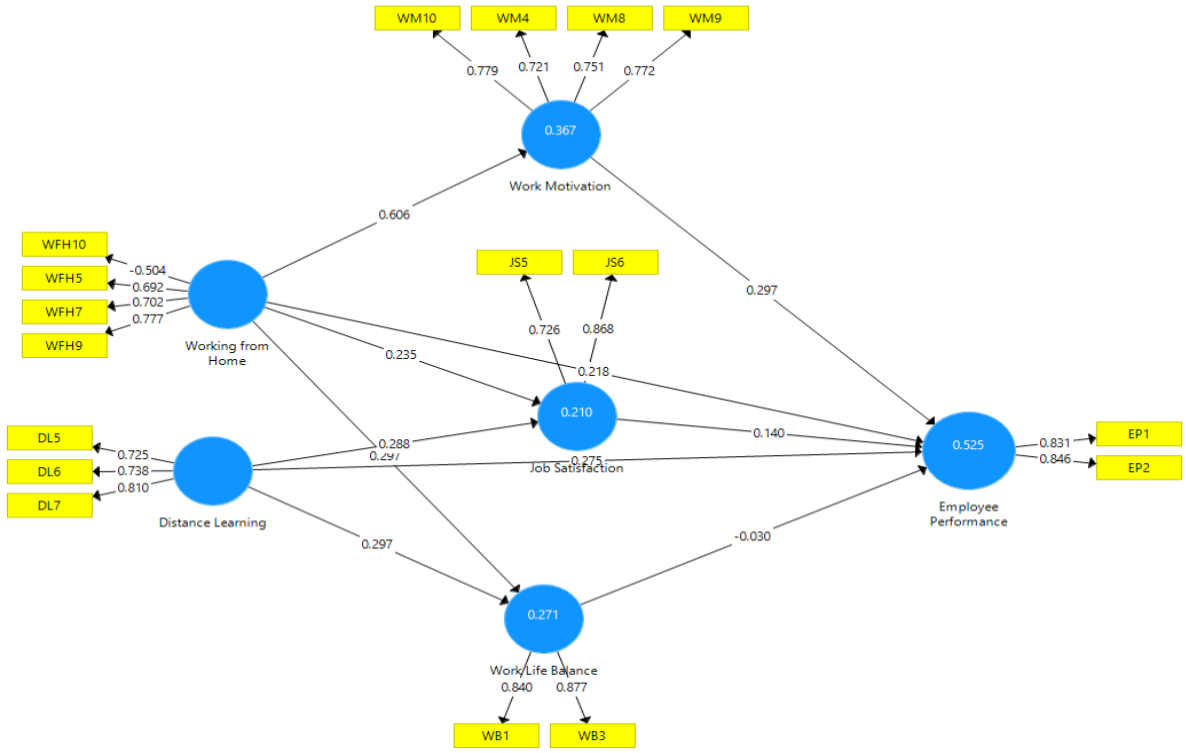


Figure 2: Outer Processing Model

All outer loading values in the second test pass the indicator reliability test of the 43 indicators, 27 were omitted because they did not meet the criteria for the indicator reliability test, so the remaining 16 indicators.

Discriminant Validity

This explains that indicators have good discriminant validity in forming their respective variables. In the variable distance learning with the indicators DL5, DL6, and DL7, it has a higher value for the parent variable than the other indicators. All indicators in this study passed the discriminant validity test with cross loading.

Table 1: Discriminant Validity Results with Cross Loading

	Distance Learning	Employee Performance	Job Satisfaction	Work-Life Balance	Work Motivation	Employee Performance
DL5	0,725	0,318	0,319	0,390	0,518	0,484
DL6	0,739	0,329	0,309	0,311	0,140	0,172
DL7	0,810	0,623	0,317	0,341	0,440	0,494
EP1	0,457	0,832	0,455	0,341	0,520	0,450
EP2	0,519	0,844	0,328	0,285	0,513	0,529
JS5	0,292	0,293	0,726	0,359	0,292	0,223
JS6	0,364	0,436	0,867	0,211	0,426	0,300
WB1	0,387	0,243	0,348	0,840	0,395	0,399
WB3	0,396	0,389	0,240	0,878	0,363	0,337
WFH5	0,335	0,343	0,156	0,289	0,378	0,704
WFH7	0,466	0,426	0,227	0,390	0,386	0,750
WFH9	0,379	0,526	0,337	0,289	0,560	0,801
WM10	0,405	0,454	0,303	0,328	0,781	0,505
WM4	0,418	0,495	0,526	0,373	0,713	0,383
WM8	0,288	0,437	0,323	0,317	0,755	0,402
WM9	0,381	0,478	0,247	0,315	0,774	0,508

The discriminant validity test uses the Fornell Larcker measure, namely the comparison value between the AVE value and the quadrant of the correlation value between constructs or comparing the AVE root with the quadrant of the correlation value between constructs. Fornell Lacker each latent variable must be greater than the correlation between latent variables. The six variables were declared to have passed the Discriminant Validity test with Fornel Larcker values.

Table 2: Discriminant Validity Results with Fornell Larcker

Variabel	*Distance Learning*	*Employee Performance*	*Job Satisfaction*
Distance Learning	0,759		
Employee Performance	0,583	0,838	
Job Satisfaction	0,413	0,465	0,800
Work-Life Balance	0,455	0,373	0,338
Work Motivation	0,495	0,616	0,458
Employee Performance	0,522	0,585	0,332

Internal Consistency

The internal consistency test uses indicators of composite reliability and Cronbach's Alpha. The accepted cut-off value for the composite reliability level, for exploratory research is ≥ 0.6. Composite reliability does not assume the convenience of booting from each indicator, while Cronbach's Alpha assumes the convenience. The four variables of this study have passed the internal consistency test, which means that they support the internal consistency

test. Job satisfaction and work from home variables have values below 0.6 so they do not pass the Cronbach's Alpha test.

Convergent Validity

The results of the AVE values of the four variables fulfill the convergent validity testing, which has a value above 0.5. The four variables were declared to have passed the convergent validity test.

Multicollinearity Test

All VIF values in the relationship between variables are smaller than 10. There was no phenomenon of two or more independent variables or highly correlated exogenous constructs, which means that there is a strong intercorrelation between latent variables, causing the predictive ability of the model to be poor.

Coefficient of Determination

R-Square for work from home, distance learning, work motivation, job satisfaction, work-life balance simultaneously has a positive effect on working students' performance, with R-Square value 0.531 (53.10%) The magnitude of the influence of 53.10% is between the effect value of 0.33 and 0.67, indicating that the strength model is moderate. R-Square for work from home and distance learning simultaneously have a positive effect on job satisfaction with R-Square 0.189 (18.90%). The magnitude of the influence of 18.90% is under the influence value of 0.19 indicating that the model is weak. R-Square for work from home and distance learning simultaneously have a positive effect on working students' performance, work-life balance with the value of R-Square 0.256 (25.60%). The magnitude of the influence of 18.90% is under the influence value of 0.19 indicating that the model is weak. R-Square for work from home and distance learning simultaneously have a positive effect on work motivation with R-Square 0.358 (35.80%). The magnitude of the influence of 35.80% is below the value of the strength of influence of 0.33 indicating that the model is moderate.

Effect Size Test

If the F Square value is less than 0.02 or <0.02, the effect is ignored or considered to have no effect; the value of F Squared with a range between 0.02 to 0.15 is called small influence between variables; the F-Square value with a range between 0.15 to 0.35 is referred to as the moderate effect among the variables; and the F-Square value > 0.35 is referred to as the major influence among the variables. The F-Square value for each relationship variable is on average small, then very small, and only one F-square value has a large effect, namely F Square X2 on M1 (0.557).

Path Coefficient

The path coefficient value of the effect of distance learning on work from home is 0.267; distance learning on job satisfaction is 0.330. Distance learning to work-life balance is 0.321. Job satisfaction with work from home is 0.156.; Work-life balance against work from home is -0.026. Work motivation towards work from home is 0.283; Work from home against work from home is 0.283. the value of job satisfaction is 0.159.; Work from home to work-life

balance is 0.258. Work from home on work motivation is 0.598. The direction of this influence is positive and significant with moderate correlation strength.

Q-Square Predictive Relevance

The results of calculating Q2 Square predictive relevance for the effect of work motivation, working students' performance, distance learning, job satisfaction, and work-life balance on work from home is that the value of Q2 is greater than 0 (zero). This shows that work motivation, working students' performance, distance learning, job satisfaction, and work-life balance have predictive value relevance to working students' performance.

Hypothesis Test

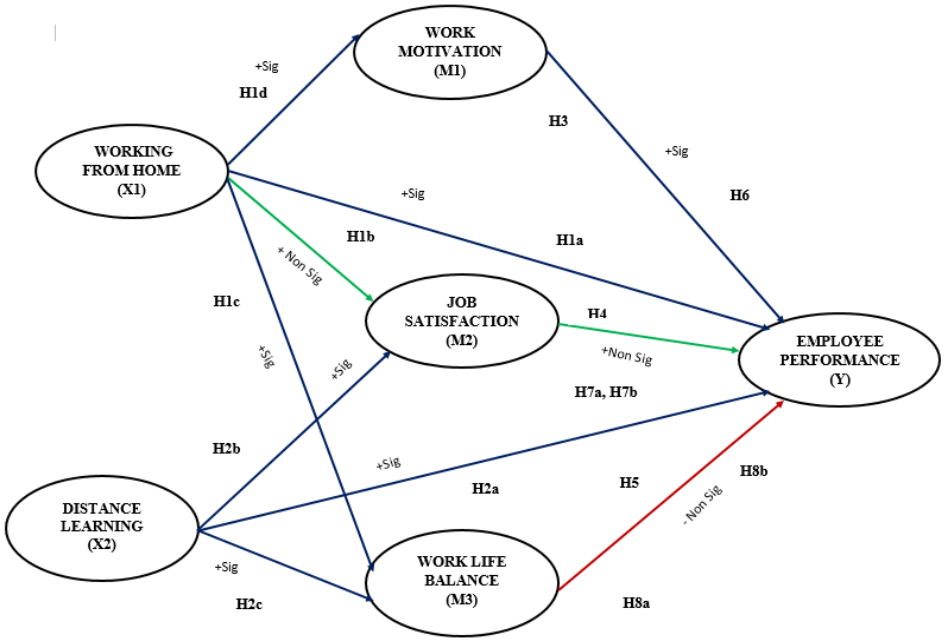


Figure 3: Hypothesis Test

Hypothesis 5 (Effect of Work-life balance on working students' performance)
The path coefficient value is 0.235, coefficient of determination (R2) is (0.235)2 = 0.0552 (5.52%). Significance test is t = 2.242 (> 1.96) and the p-value is 0.025 (< alpha 0.05), which means that work from home has a positive and significant effect on working students' performance. Hypothesis 1a is proven.

H1b: Work from home has a positive effect on job satisfaction
The path coefficient value of work from home to job Satisfaction is 0.159, coefficient of determination (R2) is (0.159)2 = 0.0252 (2.52). Significance test value t = 1.463 (<1.96) and p-value 0.144 (> alpha 0.05), which means that work from home has a positive but not significant effect on job satisfaction. Hypothesis 1b is not proven.

H1c: Work from home has a positive effect on work-life balance
The path coefficient value of work from home to work-life balance is 0.258, coefficient of determination (R2) is (0.258)2 = 0.066564 (6.65%). The significance test is t = 2.409 (> 1.96) and the p-value is 0.016 (> alpha 0.05), which means that work from home has a positive and significant effect on work-life balance. Hypothesis 1c is proven.

H1d: Work from home has a positive effect on work motivation
The coefficient value of the work from home path on work motivation is 0.598, coefficient of determination (R2) is (0.598)2 = 0.3576 (35.76%). Significance test t = 8.825 (> 1.96) and p-value 0.000 (< alpha 0.05), which means that work from home has a positive and significant effect on work motivation. Hypothesis 1d is proven.

H2a: Distance learning has a positive effect on working students' performance
The path coefficient value of distance learning to work from home is 0.267, coefficient of determination (R2) is (0.267)2 = 0.0712 (7.12%). Test the significance value of t = 2.452 (> 1.96) and the p-value is 0.015 (> alpha 0.05), which means that distance learning has a positive and significant effect on working students' performance. Hypothesis 2a is proven.

H2b: Distance learning has a positive effect on job satisfaction
The path coefficient value of Distance Learning on Job Satisfaction is 0.330, coefficient of determination (R2) is (0.330)2 = 0.1089 (10.89%). Significance test t = 3.262 (> 1.96) and p-value 0.001 (<alpha 0.05), which means that distance learning has a positive and significant effect on job satisfaction. Hypothesis 2b is proven.

H2c: Distance learning has a positive effect on work-life balance
The path coefficient value of Distance Learning to Work-life balance is 0.321, the coefficient of determination (R2) is (0.321)2 = 0.1030 (10.30%). Significance test with a t = 3.040 (> 1.96) and a p-value of 0.002 (< alpha 0.05), which means that distance learning has a positive and significant effect on work-life balance. Hypothesis 2c is proven.

H3: Work motivation has a positive effect on working students' performance
The path coefficient value of work motivation towards Work from home is 0.283, coefficient of determination (R2) is (0.283)2 = 0.08008 (8%). Test the significance value of t = 2.550 (> 1.96) and the p-value is 0.011 (> alpha 0.05), which means that work motivation has a positive and significant effect on working students' performance. Hypothesis 3 is proven.

H4: Job satisfaction has a positive influence on working students' performance.
The path coefficient value of job satisfaction to work from home is 0.156, coefficient of determination (R2) is (0.156)2 = 0.02433 (2.43%). Test the significance value of t = 1.862 (<1.96) and the p-value is 0.063 (> alpha 0.05), which means that job satisfaction has a positive but not significant effect working students' performance. Hypothesis 4 is not proven.

H5: Work-life balance has a positive influence on working students' performance
The Work-life balance path coefficient value for Work from home is -0.026, coefficient of determination (R2) is (-0.026)2 = 0.00067 (0.067%). The significance test is t = 0.273 (> 1.96) and the p-value is 0.785 (> alpha 0.05), which means that work-life balance has a negative and insignificant effect on working students' performance. Hypothesis 5 is not proven.

H6: Work from home has a positive effect on working students' performance with work motivation as a mediating variable
VAF value 41.87% (20% -80%), only partial mediation. Work motivation plays a role in mediating the effect of Work from home on working students' performance. Hypothesis 6 is proven.

H7a: Work from home has a positive effect on working students' performance with Job Satisfaction as a mediating variable
VAF value of 9.57% (<20%), no mediation. Job satisfaction does not play a role in mediating the effect of work from home on working students' performance. Hypothesis 7a is not proven.

H7b: Distance Learning has a positive effect on working students' performance with Job Satisfaction as a mediating variable
VAF value of 16.30% (<20%), no mediation. Job satisfaction does not play a role in mediating the effect of distance Learning on working students' performance. Hypothesis 7b is not proven.

H8a: Work from home has a positive effect on working students' performance with work-life Balance as a mediating variable
The VAF value is 3.05% (<20%), meaning there is no mediation. Work-life balance does not play a role in mediating the effect of work from home on working students' performance. The H8a hypothesis is not proven.

H8b: Distance learning has a positive effect on working students' performance with work-life balance as a mediating variable
VAF value of 3.08% (<20%), no mediation. Work-life balance does not play a role in mediating the effect of distance learning on working students' performance. The H8a hypothesis is not proven.

Discussion

The effect of work from home on working students' performance
The results of the study show that work from home has a positive and significant effect on working students' performance. Means the first hypothesis is proven. The results of this study support that work from home has a positive and significant effect on working students' performance (Mardianah et al., 2020). Work from home can increase work productivity (Amador et al., 2016; Noonan & Glass, 2012). However, the results of this study contradict) that work from home has a negative effect on working students' performance (Farooq & Sultana, 2021).

The effect of work from home on job satisfaction
The results showed that work from home had a positive but not significant effect on job satisfaction. The results of this study are in line with (Irawanto et al., 2021) which were carried out for employees from major islands in Indonesia. Work from home has a positive and significant effect on job satisfaction.

The effect of work from home on work-life balance
The results showed that work from home had a positive and significant effect on work-life balance. These results support (Biron & van Veldhoven, 2016; Cavalcanti et al., 2021) who found a relationship between work from home and work-life balance. Work from home has also been proven to improve the balance between work and personal life because it gives employees the opportunity to do both work and non-work-related things better.

The effect of work from home on work motivation
The results showed that work from home had a positive and significant effect on work motivation. These results support that work from home has a positive effect on work motivation (Amsak & Indriati, 2021) The results of this study indicate that aspects of technology, information and communication (ICT) that can be used while employees are doing work from home, have become important factors to increase their work motivation.

The effect of distance learning on working students' performance
The results of the study show that distance learning has a positive and significant effect on working students' performance. The meaning of the results of this study is that technology, information, and communication (ICT) factors have a role for employees who do distance learning to keep working optimally. In addition, distance learning has a positive and significant effect on the performance of employees who work while studying. This is because distance learning provides opportunities for college employees to manage their time better.

The effect of distance learning on job satisfaction
The results of the study show that distance learning has a positive and significant effect on job satisfaction. However, no previous research has been found that examines the effect of distance learning on job satisfaction, so the results of this study cannot be compared with previous studies. The meaning of these indicators is that employees have a positive perception of distance learning, so that it also has a positive impact on job satisfaction.

The effect of distance learning on work-life balance
The results of the study show that distance learning has a positive and significant effect on work-life balance. However, no previous research has been found that examines the effect of distance learning on work-life balance, so the results of this study cannot be compared with previous studies. Distance Learning improves Work-life balance because it allows employees who work while studying to have the opportunity to divide their time between study, work and personal life activities in a more balanced manner.

The effect of work motivation on working students' performance
the results of the study show that work motivation has a positive and significant effect on working students' performance. The results of this study are in line with (Chien et al., 2020; Firdiansyah & Pamungkas, 2021; Izzah et al., 2020; Priarso et al., 2019; Sembiring et al., 2020; Thamrin & Riyanto, 2020; Widyaningrum & Hamdan, 2018) that employees need external and non-financial motivation to encourage these employees to improve their performance.

The effect of job satisfaction on working students' performance
The results showed that job satisfaction has a positive but not significant effect on working students' performance. Job satisfaction affects work performance. This means that so far management has not provided enough support to employees to further improve their performance.(Judge et al., 2001) Another explanation why the effect of Job Satisfaction is not significant on working students' performance.

The effect of work-life balance on working students' performance
The results of the study show that the Work-life balance has a negative and insignificant effect on working students' performance. These results are in accordance with (Malalasekara, 2019) who found that there is a relationship between work-life balance and employee workplace performance So far, management is perceived to be insufficient in providing

various policies or incentives to lighten work, especially those that can provide a balance between workload and employees' personal lives.

The role of work motivation in mediating the effects of work from home on working students' performance

The results of the study show that Work Motivation plays a role in mediating the effect of Work from home on working students' performance. However, no previous research has been found which proves that work motivation mediates the effect of work from home on working students' performance. Only found the results of research regarding the influence of intervariables partially. Work from home has a positive and significant effect on working students' performance, work from home can increase work productivity (Amador et al., 2016; Noonan & Glass, 2012) As is known work productivity is part of working students' performance. (Amsak & Indriati, 2021) prove that work from home has a positive effect on work motivation.

The role of job satisfaction in mediating the effect of work from home on working students' performance

The results of the study show that job Satisfaction does not play a role in mediating the effect of work from home on working students' performance. The effect of work from home on working students' performance is proven, among others, work from home has a positive and significant effect on working students' performance.(Mardianah et al., 2020) Work from home had a positive and significant effect on job satisfaction.(Irawanto et al., 2021) Job satisfaction affects work performance (Judge et al., 2001) This research is one of the new studies that proves that job satisfaction does not play a role in mediating the effect of work from home on working students' performance.

The role of job satisfaction in mediating the effect of distance learning on working students' performance

The results of the study show that job satisfaction does not play a role in mediating the effect of distance learning on working students' performance. However, no previous research has been found which proves that Job Satisfaction mediates the effect of distance learning on working students' performance. Only found the results of research regarding the influence of each of the variables partially as mentioned in the previous hypothesis. Why Job Satisfaction does not play a role in mediating the effect of distance learning on working students' performance can be explained statistically that the role of mediation will be high if each influence is partly in the path model, all of which have a significant effect (Baron & Kenny, 1986).

The role of work-life balance in mediating the effects of work from home on working students' performance

The results of the study show that the Work-life balance does not play a role in mediating the effect of work from home on working students' performance. However, no previous research has been found which proves that Work-life balance mediates the effect of work from home on working students' performance. Only found the results of research on the influence between variables partially. Statistically, the role of mediation will be high if each effect is partially in the path model, all of which have a significant effect (Baron & Kenny, 1986). The requirement for a mediating role must have a significant effect on the direct relationship and the indirect relationship with the dependent variable.

The role of work-life balance in mediating the effects of distance learning on working students' performance

The results of the study show that the work-life balance does not play a role in mediating the effect of distance learning on working students' performance. However, no previous research has been found which proves that work-life balance mediates the effect of distance learning on working students' performance. Only found the results of research regarding the influence of each of the variables partially as mentioned in the previous hypothesis. Statistically, the role of mediation will be high if the partial influence in the pathway model is all significant (Baron & Kenny, 1986). Work-life balance has a positive but not significant effect on working students' performance; It is understandable if the Work-life balance does not play a role in mediating the effect of distance learning on working students' performance.

Conclusion

Work from home has a positive and significant effect on working students' performance. Work from home has a positive but not significant effect on job satisfaction. Work from home has a positive and significant effect on work-life balance. Work from home has a positive and significant effect on work motivation. Distance learning has a positive and significant effect on working students' performance. Distance learning has a positive and significant effect on job satisfaction. Distance learning has a positive and significant effect on work-life balance. Work motivation has a positive and significant effect on working students' performance. Job satisfaction has a positive but not significant effect on working students' performance. Work-life balance has a negative and insignificant effect on working students' performance. Work motivation plays a role in mediating the effect of work from home on working students' performance. Job satisfaction does not play a role in mediating the effect of work from home on working students' performance. Job satisfaction does not play a role in mediating the effect of distance learning working students' performance. Work-life balance plays no role in mediating the effect of work from home on working students' performance. Work-life balance does not play a role in mediating the effect of distance learning on working students' performance.

Implications

The managerial implication of this research is the management dimension that must be considered in work from home, so that work from home policies can support the working students' performance. Management must consider the balance between work and the needs of their families. Management improves the completeness of ICT facilities and improves employee skills in using ICT. Management reduces the additional burden that burdens employees. Distance learning can be an alternative for employees to get a balance of life. Management needs to take the right motivating steps for employees, both in the form of financial and non-financial motivation.

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Strengthening Higher Order Critical Thinking Skills of C1 Level Students in a Classroom Environment

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Abstract
Higher-order critical thinking skills are essential in university settings because they enable students to succeed in their studies. However, they cannot be learned solely by course materials and articles; nevertheless, they must develop a critical thinker's attitude or disposition. The two main objectives of this study were to examine whether students were enhancing their higher-order thinking abilities through vocabulary, grammar, discourse, reading, engaging with the text, and externalizing from the text. In addition, instructor-related questions were asked to identify how higher-order thinking skills were applied in the classroom. This study will target first-year students at the C1 level of the undergraduate academic English program. We will answer how essential higher-order critical thinking skills are for fostering learning strategies for academic skills such as vocabulary, grammar, discourse, reading, engaging with a text, and externalizing from a text. Furthermore, a standardized Cambridge self-assessment survey on critical thinking was conducted among 52 students to measure their critical thinking skills and evaluate the success/failures of students. Using the qualitative and quantitative methods, the results of the study showed that students could use vocabulary (54.5%), sentence-level grammar (51.3%), discourse (49%), reading & listening (48.7%), engage with a text (53.5%), and externalize from a text (51.4%) often. Although most students concluded that instructors always support them well in the learning environment, results showed their skills need to develop better. Furthermore, we will examine how this correlation can improve and how concepts can be put into practice.

Keywords: Higher-Order Critical Thinking Skills, Vocabulary, Grammar, Discourse, Reading, Engaging With a Text, Externalizing From a Text, Learner-Centered Pedagogy

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Introduction

Critical thinking is a crucial skill that should be acquired and enhanced in higher education among students by studying and reading and by being an active listener, speaker, and thinker. Improving teaching and learning can be beneficial to cultivate students' mental abilities through the practice and application of critical thinking in academic English in the classroom setting. Specific reading, listening, reading, and writing abilities are necessary at the C1 level of Academic English to comprehend complex sentence structures and information, develop a research paper and arguments, use sources, cite and reference them correctly, adhere to academic conventions, and consider cultural and psychological factors. The literature lacks research investigating whether students in the process of improving their academic reading and writing skills in English have the necessary background, understanding, or experience in critical reading and writing in English and how explicit instruction of these skills contributes to their understanding of critical reading and writing (Bilki & Irgin, 2022). Although researchers in Mongolia have researched critical thinking skills, there is insufficient information on how learners can develop themselves, and educators support their skills in Academic English. The University of Finance and Economics (UFE) started a new curriculum of Academic English with critical thinking in 2015 using 'Qskills' Oxford course books. In 2021, considering the necessity of global skills, the course changed textbooks to 'University Success' from Stanford University, which integrated challenging academic content and critical thinking. As this C1 course is in its second year at the university, students still face difficulties. Secondary schools in our country do not develop pupils' critical thinking skills, thus affecting their performance when they enter university.

This study examined how essential higher-order critical thinking skills of C1 level students foster skills in vocabulary, grammar, discourse, reading, engaging with a text, and externalising from a text. Also, we found out how instructors contribute to strengthening students' higher-order thinking skills. According to our findings, some of the significant abilities that Mongolian students lack are reading comprehension, listening, and discourse through higher-order critical thinking. Therefore, these skills need to be considered crucial for high-order critical thinking and learning rather than a means of information transfer.

English is a foreign language in Mongolia, where students must be tested to discover their proficiency level, and courses are provided accordingly. Therefore, this study will target first-year students at the C1 level of the undergraduate Academic English program at the UFE who only studied this course for one semester. The survey used quantitative and qualitative methods in Google Form. The significance of the study is to propose some strategies for the learners' improvement of higher-order critical thinking skills. This research includes relevant literature review, methods, discussions, results, recommendations, conclusions, and references.

Literature Review

Many studies have been done on critical thinking skills integrating academic English as a second or foreign language. Adams et al. (2018) suggest critical thinking in EAP is realised in two ways: thinking about the language (analysing how English is used to express ideas) and thinking through the language (participating actively in using the language to explore and present ideas and arguments). Tricia, H. (2020) stated that good readers recognise, and decode quickly and accurately, words, grammatical structures, and other linguistic features and unaware of the process as they engage in this. In other words, a fluent reader knows

language structure well and can recognise a wide range of vocabulary automatically (Tricia, 2020). Therefore, educators should support, encourage, and guide their learners to foster critical thinking skills. Mongolian students must learn how to find and differentiate the truth and fallacy, reasons for something, the truth and validity of an argument, or draw a conclusion based on the interpretation of data, evidence, facts, and opinions. Also, instructors need to assist them in discovering to evaluate their own beliefs depending on their prior knowledge and distinguishing the facts and opinions using lingual devices.

Higher-order thinking skills involve the cognitive processes of analysing, evaluating, and creating. In this paper, we will try to find whether our C1 level learners developed higher-order thinking skills in a semester and what instructors can do to enhance their abilities in the classroom environment. Anderson, L. and Krathwohl, D. suggested that 'analyse' breaks the material into its constituent parts and determines how the parts relate to one another and/or to an overall structure or purpose (Anderson et al., 2001). According to Anderson, L. and Krathwohl, D., *evaluate* means making judgments based on criteria and standards. The last level of higher-order thinking is 'create', which means combining elements as a new coherent or functional whole; reorganising elements into a new pattern or structure (Anderson, et al., 2001).

Davies and Barnett (2015) identified three main threads, summarising critical thinking as reflective thinking skills, critical thinking as dispositions, and critical thinking as critical pedagogy. Regarding reflective thinking skills, Wilson (2019) stated, 'critical thinking cannot exist in a vacuum, so accessing and understanding content – sound and reliable knowledge about a particular topic – is essential. It is the first challenge for non-native speakers when reading. Further, higher-order thinking enables students to apply, analyse and evaluate information, and on this basis to reason and to create new ideas and knowledge.' It is true that learning academic English and developing students' criticality related to higher thinking is challenging for both non-native educators and learners. It is arguably the responsibility of EAP teachers to push their students to think and question beyond their comfort zone and to engage with issues in the modern world (Wallace, 2003). A critical-thinking classroom depends on genuine, higher-order questions – questions which challenge but are answerable and which come from the students as well as the teacher. Group work and think-pair-share activities can provide non-threatening, supported opportunities for students to practise critical thinking (Wilson, 2019). When reading critically and actively, it is essential to know how to interpret and to reflect upon what is read through writing and discussing it with others. It means that students relate and engage with the text so that they will be able to think about how and why it is written and who the audience is. Most importantly, they can ask themselves how to create or produce a text, essay, or paper using various science-related topics and real-life cases. It concluded that teaching critical thinking was vital, and educators had to be good critical thinkers. The reason is that knowledge and abilities are inherited from one another. Bilki, Z. and Irgin, P. (2022) stated "to be able to externalise from the text as part of critical reading; readers need to make notes from the text and write about the text to present their position by synthesising from a range of texts and using their constructed meaning in what they produce as a writer. At this point, reading is linked to writing" (Bilki & Irgin, 2022). While academic reading requires identifying authors' positions, views, audience, arguments, inferences and so on in specialised texts such as Sociology, Humanities, Biology, and Economics, academic writing needs research, analysis, comparison, evaluating and synthesising, integrating sources, summarising and creating a paper based on a specific topic which means they look for deeper information to understand life, cases, reasons, and logics. Listening and speaking could also be related to these sub-skills. The reason is that

when they listen, they have to make a conclusion on a given topic. When learners speak, they select words to say, arguments to make, and evidence to provide in the academic setting. In other words, they think critically using those sub-skills of higher-order thinking to produce the language, ask questions, and present their positions and views in English. According to Bilki, Z., and Irgin, P. (2022), expressing ideas and arguments clearly, logically, and reflectively on a paper is fundamental to critical thinking.

Fahim and Mirzaii (2014) concluded that "the ability to write argumentatively crucially depends on EFL/ESL learners' being equipped with an intellectual capacity for thinking in a critical manner" (p.8), which shows the importance of training learners on language skills by embedding critical thinking skills into them. Pei, Zheng, Zhagn, and Liu (2017) explored the correlation between EFL learners' argumentative writing and critical thinking. Although they found out an insignificant correlation between critical thinking skills and English writing proficiency, textual analysis of student essays showed that "strong critical thinking learners outperformed weak critical thinkers in relevance, clarity, logicality, profundity, and flexibility of argumentative writing" (p. 31). Amir, P. and Amina, O. (2018) noted, "as language acquisition processes engage learners' higher-order thinking skills to negotiate meaning, at the same time, better language skills and active language use activate critical thinking skills." Critical thinking is related to high-order cognition thinking like analysing, synthesising, and evaluating (Fuad et al., 2015). Teachers should consider the significance of critical thinking to plan and conduct learning that can improve students' thinking skills and conceptual understanding (Mamu, 2015). Due to the additional time and effort required for the learning process, giving students challenging assignments may assist in boosting both teachers' and students' motivation. Because dealing with arduous, intense, debatable themes and subjects helps to increase their stimulus in the classroom. As a result, learners, who are motivated to learn, are more likely to desire to study harder and learn more.

Methods

This quantitative and qualitative data aimed to determine the students' higher-order thinking skills with the help of open and closed questions in the questionnaire at the Institute of Foreign Languages, UFE. In addition, it was administered to investigate how language teachers feel about critical thinking and how it is used in the classroom. The study was grounded on the interpretive approach that "allows the researcher to conduct a study in its natural setting" (Al Riyami, 2015, p.413). The survey was carried out over four weeks using Google Form.

The following research questions were used during the study:

1. How were students' higher-order critical thinking skills? If their skills are poor, how can we push them to improve during one semester in the classroom?
2. How did teachers support their learners to foster their higher-order critical thinking skills from the students' view during the lesson?
3. What could teachers do to develop these skills?

This study included 52 Mongolian participants who were non-native speakers and were studying Academic English at the C1 level for one semester at the university. The participants' ages were between 17-21 years old. At the university, first-year students must study this course according to the curriculum at the higher education level. Learners' proficiency tests were conducted before the course started in 2022. Twenty-three statements relating to students' experiences and 13 statements regarding lecturers' support from their

perspectives were asked to select one considering answer from the multiple choice. In addition, one open-ended question was requested to complete by their answers. In total, there were 37 questions. The texts were transferred to percentages. The students' survey was done in accordance with Student Self-Assessment Critical Thinking Questionnaire designed by Cambridge Life Competencies Framework in 2019. Furthermore, 16 statements with multiple choice and two open-ended questions on higher-order thinking skills improvement and acquisition were asked to complete the questionnaire from 4 instructors, who taught Academic English in the Fall semester of 2022, two of them were native speakers from Fiji and the USA, others were non-native Mongolian speakers. The instructor from the USA has one and a half years of experience while Mongolian and Fiji teachers have above 15 years of experience.

Yan, Z. (2021) stated in her research "teachers with the ability to think critically is good problem solvers and when facing a problem during the class, they can have greater reasoning skills so as to find a solution to the problem" which the belief of a good thinker can be inherited from time to time to the students. As stated by Vdovina and Gaibisso (2013), critical thinking is relevant to quality thinking that enables learners to communicate with others, gain knowledge, and deal with ideas, attitudes, and beliefs in a more skillful way. Shirkhani and Fahim (2011) proposed "critical thinking is an integral factor in many ways. The first reason that can be taken into consideration is that when language learners take responsibility for the way they think; they can evaluate the way they learn in a more successful way. Secondly, critical thinking causes learners to experience a meaningful process of learning in which learning a language is meaningful to them. Thirdly, critical thinking and learners' achievement are positively correlated." If the teachers show how to think critically, students learn a language proficiently. Crocker and Bowden (2010) proposed using a content-based approach as a way of merging the notional-functional approach with critical thinking in a language course, which means that "self-correction, clarifying ideas, making distinctions, giving reasons, formulating appropriate questions, making connections and comparing" could be the examples (p.3). Likewise, among scholars, it is believed that rote learning and ready-made materials cannot develop learners' higher-order thinking skills. Victoria, T. & Saleh, I. (2017) noted that learning strategy instruction is also considered an effective approach to teaching critical thinking skills in the language classroom. According to them, language teachers can promote their students' critical thinking by teaching them learning strategies. In doing so, students can develop their metacognitive awareness. Furthermore, teachers can encourage students to describe and share their own learning techniques and strategies (Victoria & Saleh, 2017). From the survey, we attempted to find out the answers to those three research questions and propose some strategies for improving the learners' higher-order critical thinking skills.

Instruments and Data Analysis

The qualitative method investigated students' academic English awareness and teachers' assistance with critical thinking as higher-order skills in the classroom. The questionnaire refers to teachers and is quantitative because it comprises statistics gathered from the questionnaire to identify how teachers support learners' higher-order thinking skills.

The raw data were analysed using Statistical Package for the Social Sciences (SPSS) and Excel programs. The survey questionnaire was put into the Google Form to collect the data. We identified students' improved higher-order critical thinking skills and the following abilities: Vocabulary, Sentence-level grammar, Discourse, Reading & Listening, Engaging

with a text, Externalizing from a text, and Lecturer related questions. Each part of these skills was explained in the Google Form to ensure everything was clear for students. Finally, to determine the correlation between students' and teachers' perspectives, we conducted teachers' surveys on how they supported their learning to foster higher-order thinking skills.

Findings

The figures below demonstrate participants' age and gender rates. The participant's ages were between 17-21, as mentioned before. Therefore, 44.2% and 42.3% were the highest proportion of 18- and 19-year-old students. Furthermore, as we can see from **Figure 2**, 55.8% were females, whereas the male population was smaller than females, which means 44.2% were male students.

At the beginning of each skill, the descriptions of the skills are given to identify students' skills by themselves. **Table 1** below shows how they were described in the survey.

From **Table 2**, it is clear that learners often explain (63.5%), know (61.5%) what the implication of particular word choices is, and they have the ability to choose (40.4%) words for a different audience. At the C1 level, it is not a secret that vocabulary is not taught or learnt. Because at this level, students must be able to acquire and strengthen their awareness based on prior knowledge. Usually, the coursebooks for C1 level learners are not designed to learn new words. They are designed to analyse, evaluate, and predict the word meanings from the context. It shows that students can explain different vocabulary but must carefully select words for an academic audience. In terms of Sentence-level Grammar, according to **Table 3**, although 48.1% have some difficulties comparing and explaining the use of grammatical forms in different genres, 55.8% and 57.7% of the students said they have abilities to use grammar in complex sentences as well as identify author's purpose in the text.

Figure 1 Participants' ages

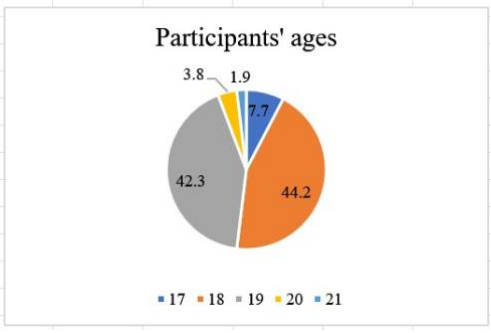


Figure 2 Participants' gender

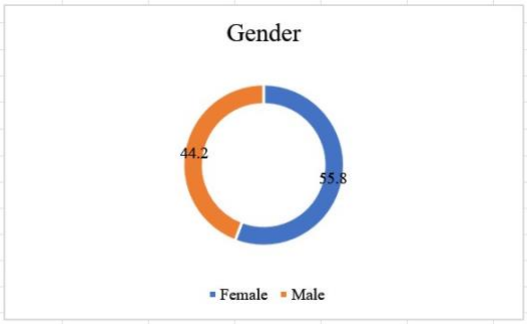


Table 1 Skills and descriptions related to higher-order critical thinking

№	Skills related to higher-order thinking	Descriptions
1	Vocabulary	Vocabulary refers to the words we must understand to communicate effectively. Educators often categorize vocabulary into the four skills: listening, speaking, reading, and writing. Having the appropriate vocabulary will enable you to effectively communicate in these skills.
2	Sentence-level grammar	The term refers only to the study of sentence and word structure (syntax and morphology), excluding vocabulary and pronunciation. Grammar, rules of a language governing the sounds, words, sentences, and other elements, as well as their combination and interpretation.
3	Discourse	Discourse means verbal interchange of ideas. Discourse refers to the use of words longer than a single sentence.
4	Reading & Listening	Good readers make predictions about thoughts, events, outcomes, and conclusions. As you read, your predictions are confirmed or denied. If they prove invalid, you make new predictions. This constant process helps you become involved with author's thinking and helps you learn.
5	Engaging with a text	It refers to the author's meanings: relating the author's text to what they already know, evaluating the author's arguments, and potentially making shifts in their own position.
6	Externalising from a text	This refers to the ability of being able to express the ideas from readings in the verbal and written forms.

Table 2 Vocabulary

1. Vocabulary

1.1 I can explain the meaning of particular words.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sometimes	13	25.0	25.0	25.0
	Often	33	63.5	63.5	88.5
	Always	6	11.5	11.5	100.0
	Total	52	100.0	100.0	

1.2 I know what the implication of particular word choices.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	1	1.9	1.9	1.9
	Sometimes	12	23.1	23.1	25.0
	Often	32	61.5	61.5	86.5
	Always	7	13.5	13.5	100.0
	Total	52	100.0	100.0	

1.3 I am able to choose words for a different audience.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	2	3.8	3.8	3.8
	Sometimes	21	40.4	40.4	44.2
	Often	20	38.5	38.5	82.7
	Always	9	17.3	17.3	100.0
	Total	52	100.0	100.0	

Table 3 Sentence-level grammar

2. Sentence-level grammar

2.1 I can apply grammatical structures with complex sentences in writing.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sometimes	18	34.6	34.6	34.6
	Often	29	55.8	55.8	90.4
	Always	5	9.6	9.6	100.0
	Total	52	100.0	100.0	

2.2 I can identify a purpose of an author in the text.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sometimes	12	23.1	23.1	23.1
	Often	30	57.7	57.7	80.8
	Always	10	19.2	19.2	100.0
	Total	52	100.0	100.0	

2.3 I am able to compare the use of grammatical forms in different disciplines and different genres and explain their purposes.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sometimes	25	48.1	48.1	48.1
	Often	21	40.4	40.4	88.5
	Always	6	11.5	11.5	100.0
	Total	52	100.0	100.0	

Table 4 Discourse

3. Discourse					
3.1 I can analyse how a text is structured and explain why.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	3	5.8	5.8	5.8
	Sometimes	19	36.5	36.5	42.3
	Often	27	51.9	51.9	94.2
	Always	3	5.8	5.8	100.0
	Total	52	100.0	100.0	
3.2 I can compare similar genres across and within disciplines.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	2	3.8	3.8	3.8
	Sometimes	18	34.6	34.6	38.5
	Often	28	53.8	53.8	92.3
	Always	4	7.7	7.7	100.0
	Total	52	100.0	100.0	
3.3 I can use citations to synthesise ideas					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	2	3.8	3.8	3.8
	Soemtimes	21	40.4	40.4	44.2
	Often	19	36.5	36.5	80.8
	Always	10	19.2	19.2	100.0
	Total	52	100.0	100.0	
3.4 I evaluate the evidence used in a text and research paper.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sometimes	14	26.9	26.9	26.9
	Often	28	53.8	53.8	80.8
	Always	10	19.2	19.2	100.0
	Total	52	100.0	100.0	

Regarding discourse, half of our learners (51.9%) have the capabilities to analyse academic text, (53.8%) compare genres, and (53.8%) evaluate evidence in a text or research paper. On the other hand, although they have these abilities, they have some challenges (36.5%) in using citations to synthesise ideas. Therefore, teachers must motivate them to master using in-text citations to integrate or synthesise ideas.

During one semester, teachers provided students with guidelines and consultations on how to write a research paper, include APA in-text citations, use them in the speech, feedback was given on each student's work to strengthen their critical thinking skills.

Although half of the participants can make predictions about thoughts, events, outcomes, and conclusions as they read, 26.9% cannot hear the author's argument and points of view from recordings. We believe that if they read and write more out of classroom activities, their listening skills in the academic environment will enhance at the C1 level.

Table 5 Reading and Listening

4. Reading and Listening					
4.1 I can read for understanding.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sometimes	5	9.6	9.6	9.6
	Often	21	40.4	40.4	50.0
	Always	26	50.0	50.0	100.0
	Total	52	100.0	100.0	

4.2 I work hard to hear the author's argument and points of view.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	2	3.8	3.9	3.9
	Sometimes	6	11.5	11.8	15.7
	Often	29	55.8	56.9	72.5
	Always	14	26.9	27.5	100.0
	Total	51	98.1	100.0	
Missing	System	1	1.9		
Total		52	100.0		

Table 6 Engaging with text

5. Engaging with text					
5.1 I relate meanings to other texts and my own prior knowledge.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	1	1.9	1.9	1.9
	Sometimes	14	26.9	26.9	28.8
	Often	28	53.8	53.8	82.7
	Always	9	17.3	17.3	100.0
	Total	52	100.0	100.0	

5.2 I can listen for bias, assumptions, stance, inference.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	1	1.9	2.0	2.0
	Sometimes	20	38.5	39.2	41.2
	Often	25	48.1	49.0	90.2
	Always	5	9.6	9.8	100.0
	Total	51	98.1	100.0	
Missing	System	1	1.9		
Total		52	100.0		

5.3 I can examine previously-held views.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	1	1.9	1.9	1.9
	Sometimes	20	38.5	38.5	40.4
	Often	27	51.9	51.9	92.3
	Always	4	7.7	7.7	100.0
	Total	52	100.0	100.0	

5.4 I consider implications.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	1	1.9	1.9	1.9
	Sometimes	15	28.8	28.8	30.8
	Often	31	59.6	59.6	90.4
	Always	5	9.6	9.6	100.0
	Total	52	100.0	100.0	

The ‘Engaging with text’ skill focuses on whether students can relate to and evaluate their prior knowledge of the author’s ideas, arguments, views, and implications and whether they can evaluate their position within the author’s views. Although learners are able to relate meanings to other texts using their prior knowledge (53.8%), examine views (51.9%), and consider implications (59.6%), they have some needs to improve the skills such as listening for bias, assumptions, stance, as well as inference which are crucial at the C1 level.

Table 7 Externalising from text

6. Externalizing from text					
6.1 I make notes - including both summaries and reflections.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	1	1.9	1.9	1.9
	Sometimes	18	34.6	34.6	36.5
	Often	24	46.2	46.2	82.7
	Always	9	17.3	17.3	100.0
	Total	52	100.0	100.0	

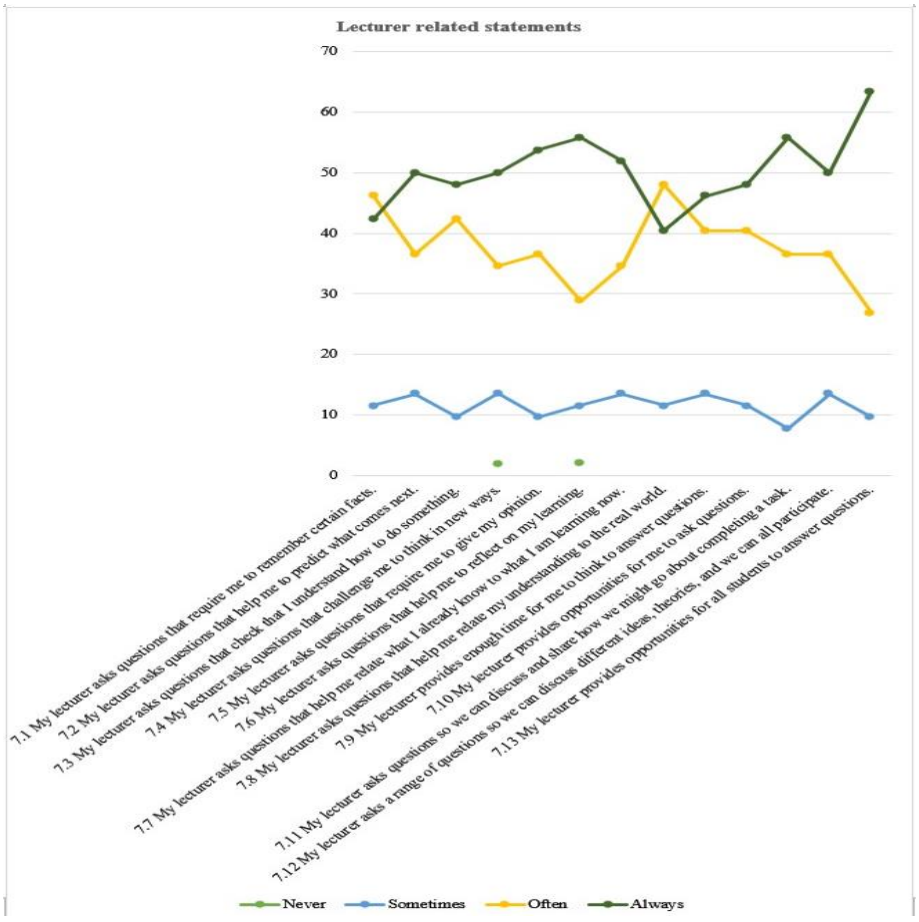
6.3 I use the text to present my own position.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	2	3.8	3.8	3.8
	Sometimes	9	17.3	17.3	21.2
	Often	30	57.7	57.7	78.8
	Always	11	21.2	21.2	100.0
	Total	52	100.0	100.0	

6.2 I can talk/write about the texts.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	2	3.8	3.8	3.8
	Sometimes	11	21.2	21.2	25.0
	Often	25	48.1	48.1	73.1
	Always	14	26.9	26.9	100.0
	Total	52	100.0	100.0	

6.4 I can synthesise from a range of texts.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	1	1.9	1.9	1.9
	Sometimes	17	32.7	32.7	34.6
	Often	28	53.8	53.8	88.5
	Always	6	11.5	11.5	100.0
	Total	52	100.0	100.0	

Table 7 shows that our learners can present their ideas using the text (57.7%) and synthesise information from various types of texts (53.8%). However, we need to focus on developing their skills to take notes, summarise (46.2%) given texts as well as talk and write (48.1%). Any university student must acquire these skills to lead academically and think critically.

Figure 3 Lecturer related statements



The last section of the survey was lecturer-related statements on how they were encouraged to foster higher-order critical thinking skills. We also asked our colleagues how they supported and motivated their learners to enhance their skills and tried to identify whether

teachers' and students' perspectives overlapped. As a result of the findings, both instructors and students considered themselves motivated, enhanced, and most importantly, cultivated higher-order thinking skills. Instructors improved students' abilities to think critically, including problem-solving, analysing and evaluating information as well as one's ideas, integrating data, and distinguishing facts and opinions at the academic level. In addition, they assisted students in learning using the APA style, selecting appropriate research papers, recognising the author's purposes and arguments and so on. According to the table below, one teacher was hesitant about whether the students acquired the skill of drawing reasonable inferences from observations and understanding perspectives and values of this subject. On the other hand, we strongly believe they raised their ethical awareness regarding plagiarism by reading, analysing, and writing a research paper.

Table 8 Questions and population were chosen by teachers

№	Questions & Percent have been chosen by teachers	20%	50%	80%	100%
1	Students developed ability to apply principles and generalizations already learned to new problems and situations.	☐	☐	☐	☑
2	They developed their skills to analyze information and ideas (comparing and contrasting, listing, discussing, etc).	☐	☐	☐	☑
3	They developed their skills to evaluate information and ideas (revising, interpreting, measuring, criticizing, explaining etc).	☐	☑	☐	☐
4	Students developed ability to draw reasonable inferences from observations.	☑	☐	☑	☐
5	Students developed ability to synthesize and integrate information and ideas.	☐	☐	☐	☑
6	Students developed ability to distinguish between fact and opinion.	☐	☐	☐	☑
7	Students enhanced ability to create something (generating ideas, making outline, planning, preparing, performing a presentation, writing a paper, etc.)	☐	☐	☐	☑
8	They improved their reading skills such as reading actively, recognizing main ideas and supporting details, understanding cohesion, reading fluency, identifying author's purpose and arguments in a text, audience, inference, looking for and reading appropriate research papers related to a given topic.	☐	☐	☐	☑
9	They improved their writing skills such as developing a research question, creating an outline with thesis statement, creating coherence and cohesion, paraphrasing, using APA style, referencing, citing the sources, critically evaluating and organizing research, producing a research paper.	☐	☐	☐	☑
10	They improved their listening skills such as listening actively, understanding main ideas and supporting details, speaker's inference, attitude and tone, voice in real life situations or from the recordings.	☐	☑	☐	☐
11	They improved their speaking skills such as delivering a persuasive group presentation, creating cohesion in presentations and discussions, synthesizing a text into a visual, and participating in extended discourse.	☐	☐	☐	☑
12	They learned to understand perspectives and values of this subject.	☑	☐	☑	☐
13	With the assistance of this lesson, some students became open to express their opinions.	☐	☐	☐	☑
14	They cultivated a sense of responsibility for one's own behavior such as copying/ plagiarizing other's work.	☐	☐	☐	☑
15	Students cultivated an active commitment to honesty and respect for others.	☐	☐	☐	☑
16	How can student centered learning method influence students' learning to improve higher-order critical thinking skills? Please, be specific.				
17	In general, how do you see your primary role as a teacher?				
18	How did you support/ What did you do to develop your students higher-order thinking skills?				

Questions 16, 17, and 18 were open-ended for teachers to specify whether the student-centred learning method affected the cultivation of their higher-order critical thinking skills. As they mentioned, **Instructor 1:** student-centred learning method makes students feel more comfortable expressing their opinions openly without criticism. It will encourage students to explore ideas more critically and discuss opposing views.

Instructor 2: The course developed my students' autonomy to some extent - when I mainly focused on thinking creatively and critically related questions and tasks at the beginning and end of each unit.

Instructor 3: I believe it is more beneficial to students' learning if they participate in several sessions. There could be a sign-up sheet during the first week of class, where students commit to attending consultations over the semester.

Instructor 4: Group or pair work enabled students to discuss topics openly. It led students to learn from each other.

All four teachers were asked to select a role as a teacher. Interestingly, three of them consider their roles as 'Helping students develop higher-order thinking skills', and another teacher finds herself/himself as fostering student development and personal growth.

The responses to the final questions were:

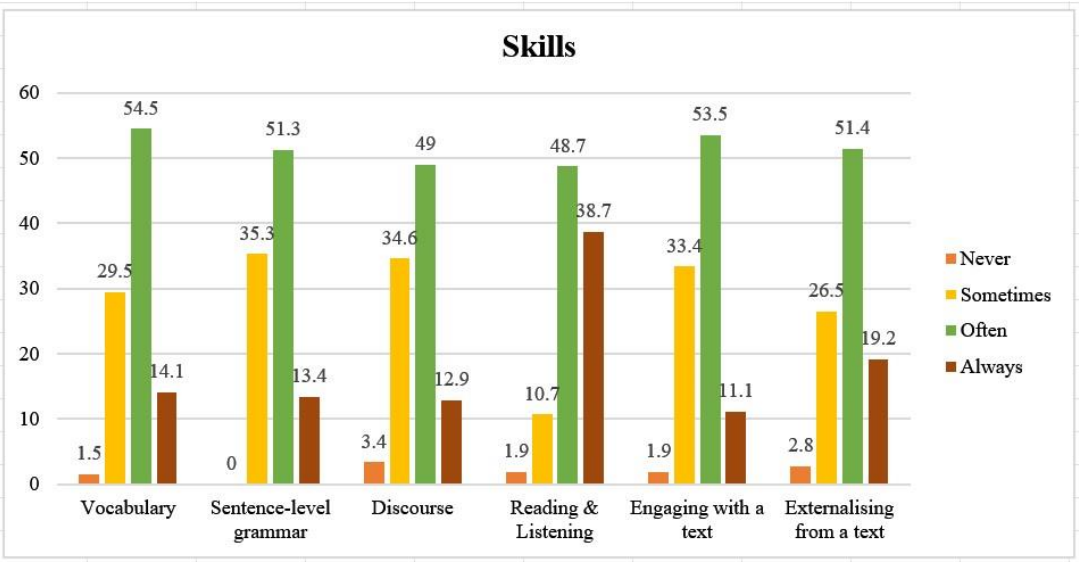
Instractor 1: Gave students different opinions/ideas/situations to openly discuss and explore.

Instractor 2: Asked Critical thinking/ Analytical questions every time to support my students' higher-order thinking skills.

Instractor 3: I think I supported my students' higher-order thinking skills through "warm-ups". I wrote a series of questions on the board related to course content and these were discussed in pairs.

Instractor 4: Different types of open-ended questions were asked to get their answers. Also, I tried to guide them to think in depth and evaluate responses.

Figure 4 Skills



The results of the study showed that students were able to use vocabulary (54.5%), sentence-level grammar (51.3%), discourse (49%), reading & listening (48.7%), engage with a text (53.5%), and externalise from a text (51.4%) often. In addition, teachers motivated their learners to strengthen their higher-order thinking skills. Students considered that they were satisfied and encouraged by their teachers. However, some results, including discourse (49%), reading and listening (48.7%), should be developed much more than other skills.

Discussion

Critical thinking skills are strongly associated with students' academic ability (Kanbay, Isik, Aslan, Tektas, & Kilic, 2017). Students' academic ability may vary across grades. Thus, the

student's academic ability must be considered when designing a lesson because the anticipated result is reducing the gap between different groups of students and the improvement in academic ability (Mahanal et al., 2019). We strongly believe that student-centred learning helps students make proper decisions, analyse, evaluate, and synthesise information to create relevant work. According to Bali, M. (2015), there are three differences among students that may make teaching critical thinking challenging: their cultural capital and exposure to critical thinking before college; their exposure to pedagogies that promote critical thinking before college; and their linguistic ability, which impacts their ability to read/write critically. Herein, it considers that students with different cultural backgrounds and world views affect their learning. In other words, their higher-order critical thinking skills were promoted differently in one semester in C1-level environments. Also, Mongolia is an Asian nation that highly respects the elderly, which means youngsters do not or avoid saying anything in opposition to elders or teachers. According to Bali, a third issue relates to linguistic competence and how it can hinder student capacity to read and write critically, as well as their confidence in expressing themselves orally. These three areas represent diversity among student and to be considered when teaching critical thinking (Bali, 2015). These phenomena impact and challenge the learners to strengthen their ability to think critically in the university setting.

Moreover, foreign language educational systems of high schools are based on rote learning in the land of nomads; however, the systems developed to modify the curriculum, including enhancement of student-centred learning and critical thinking. On the other hand, although higher educational institutions such as the UFE have been continuously changing their Academic English curriculum to improve academic and critical thinking skills, it is not enough to support learners' thinking.

Based on the results above, continual communication is one of the most important aspects of keeping the students challenged while supporting them. In other words, they must frequently quiz one another throughout conversations, dialogues, or discussions.

Conclusion

Throughout the term, students must be educated in critical thinking, especially in higher-order thinking skills. Regular assignments that challenge higher-order critical thinking must be assigned and given to them such as writing a research paper. It allows learners to upgrade their abilities to think critically. Lecturers, instructors, and professors must observe how they are doing to foster their higher-order thinking skills. To do so, learners can be observed by peers and classmates by reviewing each other's work.

To improve higher-order critical thinking skills, they must be practised consistently throughout the course by working together as groups or pairs to learn from each other. Discussions during the course will help them strengthen their abilities to analyse, evaluate, interpret, and integrate sources to create their research papers and complete their given assignments and tasks. Instructors must provide an example for their learners of how to conduct higher-order critical thinking, and they must help them become critical thinkers by offering them practice opportunities and providing feedback. Instructors should stop asking students to memorise new words and the contents they have learnt. If instructors are aware of higher-order thinking skills and are good thinkers, then students become excellent thinkers. Therefore, showing and modelling them could be the best way to enhance their thinking skills in higher order. In addition, it will be possible to strengthen learners' higher-order thinking

abilities if we let them create their presentations, ideas, theories, papers, activities, and actions rather than trying to impart our knowledge to them. Also, when designing the curriculum, there must be ideas for cultivating these skills at tertiary level studies.

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The Silk Road of Siam the Country in the Western Central Region

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Abstract
This research has 4 objectives, but this presentation presents only one objective, which is to study the history of cultural tourism in the western central region. This research is a R&D research. The research hierarchy is 1) R1: Study documents and research related to the history of the central west region, 2 provinces, namely Kanchanaburi (Sam Ong Pagoda Pass) and Ratchaburi (Ban Bang Kaeo) by focusing groups of people in the central west region to obtain comes with all-around information. 2) D1: Use the information obtained from R1 to analyze and develop issues related to cultural tourism in the central and western areas. (on the area where the history of the 2nd Ayutthaya War was known as Krung Taek). 3) R2: Let 3 experts in finding the IOC value and the Focus Group check the accuracy and completeness from D1. 4) D2: bring the results from R2 to create cultural tourism innovations for the central and western areas designated in 2 provinces, namely Kanchanaburi (Sam Ong Pagoda Pass) and Ratchaburi (Ban Bang Kaeo). The results of this research: It was found that the western central region with its historical stories and evidence showing its prominence can be developed as a cultural tourism learning center and developed into an educational curriculum, namely; The area in Kanchanaburi and Ratchaburi provinces that has such a history since the Ayutthaya period is known as "The 2nd Ayutthaya War (Krung Tak)."

Keywords : The Silk Road, Siam, Country in the Western Central Region

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Introduction

In the midst of the advancement of technology known as the digital age, it is an innovation that is rapidly leaping forward for Thai society. The west central region is an area that has a history story. Long time since the Sukhothai period, continuing to the Ayutthaya period until the present. For example, Kanchanaburi before it became the name of Kanchanaburi Province. Originally, in the Ayutthaya period, it maintained its status as a city in the border of the Kingdom of Siam. It is a frontier town in the central region of the west of Siam. Especially when the Thai-Burma war occurred. since the reign of King Chai Rachathirat until the turn of the city was lost in 1767.

Next in line is Ratchaburi Province, which is considered the inner city that protects the independence of Siam. It is also the city chosen by the King to be the settlement of the immigrants who came to seek refuge in His Majesty the King and those who were prisoners of war. resulting in cultural integration of up to 8 groups.

The history of each area is a trace of civilization that reflects the way of life. Including the arts and culture of that area, especially Siam, a country that has been through the era for hundreds of years. Since the creation of the land of Siam until the Sukhothai period Ayutthaya, Thonburi and the present Rattanakosin. From Siam to Thailand Stories in the history of Siam country The western central region has always been a land that is like the first line of defense to protect Siam from Burma's wars.

For example,

- The Three Pagoda Pass (ด่านเจดีย์สามองค์) is the main route for the Burmese army. Currently in Kanchanaburi.
- Ban Bang Kaeow (บ้านบางแก้ว) in the battle of Ban Bang Kaeo in 1774. At present, it is located at Khao Chang Num Sub-district, Photharam District, Ratchaburi Province.

And there are many areas with historical stories that can lead to the development of cultural tourism. As well as develop into learning and career development courses to generate sustainable income for communities along the Silk Road.

However, learning about historical stories in the western central region where there are important traces dating from the Ayutthaya period There will always be civilization in art and culture. Because any prosperity or decline in every society has its roots in art and culture that go hand in hand. For this reason, in Kanchanaburi and Ratchaburi provinces, which are central and western areas that have been written in history for hundreds of years. Therefore, it is very interesting how to make these stories valuable and valuable without fading, fading, or disappearing from Thainess.

Which is related to the learning theory according to Bloom's Taxonomy Revised, 2001, which is defined in 6 steps:

1) Remembering
2) Understanding
3) Applying
4) Analyzing
5) Evaluating
6) Creating

In learning, if you want to develop what you have learned to be better, you need to be creative, which means creating, planning and producing in order to survive and continue as well as learning about the history and arts and culture of Kanchanaburi and Ratchaburi provinces. This is the central west region that will have to be built, planned and produced. By using innovations to create cultural tourism Continuing the development of this Silk Road learning curriculum Including career development to generate sustainable income for the community.

For such a reason, it is of interest to the research about how to make the history of the history that have passed, leaving only traces in the land that appears with the ruins. There is a culture as a tool to tell stories for people of this generation and beyond to learn under the development of a learning curriculum and develop a sustainable income generation for the community.

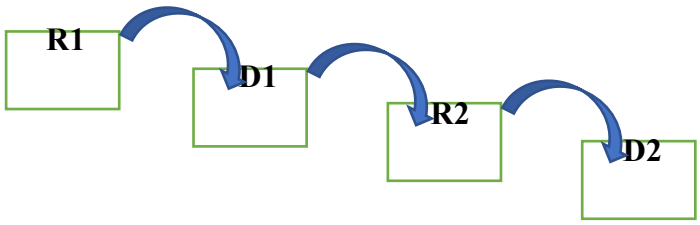
Objective

To study the history of cultural tourism in the western central region.

How to conduct research

1. This research is a R&D research (Research and Development). The research procedures are as follows.
   R1 - Study documents and research related to the history of the western central region. Set in 2 provinces: Kanchanaburi and Ratchaburi.
   - Focus Group people in the central west region to obtain all-round information.
   D1 - Uses the information obtained from R1 to analyze and develop issues related to cultural tourism in the central west region. (on the area where the history of the 2nd Ayutthaya War was known as Krung Taek).
   R2 - Have 3 experts complete validation with IOC process from D1.
   - Let the group that made the Focus Group (from R1) verify the integrity from D1.
   D2 - Brings results from R2 to create cultural tourism innovations for the central west region. Set in 2 provinces: namely Kanchanaburi (Sam Ong Pagoda Pass) and Ratchaburi (Ban Bang Kaeo).

From the aforementioned steps, it can be schematically written as follows.



2. Content scope: study information from documentary evidence recorded in the form of research, textbooks, books, and other documents related to the story of the 2nd Ayutthaya War (Krung Taek), which was the route between Kanchanaburi Province (Sam Ong Pagoda Pass) to the province Ratchaburi (Ban Bang Kaeo).

3. Scope of time: Research period 1 academic year.

4. Area Boundary: study only the central and western region known as the Silk Road. are Kanchanaburi (Sam Ong Pagoda Pass) and Ratchaburi provinces (Ban Bang Kaeo).

5. The scope of experts: 3 experts in IOC evaluation.
   Whose details are as follows:
   Qualifications of 3 experts for the evaluation of the IOC are:
   - Must have completed a Master's degree or Ph.D. in the field of curriculum and teaching or the field of tourism or cultural management or related fields.
   - Must have outstanding academic performance.
   - Must have at least 2 research experience in related fields.

6. Qualifications of those who will do the Focus Group of 20 peoples are:
   6.1 Must be a person who has domiciled and resided in the area for at least 20 years and at least 50 years of age.
   6.2 Must be a person who has lived in the area for at least 20 years and must be at least 50 years old.

7. Research tools
   7.1 IOC Evaluation Form
   7.2 Focus Group Data Collection

8. Preliminary Agreement
   8.1 This evaluation of the IOC value is to confirm and support the true results of the IOC evaluation from experts.
   8.2 Focus Group data collection is a true collection of data from people who know in the area, making the data reliable.
   8.3 Processing from IOC and Focus Group determinations is reliable data confirmation.
   8.4 All 3 experts located in different areas and is assessed through that document It did not affect the assessment in any way.

9. Research Process
   9.1 Study documents and research on historical tourism in the western central region. Especially during the 2 nd Ayutthaya War (Krung Tak) is Kanchanaburi (Sam Ong Pagoda Pass) and Ratchaburi (Ban Bang Kaeo).
   9.2 Collect spatial data from focus groups of 20 peoples.
   9.3 Compare the data from item 9.1 with the data in item 9.2 and combine the results to summarize the body of knowledge.
   9.4 Take the information obtained from item 9.3 to 3 experts to find the IOC value and at the same time take the information from item 9.3 back to the focus group for examination to confirm the knowledge gained. In detecting IOC values with results from Focus Group, it is a form of data verification to ensure the most completeness of the data.
   9.5 Take the information from item 9.4 to write a story about the Silk Road of Siam in the central and western region of Thailand.

Research Results

Presentation of the results of this research, it is only presented according to objective number 1, which is to study the history of cultural tourism in the western central region. Before moving on to the development of the Silk Road of Siam country curriculum in the central and western areas that can be used for people interested in all levels.

From finding the IOC value by all 3 experts and doing a Focus Group from approximately 20 informants, resulting in the research results from finding the IOC value of all 20 questions at a level of 0.98, which is considered valuable. Very good straightness it can be explained one by one as follows:

1. The question on the coverage of the body of knowledge obtained from the study of documents combined with the Focus Group was at a level of 1.00.
2. The question on the depth of knowledge obtained from the study of documents combined with Focus Group was at a level of 0.98.
3. The question on the appropriateness of knowledge categorization obtained from the study of documentation combined with the Focus Group was at a level of 1.00.
4. The question on applying the knowledge gained from the study of documentary works combined with the Focus Group to develop a course on the Silk Road of Siam in the Central West Region that can be used for interested people at all levels is at the 1.00.

In addition, there is an interesting point from the Focus Group. It was found that the informant suggested that these stories should be able to do anything in a concrete way that everyone could study and learn. As well as likely to develop learning resources to be concrete in the future which corresponds to what the researcher has set other 3 objectives, which are in items 2-4, namely:

Objective No. 2 To create cultural tourism innovation in the central west region. This innovation will be produced in the form of 3D media, located in 1 location in Kanchanaburi Province (Sam Ong Pagoda Pass) and 1 location in Ratchaburi Province (Ban Bang Kaeo), so that everyone can learn about historical tourism in the beginning.

Objective No. 3 To develop a curriculum on the Silk Road of Siam in the central region. West Coast that can be used for people interested in all levels. Developed to be used for learning management in the form of a local curriculum.

Objective No. 4 To develop the community economy on the Silk Road in the central west region to generate sustainable income. This item is an extension to add market value to the community. This is to develop products and create a product brand and generate income for the community in a sustainable manner.

Conclusions

It can be concluded that the results of the IOC estimation combined with the Focus Group confirmed that the first objective of the research was successfully met. Because the research results from this first objective can be developed into a course on the Silk Road of Siam in the central and western areas of Thailand. As mentioned in the research results that the presenting of this research is the presentation of the results from the IOC evaluation by the three experts, combined with the results from the Focus Group, both of which will be used to verify the accuracy of each other reliably. And when the results are completed Researchers will continue to develop a Silk Road curriculum in the central and western region of Thailand

that can be applied to interested people at all levels. According to the written research process.

Discussion of Research Results

From the objectives of this research to study the history of cultural tourism in the western central region, the results can be discussed as follows:

1. The question on the comprehensiveness of the body of knowledge obtained from the study of the documentary work combined with the Focus Group. This issue is consistent with the research on Cultural Tourism Route improvement for Valuable Architecture Learning In Lan Na Civilization Route by Tassanee Krachangchom and others (2018) and research on The Study of Approaches to Develop Cultural Tourism in Muang District, Uthaithani Province by Sukanya Wongcharoenchaikul (2018). It can be concluded that collecting information from the preliminary documents can be used to determine the direction of the next research. And able to provide concrete information to that research as well. The question of coverage of the body of knowledge derived from this paper study of the researcher was also combined with results from the Focus Group, thus making the data extremely comprehensive and complete.

2. Questions on the depth of knowledge gained from the study of the paper, combined with the Focus Group. The research results in this issue are consistent with the research on The Development of Cultural Tourism in Bang Namphung Community Samutprakarn Province by Tosaporn Mitwong (2017) and research on Cultural Tourism Route improvement for Valuable Architecture Learning In Lan Na Civilization Route by Tassanee Krachangchom and others (2018). It can be concluded that the acquisition of deep information. It must arise from the synthesis of results from detailed studies of various documents and also requires integrated qualitative research. Therefore, it is believed that the determination of the IOC combined with the results of the focus group in this aspect of the researcher is complete.

3. The question on the appropriateness of knowledge categorization obtained from the study of documentation combined with the focus group on this issue is consistent with the research on A Study of Experience Design for the Development of Cultural Tourism by Khemika Thiraphong (M.P.A.) and research on Cultural Tourism Management in Authenticity and Creative Tourism: A Case Study of Muang Mallika R.E. 124, Kanchanaburi Province by Sarocha Amornpongmongkol (2018). It can be concluded that when collecting data from various documents, the researcher must categorize those data for ease of study and use for the benefit of research work. Also, categorizing this knowledge can shed light on issues that may be missing or incomplete. In particular, the focus group of the researcher this time was able to review the data between the IOC determination and the results from the focus group as well thus making it easy to categorize knowledge.

4. Questions on applying the knowledge gained from the study of document work, combined with the Focus Group, to develop a course on the Silk Road of Siam Country in the central and western region that can be applied to interested people at all levels. This issue is consistent with the research on Development of a Curriculum Model in the Historical Tourism Course for Upper Secondary School Students by Wichai Wongsuwan and others (2013) and research on Developing the quality of historical tourism in the

Northeast by Prapawee Wongbutsri (2012). It can be concluded that if each successful research can be developed into a curriculum to manage learning for interested people at all levels, it would be very good. Especially the development of local curriculum used in teaching and learning at the basic education level. Therefore, this research is able to answer this issue very well. Because after the result of the first research, it will lead to the development of the silk road study curriculum of Siam country in the central and western areas.

Epilogue

From this study, The Silk Road of Siam the country in the western central region, only the results from objective 1 are presented is to study the history of cultural tourism in the western central region before moving on to other objectives. Therefore, the results obtained this time are very important as the first step towards the destination. However, research in this field in Thailand still pays little attention to the central and western regions. In this regard, this research is an integration of tourism research with education and marketing at the same time. This is considered to be very diverse in research. And it is expected that if this research is completed with all research objectives, it may cause a huge increase in spatial changes in the future.

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Theoretical Framework on the Use of Art-Inspired Pedagogy in Early Childhood to Mitigate Urban Barriers

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Abstract
Cities around the world are changing rapidly, putting new pressures on the education system. Vietnam has particularly seen a period of rapid economic growth in many of its major cities. These urban environments can create both barriers and opportunities for learning. This paper aims to answer the question of if and how art-inspired pedagogy (AIP) can be used to mitigate the urban barriers in the early childhood education system. Through a rapid literature review of 48 papers, we discovered how AIP can contribute to children's holistic development (particularly in social emotional learning and literacy) and what conditions are needed to implement AIP in Southeast Asia. Additionally, CITIES, a 3-phase programme in Da Nang, Vietnam with 29 schools, provides a practical lesson learned on how AIP can fit within the existing system and support the new early childhood curriculum in Vietnam, and what still needs to be in place for this to be successful. This paper provides a theoretical framework, based on literature and practice, for implementing AIP in the urban environment in Vietnam.

Keywords: Early Childhood, Art, Urban Education, Art-Inspired Pedagogy, Learning Through Play, Vietnam

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1. Introduction

Vietnam's recent economic growth has been among the highest in Southeast Asia (SEA), framed as an 'economic miracle' leading to rapid urbanization (Van & Sudhipongpracha, 2015). Da Nang, the sixth largest city in Vietnam, is a prime example of rapid urbanization given its current economic growth and foreign investment (World Bank, 2013). While urbanization is seen as a driver of economic growth and poverty alleviation (UN Habitat, 2016), the process also creates specific social challenges, particularly for children. Da Nang is now home to a considerable number of migrants workers from neighboring provinces who fill the need for low-income labor, seasonal jobs in construction and food sales, and as street vendors (Chatterjee, 2015). This economic growth has contributed to the marginalization of certain populations by pushing up land and rental prices, thus widening the economic disparities within the city. Certain adverse experiences resulting from urban growth have the potential to affect child development, such as poor social and emotional development and a higher risk of mental health problems, which can hinder school readiness for preschoolers (Perry and Conners-Burrow, 2016, cited in Solis Schnyder et al, 2020).

1.1 VVOB CITIES Programme

To analyze and respond to the potential educational challenges resulting from urban growth in Da Nang, VVOB's CITIES programme aimed to strengthen teacher capacities to discover the urban barriers that hinder children's development, learning, and well-being and to develop interventions to mitigate them. In this first phase, teachers and school leaders identified common barriers such as, limited access to green spaces and interaction with surroundings, changes in social cohesion, lack of parental time, and increased screen time, highlighting similar factors as mentioned by Perry and Conners-Burrow, 2016 (VVOB, 2019).

To address the above-mentioned challenges, teachers created learning activities based on art-inspired pedagogy (AIP) using professional learning communities (PLCs). These activities were introduced into teaching and learning environments as part of innovative practices for teachers to tackle these challenges. **VVOB defines art-inspired pedagogy[1] as a creative approach that stems from the foundation of 'learning through play.' It leverages the arts as a vehicle that teachers can use to promote creativity and exploration while meeting set learning goals**. AIP is a pedagogical approach that uses one or more art forms[2] to deepen understanding and support learning objectives in the classroom (Burnaford, Aprill & Weiss, 2009; Dohahue & Stewart, 2010; PCAH, 2011; Silverstein & Layne, 2010). Because the CITIES programme was in Da Nang, a city rich with culture, history, and arts; the city's identity[3] was also leveraged to mitigate the urban barriers children are facing.

1.2 Rationale for Framework

Little is known about the casual effects of AIP in preschool education in Vietnam on the holistic development of children. Because of this, primary research through harvesting

[1] Many terms are used to describe similar approaches, such as "arts-based" and "art integration." VVOB has chosen to use "art-inspired pedagogy" as "art" is a technique used to meet learning goals rather than art products or art education being the end goal.
[2] **Art forms** include visual arts such as painting and drawing or performing arts such as music, drama, or dance.
[3] **City identity** in VVOB CITIES programme: what a city or urban environment can offer in terms of pedagogical opportunities

(consisting of interviews, group discussions and a survey) and secondary research through a rapid literature review were conducted to answer the research questions. Due to the high level of interest, and teacher-reported effectiveness in AIP shown through the harvesting, VVOB, in collaboration with national and international education experts, has developed empirical research to create a theoretical framework for the use of AIP to mitigate urban barriers. The initial harvesting results show the participants' positive perceptions of AIP in enhancing the professional capacity of teachers as well as in creating an active and engaging learning environment for children. However, the question to be raised is what the effects on the holistic development of children are and how this approach can be applied systematically and effectively in preschool education.

2. Methodology

2.1. Research questions and sub-questions

The following research questions were answered through the rapid literature review and project data collection.

Main research question: *"What is known about the effect of art-inspired pedagogy on the holistic development of children in early year childhood education in urban environments?".*
Sub-questions:

1. How can art-inspired pedagogy facilitate the development of preschool children?
2. What is the evidence that art-based pedagogy helps to mitigate urban barriers faced by children in urban environments?

2.2. Rapid review

Conventional literature reviews provide an overview of the relevant scientific literature published on a topic, however; it's trustworthiness is often low (Briner, 2014). Clear criteria for inclusion are often lacking and studies are selected based on the researcher's individual preferences or theorizing perspective. Here, a 'rapid review' method is being used which aims to identify the most relevant studies on a specific topic as comprehensively and structured as possible and to select appropriate studies based on explicit criteria[4]. The rapid review is transparent, verifiable, and reproducible, and as a result, the likelihood of bias is considerably smaller. In this case, there were two separate rapid reviews conducted, one on AIP in general on an international scale and one specifically focused on Southeast Asia (SEA) and AIP.

2.3. Project Data Collection

Along with the rapid review, the CITIES programme reports have been collected and carefully reviewed. Harvesting was completed after programme implementation to gain insight into the interest, practicality, and effectiveness of AIP from the perspectives of government officials, school leaders, and teachers. The harvesting employed a mixed-method approach, combining both qualitative and quantitative data collection tools and methods including survey questionnaires, in-depth interviews, and focus group discussions. Data collection activities were applied with 98 teachers from 29 preschools, 29 school leaders from

[4] The inclusion criteria for the rapid reviews can be found in Annex 1.

29 preschools, 7 officials from Bureaus of Education and Training (BOET) and 1 Department of Education and Training (DOET) official.

Harvesting was conducted to understand how and at what level the teachers applied and plan to apply AIP with children and to provide evidence of the changes that were institutionalized in the schools' operations. The results present the successes and challenges on the ground when implementing AIP and the effects that teachers, school leaders, and government officials saw after implementation. In addition, it discusses the practicality of AIP to fit in with and enhance the current curriculum and systems in place in early childhood education (ECE), from the perspective of DOET, BOET, and school leaders.

3. Research Findings

3.1 General Findings

3.1.1 AIP on Holistic Development

Whilst extensive research has demonstrated the positive effect of AIP on children's development in learning and wider outcomes, there is still very little scientific understanding of the causal effect of this relation. There is strong evidence that the use of art activities in the classroom could contribute to children's academic outcomes and psychological and social outcomes such as the attitude towards achievement, creativity, critical thinking, communication skills and emotional intelligence. The arts can serve as a tool for cross-domain integration and can enhance both the teaching methodology and the learning process (Stoycheva & Perkins, 2018).

One domain that tends to show positive effects from AIP is in literacy outcomes. In Taiwan, pilot research found that AIP could foster young learners' Chinese language ability by facilitating their pronunciation and word memorization (Chen, Chien-Hsu, et al., 2007). Other findings suggest that DBP has a significant positive effect on achievement. Through drama, students could learn about characters, thematic understanding, complex language, as well as increase enjoyment of and persistence with interpreting and creating stories (Lee et al., 2020). Music interventions also generally had a positive and significant effect on the teaching of reading skills, though they were inconsistent across studies. Song lyrics often contain elements of reading comprehension and practice for visual decoding skills, and listening stations allow students engage in repetition that is not perceived as drilling (Standley, 2008).

Visual arts can play a strong role in teaching emergent literacy skills. Arts instruction could help children pay more attention to forms and detail, leading to an increase in their reading readiness scores. Burger and Winner (2000) carried out meta-analyses that supported that when reading instruction was integrated with art instruction, children became more motivated to read as they find art activities engaging compared to traditional reading curricula.

3.1.2 Possible Moderators

To gain a nuanced understanding of the effect of AIP on children's development, it is important to understand possible moderators that might influence the intervention. This review found two possible moderators, namely instructors and structure of the intervention.

Instructors

Lee et al., (2015) conducted moderator analyses on the type of instructor to understand the potential moderating effects of the facilitator. In sum, interventions directed by the researcher or classroom teacher had significantly more positive effects than interventions led by a teaching artist for achievement and 21st-century skills whereas the opposite pattern showed when the interventions led by teaching artists had more positive effects on attitudes towards school. This raises the question of teachers' training and preparation on how to combine pedagogical teaching skills and a strong understanding of the arts and its application. If schools opt for teaching artists as leaders in a class context, it is essential to provide them with extensive training in pedagogy and content knowledge to be more effective in the classroom (Lee et al., 2015). It is relevant to note that the achievement moderator analysis has the strongest effect in preschools.

In the meta-analysis regarding the effect of DBP on literacy-related outcomes, Lee et al (2020) also found that the leader of the DBP is the crucial moderator of studies. The largest effect is for studies reporting the classroom teacher leading the DBP which is significantly larger than treatments led by the researcher and treatments led by teaching artists.

Structure of the Intervention

The second possible moderator is the structure of the intervention[5], including the duration and model of the given intervention. According to Stanley (2008), music for reading achievement functioned better when it was added to ongoing music education activities than when it replaced regular music education in the general curriculum. Studies that employed more than 60 hours of music instruction in the given period showed no significantly greater effects than those with less than 20 hours of intervention even when spread across the entire school year. On the contrary, the duration of intervention plays an essential role in the effect of DBP on children's academic-related outcomes (Lee et al., 2015, 2020). This shows that the effect of the duration is likely dependent on the specific art form being used.

In the research on the effect of DBP on literacy outcomes, Lee et al (2020) used the intervention duration as coded as the number of hours. The largest average effect is for the 3-10 hours of lessons which is significantly greater than all other categories. Studies reporting 11-20 hours are significantly more positive than more than 20 hours of lessons. Lee et al (2020) recommended that DBP learning experiences are more impactful when informed by a focused inquiry and by learning theory and practice. The requirement of sufficient time in instruction highlights the specific feature of DBP which focuses on the process-oriented and reflective experience rather than the final product or theatrical outcome.

A randomized experimental study of Çetin (2021) also argued that artistic activities should be process-oriented rather than product-oriented. Artistic learning is the creative process between the individual and the work through planned, meaningful relationships created in pre-programmed aesthetic activities between the teacher and the learner. This explains why they proposed a modular art education program guided by a researcher in 7 weeks for 54

[5] The intervention can be expressed in two main forms, including visual arts, and performing arts. Visual arts focus on what children see and how they develop their artistic awareness, for example, painting, drawing, photography, etc. while performing arts consider the activities related to body movements such as dance, drama, and music activities.

preschoolers. As a result, Çetin (2021) identified that the emotional and social development of children in the experimental group is significantly different from those of the control group after participating in modular art education.

3.1.3 AIP and Urban Barriers

Although no high-quality studies are identified on the role of AIP on the relationship between urban barriers and preschool children's development explicitly, this review acknowledges that AIP could foster children's development and study-related outcomes, fitting in the general practice of 'play-based learning'. Given the context of urban environments, art-based programs seem to support urban children to develop self-esteem, creativity, and social skills as well as their coping skills to overcome adversities. Certain types of performing arts have been shown to help increase emotional intelligence skills like self-confidence, well-being, self-control, and efficiency in interpersonal relationships (San-Juan-Ferrer & Hípola, 2020).

This rapid review indicates some studies showing how city context could convert urban-related challenges into learning opportunities for young children. One of the ways that researchers recommended is to rethink city infrastructures as 'spaces of learning' (Face & Buchczyk, 2019; Tuitjer & Muller, 2020). The lessons conducted in the combination of arts and city materials not only could improve children's creativity, social and emotional skills but also create occasions for them to learn more about 'what is there' in their city and come up with ideas how they would like to make their city better.

Using the city as a space for learning creates unique moments in which students can experience, explore and be more attentive to their surroundings. Careful attention inspires children to take more active roles, raise questions, communicate with others, and feel more connected to their living places. This might help to improve social cohesion between the child with the space and place they are living as the idea of an assemblage of the city. City infrastructures such as public art spaces have the potential to invite the children's gaze, arouse their curiosity, stimulate different ways of seeing as well as offer them chances to think about how city center spaces might be designed as more aesthetic and playful places supportive of public life. In other words, the employment of art in this case highlights the value of a city's identity and its resources in which children do not simply learn *about* the city, but rather they learn *with* it.

3.2 AIP in Asia

Despite many Asian countries adopting child-centered ECE policies, studies in several East Asian countries suggest that children still find their curriculum consisting of scripted instruction, repetitive learning, and standardized testing (Hui & Yuen, 2010; Lee & Yelland, 2017; Lim-Ratnam, 2013). Lee and Yelland (2017) report that parental expectation is that pre-school teaching shall bring about academically rigorous instructions, as well as conduct regular assessments to acquaint children with high-stakes testing. Equivalently, creative and "outside-the-box" thinking is obliquely downplayed in the major parts of Asia which are still influenced by Confucian principles of modesty, particularly in the Chinese traditions (Hui & Yuen, 2010). Because of these expectations many Asian families and teachers have for preschool students, AIP has not been a widely adopted practice in this context, therefore providing us with limited research on its effectiveness in this context as well as a need to analyze the relevance and adaptability of this model.

Despite the challenges presented above, there are some schools and organizations in the region that are applying AIP. In Singapore, the “Nurturing Early Learners" (NEL) approach based on AIP has been increasingly adopted to facilitate children’s creative thinking and self-exploration. Also in Singapore, Bautista et al. (2018) found some promising results as to the positive effects of AIP, including students’ positive attention, generating enthusiasm, and/or curiosity, self-expression, creativity in children, and tailoring arts-related activities to students’ interests.

There have been a variety of AIP initiatives starting in Asia which show a growing interest in the methodology as well as provide us with some lessons learned. Creative Arts Activities (CAA) program in Malaysia, for instance, has deployed a five-step creative process to inspire teachers' and school leaders’ new ideas in the teaching and learning (Kuong, Ling Pik et. al., 2012). Research in Indonesia also implied that certain elements, namely adequate facilities, and infrastructure; teachers’ creativity; teacher-children cooperation; and parents’ assistance are key factors for the effective implementation of AIP (Trisnawati & Sugito, 2020). Moreover, the implementation of AIP poses some challenges which consist of facilitating different students’ creativeness, the requirement of teachers’ high competency to manage the classroom, and the need to attend to children’s queries and expectations. In the Asian context, teaching is often highly structured, and children’s needs are seldomly used in lesson planning creating a need for specific professional development to support teachers in implementing AIP (Lim-Ratnam, 2013).

3.3 AIP in Practice: Programme Findings

In Vietnam’s education system, AIP is a new methodology both in policies and practice. In CITIES, AIP was introduced to schools to improve children's learning and to overcome urban barriers. The programme left valuable results and lessons learned in the application of AIP in preschools and the needed conditions of human capacity and institutional systems to support its implementation. It provides us with a promising model that should be explored on a larger scale and in different contexts to validate its relevance and effectiveness.

3.3.1 Knowledge, Attitude and Practices (KAP)

The end-project KAP survey indicated a proficient level of knowledge and understanding of art-based innovation among the programme participants, demonstrating the effectiveness of the AIP training. Teachers have utilized arts in experimental activities as well as activities to achieve foundational skills, such as learning numbers, shapes, and letters. To enhance the practice, teachers shared what they had tried and learned via teacher professional learning communities (PLCs). In CITIES, PLCs were used as a platform for teachers to tackle teaching and learning challenges, such as urban barriers, through a collaborative process of co-designing, trying out, and reflecting on the application of innovative methods such as AIP. This provides us with encouraging results that with focused training and coaching, teachers can make significant advances in their teaching practices.

3.3.2 Interest and application

The KAP survey revealed that arts/innovative activities were applied in all schools to varying degrees. Most teachers (98%) showed their willingness and commitment to continue integrating art-based innovations in their work. There is a correlation between the way teachers select activities to continue in their work and the difficulties teachers have

experienced in implementing art-based activities in the previous school years. These results lead us to believe that while teachers are motivated to apply AIP, there are conditions needed to do this successfully (VVOB, 2021).

3.3.3 Effectiveness

According to the teachers in CITIES, applying AIP in activities has helped remove urban barriers to learning. Many teachers observed that students participating in art-based activities spent more time exploring the materials and the environment, expressed their ideas and thoughts in more creative ways, and asked more questions in comparison with how they were in the previous activities. Teachers recognized that their students improved their linguistic, social, emotional, and cognitive skills, however; full impact research would need to be conducted to prove statistical significance. It was stated by a teacher of a 4–5-year-old class that her students learned shapes and numbers faster when they made or created the shapes and numbers by themselves through the given materials such as clay, paint, or wood (VVOB, 2021).

Throughout the programme implementation, government officials demonstrated their positive perspectives on the success of AIP in enhancing the capacity of teachers to create an active learning environment. DOET officials expressed that the innovative methods have allowed teachers to become flexible in designing educational activities which are play-based and offer experiential opportunities for children at different ages. They emphasized that AIP could go hand in hand with the national curriculum and they are able to see the effectiveness of this implementation in mitigating barriers related to urban contexts. Many school leaders consistently stated that AIP created a comfortable teaching environment for teachers and an active learning environment for children. In terms of effectiveness in dealing with barriers to learning, 86% of BOETs asserted that the applied arts/innovation activities have been effective in mitigating barriers related to urban contexts (VVOB, 2021).

4. Theoretical Framework

4.1 Basis for the Framework

While there is still a lot to be discovered in terms of AIP's ability to mitigate urban barriers and improve students' holistic development, the rapid review and practical experience provide promising information to allow this theoretical framework to be designed. AIP has been shown to be effective in increasing students' social-emotional and literacy skills. Many of the urban related barriers to student learning center on the high stress city environments and lack of social cohesion, therefore; leading us to believe the AIP could be used as a tool in the classroom to mitigate some of these barriers. While there may be some challenges in the implementation in SEA, new student-centered policies in ECE lend themselves to the adoption of methodologies such as AIP. With this theoretical framework, we hope to provide readers with a practical way to implement student-centered policies while increasing students' holistic development and mitigating urban barriers.

4.2 Explanation of the Framework

This framework aims to support school leaders and teachers in the implementation of the emerging ECE curriculum that emphasizes holistic development through child-centered pedagogy. AIP complements this approach by providing specific methods that integrate art

into teaching and learning for preschools. AIP is one way that child-centered pedagogy can be implemented and could be a preferred method for ECE as art-based activities are already commonly used. AIP is a pedagogy that allows art to be integrated into daily lessons and activities to increase engagement and interest, which often leads to improved wellbeing and involvement and learning outcomes.

The CITIES programme proposed 8 art-inspired activities as a toolkit for teachers to implement in their classrooms. However, the ways in which AIP can be included in the daily ECE curriculum are vast and should be explored further. The goal of AIP is for teachers to develop the mindset and skills necessary to take ownership of this pedagogical approach and implement it as part of their daily lessons, while meeting the necessary ECE standards. The below model can help explain how AIP fits in the existing push for a child-centered approach in the new Vietnamese ECE curriculum and what the intended holistic development outcomes are.

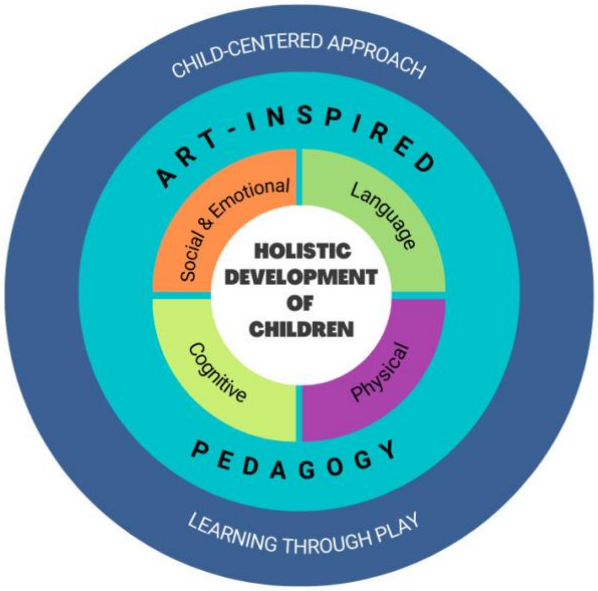


Figure 1. Holistic Development of Children

4.3 Implementation of the Framework

The desired environment for an art-inspired pedagogy framework consists of four pillars: **teachers' capacity, art-inspired activities, school support, and professional learning communities (PLCs).** The four pillars are interconnected, and the framework best supports the application of art-inspired pedagogy when all four components are in place and supporting each other. They take into account the two factors of instructors and structures of intervention as discussed in section 3 and expand on what other conditions might be needed to successfully implement AIP based on experience in the field.

Teacher capacities for implementing AIP include the toolset, skill set, and mindset for implementation. AIP can require unique materials and environments to be implemented. Not only the physical tools are needed but also the foundational tools of methodologies such as

process-orientated child monitoring (POM)[6] and learning through play. Teachers also need a specific skillset that includes understanding AIP, facilitation skills, ability to adapt and modify curriculum implementation while meeting the desired government standards and managing the classroom during these activities. It includes a teacher's ability to reflect, give and receive feedback and adjust teaching practices accordingly. The last, and arguably most important feature, is the mindset. It is not just applying prescribed art activities or games, but rather an ability to internalize the essence of AIP and learning through play to apply it systematically and consistently. As mindset shifts are a complex process, school leaders must provide close coaching to ensure they are able to transfer this into practice.

Art-inspired activities refer to the blending of the arts into class activities. This requires looking into the current curriculum to identify the opportunities to integrate arts to enhances learning outcomes. Teachers can consider a variety of visual and performing arts as the means to help achieve educational goals. Activities that are inspired by arts have different dynamics, allowing for more child-led exploration meaning that student learning will require more teacher facilitation rather than direct teaching.

Specifically, for those in urban environments, teachers are encouraged to explore the features and resources in the city that can enrich the learning experience for the children which will provide students with meaningful experiences to connect with their community and with the curriculum. Some characteristics that ought to be included in AIP include (but are not limited to):

- Integrating song, dance, painting, drama, etc. into the lesson while maintaining set learning objectives
- Using open materials
- Engaging in meaningful tasks
- Using the 5 senses in activities
- Using natural materials
- Visiting community cultural centers

School support includes instructional guidelines and school leadership. The framework recommends that a set of guidelines be provided to schools that would give an overview of AIP and suggestive instructions on how to integrate in teacher professional development (TPD) activities. The guidelines provide core steps and examples to help schools applying AIP approach and at the same time will give space for the schools to adjust to suit the school's needs. The CITIES 8-activity toolkit could be used as the starting point for the creation of AIP guidelines for schools.

School leaders must also possess the mindset necessary for AIP and that they create a healthy environment for learning, sharing, and reflecting. School leadership also includes the right policies and incentives to encourage the application and sustain AIP practice in the school based TPD system.

Professional Learning Communities (PLCs) are an essential component of this framework as they provide a platform for teachers and educators to share experiences in applying AIP. A

[6] POM is a tool developed by VVOB to monitor the well-being and involvement of the child and act steps to improve those aspects. More information can be found here: https://vietnam.vvob.org/sites/vietnam/files/20210720_vvob_pom_for_endorsement_en-light.pdf

PLC is a group of educators that come together to discuss teaching challenges, come up with possible solutions, try them out in practical environments and evaluate their effectiveness. PLCs can be created among teachers from a school, school leaders, and/or other stakeholders in art education. Harvested results indicated the two most favorable learning channels of the teachers are learning from doing and from exchanges with colleagues. AIP is new to schools and teachers; therefore, PLCs will facilitate exchange and feedback between teachers as they try out these new methods.

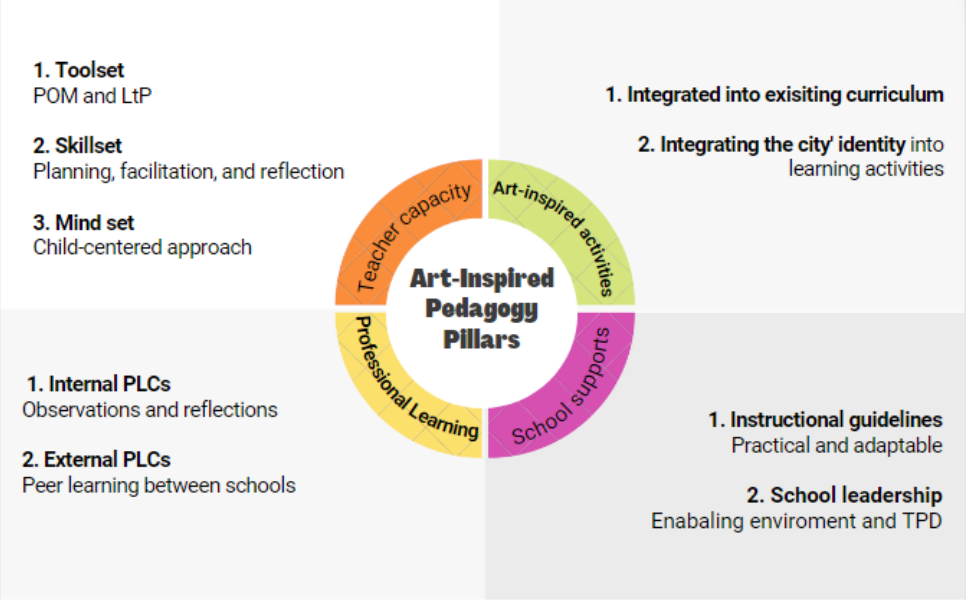


Figure 2. Art-Inspired Pedagogy Pillars

4.4 AIP and the ECE National Curriculum

In the Vietnamese ECE curriculum, art is included as a means of aesthetic education for preschool children. According to this framework, art is not only for aesthetic education, but also for language, physical, cognitive, social-emotional skills. According to one government official who participated in the CITIES progamme, "*The schools made plans and allocated funds for the activities so that the teachers had opportunities to apply activities in parallel with the MOET's curriculum that focuses on the child-centered approach*" (VVOB, 2021). After review, a governmental official stated that the framework supports the current curricular which promotes the empowerment of ECE preschool teachers and school leaders to "supplement educational contents and methods" to ensure the best learning outcomes for their students. She finds the framework highly feasible in this context and stressed the importance of teacher capacity and motivation to respond to the individual needs and interests of children (Le Thi Dieu Thuy, 2022).

4.5. Limitations

Within this study and the theoretical framework, two main limitations have been identified: (i) research gaps particular in SEA; (ii) the project scale of the CITIES programme.

The research team used some extended key words: "education through art" OR "Art-related pedagog*" OR "Music pedagog*" OR "learning through art" OR "learning with art" yet there is limited research focused on documenting what AIP looks like in actual preschool classrooms, particularly in SEA countries.

Regarding the project scale, most activities were conducted in Da Nang, a central coastal city of Vietnam which may not be representative of all urban environments in Vietnam. The fact that the scale of this project is quite small and no baseline and endline studies were conducted, makes it insufficient to make conclusive or casual statements regarding effectiveness. We also acknowledge that other approaches might be more beneficial in mitigating urban barriers and that more research would need to be done to prove that AIP is the most effective for this. Given the shortage of evidence on the causal impact of arts, See and Kokotsaki (2016) recommended considering the effect of arts as a bonus if it leads to improvements in academic attainment and other affective outcomes when integrating it in teaching and learning environments. Full impact research and further consultation with other policy makers would help make conclusive statements to answer the above research questions.

5. Conclusion

Art-inspired pedagogy and its connection to the mitigation of urban barriers is a topic with still a lot to be discovered. In Vietnam, where rapid urbanization is underway and the effects this is having on the early childhood sector is becoming more pronounced, governments and schools must begin to try new models and expand research on how the school system can best support the ECE students. This framework provides a starting point for the discussion on the effects of urbanization on children and possible solutions. The current trend shows that the population and economic growth in Vietnams major cities will continue into the next decade. The education system must be prepared to recognize its effects on the ECE system and provide school leaders and teachers with practical tools to support their students. The above proposed framework, including the CITIES activities tool kit provides a starting point for teachers, school leaders and government officials to explore the possibility of AIP to integrate the child-centered approach in the new policies and mitigate the urban barriers that rapid urbanization induces.

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Digital Piracy Case of Learning Materials in China: A Tough Challenge to Chinese Copyright Law

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Abstract
Digital piracy of learning materials is arguably considered as unlawful behavior of students under Copyright Law of the People's Republic of China (hereinafter referred to as "Chinese Copyright Law"), which has caused great harm to the copyright owners and licensed users. This study aims to examine the reasons for digital piracy of learning materials and the defense against copyright infringement, i.e. fair use regarding private study and research, classroom teaching and scientific research according to Article 24 (1) and Article 24 (6) of Chinese Copyright Law. This study focuses on three questions: whether university students have the awareness of digital piracy of learning materials and the copyright infringement arising from digital piracy, what is the attitude of university students toward digital piracy of learning materials, and how to protect the copyright of digital learning materials under Chinese Copyright Law. There are two instruments in collecting data, questionnaire and semi-structured individual interviews with different university students currently studying in Beijing. Findings suggest that most students had the experience of piracy of learning materials without the awareness of copyright infringement, and they supported digital piracy of learning materials due to the habit, ease, common practice and no charge of digital learning materials. The copyright of digital learning materials could be effectively protected by not charging fees for digital learning materials, collaborating with relevant academic associations to allow students to download at a lower price, and utilizing technical barriers to prevent illegal downloading.

Keywords: Digital Piracy, Learning Materials, Copyright, Fair Use

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1. INTRODUCTION

1.1 Rational

The development of high Internet has facilitated the access to digital information. It also brings opportunity for students to acquire a great number of digital leaning materials. As students take advantage of the convenience brought by online file downloading and sharing, some students have been involved in digital piracy and copyright infringement, which might be exempted from legal liabilities with the defense of fair use under Chinese Copyright Law.

Digital piracy is defined as the illegal act of uploading, downloading, copying, sharing, trading digital materials, such as digital documents, audios, videos, software, and other copyrighted materials without permission from, and without payment of remuneration to the copyright owner (Gopal et al., 2004; Higgins et al., 2006). For students, examples of digital piracy include copying digital learning materials published by for-profit educational institutions, downloading digital learning materials from illegal websites, and using certain avoiding or destroying technical measures to obtain digital learning materials, which may cause copyright infringement liability, administrative responsibility, and even criminal responsibility to them.

It seems clear that a student who has committed digital piracy shall be liable for the copyright infringement. However, there is a defense against copyright infringement called “fair use”, which allows a work to be exploited “without the permission from, and without payment of remuneration, to the copyright owner” in an exhaustive list of cases. From the perspective of education and scientific research, it is a common practice for Chinese students to rely on the Article 24(1) or 24(6) to negate the copyright infringement. The Article 24(1) and 24(6) of Chinese Copyright Law will be elaborated by the researcher in the following sections.

1.2 Research Objectives

The purpose of this study is to identify whether students have the awareness of copyright infringement against digital piracy of learning materials, what attitude they have toward digital piracy of learning materials, and how to protect the copyright of digital learning materials under Chinese Copyright Law. This study will be beneficial to students to assess their current practices and gain insights into copyright infringement. It shall also be significant to legislators and policy makers to improve copyright protection subject to the defense of fair use under Chinese Copyright Law. Finally, it may help the whole society create a good academic atmosphere to realize one of the Sustainable Development Goals, which is to “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.”

1.3 Research Questions

RQ 1: Are university students aware that some illegal acts constitute digital piracy? Are they aware of the copyright infringement arising from digital piracy of learning materials?
RQ 2: What attitude do university students have toward digital piracy of learning materials? Why do they support or object to the digital piracy of learning materials?
RQ 3: How to protect the copyright of digital learning materials under Chinese Copyright Law? How do university students evaluate the effectiveness of those solutions?

2. LITERATURE REVIEW

2.1 Digital Learning Materials

Digital learning materials are typically used by teachers and students for the purpose of online education. According to Mendes (2000), the resources for online education include handouts, PowerPoint slides, papers, tutorial and assignment problems, teaching audio-visual works, and examination questions prepared by the teachers and professors to facilitate the delivery of online courses. Among them, the most pervasive forms of learning materials in China are handouts, PowerPoint slides, papers and audio-visual works.

2.2 Digital Piracy

Digital piracy is considered a civil infringement and an administrative violation in China. In more serious cases, it even constitutes criminal offense under Chinese Criminal Law. Taylor et al. (2009) indicated a lower digital piracy rate could lead to economic growth, lower unemployment rate and innovation. Existing literature found that digital piracy was linked to low self-control (Higgins, 2005). It was also affected by the sense of thrill, excitement, and risk (Higgins et al., 2006). Some infringers committed digital piracy because they did not view digital piracy as an illegal or unethical act (Hinduja, 2007; Ingram & Hinduja, 2008; Morris & Higgins, 2009; Peace et al., 2003). Absence of penalties, absence of a code of ethics, low risk of being caught and the ease of piracy were other factors that facilitated digital piracy (Cheng et al., 1997; Limayem et al., 2004; Triandis, 1980). Other studies found that deterrence and guilt are the important factors to reduce instances of digital piracy (Higgins et al., 2006; Paternoster, 1987; Yu & Liska, 1993). However, Bhattacharjee et al. (2006) found that both the threat of litigation and the consumer education against digital piracy failed to affect the prevention of digital piracy. Sulaiman and Kamel (2020) found that both religion and awareness treatment were significant to reduce the intention toward digital piracy, while the law system was not essential to reduce digital piracy. Belleflamme and Peitz (2012) divided digital piracy into two types, namely commercial piracy where for-profit companies reproduce and distribute copyrighted products to generate high profit margins, and end-user piracy where consumers themselves illegally reproduce copyrighted works. For students, they are more likely to commit end-user digital piracy, which is much more complex than commercial piracy as to the nature of private study or research.

2.3 Fair Use

“Fair use” is a defense to negate the copyright infringement that allows a work to be exploited “without the permission from, and without payment of remuneration, to the copyright owner” in a exhaustive list of cases. In China, fair use is stipulated in the Article 24 of Chinese Copyright Law. For students being caught for digital piracy, it is a common practice to rely on the Article 24(1) or 24(6) to negate copyright infringements, which allows them to reproduce “for the purposes of the user’s own private study, research”, or reproduce “in a small quality of copies... in classroom teaching or scientific research”. However, in a situation where students illegally share digital learning materials online, it is not an absolute defense under Article 24(1) because sharing could not be construed as purely for private study or research. In a situation where students illegally reproduce digital learning materials, Article 24(6) is not sufficient because it is arguably beyond the limits of “classroom teaching or scientific research” and “in a small quality of copies.”

3. METHODOLOGY

3.1 Research Methods

This research will use mixed methods to study the research questions. Quantitative method will be used to determine whether university students have the awareness of digital piracy of learning materials and the copyright infringement arising from digital piracy (RQ1), and how to protect the copyright of digital learning materials under Chinese Copyright Law (RQ3). Qualitative method will be used to indicate what attitude university students have toward the digital piracy of learning materials (RQ2).

3.2 Population and Locale of the Study

The researcher used 136 university students currently studying in Beijing as the respondents to determine RQ1 and RQ3, as they were the ones who often used digital learning materials and were vulnerable to digital piracy issues. Among them, 10 students were used as the key informants to indicate RQ2. The researcher attempted to diversify the majors of the key informants as much as possible to attain variation (Juliet & Anselm, 2008).

ID	Gender	Major	ID	Gender	Major
S1	F	Economics	S2	F	Literature
S3	F	Law	S4	M	Civil Engineering
S5	M	Computer Science	S6	F	Accounting
S7	M	Medical Science	S8	M	Mechanical Automation
S9	F	Human Resources	S10	M	Mathematics

Table 1: Summary of the Basic Information of Interviewed University Students

3.3 Instrumentation

The researcher used questionnaire and semi-structured interview to gather data. The questionnaire included the basic information, personal experience regarding digital piracy of learning materials, awareness of the digital piracy of learning materials, awareness of copyright infringement (RQ1), and how to evaluate the solutions to protect the copyright of digital learning materials (RQ2). The interview guide to answer RQ2 was based on the experience of key informants. Interviews were hosted by the researcher specializing in copyright law and education, in order to identify potential misinterpretation and ensure a common standard of the research questions for different key informants.

3.4 Data Analysis

The researcher used multiple choice questions to collect data on RQ1. Thematic analysis was used to indicate the common responses of the key informants about RQ2. A thematic coding process was used to identify, analyze, and interpret patterns of meaning within large bodies of text (Williams & Moser, 2019). The respondents also rated the effectiveness of different solutions to protect copyright of learning materials, from 1-“not effective at all” to 5-“completely effective”, and average scores for each protection measure were calculated for RQ3.

4. FINDINGS & DISCUSSION

In this section, the researcher will report the findings with discussions on digital piracy of learning materials. The major themes emerging from this study can be categorized into: 1) awareness of digital piracy and copyright infringement; 2) attitude toward digital piracy of learning materials; 3) legal protection against digital piracy of learning materials. These are the results gathered from the respondents.

4.1 Awareness of Digital Piracy and Copyright Infringement

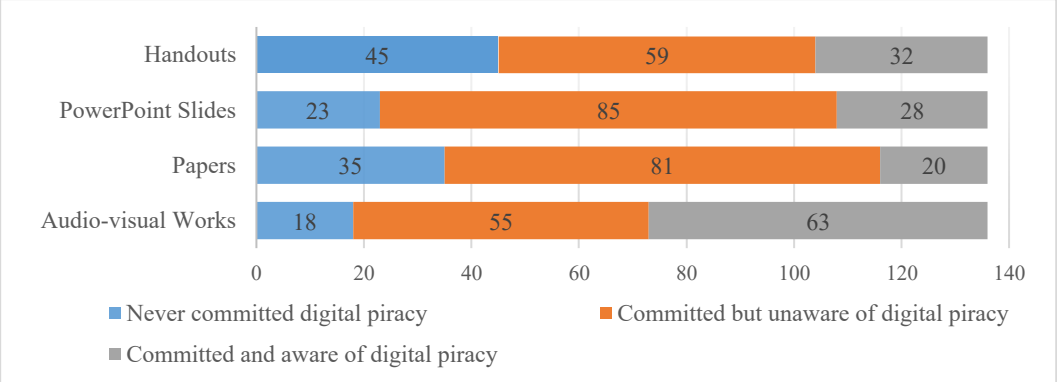


Figure 1: Students' Awareness of Digital Piracy of Different Types of Learning Materials

According to the result in Figure 1, most university students had the experience of digital piracy of learning materials, no matter what types of the learning materials were. For those students with the experience of digital piracy of handout, PowerPoint slides and papers, most of them were unaware that their illegal acts constituted digital piracy. For those who had committed digital piracy of audio-visual works, the number of university students aware of digital piracy is slightly larger than those who were unaware of the digital piracy.

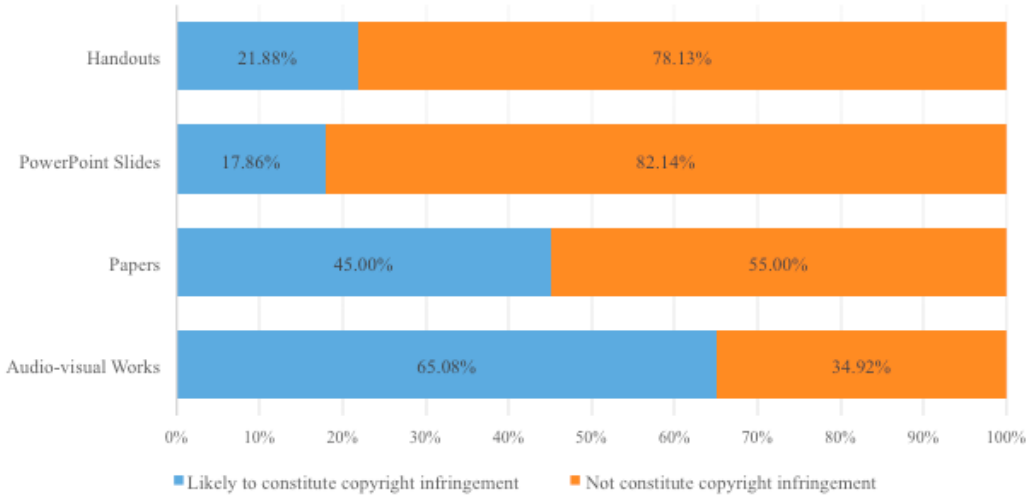


Figure 2: Students' Awareness of Copyright Infringement of Digital Piracy

Among those students who had awareness of committing digital piracy of learning materials, the researcher further studied whether they considered digital piracy of learning material as copyright infringement. Figure 2 illustrates that 21.88%, 17.86% and 45.00% of the

university students were aware that digital piracy of handouts, slides and papers might constitute copyright infringement, while 65.08% of those who ever committed digital piracy of audio-visual learning materials were aware that digital piracy of audio-visual works might constitute copyright infringement.

4.2 Attitude toward Digital Piracy of Learning Materials

Digital piracy lies in different types of learning materials, ranging from handouts, PowerPoint slides, papers to audio-visual works. For the key informants who had experienced digital piracy of learning materials, their attitude varied from person to person.

ID	Major	Attitude	ID	Major	Attitude
S1	Economics	Support	S2	Literature	Object
S3	Law	Not clear	S4	Civil Engineering	Support
S5	Computer Science	Support	S6	Accounting	Support
S7	Medical Science	Support	S8	Mechanical Automation	Not clear
S9	Human Resources	Object	S10	Mathematics	Support

Table 2: Attitude toward Digital Piracy of Learning Materials

Table 2 shows that 6 out of 10 key informants supported digital piracy of learning materials, even though some had the awareness of digital piracy and/or copyright infringement. It is surprising to observe that for some university students majoring in law, computer science, medical science that require a higher level of copyright protection, their attitude toward digital piracy of learning materials is not much different from that of students in other majors.

As to the key informants who supported digital piracy of learning materials, as mentioned by S1, S4 and S10, digital piracy was committed out of habit, and it is easy and common to download digital learning materials from illegal websites and share digital learning materials without obtaining permission and paying to the copyright owners. It can be explained by the neutralization theory (Sykes & Matza, 1957) which asserts that individuals are inclined to neutralize their illegal acts by justifying as “normal” (Hinduja, 2007). S6 indicated that university students were too poor to purchase accounts on paid educational platforms or purchase the copyrighted digital learning materials from paid websites. S1, S7 and S10 justified by noting that reproducing, purchasing, and sharing digital learning materials would not cause damage to anybody. S7 added that it would contribute to the improvement of the academic level for the whole society. These findings support previous research that the most prevalent reason for digital piracy is the unwillingness to pay for the digital content (Sadiku et al., 2021).

For those who objected to digital piracy of learning materials, S2 indicated that the digital learning materials should be protected by copyright law, so as to create a safe academic environment for teachers, students and researchers to produce their academic work. As mentioned by S9, the illegal act of digital piracy might constitute copyright infringement, and even criminal offence, which deterred some students from committing digital piracy. In previous study by Paternoster (1987), legal deterrence was also found as a major factor for the resistance of digital piracy.

In terms of the key informants with unclear attitude, S3 relied on “fair use” doctrine to explain why students were free to commit digital piracy. However, S3 was uncertain about

whether digital piracy of learning materials could fall into the scope of fair use under Chinese Copyright Law. S8 viewed digital piracy of learning materials as an unethical but legal act, which should be judged and punished by the ethics rather than the laws concerning copyright infringement.

4.3 Legal Protection against Digital Piracy of Learning Materials

According to Sadiku et al. (2021), legislators and policy makers could protect the copyright of digital learning materials by removing the incentives, raising awareness of copyright infringement, enhancing collaboration with communities, adding watermark on copyrighted works, and utilizing technical barriers to prevent digital piracy. In light of these findings, the researcher summarized the solutions to protect copyright of learning materials against digital piracy as not charging fees for digital learning materials, increasing education about digital piracy and copyright infringement, collaborating with relevant academic associations so as to allow students to download learning materials at a lower price, adding watermark on the learning materials to highlight the statement of copyright, and utilizing technical barriers to prevent illegal downloading.

Solution	Average Score	Level
1. Not charging fees for digital learning materials	4.15	High
2. Increasing education about digital piracy and copyright infringement	2.03	Low
3. Collaborating with academic associations to download at a lower price	3.71	Medium
4. Adding watermark to highlight the statement of copyright	2.78	Low
5. Utilizing technical barriers to prevent illegal downloading	3.20	Medium

Table 3: Effectiveness of Solutions to Protect Copyright of Learning Materials

Table 3 illustrates that the most effective solution to protect the learning materials against digital piracy is not charging fees for digital learning materials with the average score of 4.15, which is consistent with the result of RQ2 that suggests the most prevalent reason for digital piracy was the unwillingness to pay for the digital learning materials. Accordingly, allowing university students to download and share digital learning materials without any charges could significantly reduce the instances of digital piracy. The protection solution of collaborating with relevant academic associations to allow downloading learning materials at a lower price is moderately effective with the average score of 3.71, followed by utilizing technical barriers to prevent illegal downloading with the average score of 3.20. It is worth nothing that during the semi-structured interview, S5 indicated that the technical barriers might not as effective as ordinary students considered because it is easy for some students to use circumvention techniques or disruptive techniques to overcome technical barriers.

Adding watermark to highlight the statement of copyright and increasing education about digital piracy and copyright infringement are less effective, with the average scores of 2.78 and 2.03 respectively. As illustrated in Figure 1 and Figure 2, most of the respondents were unaware of the digital piracy and copyright infringement issues. However, Table 3 illustrates that raising the awareness of digital piracy and copyright infringement by increasing legal education and adding watermarks was not sufficiently effective to reduce digital piracy of learning materials, provided that university students have already gained adequate awareness of copyright infringement as the nature of illegal act. It is worth noting that, as indicated by S9, although the education regarding legal consequences for copyright infringement would

not directly reduce digital piracy, it might have significant deterrence effect on potential infringers.

5. CONCLUSION

In this paper, the researcher has studied whether university students have the awareness of digital piracy of learning materials and awareness of copyright infringement arising from digital piracy, what attitude university students have toward the digital piracy of learning materials, and how to protect the copyright of digital learning materials. This research involves a survey covering 136 university students in Beijing and semi-structured interviews with 10 university students from different majors. The findings suggest that most university students have the experience of digital piracy of learning materials without the awareness of copyright infringement. They support digital piracy due to the habit, ease, common practice and no charge of downloading and sharing digital learning materials. The researcher further suggests that the copyright of digital learning materials could be effectively protected by not charging fees for digital learning materials, collaborating with academic associations to allow students to download learning materials at a lower price, and utilizing technical barriers to prevent illegal downloading.

Based on the findings of this study, it is recommended to improve the pricing system of digital learning materials, develop a collaborative relationship with relevant academic associations to provide digital learning materials at a lower price, and utilize technical barriers to prevent illegal downloading, so as to balance the interests of students and teachers, create a better academic atmosphere and achieve one of the Sustainable Development Goals, which is to “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.”

6. LIMITATIONS

Since this study focused on university students currently studying in Beijing, the result may not be necessarily generated to other populations or geographical regions. Further research should focus on the students at other educational levels from other cities, in order to have a better understanding of the digital piracy of learning materials. Another limitation in this study involved the small size of the key informants because only 10 out of 136 students were willing to be further interviewed. Future qualitative studies could focus on larger size of the key informants.

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The Development of Mathematics Teachers' Proficiency Framework for Sustainable and Standardised Assessment in Southeast Asia (SEA)

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Abstract
No education can exceed the quality of its teachers. This statement indicates that teachers' competence is important in the education system. A professional teacher must have specific knowledge and skills, which are related to pedagogy, content, and technology in providing good quality mathematics teaching and learning in the 21st century. The knowledge and skills need to be improved from time to time to fit the recent issues suitable for advancing technology information and global society. An assessment framework and tools for mathematics teachers' proficiency are needed, considering the importance of assessing mathematics teachers' knowledge for sustainable improvement. This study aims to develop a rigorous region-wide teacher proficiency assessment framework to evaluate mathematics teachers' knowledge. This research is an ongoing project funded by the Ministry of Education, Culture and Technology of Indonesia which involved two lecturers, two analysts, and seven researchers. The method used in the study is the ADDIE instructional design of which steps are Analysis, Design, Development, Implementation, and Evaluation. This paper produced an assessment framework with the twelve sub-indicators for Pedagogical Content Knowledge (PCK), six for Technological Content Knowledge (TCK), and ten for Technological Pedagogical Knowledge (TPK), which cover mathematics teachers' proficiency components. By using this framework, it is expected that an assessment test for mathematics teachers in Southeast Asia can be developed in the near future.

Keywords: Mathematics Teachers, Teachers Proficiency Framework, Assessment Framework, TPCK

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Introduction

A professional teacher must have specific knowledge and skills to provide high-quality mathematics teaching and learning in the 21st century. There are at least two knowledge areas that need to be accomplished by mathematics teachers regarding the content and pedagogy, which will then be conveyed to students. In the teaching and learning practice, content and pedagogical knowledge are two pieces of knowledge that are not mutually exclusive. For this reason, having knowledge of standalone content and general pedagogical strategies was not enough to grasp the knowledge of good teachers.

As we are now living in the digital era, In the digital era, the use of ICT has become prevalent (Chai et al., 2013) and even becomes one of the most critical components in the classroom (Ozudogru & Ozudogru, 2019). Consequently, teachers are intended to master technology, specifically the technology to be integrated into the learning process. In line with the content and pedagogical knowledge, technological knowledge must combine with the content and pedagogical in the learning process. Thus, to become ready to facilitate students in mathematics teaching and learning to develop 21st century skills, teachers must keep evaluating and maintaining their knowledge and skills regarding the content, pedagogy, and technology.

The teachers' knowledge and skills need to be improved occasionally to fit the recent issues suitable for advancing technology, information and global society. Handal et al. (2013) emphasized the two main reasons teachers' competence in integrating technology in the teaching and learning process needs to be evaluated. First, ensuring the quality of teaching is as essential as ensuring the students have novel technologies exposure in the classroom. Second, evaluating the teacher's competence in integrating the technologies into the teaching and learning process can be a strategic way to provide the appropriate teacher professional development programs.

There is a need to assess mathematics teachers' knowledge for their sustainable improvement. Moreover, there are various types of research regarding the assessment of teachers' knowledge, specifically on TPCK. However, the researches that have done had various focus areas and different perspectives. Most research used questionnaires or self-report instruments to measure the TPCK (Handal et al., 2013; Malubay & Daguplo, 2018; Pamuk et al., 2015; Schmidt et al., 2014). Scherer et al. (2017) also had measured the technology-dimensions in the Technological, Pedagogical, and Content Knowledge (TPACK) using questionnaires or self-report. Baier & Kunter (2020) developed a knowledge-based instrument to measure the TPK on the TPCK model, or it called as using the cognitive perspective to assess the teachers' TPK. Thus, the researcher teams considered developing the teachers' proficiency framework, envisioned for sustainable and standardized assessment for primary school teachers and junior high school mathematics teachers within Southeast Asia (SEA) countries.

Theoretical Framework

No education can exceed the quality of its teachers. This statement indicates that teachers' competence is essential in the education system. It is supported by the statement of Tican & Deniz (2019) that is teachers should be qualified enough to support the development of 21st century skills in education. The teachers' competencies are related to the content, pedagogy and technology in order to be able to provide a good quality of 21st century learning. In other words, to deliver the appropriate 21st century learning competently, a teacher needs to know

and use technology to be used to teach specific content subjects in a classroom effectively. In the educational research filed, there is Technological Pedagogical Content Knowledge (TPCK) framework to understand the teacher knowledge needed to effectively integrate technology in teaching and learning (Mishra & Koehler, 2006).

The TPCK framework was then renamed to TPACK to make it easier to remember and represented a more integration of technology, pedagogy, and content knowledge (Schmidt et al., 2014). This framework consists of seven components as depicted in the picture below.

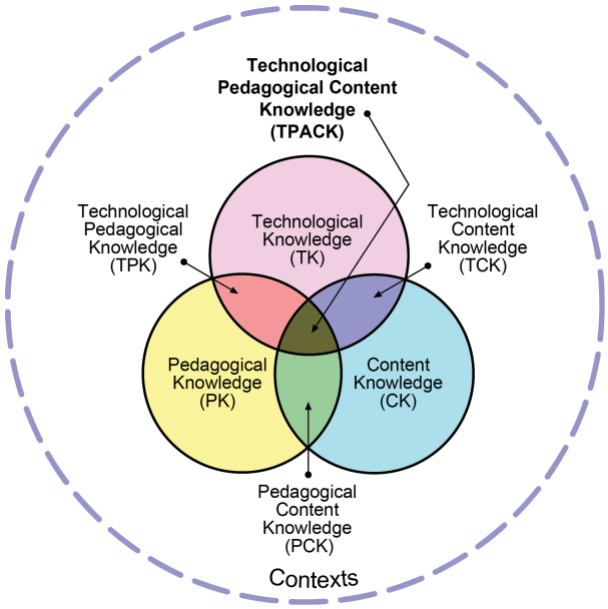


Figure 1. TPACK framework from tpack.org

In TPACK framework, there are there basic components – content (C), pedagogy (P), technology (T); its interrelated knowledges - pedagogical content knowledge (PCK), technological content knowledge (TCK), technological pedagogical knowledge (TPK); and all three interplay knowledge – technological pedagogical content knowledge (TPCK) (Mishra & Koehler, 2006). This framework emphasized more on the complex interrelation between the components, rather than treated separately on each three basic knowledges for having a good teaching.

One of the basic components is content knowledge (CK). Mishra & Koehler (2006) stated that the content knowledge (CK) was the knowledge of the content that a teacher will convey to the students. Besides the content knowledge, a teacher must also understand about the ways to deliver the teaching and learning processes that involve how students learn, how to manage the classroom, how to develop lesson plans and how to assess the student. This knowledge then is called pedagogical knowledge (PK) (Mishra & Koehler, 2006).

The intersection of content and pedagogy is the Pedagogical Content Knowledge (PCK). It is argued that it is not good enough for teacher to teach particular subject matter using the knowledge of contents and general pedagogy knowledge (Shulman, 1986). A good teacher must have a knowledge on how to teach a particular subject. With the same notions with Shulman, Mishra & Koehler (2006) mentioned that PCK is a specific content knowledge that focuses on the applicability of the content to be delivered for students.

PCK as the intersection of content knowledge and pedagogy, Pamuk et al (2015) mentioned that it is also a specific part of pedagogical knowledge that focus on the teaching strategies that incorporate appropriate conceptual representations to address learner difficulties and misconceptions. Further, PCK claimed as teacher competence to foster meaningful understanding on a specific content (Depaepe et al., 2013). Some experts also mentioned that PCK is not only related to content and teaching, but also knowledge of contents and students (Hill et al., 2008; Marks, 1990) as well as knowledge of curriculum (An et al., 2004; Hill et al., 2008; Lannin et al., 2013). Specifically for mathematics teachers in SEA, SEAMEO RECSAM (2013) mentioned that a teacher with professional teaching and learning process includes the knowledge of mathematical task and discourse; planning for learning processes; implementing teaching strategies; monitoring, assessment, and evaluation; and reflection of teaching and learning.

Besides content and pedagogy, in this digital era teachers need to master technology to be integrated in the mathematics classroom. Mishra & Koehler (2006) defined the Technological Knowledge (TK) as knowledge about standard technologies, such as a ruler, chalk and blackboard, and more advanced technologies, such as the computer and internet, that involves the skills to operate software tools such as word processors, spreadsheets, browsers, and e-mail. The nature of TK must be updated since the technology is constantly changing in the shift time.

In line with the content and pedagogical knowledge, the technological knowledge must combine with the content and pedagogical in the learning process. Mishra and Koehler (2006) then defined technological content knowledge (TCK) as the knowledge about how technology and content are reciprocally related. On the other hand, TCK can also be defined as the knowledge and skills to select and use technology to support content or concept (Harris & Hofer, 2009; Koehler et al., 2013; Lux et al., 2011; Pamuk et al., 2015). In the context of mathematics teachers, SEAMEO RECSAM (2013) also mentioned that a professional specifically in teaching mathematics, a teacher must have the knowledge of how particular technology supports a mathematics concept, and the knowledge of use of ICT to model context and solve problems.

Mishra and Koehler (2006) also define technological pedagogical knowledge (TPK) as knowledge of how various technologies are used in teaching and learning settings and knowledge of how teaching might change as the result of using a particular technology. On the other hand, TPK means the knowledge related to how to integrate technology about enhancing the pedagogical practices (Heitink et al., 2017; Lux et al., 2011; Pamuk et al., 2015). Since, pedagogical practices are related to the process to support students' learning, Sahin (2011) mentions that teachers that have TPK means they have knowledge in using computer applications to support students' learning.

The intersection between PCK, TCK, and TPK that are defined as TPACK (Technological Pedagogical Content Knowledge) should be mastered by teachers to be a good teacher in compounding content, pedagogy and technology representing an efficient teaching and learning process through technology (Handal et al., 2013). Mishra & Koehler (2006) described in details regarding the TPACK as follows:

> TPCK is the basis of good teaching with technology and requires an understanding of the representation of concepts using technologies; pedagogical techniques that use technologies in constructive ways to teach content; knowledge of what makes

> concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of students' prior knowledge and theories of epistemology; and knowledge of how technologies can be used to build on existing knowledge and to develop new epistemologies or strengthen old ones. (p.1029)

By having the TPACK, a teacher will teach a subject matter with the suitable pedagogical methods and technologies (Schmidt et al., 2014).

Many researchers had worked on assessing the teachers' perception of their content, pedagogy and technology understanding. Some of them were using surveys on the TPCK domain and required a long time study (Schmidt et al., 2014). Furthermore, (Kabakci Yurdakul et al., 2012) also had developed a TPACK deep scale to gather the information about blending technology, pedagogy and content knowledge in the teaching and learning process. However, the TPACK framework consisted of seven components in it. In this connection the researchers needed to define which components that could effectively reflect the mathematics teacher's proficiency.

Methodology

This research is a part of the project on developing a rigorous region-wide instrument to measure mathematics teachers' proficiency in Southeast Asia. This paper will report on the main question: *how to develop Mathematics Teachers' Proficiency Framework for Sustainable and Standardised Assessment in Southeast Asia (SEA)?*

This study used the ADDIE instructional design of which steps are Analysis, Design, Development, Implementation, and Evaluation. It involved two lecturers, two analysts, and seven researchers during the assessment framework development processes. The process on developing the assessments framework consisted of the following phases:

Analysis

The process of developing the theoretical and methodological assessment frameworks began using the collaborative inquiry approach aimed to systematically examine the existing teachers' standards either in international or national level from several resources. This process administered using the online meeting platform in order to facilitate the experts on mathematics teachers and education from Malaysia, Australia and the Ministry of Education, Research and Technology of Indonesia to discuss and brainstorms the existing standards of professional mathematics teachers in Southeast Asia.

Design

After getting the notions and advisors from the expert on defining the standards of professional mathematics teachers, the research teams were grouped into three teams – TPK teams, PCK teams, and TCK teams. Each team consisted of three experienced researchers on mathematics education and teacher professional development field to further review the literature regarding the TPK, TCK, and PCK.

Develop

The TPK teams, PCK teams, and TCK teams then defined the appropriate indicator and sub indicator of each domain of teachers' proficiency. Furthermore, the researcher teams also collaboratively defined the most possible and appropriate type of questions that can represent the evidence of each indicator or sub indicators.

Implementation

The researchers invited the experts from Malaysia and Australia to share the initial draft of the assessment framework via online meeting platform. The online discussion sessions aimed to provide the room to describe the work done by the researchers and to confirms the ideas from the researchers.

Evaluation

Right after the implementation phase, the researcher teams send the initial draft of the assessment framework to validate the construct and get feedback from experts. This phase involved two experts on mathematics education and teacher professional development from university and a regional institution.

Result and Discussion

Developing the theoretical and methodological assessment framework

The domain of the assessment framework of mathematics teachers' proficiency pointed on the three main domains as depicted in the picture below.

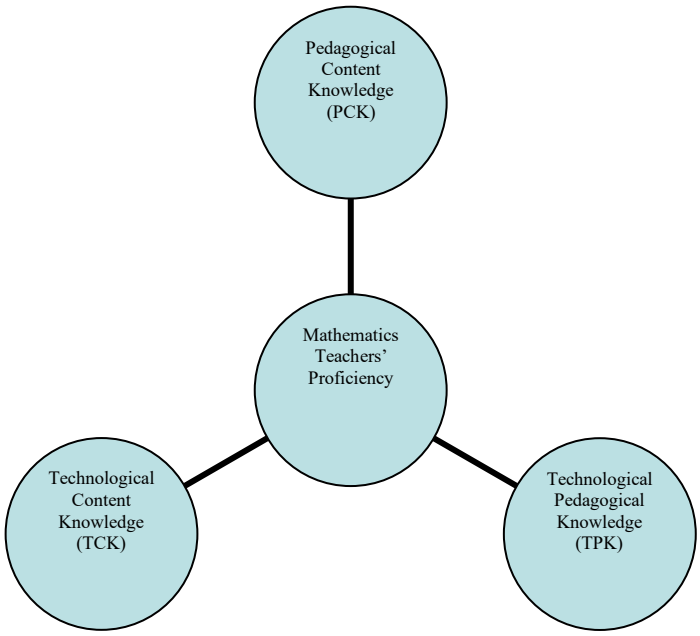


Figure 2. Mathematics Teachers Proficiency Domains

On the domain of PCK, 9 articles had been reviewed to break down the indicators reflecting the knowledge of pedagogy and subject matter content. The results are described on the following table.

Table 1. Summary of literature review on PCK

Reference	Definitions
SEARS-MT (SEAMEO RECSAM, 2013)	Professional teaching and learning standards consist of 1. Mathematical task and discourse 2. Planning for learning processes 3. Implementing teaching strategies 4. Monitoring, assessment, and evaluation 5. Reflection of teaching and learning

Shulman (1987)	1. knowledge of learners and their characteristics 2. knowledge of educational context 3. knowledge of educational ends, purposes and values, and their philosophical and historical bases. 4. content knowledge 5. general pedagogical knowledge 6. curriculum knowledge
An et al. (2004)	1. knowledge of content 2. knowledge of curriculum 3. knowledge of teaching
Lannin et al. (2013)	1. knowledge of curriculum for math 2. knowledge of instructional strategies for math 3. knowledge of student understanding within mathematics 4. knowledge of assessment for math
Marks (1990)	1. knowledge of student understanding 2. knowledge of subject matter for instructional purposes. 3. knowledge of media for instruction 4. knowledge of instructional processes
Pamuk et al. (2013)	1. Determining the teachability of the content 2. Understanding content related difficulties and easiness 3. Organizing and teaching content according to students' levels and contextual factors. 4. Developing alternative strategies for components of teaching (i.e.) assessment, classroom management, motivation, individual differences) 5. Knowledge of teaching methods for different types of subject matters 6. Knowledge of representing and formulation of the content 7. Enriching teaching and understanding with examples, analogies, representations.
Shulman (1986)	1. Knowledge of instructional strategies and representations 2. knowledge of students' (mis)conceptions
Depaepe et al. (2013)	1. common content knowledge 2. specialized content knowledge 3. horizon content knowledge
Hill et al. (2008)	1. Knowledge of content and students (KCS) 2. knowledge of content and teaching (KCT) 3. knowledge of curriculum

Based on the above literature review result, the indicators for PCK domain were identified on the following table.

Table 2. General indicators for Pedagogical Content Knowledge (PCK)

Knowledges	**General Indicator**
Pedagogical Content Knowledge (PCK)	Knowledge of mathematical task and discourse Knowledge of instructional strategies Knowledge of assessment and evaluation Knowledge of reflection of teaching and learning

Within the Southeast Asia context, there is the SEA-BES Common Core Regional Learning Standards (CCRLS) in Mathematics which provide the mathematics contents strands for mathematics activity in primary and junior high school (Mangao et al., 2017)

Table 3. Mathematics Strands based on SEA BES CCRLS in Mathematics

Key Stage	**Mathematics Strands**
Key Stage 1 covers Grades 1 to 3	Numbers and Operations Quantity and Measurement Shapes, Figures and Solids Pattern & Data Representations
Key Stage 2 covers Grades 4 to 6	Extension of Numbers and Operations Measurement and Relations Plane Figures & Space Solids Data Handling and Graphs
Key Stage 3 covers Grades 7 to 9	Numbers and Algebra Relations and Functions Space and Geometry Statistics and Probability

Since the assessment framework will be implemented for primary and junior high school mathematics teachers, then the specific mathematics content will be based on all those three key stages on table 3.

On the domain of TCK, 5 main articles had been reviewed to break down the indicators reflecting the knowledge of content and technology. The results are described on the following table.

Table 4. Summary of literature review on TCK

Reference	**Definition**
SEARS-MT (SEAMEO RECSAM, 2013)	a. Knowledge of how particular technology supports a mathematics concept b. Knowledge of use of ICT to model context and solve problems
Koehler et al., (2013)	a. Knowledge of the way the subject matter (or the kinds of representations that can be constructed) can be changed by the application of particular technologies. b. Knowledge of which specific technologies are best suited for addressing subject-matter learning in their domains. c. Knowledge of how the content dictates or perhaps even changes the technology—or vice versa.
Pamuk et al., (2013)	a. Transformation of the content b. Organization of the content c. Make unobservable content more explicit (observable) d. Emerging different perspectives on the content e. Communicating with particular content f. Representation of the subject matter with technology g. Use of technology to support varied representations

	h. Use of technology to ensure flexibility navigating across representations i. Data collection and analysis

Harris & Hofer, (2009)	a. Knowledge to select technologies to communicate particular content. b. Knowledge to use technologies to communicate particular content.
Lux et al., (2011)	a. Knowledge to select affordable technology to support the content. b. Knowledge to select appropriate technology based on types of content ideas. c. Knowledge to improve the quality content representation using technology

Finally, as for Technological Content Knowledge (TCK), there are two general indicators and six sub indicators as shown on Table 1.

Table 5. General Indicators for Technological Content Knowledge (TCK)

Knowledges	General Indicator
Technological Content Knowledge (TCK)	Knowledge of how particular technology supports a mathematics concept Knowledge of use of ICT to support mathematical activities

Furthermore, there are six main articles that had been reviewed to define the element of TPK. The summary of the literature review process is as follows.

Table 6. Summary of literature review on TPK

Reference	Definition
SEARS-MT (SEAMEO RECSAM, 2013)	**Dimension 1: Professional Knowledge** a. Knowledge of ICT **Dimension 2: Professional Teaching and Learning Process** a. Planning for Learning Process b. Implementing teaching strategies c. Monitoring, assessment, and evaluation d. Reflection of teaching and learning **Indicator** a. Knowledge of motivational and engagement levels of students for learning mathematics b. Knowledge of strategies for supporting creativity and innovation c. Knowledge of strategies for developing students' higher order thinking skills in mathematics

	d. Knowledge for making complex relations between representations of core topics e. Knowledge of ICT integration in teaching and learning 1234 f. Knowledge of how to use ICT to model context and solve problems g. Engage and enrich students in mathematical thinking through discourse h. Communicate thinking through various means of representation and reasoning i. Plan for an effective and safe learning environment to cater to the diversity of all students j. Use of effective communication and promotion of classroom discussion k. Develop and use a range of appropriate assessment tasks and strategies l. Analyze students' learning through assessment
Australian Professional standards for teachers (Dyson et al., 2018)	a. Demonstrate knowledge and understanding of strategies for differentiating teaching to meet the specific learning needs of students across the full range of abilities. b. Implement teaching strategies for using ICT to expand curriculum learning opportunities for students. c. Demonstrate knowledge of a range of resources, including ICT, that engage students in their learning. d. Demonstrate an understanding of the relevant issues and the strategies available to support the safe, responsible and ethical use of ICT in learning and teaching. e. Demonstrate an understanding of the purpose of providing timely and appropriate feedback to students about their learning.
Koh & Sing (2011)	a. Knowledge of how to use technology to construct different forms of knowledge b. Knowledge of how to use technology to plan and monitor students' learning
Cox (2008)	a. Technological pedagogical knowledge is an understanding of the application of technology without reference to a specific content

Lux et al. (2011)	a. Knowledge of how to integrate technology into teaching and learning in order to help students achieve specifics pedagogical goals and objectives b. Knowledge to adapt technologies to better support teaching and learning c. Knowledge to reconfigure technology and apply it to meet instructional needs
Pamuk et al.(2015)	a. TPK is knowledge about enhancing pedagogical practices, components (teaching, assessment, motivation etc.) with the implementation of technology into teaching and learning activities b. Knowledge of how to use technologies to assess students' learning c. Knowledge of how to use technologies to identify differences among students d. Knowledge of how to use technology to advance teaching and students' learning e. Knowledge of how to use technology to bring students' individual differences (learning preferences, content background, academic level) into the classroom

In connection to the above literature review on TPK, then it was defined the general indicator of TPK on this assessment framework as follows.

Table 7. General indicators for Technological Pedagogical Knowledge (TPK)

Knowledges	General Indicator
Technological Pedagogical Knowledge (TPK)	Knowledge of how to use ICT to plan for and implement joyful and meaningful teaching and learning Knowledge of how to use ICT to provide joyful and meaningful monitoring, assessment and evaluation. Knowledge of how to use ICT to reflect of teaching and learning

The assessment framework developed referred to SEARS – MT, which includes standards for teachers in the Southeast Asian region. In addition, for the content components covered by TCK and PCK, we used The SEAMEO Basic Education Standards (SEA-BES) and the Common Core Regional Learning Standards (CCRLS) in Mathematics. At SEA BES CCRLS in Mathematics, standard mathematics learning content has been provided for countries in Southeast Asia.

Reviewing and finalizing the assessment framework

The framework was reviewed by the two experts from Australia and Malaysia. Each expert gives reviews on indicators, sub indicators and descriptions on each component of TPK, PCK

and TCK. The review results on the TCK component mentioned that all content domains are covered and linked to the applicable technology. The same result goes to the TPK component. All sub indicators and descriptions covered the technological and pedagogical knowledge domains. Then, for the PCK component, one reviewer gave the additional comment to include the mathematical content to the sub indicators. The feedback has been followed up by providing the content or mathematics for every sub indicator.

In previous research, many instruments have been developed to measure TCK, PCK, or TPK. this study adopts a cognitive perspective, meaning that the teacher's attribute can be measured separately from actual classroom teaching by means of questionnaires or tests (Depaepe et al., 2013). This assessment framework will be then followed up by developing the knowledge-based test as the assessment tools.

Conclusion

After all the phases of the development, it was produced an assessment framework with the twelve sub-indicators for Pedagogical Content Knowledge (PCK), six for Technological Content Knowledge (TCK), and ten for Technological Pedagogical Knowledge (TPK), which cover mathematics teachers' proficiency components. The author plan by using this framework, it will be carried out the development of an assessment test for mathematics teachers in Southeast Asia in the near future.

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Assessing ASEAN Students' Competencies and Readiness in Learning Mathematics Through MaRWA Diagnostic Test

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Abstract
MaRWA is a Southeast Asia regional mathematics assessment based on PISA and TIMSS, initiated by SEAMEO QITEP in Mathematics. This paper aims to determine students' type of correct and incorrect answers on the assessment. A total of 882 students in grades 5, 8, and 10 from 26 schools in regional wide were involved in this study. For each level of education, there were 30 mathematics problems, which were classified into 20 multiple choice questions and 10 essay questions. These items were generally made to determine students' competencies and readiness in learning school mathematics, specifically to measure their order of thinking level. There were four types of correct answer and six types of incorrect answers. The quantitative data is the students' scores, while the qualitative data is coded students' answers. It was found that students' average scores for the primary to senior high school levels were in a low category, and most of the participants were struggling to solve HOTS problems. Moreover, most students in all levels left problems in blank. We foresee this study can contribute to bridge the students' HOTS by improving the practice of teaching and learning throughout Southeast Asia.

Keywords: Mathematics Assessment, Types of Error, Higher Order Thinking Skill, Mathematics Teaching and Learning, ASEAN

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Introduction

Introduction to SEAMEO QITEP in Mathematics

The Southeast Asian Ministers of Education Organization (SEAMEO) is a regional intergovernmental organisation established in 1965. Its objective is to nurture cooperation among Southeast Asian countries governments in three areas named education, science, and culture. For education, there are seven priority areas: achieving universal early childhood care and education; addressing barriers to inclusion; promoting resilience in the face of emergencies; promoting technical and vocational education and training; revitalising teacher education; harmonising higher education and research; and adopting a 21st century curriculum.

The executive arm of the Council and the centre of SEAMEO organisations is SEAMEO Secretariat which located in Bangkok, Thailand. Among 26 SEAMEO regional organisations spread in Southeast Asian countries, three regional centres are categorised in the education cluster and focused on improving teachers and education personnel quality. One of which is SEAMEO Regional Centre for Quality Improvement of Teachers and Education Personnel (QITEP) in Mathematics (SEAQiM) which is located in Yogyakarta, Indonesia. This institution has major goals such as catering for the needs to improve the quality of mathematics teachers and education personnel in Southeast Asia; promoting sustainable teacher professional development in the area of mathematics education; establishing extensive networks, information exchange, and best practice sharing in mathematics education among SEAMEO member countries; and providing intellectual forums on mathematics education innovation (SEAQiM, 2012).

SEAQiM runs many programmes to improve mathematics teachers' quality throughout Southeast Asia. It has a flagship programme named regular course with different themes such as Differentiated Instruction, Lesson Study, Realistic Mathematics Education, STEM Education, Joyful Learning, Teacher-Made Teaching Aids, and Clinical Supervision. The regular course usually holds three to four times in a year.

Other than course, SEAQiM also develop an assessment for mathematics learning, especially in determining students' higher order thinking skills (HOTS) in learning mathematics. This programme is called Mathematics Regional Wide Assessment (MaRWA) and will be described in the next section.

MaRWA

MaRWA is a Southeast Asia regional assessment which aims at determining students' readiness in learning mathematics. It is a diagnostic test for students across Southeast Asia in grade 5 (primary level), grade 8 (junior high level), and grade 10 (senior high level). This programme was established in 2012, considering the importance of regional benchmarking.

Why developing MaRWA? Why do not we just believe the result of other international assessment such as The Programme for International Student Assessment (PISA) or Trends in International Mathematics and Science Study (TIMSS)? Both PISA and TIMSS are international assessments. In PISA, the test items are different to what students usually have in school as the test is not about remembering what students have learned but school, but how students can use their knowledge for problem solving (Schleicher, 2019). There are critics

addressed to PISA (Hopmann, 2008; Eivers, 2010; Sjøberg, 2015; Forestier & Adamson, 2017; Zhao, 2020). Some critics are regarding its implementation, statistical analysis, interpretations, and immense influence on a country's education. Another critique is on the use of context for the problems which is incompatible with the culture of the country-test-taker as assessing mathematics achievement is related to a country's educational activities (Lamichhane, 2018). Thus, to ascertain of more valid and constructive results, a country should develop its own localised assessment, in which its contexts and characteristics is in accordance with a country's culture (White, 2017; White, 2018).

Developed items for MaRWA used PISA and TIMSS as the references. However, one of important points is that, MaRWA test items should not duplicate test items on PISA and TIMSS as it is an ASEAN localised assessment. Moreover, this is a diagnostic test, not a test to rank participants as its result will be used to detect students' strengths and weaknesses in learning mathematics. Through the result, MaRWA is expected to help mathematics teachers in recognising the problems of students learning and provide inputs for teacher education providers to conduct relevant teacher professional development for mathematics teachers in Southeast Asia.

Developing MaRWA Items

In 2012, numbers of experts in mathematics assessment from different countries, for instance Australia, Japan, Malaysian, and Indonesia, developed MaRWA items for grade 5 and grade 8 in the form of multiple choice, explanation, and short answer. As previously mentioned, MaRWA items were referring to PISA, in which to assess students' HOTS. These cover aspects of HOTS such as students' ability to select relevant information to solve problems, to use different strategies, and to utilise critical thinking and metacognition (OECD, 2021).

After developing these items, a pilot was conducted in 2013 in Indonesia, Vietnam, Philippines, and Cambodia. It was resulted in items which were readable and had a good discriminant factor. Then, an extended try-out was employed in 2014 at several schools in Cambodia, Indonesia, Thailand, Timor Leste, and Vietnam. More items were developed in 2016, and on that year the level was added, grade 10 senior high. These items were tested in schools in Indonesia through paper test and online test. From then on, SEAQiM has committed to implement the assessment online.

Error Categories

Newman (1977, as cited in Clements, 1980) created five error categories: encoding, process skills, transformation, comprehension, and reading. Problems in MaRWA involves contexts. Therefore, we used comparation of Newman's error categories and Blum and Leiss' modelling process (Wijaya, van den Heuvel-Panhuizen, Doorman, & Robitzsch, 2014). It turned out that the error categories and the coding is in line with the modelling process and mathematisation stages of PISA. To determine students' error, we used error categories of Wijaya et al. (2014) which classified the errors into comprehension, transformation, mathematical processing, encoding, and unknown. Compared to Newman's and Wijaya's, who constructed five error categories, we also added an error type in which students left the problem in blank, did not answer the problem, or gave irrelevant answer. This will be written in details in Methodology section.

Based on the abovementioned sections, this study aims at examining ASEAN students' competencies in working with mathematics problems of different levels thinking skills through MaRWA. Therefore, in this study we expect to determine what is the common type of error and correct students' answers, especially on HOTS items, in MaRWA.

Methodology

Method

This study employed case study research design. According to Creswell (2007), case study is a qualitative approach to determine a specific case for periods of time. Moreover, this research design is appropriate for exploring a phenomenon in a real-life context (Yin, 2003). Mixed method is commonly used in case study research design. Therefore, in this study we analysed the collected data quantitatively and qualitatively. This paper was focused on identifying the most common type of errors and correct of students' answers during MaRWA 2020.

Participants of MaRWA 2020

A total of 882 students in grades 5, 8, and 10 from 26 schools in regional wide were involved in this study. These 26 schools were located in three countries: Indonesia, Malaysia, and Philippines. In details, there were 204 students grade 5 from 10 schools in Indonesia, Malaysia, and Philippines; 169 grade 8 students from nine schools in Indonesia; and 509 grade 10 students from seven schools in Indonesia.

Test Items

For each level of education, there were 30 mathematics problems, which were classified into 20 multiple choice questions and 10 essay questions. These items were generally developed to determine students' competencies and readiness in learning school mathematics, specifically to measure their order of thinking level. Three levels of thinking: higher order thinking skill (HOTS), middle order thinking skill (MOTS), and lower order thinking skill (LOTS); were embedded in the set of problems. Items of MaRWA covered strands such numbers, geometry and measurement, algebra, and statistics. In details, the strands and levels are presented in Table 1.

Table 1: Strands of MaRWA Items for Each Level

Level	Strands
Primary	Numbers and operation
	Quantity and measurement
	Shapes, figures, and solids
	Data handling and statistics
Junior High	Numbers
	Algebra
	Geometry
	Statistics and probability
Senior High	Algebra
	Geometry
	Trigonometry
	Statistics and probability

These items were developed and revised in 2012 and 2016. As MaRWA has been employed for more than 10 years, these mathematics problems have been tested to more than 200 students in Southeast Asia region on each level.

Test Implementation

The test of MaRWA 2020 was carried out on June to July 2020, it was during COVID-19 pandemic. Moreover, as the budget of MaRWA implementation was limited, we digitalised the developed test items and uploaded these into a platform named Quia. The platform is suitable for test items in the form of multiple choice and essay. It enables students in writing their arguments in details.

To take the test, the mathematics teacher registered the school by sending an email to marwa@qitepinmath.org to set the test date. Before the test, SEAQiM ensured that the internet connection in the school was stable through confirmation of the mathematics teacher. Once the date set, SEAQiM shared the test link, it was different links for each school, and students will be given 90 minutes to work on the test. During the test, students had to fill in their names.

Analysing Test Items

The data in this study is students' answers. As mentioned before, the test items of MaRWA included multiple choice and essay questions. There were two ways in analysing students' answer. For multiple choice answers, we utilised statistical analysis such as finding out the maximum, the minimum, and the average score by using Excel. As for essay questions, we distinguish between correct and incorrect answer. We categorised answers on essay questions based on classification of correct and incorrect (error) answers as displayed in Table 2 and Table 3. To add, we also utilised statistical analysis to determine percentage of correct and incorrect answers types on essay questions.

Table 2: Correct Types and Codes for Analysing MaRWA Results

Type	Coding
Student only writes the final answers	B0
Student writes incorrect strategy/procedure	B1
Student writes mysterious or undefined strategy/procedure	B2
Student writes correct strategy/procedure	B3

Table 3: Error Types and Coding Scheme for Analysing MaRWA Results

Error Type	Sub-type	Explanation	Coding
Comprehension	Misunderstanding the instruction	Student incorrectly interprets what s(he) is asked to do	E1
	Misunderstanding a keyword	Student misunderstands a keyword, which is usually a mathematical term	

	Error in selecting information	Students is unable to distinguish between relevant and irrelevant information (e.g using all information provided in a task or neglecting relevant information) or is unable to gather required information which is not provided in the task.	
Transformation	Procedural tendency	Student tends to directly use a mathematical procedure such as formula or algorithm without analysing whether or not it is needed.	E2
	Taking too much account of the context	Student's answer only refers to the context or real-world situation without taking the perspective of the mathematics.	
	Wrong mathematical operation/concept	Student uses mathematical procedures or concepts which are not relevant to the tasks.	
	Treating a graph as a picture	Student treats a graph as a literal picture of a situation. (S)he interprets and focuses on the shape of the graph, instead of on the properties of the graph.	
Mathematical Processing	Algebraic error	Error in solving algebraic expression or function	E3
	Arithmetical error	Error in calculation	
	Error in mathematical interpretation of data representation (e.g chart, graph, etc.)	Student mistakenly focuses on a single point rather than on an interval.	
		Student does not use the slope of the graph but only focuses on the vertical distance.	
	Measurement error	Student cannot convert between standard units (e.g. from m/minute to km/h) or from a non-standard unit to a standard unit (e.g. from step/minute to m/minute) and rounding errors.	

	Improper use of scale	Student cannot select and use the scale properly.	
	Unfinished answer	Student uses a correct procedure, but (s)he does not finish it.	
		Student is not able to answer the final answer that is caused by the previous error in the problem-solving.	
Encoding		Student is unable to correctly interpret and validate the mathematical solution in terms of the real-world problem. This error is reflected by an impossible or not realistic answer	E4
Unknown		Type of error could not be identified due to limited information from student's work.	E5
No Answer/Invalid Answer		Students did not answer the problem or gave irrelevant answer	E6

To determine the category for students' average score, we used Table 4 to describe.

Table 4: Categories for Students' Average Score

Category	Average Score
Very high	86 – 100
High	76 – 85.99
Moderate	60 – 75.99
Low	55 – 59.99
Very low	< 54

Results and Discussion

In this section, we will answer the research question "What is the common type of error and correct students' answers, especially on HOTS items, in MaRWA?" based on findings on each level. To add, we will also present examples of students' answers based on the level of students thinking skills in three categories: HOTS, MOTS, and LOTS.

Primary Level

From 30 items, there were 8, 14, and 8 questions for HOTS, MOTS, and LOTS, respectively. In other words, the number for MOTS items is the greatest of all. According to the analysis, it was found that the students' average score is very low. Furthermore, compared to other levels, primary school average score is the highest among all. The statistical result for students in primary school is displayed in Table 5.

Table 5: Statistical Data on Primary Level

Statistical Data	Score (maximum of 100)
Maximum	83.33
Minimum	0
Average	26.54

To have a deeper comprehension on students' answer for essay questions which contains three levels of thinking skills, we ran statistical analysis. Figure 1 shows a pie chart on the percentage of correct answer types. We found that most students who answered correctly on essay questions were able to explain in an appropriate strategies or procedures (B3). Based on the findings, less than 2% of primary students were able to write a correct final answer but failed to provide appropriate strategies or procedures (B1).

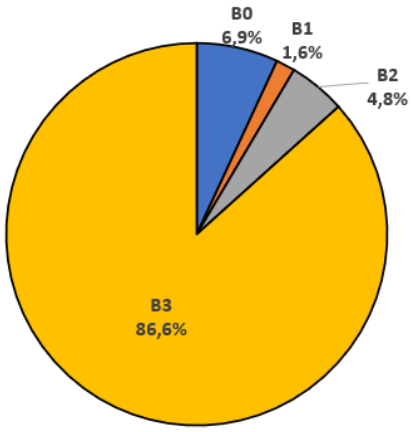


Figure 1: The percentage for each correct answer type on primary level

Not only statistical analysis for correct answer, we also ran for incorrect answer on essay questions as showed in Figure 2. According to findings, most primary students were unable to provide answer or they provided invalid answer (E6). Another error type that usually occurred is that students' strategy could not be identified due to limited explanation (E5).

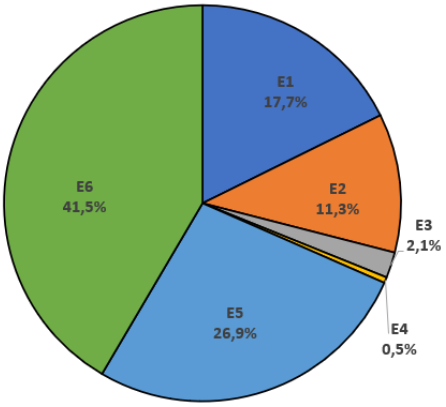


Figure 2: The percentage for each error type on primary level

According to statistical analysis, the correct and error type for HOTS items is in line with findings the percentage for correct and error type on essay questions. For HOTS items on essay questions, most students were fall into error type E6 (43%) and correct type B3 (74.4%).

HOTS Items for Primary Level

Figure 3 illustrates the percentage of students' answer for HOTS items. More than 70% of students on primary level were unable to answer correctly for all HOTS items. These top three items: question 3, question 17, and question 29, were HOTS items with the highest unsolved percentage of all.

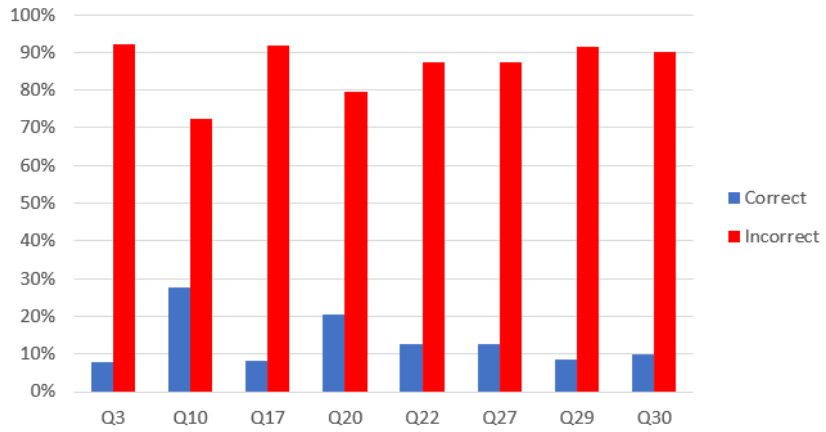


Figure 3: The percentage of primary students' answer for HOTS items

To illustrate, we provide question 29 and samples of students' answer in Figure 4.

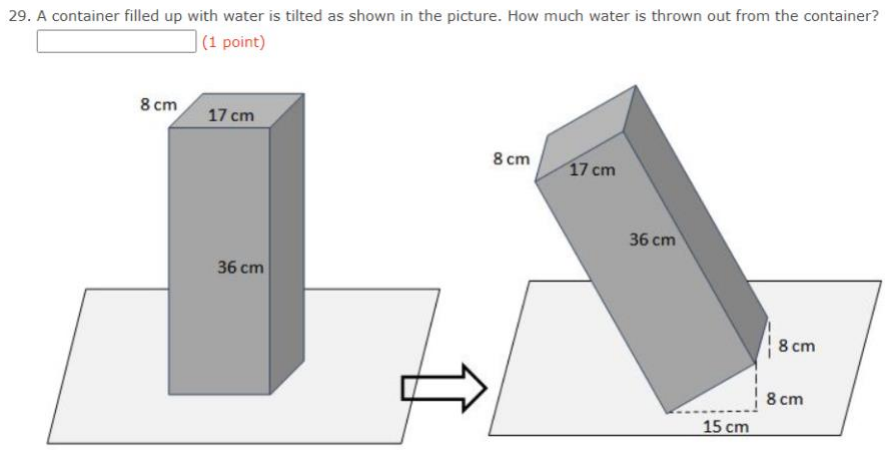


Figure 4: A sample of HOTS item for primary level, question 29

Samples of students' error:

- 18×17×36×8×8×15=4.700.160 (E1)
- 8×17×36 = 4896
  8×15×36 = 4320
  4896 – 4320 =576 (E1)

These two samples are illustrating the error type of comprehending the problem (E1). The problem is asking for amount of water that is thrown out of the container when it is tilted. However, the first sample provides us an information that the student was unable to use information to solve the problem. Rather than determining the volume of a prism then subtracting it with the amount of thrown water, this student multiplied all numbers on the question. The student has failed to comprehend in determining the volume of a prism.

As for the second sample, the student has failed to determine the volume of thrown water when the container is tilted. Rather than determining the volume of triangular prism, based on the explanation, the student assumed that the height for the tilted container is 15 cm. Therefore, the second step of the student was multiplying 8, 15, and 36.

Based on Figure 3, less than 10% of primary students were able to work on the problem correctly. We provide a sample of students' correct answer.

Sample of students' correct answer.

V container = 36cm×17cm×8cm=4896cm^3

V tilted = ½×8cm×8cm×15cm=480cm^3

Thus, the thrown water is=480cm^3 (B3)

The correct answer sample is illustrating that the student came up with the correct answer and able to solve the problem with correct strategies or procedures.

Junior High Level

From 30 items, there were 8, 14, and 8 questions for HOTS, MOTS, and LOTS, respectively. In other words, the number for MOTS items is the greatest of all. According to the analysis, it was found that the students' average score is very low. To add, the maximum score for junior

high level is lower than the maximum score on primary level. The statistical result for students in junior high school is displayed in Table 6.

Table 6: Statistical Data on Junior High Level

Statistical Data	Score (maximum of 100)
Maximum	73.33
Minimum	0
Average	30.85

Figure 5 presents a pie chart on the percentage of correct answer types. We found that most students who answered correctly on essay questions were able to explain in an appropriate strategies or procedures (B3). Based on the findings, the number of students who were able to determine the correct final answer but the strategies could not be identified as these were mysterious or undefined (B2), was at the very least. There is a slight difference among correct type B0, B1, and B2 compared to correct type B3.

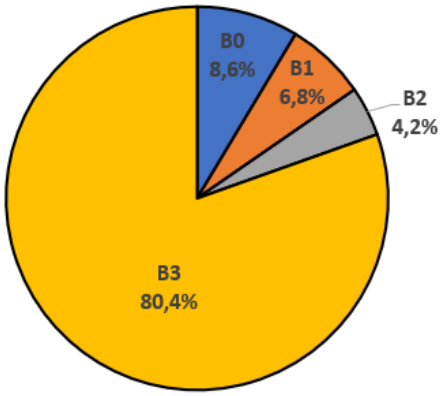


Figure 5: The percentage for each correct answer type on junior high level

As for the incorrect answers, we also determined its type of error illustrated by Figure 6. According to findings, most junior high students were unable to provide answer or they provided invalid answer (E6). Another error type that usually occurred is that students' strategy could not be identified due to limited explanation (E5). The very least type of error occurred was encoding (E4).

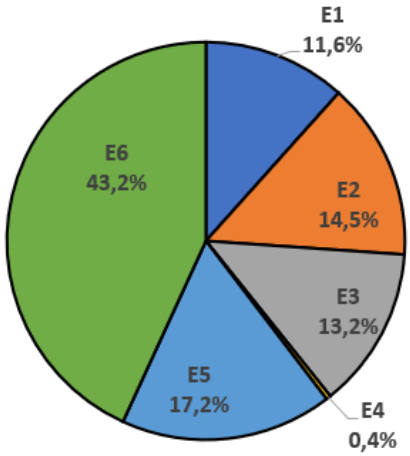


Figure 6: The percentage for each error type on junior high level

According to statistical analysis, the correct and error type for HOTS items is in line with findings the percentage for correct and error type on essay questions. For HOTS items on essay questions, most students were fall into error type E6 (42.8%) and correct type B3 (86.8%).

HOTS Items for Junior High Level

Figure 7 illustrates the percentage of students' answer for HOTS items. For question 23, none of junior high students were able to answer the problem. In addition, there are two items, following question 23, which is more than 90% of students failed to answer, those are question 22 and question 30. Compared to primary school HOTS essay questions, there is one HOTS item in junior high level which can be solved by more than a half of students grade 8 in MaRWA test, that is question 25.

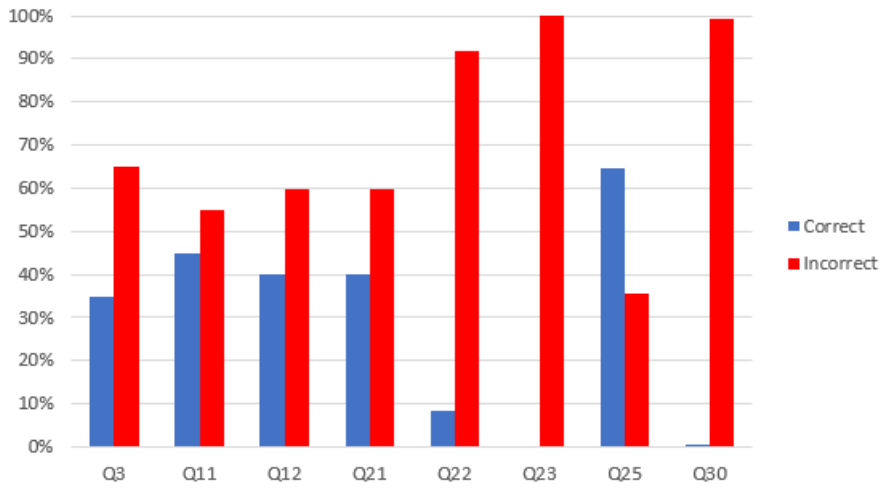


Figure 7: The percentage of junior high students' answer for HOTS items

To illustrate, we provide question 30 and samples of students' answer in Figure 8.

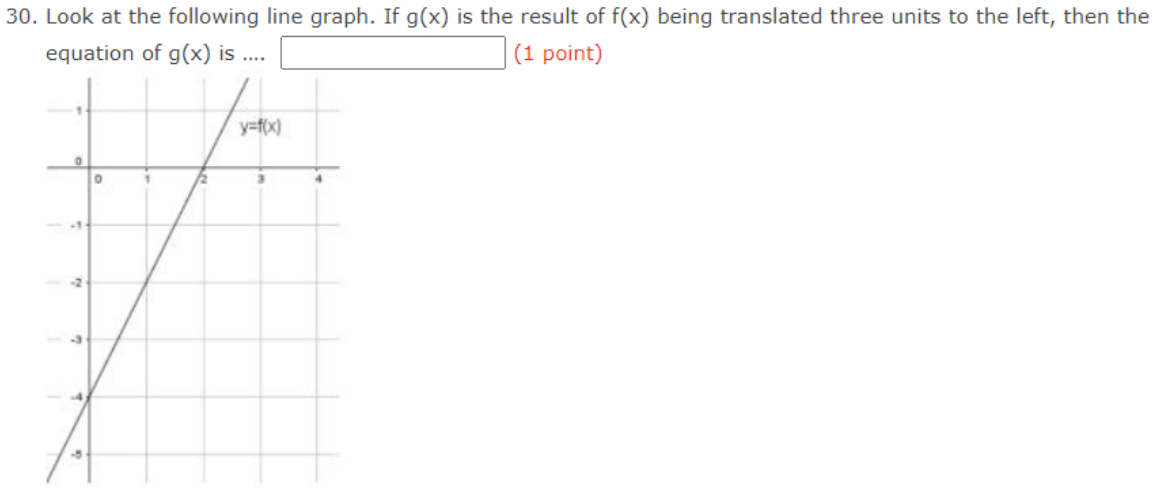


Figure 8: A sample of HOTS item for junior high level, question 30

Samples of students' error:

- Moving 3 units to the left means the x becomes -1 (E1)
- Because it intersects both (E5)

Above are two samples of error answers in different types. For the first sample, we generate that the student was failed to comprehend information provided in the problem (E1) as it simply determined the intersection between *g(x)* and *x* axis. This student was probably not aware that translating a line affects the line equation. For the second error sample, the student has failed to provide clearer information in solving the problem (E5). Indeed, the first line and the translated line intersect both *x* axis and *y* axis. However, this student wrote a limited explanation which could not be comprehend.

two samples are illustrating the error type of comprehending the problem (E1). The problem is asking for amount of water that is thrown out of the container when it is tilted. However, the first sample provides us an information that the student was unable to use information to solve the problem. Rather than determining the volume of a prism then subtracting it with the amount of thrown water, this student multiplied all numbers on the question. The student has failed to comprehend in determining the volume of a prism.

As for the second sample, the student has failed to determine the volume of thrown water when the container is tilted. Rather than determining the volume of triangular prism, based on the explanation, the student assumed that the height for the tilted container is 15 cm. Therefore, the second step of the student was multiplying 8, 15, and 36.

Based on Figure 7, less than 1% of junior high students were able to answer the problem correctly. In other words, there was only one correct answer among all. Here, we provide the only correct answer for question 30 MaRWA 2020.

Sample of students' correct answer.

> gy will pass through -1,0 and -3,-4 = a line equation which passes through these points are y=2x+2 (B3)

The correct answer sample is depicting the student's ability in comprehending information on question 30. The student translated the line and it knew that when the line moved three units to the left, it intersects point (-1,0) and (-3,-4). Even though, it did not provide the process on determining the line equation, the student knew that a line equation which passes through the two points is $y=2x+2$, which is the correct answer (B3).

Senior High Level

Similar to the other two levels, among 30 items on senior high level, there were 8, 14, and 8 questions for HOTS, MOTS, and LOTS, respectively. In other words, the number for MOTS items is the greatest of all. According to the analysis, it was found that the students' average score is very low. In addition, the average score in senior high level is the lowest among all. The statistical result for students in senior high school is displayed in Table 7.

Table 7: Statistical Data on Senior High Level

Statistical Data	Score (maximum of 100)
Maximum	66.67
Minimum	0
Average	24.52

Figure 9 displays a pie chart on the percentage of correct answer types. According to the analysis, most students who answered correctly on essay questions were able to explain in an appropriate strategies or procedures (B3). Based on the findings, the number of students who were able to determine the correct final answer but provided incorrect strategies (B1), was at the very least. This is similar to the occurrence in junior high level. Compared to other levels, the percentage of students in senior high, who only wrote correct answer without providing any detailed explanation (B0), is the highest.

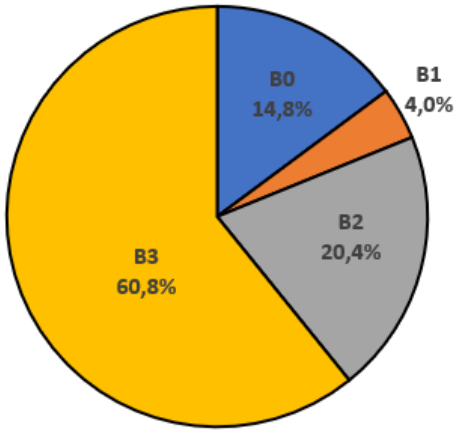


Figure 9: The percentage for each correct answer type on senior high level

According to findings on incorrect answers as displayed in Figure 10, most senior high students were unable to provide answer or they provided invalid answer (E6). It turns out that error type E6 is the most happening on three levels. Another error types that usually occurred are comprehension type (E1) and unknown type (E5). Encoding error type (E4) appears the least on all levels.

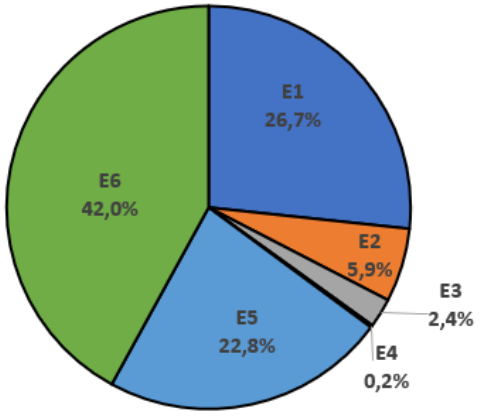


Figure 10: The percentage for each error type on senior high level

According to statistical analysis, the correct and error type for HOTS items is in line with findings the percentage for correct and error type on essay questions. For HOTS items on essay questions, most students were fall into error type E6 (38.9%) and correct type B3 (53.1 %).

HOTS Items Senior High Level

Figure 11 illustrates the percentage of students' answer for HOTS items. Answers for all HOTS items are mostly incorrect. It is similar to the finding on the primary level HOTS items. In specific, more than 70% of senior high students answered incorrectly for all HOTS items. Question 29 got the highest incorrect answer percentage among others, followed by question 27.

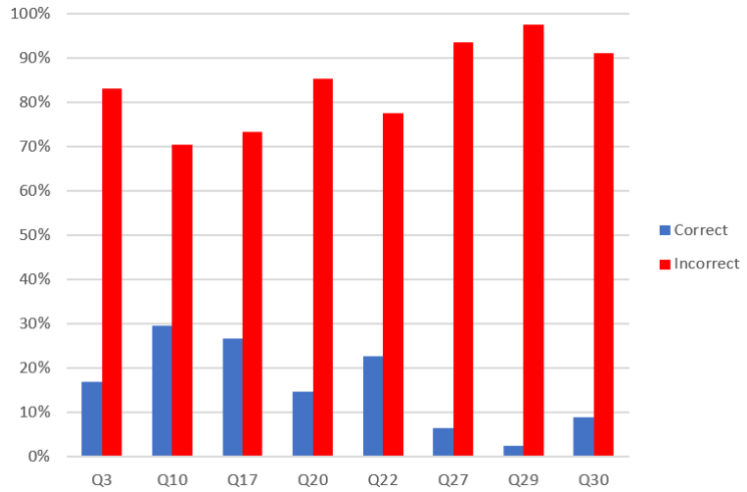


Figure 11: The percentage of senior high students' answer for HOTS items

To illustrate, we provide question 30 and samples of students' answer in Figure 12.

29. Look at the problem below. (1 point)

If $\begin{pmatrix} 3 & -2 \\ -4 & 4 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 2 \\ 0 \end{pmatrix}$, then $x + 2y = \cdots$.

Figure 12: A sample of HOTS item for senior high level, question 29

Samples of students' error:

- (3 -2) (x) = (2)
  (-4 4) (y) = (0)

  3x – 2x = 2
  x = 2

  -4y + 4y = 0
  y = 0 (E2)
- If (3 -2) (x) then x+2y is 16 (E5)
  -4 4 (y)

Above are two samples of error answers in different types. For the first sample, the student was failed to use a proper procedure to solve the problem, which fell into error type transformation (E2). Rather than working on matrix linear equation system, $3x - 2y = 2$ and $-4x + 4y = 0$, the student directly subtracted the first row to determine the value of x and subtracted the second row to determine the value of y. In other words, the student was unable to utilised linear equation system on matrix and just proceeded with the calculation.

The second student noted down the given information, that is the left side of the linear equation system. However, the student it was obscure how it came up with 16. As there was no detailed information, this means that the student fell into type error unknown (E5), in which error type cannot be identified as the strategy used by the student provided limited information.

From the three levels, we found that the biggest portion and the most common type of students correct answer for essay questions is B3, while the least type of students correct answer differs, either B1 or B2. To add, the most occurred common error is E6, followed by E5 and E1. In contrast, it is rare for error type E4 to happen. Each level has eight HOTS items. In general, the percentage of incorrect answers for HOTS items is higher. Almost on all levels, none of correct answer on HOTS items percentage is higher than the incorrect answer, except for junior high level for question 25.

Conclusion

HOTS is one of parameters to measure students' ability in using critical thinking during problem solving and flexibilities to choose a strategy, which also becomes the reflection of mathematics learning. MaRWA, a diagnostic test assessing students' readiness in learning mathematics, found that the average score of students on all levels across Southeast Asia in 2020 was very low. Most students struggled to work on HOTS problems and tended to do error type E6, in which they left the answer blank or provided invalid final answer without providing any strategy or reasoning in detail. This can happen when students are not familiar in utilising their critical thinking skills. This indicates that the mathematics teaching and learning has not provide rooms for students to use their prior knowledge in solving problems. To respond to students' struggles, we encourage teachers to adjust teaching and learning into students-centred. It is also important to give students an opportunity to have discussion with their peers. When students having different strategies in working on the problem, the teacher can facilitate students by asking questions or to bridge one strategy to another to close the gap of conceptual construction. We also would recommend institution which caters teacher professional development to design a course related to students' HOTS and more pedagogy on allowing students to be flexible and open about their ideas.

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Curriculum Review of the BS Pharmacy Program of a Local University in the NCR, Philippines: A Mechanism for Quality Assurance

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Abstract
The Bachelor of Science in Pharmacy program at a local university in the NCR was officially approved on February 10, 2012 by virtue of the Board Resolution No. 2012-029. Curriculum enhancements were made in order to align with the thrust of the local university. On December 2021, the new PSGs for BS Pharmacy program was officially released for implementation. This study, conducted from March to April 2022, aimed to determine students' level of achievement of the PLOs; strengths, limitations, recommendations and over all impressions on the program; evolved themes based qualitative responses, serving as bases for creating an action plan. Sequential, mixed-method approach was used: review of documents, online survey (Aquino, et al., 2018) and FGDs. Through purposive and convenience sampling, thirty-six (36) Levels 3 and 4 students were administered with the instrument. FGDs with students (N=55), alumni (N=6), faculty members (N=8) and industry partners (N=4) were also conducted. Results show that students' strengths are along PLO1B (3.53, SD.136 & 3.50, SD .074), Store and dispense drugs following appropriate guidelines; and PLO5 (3.4630 SD .13436 & 3.4040 SD.13968), Provide pharmaceutical care including counseling on medicinal use, medication error and medication safety. However, they need to improve on PLO 1A (3.0574, SD.188 & 3.1289 SD .239) Identify, compound, and manufacture of drugs. Three (3) main themes were difficulty or rigor of the program, best features, and opportunities for continuous improvement. Timely curriculum review is pivotal in the quality assurance of education.

Keywords: Curriculum Review, BS Pharmacy Program, Outcomes-Based, Continuous Quality Improvement

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Introduction

In June 2012, the local university started offering Bachelor of Science in Pharmacy with its unique incorporation of the Associate of Applied Science in Pharmacy Technology, and embedded enhancements in Pharmaceutical Management, marketing, and entrepreneurship. The program followed the CMO No. 3 s of 2006 or the policies, standards, and guidelines (PSGs) for pharmacy education in the country and the outcomes-based education framework. In 2018, a provisional curriculum was adopted based on the CMO No. 8 s. 2018 which allowed HEIs to submit the final new or revised curricula aligned to the new PSGs within the first term of AY 2018-2019. On November 5, 2021, CMO No. 25 s 2021, or the new PSGs for Pharmacy program was officially released.

This research aimed to conduct a review of the existing curriculum as a basis for continuous quality improvement in preparation for the implementation of the (sample) new curriculum in the CMO 25 s. 2021 for AY 2022-2023. Through quantitative self-assessment, achievement of program learning outcomes was established by 3rd and 4th-year students during AY 2021-2022. Qualitative feedback was also gathered from the same students and alumni together with other stakeholders like faculty members and industry partners.

Methodology

Both quantitative and qualitative approaches (mixed-method, sequential) were used in this study; particularly a review of documents such as the existing and new BS Pharmacy curriculum of the local university, pertinent course plans, CHED Memorandum Order 5 s. 2021; analysis of the strengths, limitations, recommendations, and overall impression from focus group discussions; and online survey using the local university's Pharmacy program learning outcomes questionnaire (Aquino, et al., 2018). The informed consent process was properly observed. Non-random methods, purposive and convenience sampling were employed. Currently enrolled levels 3 and 4 students together with the alumni were administered with a survey questionnaire. After which, focus group discussions with students (N=55), alumni (N=6), faculty members (N=8), and industry partners (with active MOA) (N=4) were conducted through a series of virtual meetings conducted from March to April 2022 at the local university of a premiere city in the NCR. Descriptive and inferential statistics particularly mean ratings, SD and T-test were used to analyze the quantitative data. Thematic analysis was used to analyze the qualitative data.

Results and Discussion

Program Learning Outcomes Assessment by the Students

The local university's BS Pharmacy program learning outcomes questionnaire (Aquino, et al., 2018) was administered online to Level 3 and 4 students during the AY 2021-2022. Thirty-six (36) students willingly answered the said tool.

PLO 1A (Identify, compound, and manufacture of drugs following appropriate guidelines, standards, and specifications)	3rd yr mean	4th yr mean	Mean	SD	Desc
1. Determining biological activities of phytochemical constituents in PMPs	3.05	3.19	3.11	0.68	C

2. Applying the appropriate method of extraction and purification	3.21	3.31	3.26	0.51	C
3. Writing and naming chemical formula of pharm'l agents	3.00	3.38	3.17	0.71	C
4. Classifying inorganic and organic pharmaceutical agents based on properties and structures	3.26	3.13	3.20	0.68	C
5. Identifying the uses of organic and inorganic compounds based on structures	2.89	3.25	3.06	0.73	HC
6. Categorizing inorganic and organic substances	3.37	3.31	3.34	0.59	HC
7. Performing tests for quality and purity of representative drugs in the official monograph	3.11	3.00	3.06	0.64	C
8. Conducting qualitative methods of analysis for each of the natural products or constituents.	2.79	2.81	**2.80**	0.76	C
9 Interpreting the results of the different chemical, physical and biological methods of drug analysis	2.95	3.06	**3.00**	0.69	C
10 Formulating pharmaceutical dosage forms based on the properties, types, and incompatibilities of substances	3.11	3.13	3.11	0.72	C
11 Selecting the most appropriate pharmaceutical aid and/or, necessity, organic and inorganic compounds to be used in preparing product formulation	3.00	3.19	3.09	0.66	C
12 Selecting the most appropriate type of water and/or other appropriate solvents to be used in different compounding situations.	3.21	3.06	3.14	0.69	C
13 Synthesizing simple organic and inorganic compound products.	3.05	3.06	3.06	0.76	C
14 Application of PICS (Pharmaceutical Inspection Co-operation Scheme) Guidelines and (Good Manufacturing Practice) GMP for ASEAN Countries in industrial pharmacy practice.	2.63	2.94	**2.77**	0.91	C
15 Performing the actual procedure of extemporaneous compounding of TPNs and paper tablets, among others.	2.89	2.56	**2.74**	0.85	C
16 Manufacturing different dosage forms based on the basic pharmaceutical principles, processes, methods, and techniques.	2.89	2.88	**2.89**	0.96	C
17 Evaluating the most appropriate container to be used for different dosage forms and in consideration of the characteristics of drugs to be prepared	3.26	3.13	3.20	0.76	C
18 Designing the appropriate product packaging including product container, compatibility, label format and product insert	3.21	3.50	3.34	0.68	HC
19 Labelling the product properly (i.e. legible, comprehensible and complete).	3.21	3.56	3.37	0.77	HC
Grand Mean and SD	3.06	3.13	3.09		C

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable (C), 1.75-2.49 somewhat capable (SC), 1.00 -1.74- not capable (NC)

Table 1. Overall Mean and SD for PLO1A learning outcomes

Out of the 19 learning outcomes in PLO1A, students assessed themselves as highly capable only in 4 learning outcomes, to wit: *Labelling the product properly (i.e., legible, comprehensible and complete) (3.37, 0.77); categorizing inorganic and organic substances (3.34 .59); designing the appropriate product packaging including product container, compatibility, label format and product insert (3.34, 0.68); and identifying the uses of organic and inorganic compounds based on structures (3.06, 0.73).* The compounding of medications is a fundamental part of pharmacy practice. Pharmacists are responsible in ensuring that dispensed products are of correct identity, pure, of proper strength and are labeled accurately and appropriately for the end user (ASHP Guidelines on Compounding Sterile Preparations, 2022).

The learning outcomes with the lowest mean ratings came out to be the following: *Performing the actual procedure of extemporaneous compounding of TPNs and paper tablets, among others (2.74, 0.85)*, followed by the *Application of PICS (Pharmaceutical Inspection Co-operation Scheme) Guidelines and (Good Manufacturing Practice) GMP for ASEAN Countries in industrial pharmacy practice (2.77, 0.91)*, and *Manufacturing different dosage forms based on the basic pharmaceutical principles, processes, methods, and techniques (2.89, 0.96).*

Based on the results, students need to enhance their competencies in extemporaneous compounding, bulk compounding, and the production of pharmaceutical products in accordance with GMP. These competencies are emphasized during laboratory classes and experiential pharmacy practice in Pharmaceutical Manufacturing, which, due to the pandemic, were delivered using remote online learning.

PLO 1B (Store and dispense drugs following appropriate guidelines, standards, and specifications)	3rd yr mean	4th yr mean	Mean	SD	desc
1. Demonstrating proper handling and storage conditions to ensure stability of the products.	3.32	3.38	3.34	0.76	HC
2. Receiving the prescriptions for drugs properly (e.g., cross-checking the name and identity of the patient on the prescription)	3.58	3.50	3.54	0.66	HC
3. Asking proper screening questions before dispensing.	3.37	3.50	3.43	0.70	HC
4. Assessing the authenticity and validity of the prescription, assessing the accuracy of information in the prescription, and not filling the violative and impossible prescriptions.	3.68	3.56	**3.63**	**0.60**	**HC**
5. Rechecking the original label of the product against the prescription.	3.42	3.44	3.43	0.65	HC
6. Indicating number and date on the prescription accordingly (if completely filled or partially filled).	3.63	3.63	**3.63**	**0.49**	**HC**
7. Issuing medicine to the patient with clear instructions and advice (e.g Proper reconstitution of powders/granules.)	3.58	3.50	3.54	0.56	HC

8. Using consistent and repeated good dispensing procedures in ensuring that errors are detected and corrected	3.63	3.50	3.57	0.56	HC
Grand Mean and SD	5.53	3.50	3.51		HC

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable (C), 1.75-2.49 somewhat capable (SC), 1.00 -1.74- not capable (NC)

Table 2. Overall Mean and SD for PLO1B learning outcomes

It is gleaned from the table that students assessed themselves as highly capable in all of the learning outcomes of PLO1B with the following in the top 3: *Indicating the number and date on the prescription accordingly (if completely filled or partially filled) (3.63, 0.49); Assessing the authenticity and validity of the prescription, assessing the accuracy of the information in the prescription, and not filling the violative and impossible prescriptions (3.63, 0.60); and using consistent and repeated good dispensing procedures in ensuring that errors are detected and corrected (3.57, 0.56).* On receiving a prescription, it should be screened and validated by the pharmacist to ensure that it is for the correct patient and it complies with the requirements. Adherence to good dispensing procedures is integral in ensuring that medicines are dispensed correctly. Any error which may occur during the dispensing process should be detected and rectified before medicines are handed to the patient or caregiver (Guide to Good dispensing practice, 2016). Patient counseling being the last point of contact between the patient, pharmacist, and medication in the dispensing process is by far the most important strategy that every pharmacist must adopt in order to minimize dispensing errors. In addition, reporting errors as they occur and when they occur will help in learning from the mistakes and ultimately prevent such errors in the future (Ismail, 2020; and Aquino et. al., 2019).

PLO 2A (Practice pharmacy in accordance with existing laws, legal and regulatory standards)	3rd yr mean	4th yr mean	Mean	SD	Desc
1 Complying with the laws, regulations, and ethical responsibilities of pharmacists to protect and ensure the well-being of their patients.	3.53	3.44	**3.49**	**0.66**	HC
2 Continuing professional knowledge of regulatory policies and laws by keeping abreast of current regulations.	3.21	3.50	**3.34**	**0.68**	HC
3 Being involved in the planning and implementation of establishing practical, technical, ethical, and regulatory policies within the organization	3.16	3.19	3.17	0.92	C
4 Providing all necessary information regarding the Substandard and Falsified Medical Products to support applications or submission	3.05	3.19	3.11	0.87	C
5 Reporting and handling Adverse Events (AEs), Adverse Drug Reactions (ADRs), and Substandard and Falsified (SF) medical	3.05	3.50	3.26	0.89	HC

6 Evaluating Adverse Events/Adverse Drug Reactions and Salesforce (SF) reports and submission of findings to regulatory authorities	2.84	3.44	3.11	0.90	HC
7 Illuminating the role of Pharmacist in Post-marketing Surveillance and Risk management Plan	3.05	3.50	**3.26**	**0.82**	HC
8 Engaging stakeholders to participate in the reporting and managing of Adverse Effects/Adverse Drug	3.11	3.31	3.20	0.83	C
9 Handling product complaints and product integrity issues.	3.11	3.25	3.17	0.92	HC
10 Sampling randomly from drug outlets which are needed for quality testing	3.11	3.00	**3.06**	0.87	C
11 Recalling products from the market in accordance with organizational and regulatory policies and procedures	3.05	3.19	3.11	0.87	C
12 Communicating the recall with regulatory authorities.	2.68	3.19	**2.91**	0.98	C
13 Ensuring that the organizational policies and procedures implemented by the company are documented properly.	2.89	3.44	3.14	0.88	C
14 Ensuring that the manufacturing and quality controls conform consistently to the specifications documented in the registration file	2.79	3.38	**3.06**	0.84	C
15 Obtaining documents required to ensure compliance of business operations	3.11	3.44	3.26	0.78	C
16 Enacting the laws relevant to the pharmacy practice into day-to-day activities.	3.16	3.31	3.23	0.81	C
Grand Mean and SD	3.06	3.33	3.18		C

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable (C), 1.75-2.49 somewhat capable (SC), 1.00 -1.74- not capable (NC)

Table 3. Overall Mean and SD for PLO2A learning outcomes

Out of the 16 learning outcomes in PLO2A, students assessed themselves as highly capable in 6 learning outcomes, top 3 is as follows: *Complying with the laws, regulations and ethical responsibilities of pharmacists to protect and ensure the well-being of their patients. (3.49, 0.66); Continuing professional knowledge of regulatory policies and laws by keeping abreast of current regulations. (3.34, 0.68); Obtaining documents required to ensure compliance with business operations (3.26, 0.78); Reporting and handling Adverse Events (AEs), Adverse Drug Reactions (ADRs), and Substandard and Falsified (SF) medicines (3.26, 0.89).* These indicators fall under the course, Legal Pharmacy and Ethics with Regulatory Pharmacy.

An essential part of medication therapy is to ensure that patients are receiving the intended effects of the medication they are taking and are not experiencing any undesired side effects, which are also known as adverse events. Pharmacists in a clinical setting could access patient information that allows them to monitor and report adverse events when it occurs while in the

community setting, the pharmacist may notice a potential adverse event while counseling or interacting with patients (Aquino et.al., 2019; and Viswanathan et.al., 2014).

The learning outcomes with the lowest mean ratings came out to be the following: *Communicating the recall with regulatory authorities (2.91, 0.98); Ensuring that the manufacturing and quality controls conform consistently to the specifications documented in the registration file (3.06, 0.84); and Sampling randomly from drug outlets which are needed for quality testing (3.06, 0.87).* Pharmaceutical regulations are the combination of legal, administrative, and technical measures that governments take to ensure the quality, safety, and efficacy of medicines (Pharmaceuticals Regulation EU Drug Discovery and development, 2013). Students need to enhance their competence in aspects that pertain to the regulatory pharmacy in the Experiential Pharmacy Practice (EPP), preferably in the hybrid or in-person mode, as this is taken up only as one of the topics in the 4 unit-course, Pharmaceutical Manufacturing. Further, these indicators can be strengthened through in-person, onsite experiential pharmacy practice experience.

PLO 2B (Practice pharmacy in accordance with ethical and moral standards)	3rd yr mean	4th yr mean	Mean	SD	Desc
1 Enacting the code of ethics for pharmacists relevant to the pharmacy practice into day-to-day activities.	3.16	3.31	3.23	0.65	C
2 Applying knowledge of personal, social, ethical and moral principles of the pharmacy practice	3.37	3.44	3.40	0.65	HC
3 Practicing what a Filipino pharmacist took oath to do in concordance with ethics and morality.	3.32	3.44	3.37	0.65	HC
4 Working ethically and effectively in the practice areas of pharmacy Engaging in lifelong learning with a passion to keep current with national and global developments in general and with pharmacy and health developments.	3.37	3.31	3.34	0.64	HC
5 Engaging in lifelong learning with a passion to keep current with national and global developments in general and with pharmacy and health developments.	3.42	3.31	3.37	0.60	HC
Grand Mean and SD	3.33	3.36	3.34		HC

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable (C), 1.75-2.49 somewhat capable (SC), 1.00 -1.74- not capable (NC)

Table 4. Overall Mean and SD for PLO2B learning outcomes

Students assessed themselves as capable in 1 out of 5 learning outcomes: *Enacting the code of ethics for pharmacists relevant to the pharmacy practice (3.23, 0.65).* They assessed themselves as highly capable in the other 4 indicators, highest of which is the learning outcome: *Applying knowledge of personal, social, ethical and moral principles of the pharmacy practice (3.40, 0.65).* Students have a firm grasp of the practice of pharmacy in accordance with ethical and moral standards. They embody the principles that form the fundamental basis of their roles and responsibilities which are based on moral obligations and virtues as specified in the Philippine Pharmacists Association Code of Ethics for Pharmacists.

These principles based on moral obligations and virtues are established to guide pharmacists in their relationship with their patients, other health professionals, and society (Aquino et. al., 2019; American Pharmacist Association, 2018; and Maitreemit et al., 2008).

PLO 3 (Collaborate and communicate effectively with other members of the HC team in safeguarding the overall health and wellness of the individuals and the community in general)	3rd yr mean	4th yr mean	Mean	SD	Desc
1 Actively participating in the functions and adhering to policies of the Pharmacy and Therapeutics Committee (PTC).	3.05	3.00	**3.03**	0.86	C
2 Applying knowledge of the roles and responsibilities of other healthcare team members to patient care	3.58	3.25	3.43	0.65	HC
3 Developing a good network and readily approaching peers, co-workers and/or superior for assistance as necessary.	3.47	3.31	3.40	0.55	HC
4 Collaborating with other members of the health care team to achieve optimal patient outcomes across the continuum of care	3.68	3.19	3.46	0.66	HC
5 Communicating effectively in counseling patients and/or the patient's caregiver about the patient's medication following the correct process	3.68	3.44	3.57	0.56	HC
6 Contributing to the development of a health vigilance system within the organization	3.11	3.38	**3.23**	0.88	C
7 Communicating to the regulatory authorities, any changes in the formulations, manufacturing process, testing procedure, and supplier of raw materials and other pertinent details of a registered product.	2.84	3.25	**3.03**	0.92	C
Grand Mean and SD	3.49	3.24	3.38		HC

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable ©, 1.75-2.49 somewhat capable (SC), 1.00 -1.74-not capable (NC)

Table 5. Overall Mean and SD for PLO3 learning outcomes

Students rated themselves as highly capable in 4 out of 7 learning outcomes. Top 2 are as follows: Communicating effectively in counseling patients and/or the patient's caregiver about the patient's medication following the correct process (3.57, 0.56); and collaborating with other members of the health care team to achieve optimal patient outcomes across the continuum of care (3.46, 0.66). In addition to professional courses, every semester, the College conducts activities like Grand case presentation and OBE Fair where students from Pharmacy, Nursing, and Radiologic Technology collaborate to accomplish a given clinical case. An interdisciplinary healthcare approach can improve patient outcomes, healthcare processes, and levels of satisfaction. Further, effective open-ended questioning and active listening are essential skills for gathering and relaying information to patients (Aquino et. al. 2019).

The lowest mean ratings are with the following learning outcomes: Actively participating in the functions and adhering to policies of the Pharmacy and Therapeutics Committee (PTC). 3.03 0.86; Communicating to the regulatory authorities, any changes in the formulations, manufacturing process, testing procedure, and supplier of raw materials and other pertinent details of a registered product. 3.03, 0.92; Contributing to the development of a health vigilance system within the organization 3.23, 0.88. These indicators include specific roles of pharmacists that can be fully acquired by students through in-person, onsite, and supervised experiential pharmacy practice.

PLO 4 (Provide relevant drug and health-related information to patients)	3rd yr mean	4th yr mean	Mean	SD	Desc
1 Interpreting laboratory test and physical assessment results.	3.37	3.31	3.34	0.59	HC
2 Evaluating the patient's need to identify the amount of education and type of information needed to optimize his/her medication use	3.47	3.38	**3.43**	0.65	HC
3 Relating various physiologic and pathophysiologic conditions of normal and special populations to effects in pharmacokinetics of drugs	3.26	3.25	3.26	0.70	HC
4 Identifying problems arising from abnormalities in of endocrine functions	3.16	3.00	**3.09**	0.70	C
5 Describe risk factors for hypertension and the impact on cardiovascular diseases/conditions such as angina, arrhythmia and congestive heart failure	3.53	3.44	**3.49**	0.51	HC
6 Designing and documenting accurately a medication counseling plan to address the needs of individual patients and a monitoring plan towards the desired therapeutic outcomes	3.47	3.31	3.40	0.60	HC
7 Providing an appropriate drug information based on prescription to achieve the goal of treating the infectious disease.	3.42	3.31	3.37	0.73	HC
8 Providing usable information to patients/customers relating to natural products which are used as ingredients of herbal supplement	3.37	3.56	**3.46**	0.61	HC
9 Identifying and prioritizing patient problems and medication-related needs.	3.16	3.25	**3.20**	0.63	C
Grand Mean and SD	3.36	3.31	3.34		HC

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable ©, 1.75-2.49 somewhat capable (SC), 1.00 -1.74-not capable (NC)

Table 6. Overall Mean and SD for PLO4 learning outcomes

Students rated themselves as highly capable in 7 out of 9 learning outcomes. The top 3 are as follows: Providing usable information to patients/customers relating to natural products which are used as ingredients of herbal supplements (3.46, 0.61); Describe risk factors for hypertension and the impact on cardiovascular diseases/conditions such as angina, arrhythmia

and congestive heart failure (3.49, 0.51); Evaluating the patient's need to identify the amount of education and type of information needed to optimize his/her medication use (3.43, 0.65). These indicators all relate to ensuring patient safety and education which are critical in order to complete an assessment that will appropriately address all of the patient's medication-related needs. The lowest ratings were found with the following learning outcomes: Identifying problems arising from abnormalities in of endocrine functions (3.09, 0.70), and Identifying and prioritizing patient problems and medication-related needs (3.20, 0.63). It is crucial that student pharmacists are capable of identifying and prioritizing patient problems and medication-related needs because it is ultimately the healthcare practitioner's responsibility to assure that all of the necessary information about the patient is collected and that the data is accurate. These indicators can be enhanced through pharmacotherapy courses and patient medication counseling cases (Aquino et. al., 2019; and Armor et.al., 2014).

PLO 5 (Provide pharmaceutical care including counseling on medicinal use, medication error, and adverse event prevention – medication safety)	3rd yr mean	4th yr mean	Mean	SD	Desc.
1. Identifying relevant drug interactions based on pharmacokinetic principles.	3.58	3.44	3.51	0.61	HC
2. Probing what the doctor has told him/her about the drug that has been prescribed.	3.47	3.56	3.51	0.56	HC
3. Asking proper relevant screening questions before dispensing.	3.53	3.56	3.54	0.61	HC
4. Providing non-drug related counseling (e.g health and wellness maintenance) before dispensing	3.53	3.50	3.51	0.61	HC
5. Preventing relevant drug interactions based on pharmacokinetic principles	3.68	3.50	**3.60**	0.50	HC
6. Resolving relevant drug interactions based on pharmacokinetic principles	3.42	3.25	3.34	0.59	HC
7. Proposing drug delivery system and routes of administration suitable for individualized therapeutic objectives (including economic considerations)	3.37	3.25	3.31	0.63	HC
8 Evaluating the medication regimen of the patient.	3.63	3.56	**3.60**	0.55	HC
9 Addressing medication-related problems	3.63	3.50	**3.57**	0.61	HC
10 Suggesting modifications in dosing and dosage regimens, when necessary, in normal and special populations and using data from Therapeutic Drug Monitoring (TDM).	3.42	3.44	3.43	0.61	HC
11 Designing dosing regimens in standard and special populations including those with altered physiologic states and economic considerations.	3.37	3.13	3.26	0.78	HC
12. Developing/initiating therapeutic plans	3.58	3.38	3.49	0.61	HC
13. Evaluating drug therapy for appropriateness, effectiveness, safety, adherence, and affordability	3.42	3.50	3.46	0.61	HC

14 Evaluating the evidence-based treatment plan for patients with renal disorders based on race, concomitant disease, drug adverse effects & drug interactions	3.42	3.38	3.40	0.50	HC
15 Evaluating the treatment plan for patients with GI disorder based on the etiology of ulcer & motility disorders	3.47	3.13	3.31	0.63	HC
16 Evaluating the treatment plan for patients with auto-immune disorders, dermatologic and hematologic disorders.	3.26	3.25	3.26	0.70	HC
17 Evaluating the treatment plan for patients with hypertension based on race, concomitant disease, drug adverse effects, & drug interactions	3.53	3.44	3.49	0.61	HC
18 Following up and monitoring the outcomes of therapeutic plans.	3.47	3.44	3.46	0.66	HC
19 Strictly follow a proper system of arrangement of drugs and supplies.	3.37	3.31	3.34	0.76	HC
20 Identifying and tagging high alert medicines (HAM) and sound alike, look alike ones (SALADs).	3.11	3.56	3.31	0.90	HC
Grand Mean and SD	3.46	3.40	3.44		HC

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable (C), 1.75-2.49 somewhat capable (SC), 1.00 -1.74- not capable (NC)

Table 7. Overall Mean and SD for PLO5 learning outcomes

Students rated themselves as highly capable along all the 20 learning outcomes of PLO5, with the following as top 3: Preventing relevant drug interactions based on pharmacokinetic principles (3.60, 0.5); Evaluating the medication regimen of the patient. (3.60, 0.55); Addressing medication-related problems (3.57, 0.61). These indicators fall under Dispensing 1 (Dispensing process, reading and interpreting the prescription and other medicine orders) and Dispensing 2 (Medication-Related Problems, Medication Safety, Medication Counselling, and Other Pharmacy Services) which are the most utilized courses across Pharmacy practice and are appropriate as it is aligned with the fundamental role of the pharmacists (Ongpoy, et. al., 2019).

PLO 6 (Practice effective management and leadership skills in all given settings or practice sites)	3rd yr mean	4th yr mean	Mean	SD	Desc
1 Assigning priorities to task in accordance with goals and objectives to manage efficiently time and other resources.	3.32	3.44	3.37	0.69	HC
2 Properly doing the role of pharmacist in purchasing and inventory management.	3.21	3.31	3.26	0.70	HC
3 Implementing changes to improve own practice or incorporating learning into practice.	3.21	3.25	**3.23**	0.60	C
4 Performing the functions of as deemed necessary (e.g planning, leading, organizing and controlling).	3.16	3.31	**3.23**	0.69	C

5 Applying the appropriate and suitable management approaches. (eg. Management by objectives (MBO), Management by Exemption (MBE), Management by Culture (MBC)	2.32	2.75	**2.51**	1.01	C
6 Solving conflicts using appropriate resolution management strategies suitable for the situation.	3.16	3.31	**3.23**	0.73	C
7 Identifying, respecting corporate hierarchies and observing proper channel of communication.	3.26	3.25	3.26	0.70	HC
8 Promoting strong team relationships in practice setting.	3.47	3.56	**3.51**	0.66	HC
9 Understanding training needs and development.	3.42	3.63	**3.51**	0.56	HC
10 Conducting performance evaluation by using relevant tools.	3.32	3.50	**3.40**	0.55	HC
11 Levelling expectation by solving, judging and managing a situation in a given setting or practice area.	3.32	3.38	3.34	0.64	HC
Grand Mean and SD	3.20	3.34	3.26		HC

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable (C), 1.75-2.49 somewhat capable (SC), 1.00 -1.74- not capable (NC)

Table 8. Overall Mean and SD for PLO6 learning outcomes

Students rated themselves as Highly Capable in 7 out of 11 learning outcomes. The top 3 is as follows: Promoting strong team relationships in the practice setting. (3.51, 0.66) Understanding training needs and development. (3.51, 0.56), Conducting performance evaluation by using relevant tools. (3.40, 0.55). The collaboration among health care professionals is one of the values that is strengthened in the College, activities are done such as Grand Case Presentation and Skills Fair which involve the student pharmacists, student nurses, and student radiologic technologists working together as a team to solve a patient case (Aquino et al., 2019). Moreover, the study by Maitreemit et. al. (2008) suggested that leadership, human relation skills, respect for authority, moral sense, emotion control, creative thinking, patience, and responsibility, among others, are the important attributes regarding pharmacists' character traits.

The lowest ratings were found with the following learning outcomes: Applying the appropriate and suitable management approaches. (e.g., Management by objectives (MBO), Management by Exemption (MBE), Management by Culture (MBC) (2.51, 1.01); Implementing changes to improve own practice or incorporating learning into practice. (3.23, 0.6); Performing the functions of as deemed necessary (e.g., planning, leading, organizing, and controlling). (3.23, 0.69); Solving conflicts using appropriate resolution management strategies suitable for the situation. (3.23, 0.73). The results may be attributed to the very few references available on management and administration based in the Philippine setting. It is important that the Center further strengthens these indicators because they are one of the critical processes in the healthcare delivery system. Furthermore, these functions are essential and must be evident in the managerial role of a pharmacist in the management of human resources, financial resources, marketing, inventory, information resources, and space management of the pharmacy (Aquino et. al., 2019; and Kelsch and Werremeyer, 2011).

PLO 7 (Manage drug establishments based on sound entrepreneurial practice integrating pharmaceutical care principles)	3rd yr mean	4th yr mean	Mean	SD	Desc
1 Performing opportunity assessment with deep understanding of environment and its opportunities	3.32	3.31	3.31	0.58	HC
2 Following the concepts of entrepreneurship as a spirit frame by understanding dilemmas of an entrepreneur.	3.26	2.94	**3.11**	0.76	C
3 Performing the concepts of a complete entrepreneur by understanding holistic attributes of an entrepreneur and the necessities of being creative and innovative.	3.32	3.19	3.26	0.74	HC
4 Performing the competence of a successful entrepreneur by understanding the concepts of self-mastery, situational mastery and enterprise mastery.	3.21	3.13	**3.17**	0.66	C
5 Applying SWOT (Strength, Weaknesses, Opportunities and Threats) analysis in concordance with Porter's analysis.	3.63	3.38	**3.51**	0.61	HC
6 Performing benchmarking by understanding item/store improvement, basic factors, and creating position articulations	3.37	3.19	3.29	0.71	HC
7 Performing the integration of all entrepreneurial marketing concepts by demonstrating competence in business appraisal.	3.32	3.19	3.26	0.70	HC
8 Utilizing relevant and innovative concepts of entrepreneurship.	3.26	3.38	3.31	0.63	HC
9 Performing the habits (e.g. disciplined, open-minded, confident among others) of successful entrepreneurs.	3.47	3.56	**3.51**	0.61	HC
10 Applying the working knowledge of the principles of entrepreneurship to analysis and problem solving	3.32	3.44	3.37	0.69	HC
11 Applying concepts of business plan by understanding the concepts and importance of pharmaceutical business plan.	3.37	3.50	3.43	0.65	HC
12 Performing contents of the summary and business description and drafting a business plan.	3.47	3.56	**3.51**	0.61	HC
13 Applying concepts of Pharmaceutical Industry Analysis by reviewing Porter's Analysis and PESTE (Political, Economic, Social, Technological and Ecological) Analysis	3.42	3.00	3.23	0.88	C
14 Utilizing pharmaceutical entrepreneurship concepts on a broader context.	3.11	3.25	3.17	0.79	C
15 Conducting financial analysis to guide allocation and use of organizational resources.	3.05	3.25	**3.14**	0.81	C
16 Performing financial analysis of different aspects of the business.	3.05	3.25	**3.14**	0.77	C
17 Creating a viable business plan (SMARTER) that will increase the pharmaceutical ventures chances of success	3.11	3.31	3.20	0.76	C

18 Illustrating and discussing the pharmaceutical healthcare industry and the health care business in the Philippines	3.26	3.44	3.34	0.80	HC
19 Identifying the core pharmaceutical marketing concepts.	3.21	3.31	3.26	0.78	HC
20 Applying pharmaceutical marketing strategy in building customer relationships by strategic planning, marketing process and marketing effort	3.21	3.31	3.26	0.89	HC
21 Performing pharmaceutical marketing in both traditional and non-traditional way.	3.16	3.38	3.26	0.85	HC
Grand Mean and SD	3.28	3.30	3.29		HC

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable (C), 1.75-2.49 somewhat capable (SC), 1.00 -1.74- not capable (NC)

Table 9. Overall Mean and SD for PLO7 learning outcomes

Students rated themselves as highly capable in 14 out of 21 learning outcomes, top 3 is as follows: Applying SWOT (Strength, Weaknesses, Opportunities, and Threats) analysis in concordance with Porter's analysis. (3.51, 0.61); Performing the habits (e.g., disciplined, open-minded, confident among others) of successful entrepreneurs. (3.51, 0.61); Performing contents of the summary and business description and drafting a business plan. (3.51, 0.61). The local university incorporated enhancements along Pharmacy Administration, Marketing, and Entrepreneurship in order to balance with Pharmaceutical Sciences and Pharmaceutical Care competencies. This PLO shows that pharmacy students at the university are already excelling in integrating administration, marketing, and entrepreneurial practice with pharmaceutical care (Aquino, et. al., 2019).

The lowest ratings are found along the following: Following the concepts of entrepreneurship as a spirit frame by understanding the dilemmas of an entrepreneur (3.11, 0.76); Performing the competence of a successful entrepreneur by understanding the concepts of self-mastery, situational mastery, and enterprise mastery (3.17, 0.66); Conducting financial analysis to guide allocation and use of organizational resources (3.14, 0.81); Performing a financial analysis of different aspects of the business (3.14, 0.77). These indicators must be strengthened in the instructional delivery given that marketing and entrepreneurship are among the keys to the development of a range of health services in the community and hospital sectors. It is important to note, however, that pharmacy students can only fully acquire and develop such competencies when they are already exposed to the actual setting.

PLO 8 (Conduct scientific research methods and processes for the development of noble drugs which are pro-Filipino and for the improvement of existing drug products and the practice of the profession itself)	3rd yr mean	4th yr mean	Mean	SD	Desc.
1 Understanding the importance of research in the different fields of practice of pharmacy.	3.21	3.56	**3.37**	0.84	HC
2 Demonstrating competence in research, technical writing and data analysis in the workplace.	3.16	3.38	3.26	0.85	HC
3 Writing the different parts of a research manuscript.	3.32	3.44	**3.37**	0.81	HC
4 Conducting research in accordance with existing protocols related to pharmaceutical sciences, education, and practice.	3.11	3.56	3.31	0.87	HC

5 Integrating relevant information from literature and studies or devising methodologies operationally.	3.26	3.44	3.34	0.76	HC
6 Critiquing contents of a published research manuscript based on established criteria.	3.21	3.50	3.34	0.84	HC
7 Presenting and defending the said research paper to a technical panel	3.47	3.63	**3.54**	0.82	HC
8 Disseminating the results of the said research at a level appropriate to the level of capacity of the audience	3.26	3.44	3.34	0.76	HC
Grand Mean and SD	3.25	3.49	3.36		HC

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable (C), 1.75-2.49 somewhat capable (SC), 1.00 -1.74- not capable (NC)

Table 10. Overall Mean and SD for PLO8 learning outcomes

As gleaned from the table, students rated themselves as highly capable along all the learning outcomes of PLO8, with the top 3 as follows: Presenting and defending the said research paper to a technical panel (3.54, 0.82), Understanding the importance of research in the different fields of practice of pharmacy. (3.37, 0.84); Writing the different parts of a research manuscript. (3.37, 0.81). Pharmacy students obtain a deeper understanding of why research is important by conducting researches and presenting and defending these researches to technical panels in Pharmacy Research Methods with Pharmaceutical Statistics, and Pharmacy Research and Thesis Writing. Further, pharmacy students were taught at the onset how to do research as part of their task assessments in courses such as Pharmaceutical Botany with Taxonomy, Pharmaceutical Pharmacognosy and Plant Chemistry, Pharmaceutical Inorganic Chemistry, Drug Delivery Systems, Pharmaceutical Microbiology, and Parasitology, among others. According to Deal et. al. (2016), regardless of the practice setting, it is imperative that pharmacists be able to participate in generating new knowledge or use the ever-expanding body of literature and studies to guide patient care, and by adopting and establishing an evidence-based practice.

PLO 9 (Contribute to the enhancement of overall social, mental, emotional, and physical health of individuals, communities, and the country as a whole)	3rd yr mean	4th yr mean	Mean	SD	Desc
1 Understanding and contributing to existing policies, laws, interventions and programs that address public health issues	3.26	3.31	3.29	0.75	HC
2 Appreciating the roles of pharmacists in a collaborative health care setting in addressing public health issues.	3.32	3.44	**3.37**	0.73	HC
3 Applying concepts, methods, strategies, interventions addressing Public Health issues and concerns.	3.32	3.44	**3.37**	0.73	HC
4 Providing appropriate pharmaceutical care services to the patient and the community (e.g., patient counseling, medication review and medication reconciliation, among others).	3.37	3.38	**3.37**	0.73	HC

5 Lobbying and working for overall health and wellness sustainability, cultural adaptability and poverty alleviation in the community and country as a whole.				
Grand Mean and SD	3.32	3.39	3.35	HC

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable (C), 1.75-2.49 somewhat capable (SC), 1.00 -1.74- not capable (NC)

Table 11. Overall Mean and SD for PLO9 learning outcomes

Students rated themselves as highly capable in all of the learning outcomes of PLO 9, with the top 3 as follows: Appreciating the roles of pharmacists in a collaborative health care setting in addressing public health issues. Applying concepts, methods, strategies, and interventions addressing Public Health issues and concerns, and providing appropriate pharmaceutical care services to the patient and the community (e.g., patient counseling, medication review, and medication reconciliation, (3.37, 0.73). The course, Public Health Pharmacy introduces the students to community health that includes both private and public efforts of individuals, groups, and organizations to promote, protect, and preserve the health of those in the community. Community pharmacists work closely with the public and would be expected to highly value the care of primary health and drug use plans of the community (Maitreemit et.al., 2008).

Significant difference in the mean self-assessment levels of Level 3 and Level 4 students along the PLOs

	3rd year		4th year		Grand Mean & SD		Desc
	Mean	SD	Mean	SD			
PLO 1A	**3.0574**	.18782	**3.1289**	.23900	**3.09**	0.05	**C**
PLO 1B	**3.5262**	.13585	**3.5012**	.07415	**3.51**	0.02	**HC**
PLO 2A	**3.0562**	.19462	3.3294	.14879	**3.19**	0.19	**C**
PLO 2B	3.3280	.10035	3.3620	.07120	3.35	0.02	HC
PLO 3	**3.4283**	.28138	**3.2617**	.15613	3.35	0.12	HC
PLO 4	3.3790	.14594	3.3310	.15609	3.36	0.03	HC
PLO 5	**3.4630**	.13436	**3.4040**	.13968	**3.43**	0.04	**HC**
PLO 6	**3.1973**	.30754	3.3355	.23162	3.27	0.10	HC
PLO 7	3.3500	.11533	**3.2918**	.18280	3.32	0.04	HC
PLO 8	3.2500	.10981	**3.4938**	.08366	3.37	0.17	HC
PLO 9	3.3175	.04500	3.3925	.06185	3.36	0.05	HC
Grand Mean & SD	3.30	0.15	3.35	0.10	3.33	0.04	HC

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable (C), 1.75-2.49 somewhat capable (SC), 1.00 -1.74- not capable (NC)

Table 12. Summary of grand mean and SD of the PLOs

A T-test was conducted to determine if a significant difference exists between the two (2) year levels of students along their mean self – assessment ratings:

	Mean		T	P-Value	Interpretation
	3rd	4th			
PLO 1A	3.0574	3.1289	-1.54	.141	NS
PLO 1B	3.5262	3.5012	.764	.470	NS
PLO 2A	3.0562	3.3294	-4.680	.000	Sig
PLO 2B	3.3280	3.3620	-.669	.540	NS
PLO 3	3.3443	3.2600	.690	.516	NS
PLO 4	3.3790	3.3310	1.368	.204	NS
PLO 5	3.4630	3.4040	1.636	.118	NS
PLO 6	3.1973	3.3355	-3.957	.003	Sig
PLO 7	3.2810	3.2986	-.429	.673	NS
PLO 8	3.2500	3.4938	-6.185	.000	Sig
PLO 9	3.3175	3.3925	-2.754	.071	NS

Table 13. T-test results

Based on the results, Level 4 students are significantly superior than Level 3 students based on their self-assessment of the following learning outcomes: Practice pharmacy in accordance with existing laws, legal and regulatory standards); Practice effective management and leadership skills in all given settings or practice sites; and Conduct scientific research methods and processes for the development of noble drugs which are pro-Filipino and for the improvement of existing drug products and the practice of the profession itself. This is primarily because level 4 students have already undergone experiential pharmacy practice in the five areas, to wit: community, hospital, institutional, industrial, public health & regulatory. Experiential learning is a very important component of pharmacy education as it gives the students the opportunity to practice and apply what they have learned, be able to interact with their peers and other health care professionals, and be exposed to actual cases or scenarios that evoke higher-order thinking skills. Internship plays an essential part in the pharmacy education program. The integration of formal and informal learning activities during an internship, including raising awareness of incidental learning, is important to further support students' learning of the professional practice of pharmacy (Wallman, 2010).

Strengths, Limitations, Overall Impression and Recommendations of Stakeholders

The table below shows the qualitative inputs of the students, faculty, alumni, and industry partners. Students and faculty members were asked the guide questions**:** *What are the strengths of the BS Pharmacy curriculum? What are the limitations of the BS Pharmacy curriculum? What is your overall impression of the BS Pharmacy curriculum? What recommendations can you suggest to enhance the BS Pharmacy curriculum?* while the alumni and industry partners' insights on the competencies that graduates must possess to become practice-ready and thus, employable, were sought in addition to their recommendations for the improvement of the curriculum.

STAKEHOLDERS	STRENGTHS	LIMITATIONS	OVERALL IMPRESSION	RECOMMENDATIONS
STUDENTS	There is always something new to learn; organized, accurate, advanced, interconnected and outcomes-based. Contains collaborative activities; Comprehensive, holistic and flexible.; practice/Field readiness; Teachers are passionate and handle the course very well.; Students are pushed to study more.; Resilient and innovative; More job opportunities and diverse career selection; Pre-requisite courses are in place; proper placement of internships	Bulky; laboratory application and immersions in actual premises (Pandemic-driven); Per level "standing" is rigorous; OBE should not be applied in all courses; Small number of units allocated for some courses e.g., Health Technology Assessment and Social and Administrative Pharmacy, Curriculum may not be recognized in other countries. Some require 5 years	Challenging yet effective; Worth it after 3rd year; Opens spectrum of possibilities in the future; Unique and Dynamic; Brings out best in each student; Makes students resilient; Satisfied with learnings; Very tiring; Good especially if you will pursue medicine; Helps in the achievement of goal; Enhancement of PHAD courses is good; Helps students to become knowledgeable and good decision makers	Activity-time ratio for assessment task; Exclude some topics that are not necessary; Larger time allocation for some courses; More effective pharmacy teachers; There should be a study group headed by higher level students; Include immunization topics; Outside school immersions, i.e., FDA visits Minor pharmacy subjects/gen ed courses should be discussed briefly; More laboratory work and hands-on activities; Additional course: Human Physio 2;
FACULTY	Holistic approach to prepare the students for entry level practice, laddered, Enhancement courses: PHAD; Catered towards the practice side of the profession	Co-requisites and Pre-requisites should be aligned; Virtual classroom isn't a good avenue for students to learn chemistry, especially on lab works/techniques; Really	Should be revisited from time to time to assess whether it is still suitable to current situation; Challenging; Exceptional due to that fact that there were additional embedded courses; BS	Continuous consultation with stakeholders including government agencies. Benchmarking, Work closely with the healthcare industry practitioners/employers; Pharmacists to have focused

		packed with many courses (both major and minor); Bulky.	Pharmacy Curriculum in the local university is competent, as evidenced by its consistent very satisfactory passing rate; Overall, it is good	track. Re-alignment of some of the courses in the curriculum; Provision for adding laboratory units for Clinical Pharmacy; Comprehensive exams at the end of every semester/year; Curricular mapping (to show a continuity in the lessons and avoid redundancy).

Table 14. Qualitative responses of stakeholders: students and faculty members

STAKEHOLDERS	Employable competencies/skills they think graduates should possess in order to become practice-ready	RECOMMENDATIONS
ALUMNI AND INDUSTRY PARTNERS	Technical and soft skills; Decision-making skills; Critical thinking skills; Pharmaceutical industry system knowledge, People smart, communication skills verbal and written, resilience and negotiation; Perseverance and the enthusiasm to learn; Leadership roles and research-oriented (statistics); Competency and Skills in Drug Therapy Management, Health Technology Assessment and Evidence-based Practice	Specialized topics; Immunization; add people-skill task for students; Career talks from the alumni, Brainstorming sessions to improve specific issues in Philippine pharmacy practice, research analysis and interpretation competence enhancement; To have PharmD course or Clinical Pharmacy. Enhancing Pharmacotherapy Subjects with applications of Drug Therapy Assessment; Evidence-based practice and HTA

Table 15. Qualitative responses of stakeholders: Alumni and industry partners

The University of Sydney Careers Centre (2022) specifies that employability skills refer to a set of transferable skills and key personal attributes highly valued by employers and essential for effective performance in the workplace. Compared with technical competence, they are generic in nature, rather than job-specific, and are common to all work roles and workplaces across all industry types. Examples are teamwork, communication, planning and organizing,

problem-solving, among others. Personal attributes that contribute to overall employability include commitment, adaptability, honesty and integrity, reliability, ability to deal with pressure, motivation, and cultural fit with the employing organization. The pharmacy program curriculum must be able to cultivate in its students these employability skills also often referred to as soft skills, in order to prepare them for the challenges and dynamics of pharmacy practice.

According to the International Pharmaceutical Federation Global Framework (2014), education has been a strong driver of change in practice, but sometimes it could be disconnected from the needs and realities of practice. Quality assurance systems that proactively engage with practice, education, and regulation can also be drivers for quality advancement in education. It is important to ensure that at no stage do any of the "gaps" among the three (education, practice, and regulation) get too wide, because this leads to an overt disconnect, creating tensions, dissatisfaction, or frustration. If, for example, pharmacy educators have a vision for pharmacy practice and education and implement a model that is not supported by practitioners and/or regulators, graduates may become disillusioned if the practice or regulatory environment does not allow them to practice in the manner conveyed by the academic program. It is therefore imperative that inputs of the stakeholders such as the industry sector be considered in curriculum enhancement activities of schools.

Thematic analysis of the stakeholders' qualitative responses

Overall, three (3) main themes were evident:

Rigor

The difficulty of professional courses in the curriculum was encountered. This was made prominent by the following: Year level fulfillment of requirements "level standing"; OBE implementation in "highly cognitive" courses; lack of contact hours for some courses; system of co-requisites and pre-requisites, "bulky", activity-time ratio for assessment tasks.

According to Mintrom (2014), a culture of excellence is an organizational context encouraging behaviors that, when deployed, continuously improve task performance. Systematically orienting students towards the pursuit of excellence produces cultures of excellence resulting to short-term and long-term gains for them. Rigorous application of evidence-based, continuous improvement in pedagogical practice cultivates excellence, eventually producing social and economic progress when they populate the workplace. Excellence in pharmacy practice must start in cultivating excellence in education. Rigor is necessary in order to foster agility that is needed in the very dynamic pharmacy practice. There is a need however, to prevent or lessen the controllable factors that can further contribute to its difficulty, for example, overwhelming student tasks and requirements given a low contact hour for a course.

Best features

Organized and accurate; Interconnected.; Outcomes-based. Laddered. Advanced Collaborative; self-directed. Comprehensive, holistic and flexible.; Practice/Field readiness; Passionate and dedicated teachers.; Resilient and innovative. Diverse career opportunities; Internships properly placed, Enhancement courses: PHAD; great curriculum in academics.

CMO 25 s. 2021 states that the outcome-based program (on a minimum), is at least a four (4)-year degree program with a total of 169 credit units, equivalent to 4,515 hours. The program offers a good mix of general education courses, which have relevant applications in the profession of pharmacy, and professional courses, that will help prepare the graduates in acquiring competencies necessary in the workplace. Foundation courses in pharmaceutical chemistry, pharmaceutics, and the life sciences enhance the understanding of pharmaceutical product development and their applications in pharmacy practice. It also includes experiential pharmacy practice programs in the 4th year that involve assigning students to different CHED-accredited affiliation establishments covering a minimum of 1,200 hours. The intern/student, during the course of the EPP experience, will be exposed to a variety of opportunities in practice areas preparing them for the different roles expected of them upon graduation. Being the local university of a premiere city, it has infused enhancements in pharmaceutical administration, management, marketing, and entrepreneurship in addition to having an associate degree after the second year. The same CMO also mentions that HEls are allowed to design curricula suited to their own contexts and missions provided they can demonstrate that the same leads to the attainment of the required minimum set of outcomes, albeit by a different route. The best features of the BS pharmacy curriculum of the local university are anchored on the salient features of the program as mentioned in the said CMO. In addition, enhancements done were considered significant in the same manner as mentors' passion and commitment.

Continuous Improvement

Specialized topics like immunization; More practical applications of theories to actual practice settings; Add people-skill tasks for students to make them more well-rounded.; Career talks from the alumni on different fields of practice; Brainstorming sessions aiming to improve specific issues in Philippine pharmacy practice, involving all year levels; reinforcement of statistics, evidence-based practice, and pharmaceutical sciences research topics; additional year/s of study to cater to specialization like PharmD/ Clinical Pharmacy program.

As emphasized in CMO 25 s. 2021, the curriculum should be designed in accordance with the needs-based professional education model of the International Pharmaceutical Federation (FIP) (published in the 2012 FIP Global Pharmacy Workforce Report) with consideration of the needs of professional practice and the Filipino society, the scope of the practice of pharmacy as stipulated in Section 4, Article 1 of the Philippine Pharmacy Act (RA 10918), the Philippine Qualifications Framework (PQF), the Philippine Practice Standards for Pharmacists (PhilPSP) and other international professional competency standards. There are also mandated topics for integration in the relevant professional courses in the curriculum such as Patient Safety and quality risk management, good pharmacy practices, leadership and management, and interprofessional education, Counterfeit Medicines and SSFFC (Substandard, Spurious, falsely labeled, Falsified and Counterfeit medical products), Pharmaceutical Promotion & Ethics, Philippine Practice Standards for Pharmacists (PhilPSP) and Pharmaceutical Supply Chain Management. The local university will continuously work for the improvement of its BS Pharmacy program using this as a guidepost.

Program Learning Outcomes (PLOs)	Quantitative	Qualitative	Identified gaps and Plan of action
PLO 1A (Identify, compound, and manufacture of drugs following appropriate guidelines, standards and specifications)	Extemporaneous compounding of TPNs and paper tablets, among others. (2.74, 0.85), PICS Guidelines and GMP for ASEAN Countries in industrial pharmacy practice (2.77, 0.91), Manufacturing different dosage forms based on the basic pharmaceutical principles, processes, methods, and techniques (2.89, 0.96).	Limitation in laboratory applications and immersions/ internships in actual premises (Pandemic-driven) Difficulty in professional courses amplified by lack of contact hours for some courses; "bulky", activity-time ratio for assessment tasks	Competencies along extemporaneous compounding and manufacture of drugs: Revisit course plan of relevant courses Revisit allotment of units for possibility of enhancement Hyflex/Hybrid mode -laboratory courses Research topics to cover pharmaceutical sciences, drug discovery and development
PLO 2A (Practice pharmacy in accordance with existing laws, legal and regulatory standards)	Communicating the recall with regulatory authorities (2.91, 0.98); Manufacturing and quality controls conform consistently to the specifications in the registration file (3.06, 0.84); Sampling randomly from drug outlets which are needed for quality testing (3.06, 0.87).		Competencies along practice of pharmacy in the industry (manufacturing and regulatory): Revisit course plan of relevant courses Revisit allotment of units Hyflex/ Hybrid mode -laboratory courses and industrial pharmacy internship

PLO 3 (Collaborate and communicate effectively with other members of the HC team in safeguarding the overall health and wellness of the individuals and the community in general)	Participating in the functions and adhering to policies of the Pharmacy and Therapeutics Committee (PTC). 3.03 0.86; Communicating to regulatory authorities, changes in the formulations, manufacturing process, and other pertinent details of a registered product. 3.03, 0.92; Contributing to the development of a health vigilance system within the organization 3.23, 0.88.	Limitation in laboratory application and actual immersions in actual premises (Pandemic-driven) Difficulty in professional courses amplified by lack of contact hours for some courses; "bulky", activity-time ratio for assessment tasks	Competencies on communication and interprofessional collaboration (hospital and industry): Revisit course plan of relevant courses Revisit allotment of units Hyflex/ Hybrid mode -laboratory courses, hospital and industrial pharmacy internship
PLO 4 (Provide relevant drug and health related information to patients)	Identifying problems arising from abnormalities in endocrine functions (3.09, 0.70) Identifying and prioritizing patient problems and medication-related needs. (3.20, 0.63	Difficulty in professional courses (Example: Pharmacology Clinical Pharmacy) amplified by lack in contact hours for some courses; "bulky", activity-time ratio for assessment tasks	Competencies on pharmaceutical care (medication therapy management): Revisit course plan of relevant courses Revisit allotment of units Hyflex/ Hybrid mode -laboratory courses and hospital pharmacy internship
PLO 6 (Practice effective management and leadership skills in all given settings or practice sites)	Applying management approaches (2.51, 1.01); Implementing changes to improve own practice (3.23, 0.6); Performing the management functions as deemed necessary (3.23, 0.69); Solving conflicts		

	using appropriate strategies. (3.23, 0.73).	Difficulty in professional courses (Example: Marketing and Entrepreneurship 2) amplified by lack in contact hours for some courses; "bulky", activity-time ratio for assessment tasks	Competencies on Pharmacy management and entrepreneurship: Revisit course plan of relevant courses Revisit allotment of units Hyflex/ Hybrid mode -laboratory courses and industrial pharmacy internship
PLO 7 (Manage drug establishments based on sound entrepreneurial practice integrating pharmaceutical care principles)	Entrepreneurship as a spirit frame (3.11, 0.76); Concepts of self-mastery, situational mastery and enterprise mastery (3.17, 0.66); Financial analysis to guide allocation and use of organizational resources (3.14, 0.81); Financial analysis of different aspects of the business (3.14, 0.77).		

Table 16. Integration of quantitative and qualitative findings: Identified gaps and plan of action

Based on FIP Global Framework (2014), institutions that offer pharmacy education – universities, schools, or colleges should play a key role in assuring the quality of education. Both students and academic staff members' assessments, evaluation, and improvement of the curriculum, implementing innovations, involving preceptors in the academic program, development of students' competency lists, and implementation of contemporary teaching methodologies are some of the essential components of the quality assurance process. Students' feedback can also influence the quality, but cannot provide the full scope of required perspectives. Hence, integrating the inputs of other stakeholders like faculty members, alumni, and industry partners is very integral. The above table of integrated inputs clearly shows the areas that need to be improved through the indicated plan of action. It is note-taking to say, however, that the pandemic has affected the delivery of pharmacy education thus the need for recovery interventions mainly through the adoption of the hybrid to full face-to-face modality, especially for laboratory and supervised experiential pharmacy practice courses.

Conclusion and Recommendation

Periodic or timely curriculum review is pivotal in the quality assurance of education (ensuring "fitness for purpose"); direction setting, curricular changes, and enhancements should be strongly built on sound process and meaning-making of available data. More extensive studies must be done to cover alumni (2019 to 2021) and employers. It is recommended that the plan of action be implemented in the enhancement of the new curriculum for the BS Pharmacy program for the academic year 2022-2023.

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The Effectiveness of Interdisciplinary Learning on 21st Century Skills for Taiwanese Elementary School Students

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Abstract
The World Economic Forum has proposed a vision of Education 4.0 in 2022, pointing out that innovative pedagogies and emerging technologies should be applied to place students at the center of learning and develop their ability to solve real-world problems. This study implemented STEAM project-based learning (PBL) combined with emerging technologies in Taiwanese elementary schools, hoping to improve students' 21st century skills (communication, collaboration, and problem solving). Seven experimental schools with 343 students from grades 4-6 participated in this study. Each school had an experimental group and a comparison group. There were 173 students in the experimental group and 170 students in the comparison group. The experimental group received STEAM PBL combined with emerging technologies, and the comparison group received traditional pedagogy. Both groups completed pre- and post-test questionnaires on communication, collaboration, and problem solving. Considering the differences in pedagogical background between the seven schools, this study applied meta-analysis to calculate the overall effect size to obtain more accurate results. The results found that the experimental group was more effective than the comparison group in improving students' communication, collaboration, and problem solving, all of which achieved medium effect sizes. It shows that STEAM PBL combined with emerging technologies can effectively increase students' 21st century skills, which is of great help to their future learning performance and career development.

Keywords: Interdisciplinary Learning, 21st Century Skills, Emerging Technologies

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Introduction

World Economic Forum proposed Education 4.0 to enable students to acquire Industry 4.0 skills for future career development (World Economic Forum, 2022). Education 4.0 pointed out that it is necessary to cultivate students' 21st century skills (such as communication, collaboration, and problem solving skills) through interdisciplinary learning, innovative pedagogies, and emerging technologies to enhance global economic prosperity (World Economic Forum, 2022). STEAM project-based learning (STEAM PBL) is an innovative interdisciplinary pedagogy that integrates science, technology, engineering, arts, and mathematics (Lu et al., 2022). STEAM PBL uses real-world problems to put students at the center of learning. Students actively apply interdisciplinary knowledge and emerging technologies to develop problem-solving products (Fernández-Morante et al., 2022). In the process of developing products, students need to constantly discuss and cooperate with their group members, stimulating collective intelligence to solve problems effectively (Lu et al., 2022). In addition, emerging technologies can support students to interact with the real world more frequently and develop products that are closer to real needs (Mota-Valtierra et al., 2019). However, there is still insufficient empirical research on STEAM PBL for students' 21st century skills, so it is necessary to verify the effectiveness of STEAM PBL with empirical evidence (Perignat & Katz-Buonincontro, 2019).

According to the above research objectives, this study can be divided into the three research questions:

1. Is STEAM PBL combined with emerging technologies better for elementary school students' communication skills than traditional instruction?
2. Is STEAM PBL combined with emerging technologies better for elementary school students' collaboration skills than traditional instruction?
3. Is STEAM PBL combined with emerging technologies better for elementary school students' problem solving skills than traditional instruction?

Methods

Participants

The participants in this study came from 7 elementary schools, with a total of 343 students in grades 4-6 (170 in the experimental group and 173 in the comparison group). All seven schools participated in Taiwan's advanced interdisciplinary project for K-12 schools of the Ministry of Education. This project aims to promote STEAM PBL combined with emerging technologies to all K-12 schools in Taiwan, cultivating students' interdisciplinary knowledge, 21st century skills, and global competence.

Experimental procedure

Each of the seven schools had an experimental group and a comparison group. The experimental group received STEAM PBL combined with emerging technologies, and the comparison group received traditional instruction. Both groups received the pretests on 21st century skills before the course was implemented, and the posttests after the course ended (one semester). STEAM PBL will apply the K-12 P^5BL theory modified by Yang et al. (2022) from Fruchter (1998) to design learning activities. K-12 P^5BL includes five phases: 1) problem; 2) project; 3) product; 4) process; and 5) place. Problem means meaningful real-

world problems. Project means the learning activities related to the project. Product means authentic product. Process means students use higher order thinking skills and metacognition to optimize their products. Place means the product connects with the community and supports the United Nations Sustainable Development Goals. The emerging technologies used by the seven schools include artificial intelligence of things (AIoT), augmented reality (AR), virtual reality (VR), and drone.

Materials

This study used the communication scale (12 questions), the collaboration scale (9 questions) and the problem solving scale (17 questions) developed by Yang et al. (2022) as research tools. The three scales were all 5-point Likert scales, and the Cronbach's α ranged from .90 - .93, which had good reliability and validity.

Data analysis

Firstly, this study used analysis of covariance to calculate the effect size of each school in the three 21st century skills. Since each school had different background factors (e.g., teaching content), meta-analysis was used to integrate an overall effect size to obtain a conclusion. Hedges's *g* was used to identify the effect size in small sample size because most experimental and comparison groups were less than 30 people (Borenstein et al., 2009). A *g* between .20 to .49 is defined as small effect size, a *g* between .50 and .79 is defined as medium effect size, and a *g* greater than or equal to .80 is defined as large effect size (Cohen, 1988).

Results and Discussion

Communication

As shown in Fig. 1, the effect sizes of the seven schools ranged from .13 to .87. The overall effect size was .55, and the *p*-value was less than .05. The overall result reached a medium effect size. Therefore, the experimental group had better communication improvement than the comparison group. It means that STEAM PBL combined with emerging technologies can effectively improve students' communication skills.

When developing solutions to real-world problems, students are constantly discussing the most feasible solution with group members (Rahmawati et al., 2022). After translating their solution into an authentic product, students introduce the functions and value of the product to peers, teachers, and community members (Miller et al., 2021). Therefore, students continue to practice communication skills throughout the learning process (Turcotte et al., 2022).

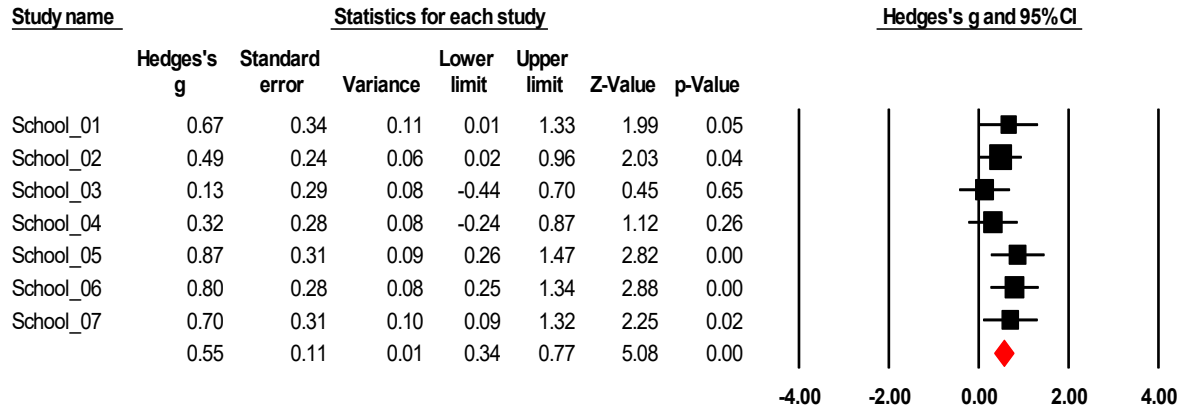


Figure 1: Effect sizes of communication of the seven schools.

Collaboration

As seen in Fig. 2, the effect sizes of the seven schools ranged from .13 to 1.16. The overall result was significant with a medium effect size (g = .51, p < .05). It showed that the experimental group had a better improvement effect in terms of collaboration. As a result, STEAM PBL combined with emerging technologies can improve students' collaboration skills.

At the beginning of the course, students need to cooperate with group members to collect information and explore the causes of real-world problems, and build a sense of responsibility toward teamwork (Melguizo-Garín et al., 2022). With the support of simulated scenarios created in AR and VR, students can brainstorm with group members to find the best solution, increasing their confidence in collaborative problem solving (Papanastasiou et al., 2019). Therefore, STEAM PBL combined with emerging technologies provides students with many opportunities for cooperative learning and develops their collaboration skills (Cheng et al., 2022).

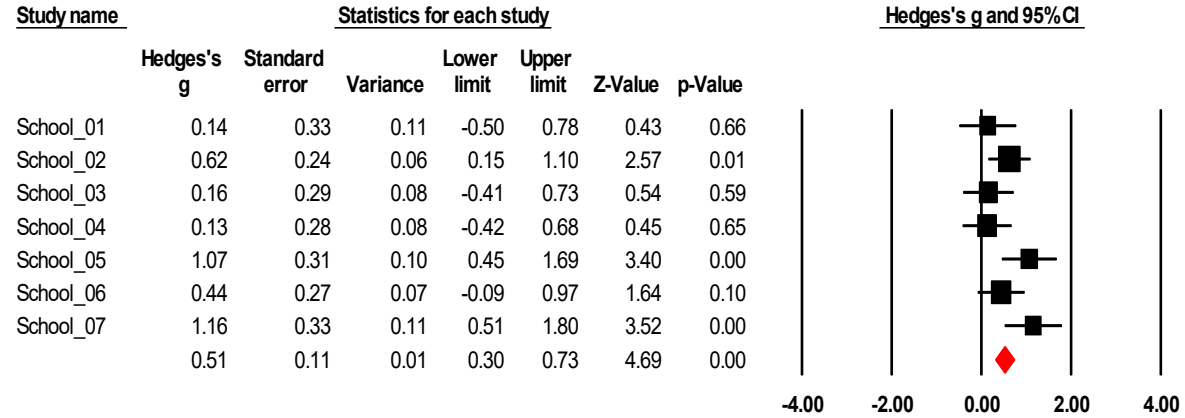


Figure 2: Effect sizes of collaboration of the seven schools.

Problem solving

As shown in Fig. 3, the effect sizes of the seven schools ranged from .14 to 1.01. The over results showed that the experimental group had a better effect on enhancing students' problem solving skills ($g = .53$, $p < .05$). It means that STEAM PBL combined with emerging technologies can positively enhance students' problem solving skills.

The real-world problems in students' lives can stimulate students' problem solving interest (Lu et al., 2022). As students develop meaningful products through hands-on activities, their motivation to solve problems increases (Mursid et al., 2022). AIoT allows students to interact frequently with the real world and improve their problem solving experience through trial and error (Auerbach et al., 2018). Therefore, the authentic situated learning created by STEAM PBL combined with emerging technologies can effectively enhance students' problem solving skills (Fernández-Morante et al., 2022).

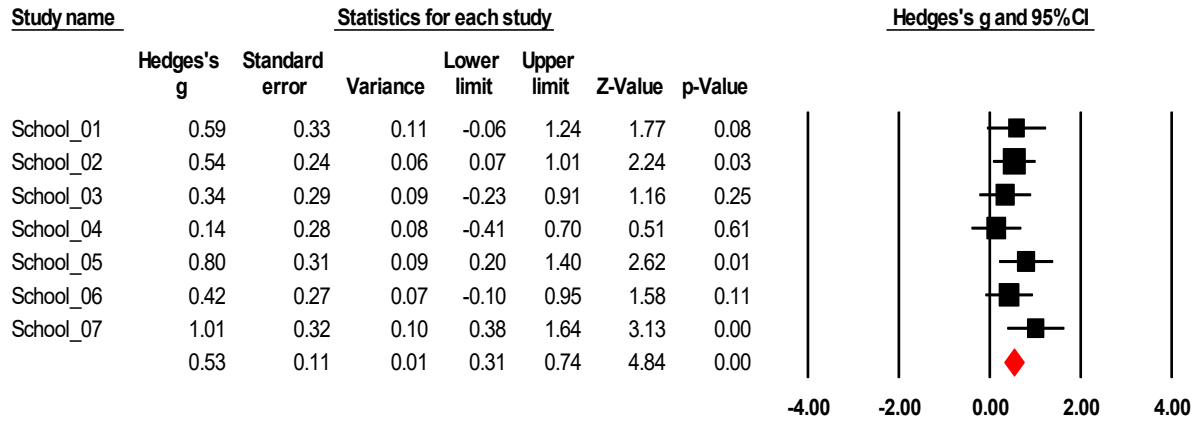


Figure 3: Effect sizes of problem solving of the seven schools.

Conclusions and Recommendations

In order to cultivate interdisciplinary talents required by Education 4.0, this study demonstrated that STEAM PBL combined with emerging technologies can improve students' 21st century skills (communication, collaboration, and problem solving skills). 21st century skills can enhance students' future learning performance and career development, and promote global economic development (World Economic Forum, 2022). In addition, creativity and critical thinking skills are 21st century skills and higher order thinking skills that are very important for students' learning growth (Wijnen et al., 2021). It is suggested that the effectiveness of STEAM PBL combined with emerging technologies on students' creativity and critical thinking skills can be further analyzed in the future.

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Designing Integrative STEM Learning Materials for Junior High School Mathematics Classroom: What Works (and Not)?

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Abstract
The demand to make science and mathematics learning more relevant and meaningful leads to integrative stem learning, a teaching approach that integrates science, technology, engineering, and math (STEM) into a cohesive and interdisciplinary learning experience. Even though STEM has been consistently increasing in popularity in Indonesia, the lack of learning materials is persistent. This paper reports the first stage of design research aimed at developing integrative STEM learning materials for junior high mathematics classroom. The result is three sets learning materials that is compatible with the national mathematics curriculum of Indonesia. The development process suggests that feasible learning materials can be developed by matching science and mathematics standards, then tie it with appropriate problem context.

Keywords: Integrative STEM, Design Research, Mathematics Education

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1. Introduction

STEM is an acronym for Science, Technology, Engineering, and Mathematics that was first introduced by the National Science Foundation (NSF) to acknowledge the growing significance of these four disciplines in various fields such as national security, immigration policy, and education (B.Gonzales & J.Kuenzi, 2012). STEM subjects are traditionally taught separately in schools, but the demand for Science and Mathematics curricula to be more relevant and applicable in the real-world gave rise to the idea of integrating the four fields (English, 2016; White & Delaney, 2021). Hence, in this paper, the term STEM refers to integrative STEM, which is a learning approach where students utilize knowledge and skills from all four disciplines to resolve real-world problems (English & Mousoulides, 2015; Hourigan & Leavy, 2020; Margot & Kettler, 2019; Shaughnessy, 2013).

Although integrative STEM has not been officially recognized in Indonesian national curriculum, it has gained widespread attention within the education community. This has resulted in a proliferation of workshops, seminars, conferences, and training programs on STEM organized by both private and government institutions. These events are primarily targeted towards educators and promoted as a means of enhancing classroom instruction. As a result, the implementation of STEM education in Indonesian schools is predominantly driven by the initiative of individuals or institutions rather than government. While there have been studies on the incorporation of STEM education in the classroom, the majority of these studies are focused on science education (Hanif et al., 2019; Jauhariyyah et al., 2017; Khaeroningtyas et al., 2016). The recent national curriculum, the Emancipated Curriculum, mandated that the students should participate in at least three project-based learning a year, which is a strong support for teachers interested to implement integrative STEM activities.

Despite its popularity, there is a considerable lack (if not absence) of research-based, ready-to-use STEM resources for teachers. Teachers in countries which are more seasoned in implementing STEM education, such as United States, have vast option of ready-to-use STEM curriculum, either paid or free. As a comparison, teachers in Indonesia interested in implementing STEM usually have to make it themselves or use online resources which cannot be accounted for. This create issues because teachers often cannot be sure about the quality of STEM teaching materials they make or use. Reliable online resources are often in English, which creates language barrier for the teachers.

To tackle this issue, this project aims to develop STEM learning materials for junior high school mathematics classrooms through design research (Gravemeijer & Cobb, 2006). This paper will report the first phase (Design), which results in the initial drafts of the learning materials. This paper is expected to provide points of consideration for educators, especially in mathematics, who are interested in developing integrative STEM activities to enhance their classroom. The research question this study aims to answer is *how to develop integrative STEM learning materials for junior high school mathematics classroom?*

2. Method

The methodology used in this study to address the research question is design research, which focuses on developing theories related to the process of learning and designing the means to aid in that learning process (Gravemeijer & Cobb, 2006). Considering the research question and goals, this approach is considered the most well-suited. Design research involves three

stages - preparation and design, classroom experiment, and retrospective analysis - as shown in Figure 1 according to van Eerde (2013).

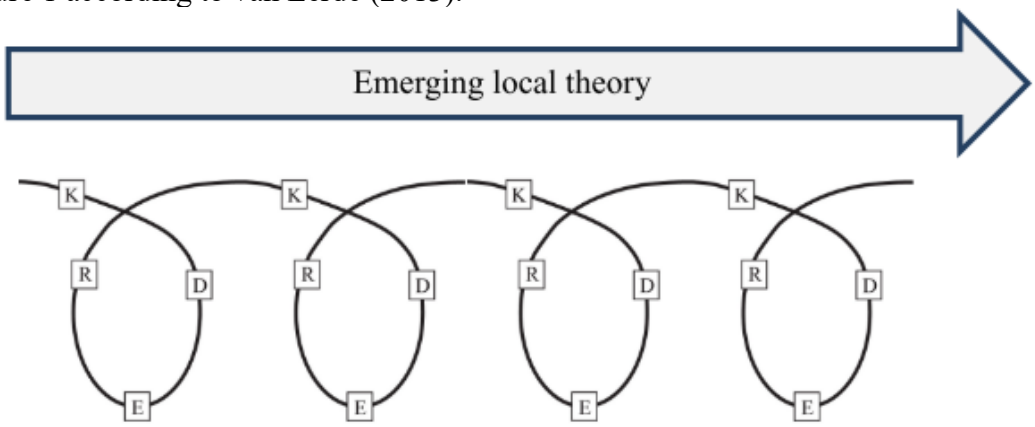


Figure 1: The stages of design research

Each letter – K, R, D, and E – denotes each stages and is explained as follow. The research process starts with the existing knowledge (K), including literature review, curriculum documents, perspective and experience of related stakeholders, and exemplary STEM activities, to prepare and design (D) the learning activities. These activities are then tested in the classroom during the classroom experiment (E) stage, and the researcher reflects on the results (R) in order to obtain new information with which the learning materials will be revised and refined. This process is repeated in cycles, leading to the development of a local instruction theory that includes both instructional activities and a theory of how students' understanding may develop.

The learning materials were developed by four academic specialists of SEAMEO QITEP in Mathematics. All specialists took part in the preparation and design phase, but then worked independently to draft the learning materials. The preparation and design phase took around three months in duration.

3. Result

The preparation and design phase was started by reviewing literature review, curriculum documents, and exemplary STEM activities, as well as interviewing several teachers. This process resulted in a list of several aspects that needs to be considered in designing the learning materials. These aspects, which is referred to as Design Consideration, is described in Table 1, which is adapted from Li et al. (2022).

Dimension	Design Decision	Description	Supporting literatures
Process Design	Designed according to the national curriculum using embedded approach	The task is designed according to the national curriculum. To circumvent the traditional school curriculum which still teach STEM subjects in siloed approach, embedded approach is used.	(Roberts & Cantu, 2012)
	Starting from content	The priority is put on the mathematics and science contents taught in the same year/semester. The contextual problem is then chosen accordingly, where the mathematics and science contents can be applied.	(Nicol et al., 2019)
Task Design	Disciplinary integration through contextual problem	Integration of the four STEM subjects is achieved by having the students apply the knowledge and skills from the subjects to solve problems set in real-life contexts.	(English & Mousoulides, 2015; Hourigan & Leavy, 2020; Margot & Kettler, 2019; Shaughnessy, 2013).
	Inquiry-based learning	The students are encouraged to do investigation and exploration aimed to formulate hypotheses and build knowledge.	(Leung, 2018)
	Emphasize on engineering	Through Engineering Design Process, an iterative process consisting of five stages (Ask, Imagine, Plan, Create, Improve), in applying STEM knowledge and skills to devise solution for real-life problems; and the establishment of criteria and constraint of successful solution.	(Cunningham, 2018).
	Low-floors, high-ceiling, wide walls activities	The activities are designed such a way that it can be solved by students with different levels of content knowledge attainment.	(English, 2017)
Strategy Design	Group work	Students are divided into mixed-ability groups during the task.	(Goodsell, 1992)

Table 1: Instructional design decision for integrative STEM learning materials

The design of the learning materials was conducted with these decisions as guidelines, resulting in three draft of learning materials each for grade 7, 8, and 9. The details of the learning materials are provided in Table 2.

Title	Grade	Description
Parachute for isolated disaster areas	7	Difficulty in distributing aid often happens after natural disaster occurs, especially in remote and isolated areas. One of the solutions that can be used to tackle this problem is using parachute to deliver the aids. In this activity, the students will use the knowledge and skills related to areas of quadrilateral, coupled with engineering principles and technology, to design ideal parachute that can be used to land aids in isolated disaster areas.
Disability-friendly environment with ramp	8	It is important for students to understand that all individuals, including those who have to use wheelchairs due to disabilities, are entitled to equal access to public facilities as part of social justice. To teach this, students will apply the principles of gradients and simple machines, as well as engineering principles and technology, to build ramps that provide an alternative to stairs in public buildings.
Earthquake-resistant building	9	As a country located on the Pacific Ring of Fire, earthquakes happen frequently in Indonesia. Through engineering design process, this lesson provides opportunities for the students to apply the knowledge and skills related to volume and surface area of solids to design earthquake-resistant residential buildings.

Table 2: The details of the initial draft of the integrative STEM learning materials

Conclusion

The growing popularity of integrative STEM as innovative teaching approach in Indonesia is not supported by the availability of research-based learning materials applicable to be used with the national curriculum. Through first stage of design research, draft of learning materials is designed that are potential to be used in accordance to Indonesia national curriculum. The design consideration including the process, strategy, and task design is expected to be able to provide points of consideration for educators interested to attempt similar learning materials. Some of the useful approach identified namely starting by matching science and mathematics content followed by identifying relevant problem context, allocating time twice or three times longer that is planned for classroom implementation, as well as emphasizing the constraint and successful criteria to students, not only to incorporate engineering, but to secure convergence for such an open learning approach.

As this paper only report the first stage of design research, the limitation is that the learning materials still need to go through classroom experiment and retrospective analysis to be considered final. The learning materials are also drafted only by mathematics education

specialist and might be biased to one subject. Future studies are encouraged to incorporate perspective from multiple experts in different subjects.

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Reflection of the Current Practice in Psychological Diagnostics of Language-Based Diagnostic Tools

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Abstract
This Article contribution focuses on the language-based psychological test, batteries and diagnostic tools used worldwide and their psychometric standardisation. The author follows in his research from his diploma thesis Analytical Methods in Psycholinguistic Research of Perception (Rudorfer, 2019), in which the author addressed the psycholinguistic and statistical approach in language performance tests and provided a number of analytical tools due to their focus and work with specific subjects using language (Czech, English, Hungarian, Japanese and German), their perceptual, cognitive skills and language intelligence, which are key aspects of research study research. The proposed research study follows up on the dissertation and diploma thesis of the main researcher of the project. It expands it mainly with a specific focus on specific diagnostic tests and psychometric analysis options for proper revision and standardisation for use in professional practice. The dissertation will focus on analytical methods for psychological diagnostic methods with a focus on literacy and language performance tests and their standardization. The project also corresponds to the long tradition of the Department of Psychology, Faculty of Education, Charles University, whose area of interest is primarily issues of literacy, functional literacy and specific learning disabilities.

Keywords: Language-Based Testing, Language Performance, Standardization, Psychometric Standards, Comparative Study, Descriptive Statistics

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Introduction

It has been the goal of many psychological associations and recent regulations in the Czech Republic [1], EU and Worldwide to support the publishing of psychological tests, batteries and collections of diagnostic tools to be available to the majority of psychologist and educational professionals alike. The main issue is regulation, and review factors coinciding with the replication crisis in psychology that divides the psychological and educational experts alike. This project builds on the current research survey and Czech academic experience in the field (e.g. Urbánek et al, 2021), Cígler (2020) or Ježek (2021). A great advantage is cooperation with leading experts on this topic working in the Department of Psychology, Faculty of Education, Charles University (FoE CUNI). The acquired knowledge can be transferred in this way to the relevant subjects provided by the Department of Psychology, both in the field of educational psychology (especially in the follow-up master's programmes, in which future counselling experts in education are prepared), and in all teaching disciplines as well where teachers and education experts can use the outputs of this research project to their benefit.

The primary goal of the presented project is to map the awareness of the professional psychological public about psychometric standards as described by Harvill (1991) or Revelle (2015) and psychodiagnostic tools used, which have a component focused on language performance, as many Czech pedagogical and psychological methods do not contain all information about data processing, whether and how often they are reviewed. and the extent to which the diagnostic tool meets psychometric standards of validity and reliability. (APA, 2017). Two screening questionnaires in Czech and English (one for psychologists from practice, the other for researchers in the field of pedagogy and psychology) helped us to determine the level of awareness of the professional and academic community in the areas of the use of standardization procedures.

The project is currently in its data processing phase, during which we already have at our disposal a list of commonly used diagnostic tools worldwide. In addition to the list of used tests, we are conducting a questionnaire study[2] which should help us better understand what factors are dependent on the use of a particular language-based psychological diagnostic tool. Based on a specific theoretical framework we presume that language-based performance is a key indicator for the majority of achievement, personality and even cognitive skill psychological tests and batteries.

Psychologically speaking, language performance can be defined as the ability of an individual to use language effectively and appropriately in various contexts. This includes the ability to understand, process, and produce language in a manner that is consistent with the individual's age, education, and culture. Language performance can be measured by various standardized tests, such as those that assess vocabulary, grammar, comprehension, and

[1]Core regulations in the Czech Republic are mainly vyhláška č. 72/2005 Sb. o poskytování poradenských služeb ve školách a školských poradenských zařízeních, ve znění vyhlášky č. 116/2011 Sb., vyhláška č. 27/2016, the EUs Mutual evaluation of regulated professions Overview of the regulatory framework in the health services sector – psychologists and related professions Ref. Ares(2016)2257345 - 13/05/2016. Similar regulations are being put forward worldwide in order to better regulate who can administer a particular psychological diagnostic/performance test under specific conditions. The internal regulations also imply that all used diagnostic tools should include verification or a test study supporting any psychometric validity and reliability of a particular psychological test or battery used.

[2] Questionare for psychologists and administrators of test is available at https://sites.google.com/view/gauk316722

fluency. In addition to these objective measures, language performance can also be evaluated subjectively based on the individual's ability to communicate effectively and appropriately in social interactions.

Factors that can affect language performance include cognitive abilities, such as memory, attention, and executive function, as well as social and emotional factors, such as motivation, self-esteem, and anxiety. Additionally, the cultural and linguistic background can also impact language performance, particularly in individuals who are bilingual or multilingual. Language-based diagnostic tools can be helpful in identifying language disorders or delays, such as developmental language disorders, specific language impairments, or language-based learning disabilities. They can also be useful in determining the appropriate treatment and intervention strategies for individuals with language difficulties.

It is important to note that language-based diagnostic tools should always be administered and interpreted by qualified professionals, such as speech-language pathologists or psychologists, who have expertise in language assessment and diagnosis.

The main research questions of the research project questionnaire screening are the following: *What are the main obstacles to the use of properly standardized diagnostic methods in professional practice? Who decides on the purchase and use of the tool, is there a comprehensive procedure, the effect of authority, custom or economic factors? Who performs and can perform psychodiagnostic/administration tools? Which institutions are responsible for the quality of the instrument? Is there a real demand for a controlling body that can recommend/review psychodiagnostic tools? How should such a body function and from what should it draw its authority? What are the most frequently used tools in pedagogical-psychological practice? What performance language tools are the most used in practice? Do frequently used tools meet psychometric standards? Is the proposed and frequently used diagnostic method sensitive enough to detect the problem?* Some of these questions have been answered already with the catalogue of psychological diagnostic tools since these are widely used in practice and therefore can be analysed further.

Another partial goal is to map and catalogue the most frequently used psychodiagnostic tools, which include items that are related to language performance and then process them into a single overview study, which this article contains.

Based on the collected data, a digital repository catalogue of diagnostic tools[3] and methods has been created for the end user (psychologist, education psych major, teacher, special educator, etc.) for specific use. The monitored sample contains 74 psychological tests and the final number will be growing in the future (see the appendix of this article for the list of the included psychological diagnostic tests). The sample was filtered and processed via the

[3] 46 のテスト機器とその専門記事、レビュー、専門マニュアル、いくつかのテスト バッテリーを管理する国内外の組織の推奨文書 (APA、ミシガン大学、MSMT-13319/2019-1、PedF CUNI 診断機器アーカイブ、American Guidance Service, Inc . , 京都大学京都大学, UC Berkeley, FSS MUNI Test Forum, Universität München). カテゴリ: 名前、略語、タイプ、分類、標準化、標準化のサンプル、改訂、チェコ共和国で利用可能、チェコ共和国での標準化、発行国、グループ管理、価格、通貨、評価、サブテストの数、および年齢グルー. A preview of the catalogue available at https://docs.google.com/spreadsheets/d/1CrR7oSxh715pSctkh8rX18KJJv1tm69o/edit?usp=sharing&ouid=109248543351033847896&rtpof=true&sd=true. See also appendix of this article for the list of diagnostic tools included

PRISMA[4] methodology standard. The following flowchart illustrates the overall inclusive criteria process.

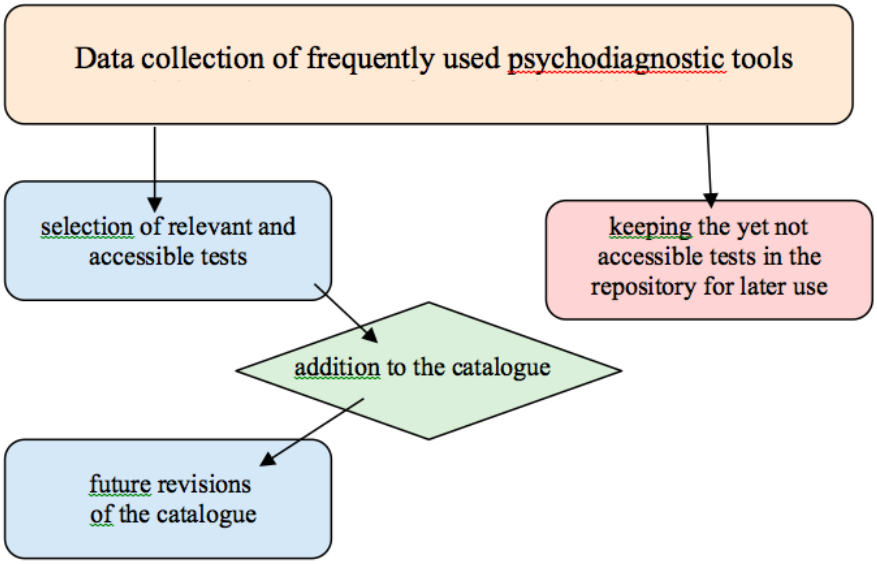


Figure 1: Flowchart of the psychological test catalogue according to the PRISMA methodology

Based on the flowchart structure we are able to create an online catalogue for psychologists containing categories such as: ID, name, acronym of the test, classification, type of test, year of standardisation, standardisation sample size, year of revision, price, number of subtests and evaluation. We want the catalogue to be able to filter based on these categories as well. Based on these parameters the following UML diagram can be applied:

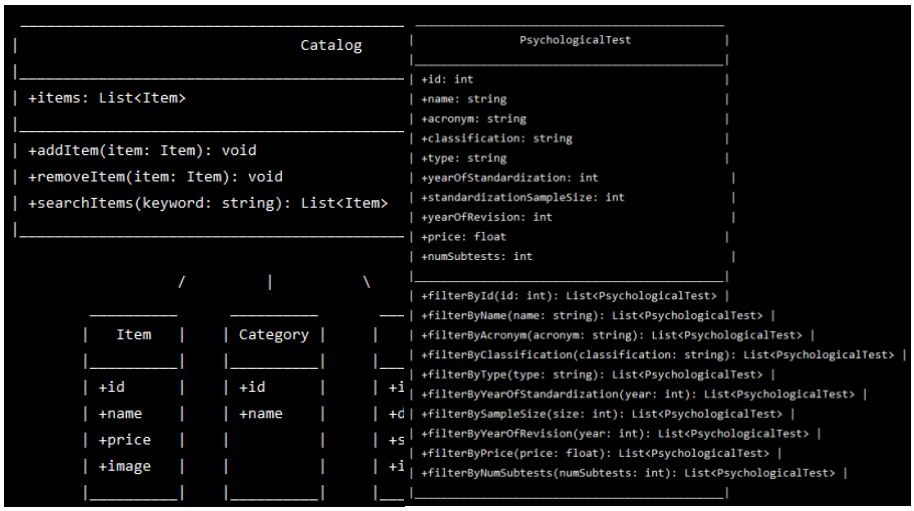


Figure 2: Sample UML for online catalogue

The catalogue then includes also an ad hoc categorisation of the results of reviews and validation studies conducted with these selected psychodiagnostic tools and a framework of 9-scale assessment categorisation has been added to the catalogue, see table 1 for examples.

[4] The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodology is a widely used approach for conducting systematic reviews and meta-analyses in various fields, including health sciences and social sciences. Published in the PLoS Medicine article titled "Preferred Reporting Items for Systematic Reviews by Moher et al., published in 2009. Accesible via: http://www.prisma-statement.org/

Evaluation/assessment criterion	**Catalogue grade**
Suitable for self-examination without supervision in the application area(s) defined by the distributor.	1
Suitable for supervised use in the area(s) defined by the distributor, by any user with general competence in test use and administration.	2
Only suitable for use by an expert user under controlled conditions or in very limited application areas	3
Suitable for use in the area(s) defined by the distributor by users who meet special qualification requirements.	4
poor ratings, inadequate, insufficient	5
Research tool only. Not for practical use.	6
It requires further development. Suitable for research use only.	7
Possible administration by a teacher/spec. teacher in the language field	8
Assessment/Validation study or review not yet conducted	9

Table 1: 9 point scale assessment categories of the included psychodiagnostic tests

As it is apparent from the scale, we counted in cases where the psychodiagnostic tests are suitable for open access and self-examination, as well as those which are only suitable for supervised use. Some frequently used diagnostic tools however are lacking a review study, or one has not yet been conducted. Such case has been found in 9 out of all tests and batteries (namely TEWL-2, TNL, TWS-5, Word test 2-E, Word test 2-A, DAR-TTS, ZAREKI, T-239, Czech DysTest). The vast majority (23 tests out of 74 total) scored evaluation 3, meaning such tests are suitable only for use by an expert user under controlled conditions or in very limited application areas, which was an expected outcome (see the appendix for details), especially for tests such as WAIS, CELF, MMPI, etc.

The catalogue has recently been added with aptitude tests such as MLAT, PLAB, LLAMA, CANAL-F, DLAB, VORD, Hi-LAB, MENYE (see the appendix table of catalogue tests for details) which all contain units or subtests that measure different aspects of language learning aptitude, including phonological memory, working memory, grammatical sensitivity, and language analytic ability. The subtests are administered in a fixed order, and there are scheduled breaks between some of the subtests. The test is typically administered in a computerised format, and participants are given detailed instructions and practice items before beginning each subtest. The majority of these unfortunately however are not for commercial use or use in psychological practice (yet) as they were mainly used as a research tool, thus receiving the evaluation grade 6 in the catalogue.

Conclusion

In conclusion, language performance is an important aspect of psychological assessment, as it provides insight into an individual's cognitive functioning, communication abilities, and overall mental health. There are several psychological diagnostic tools that focus on language performance, including language assessment tests, the MMPI (Butcher et al., 2016), the WAIS, the CELF, and the BDAE (Goodglass & Kaplan, 1983). These tests are essential for identifying cognitive deficits, diagnosing language-based learning disabilities and mental health issues, and developing appropriate treatment plans. The use of psychological diagnostic tools focused on language performance is essential in the assessment and

diagnosis of mental health issues. These tools provide valuable information about an individual's cognitive functioning, communication abilities, and overall mental health, which are critical in identifying cognitive deficits, language-based learning disabilities, and mental health issues such as depression, anxiety, and personality disorders.

The language assessment test, MMPI, WAIS, CELF (Wiig et al., 2013), and BDAE are some of the most commonly used psychological diagnostic tools that focus on language performance. Each of these tests has its own unique strengths and limitations, and their selection depends on the specific needs and goals of the assessment.

For instance, the language assessment test can help identify language-based learning disabilities, while the MMPI provides insight into an individual's personality traits and emotional functioning. The WAIS measures an individual's cognitive abilities, including language skills, while the CELF (Wiig et al., 2013) assesses an individual's language abilities across multiple domains. Finally, the BDAE (Goodglass & Kaplan, 1983) is specifically designed to assess language abilities in individuals with aphasia.

Overall, the use of these psychological diagnostic tools, in combination with other assessment methods, can provide a comprehensive understanding of an individual's mental health status. This information is critical in developing appropriate treatment plans and interventions to help individuals overcome their mental health challenges and achieve their full potential. It is, however, necessary to point out that the categorisation of frequently used tests for specific case use is an essential activity that can help psychologists and education researchers to pick the right test or psychodiagnostic battery with the knowledge of its psychometric properties, data sample used in review study and the standardisation processes.

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Appendix

List of diagnostic tools and batteries added to the digital repository catalogue reported to be in use at the time of publishing of this paper

Title of the psychodiagnostic tool containing language-based subtest/items	abbreviation	Year of publishing
Assessing Linguistic Behaviors Communicative Intentions Scale	ALB	1987
Clinical Evaluation of Language Fundamentals, Fifth Edition	CELF-5	1997
Clinical Evaluation of Language Fundamentals-Preschool, Second Edition	CELF-Preschool 2	1992
Comprehensive Assessment of Spoken Language	CASL	1999
Developmental Indicators for the Assessment of Learning	DIAL-3	1998
Comprehensive Test of Phonological Processing, Second Edition	CTOPP-2	2013
Expressive One-Word Picture Vocabulary Test, Fourth Edition	EOWPVT-4	2011
Expressive Vocabulary Test, Second Edition	EVT-2	1993
MacArthur Communicative Development Inventories-Words and Gestures	CDI	1993
Oral and Written Language Scales: Written Expression	OWLS Written Expression	1996
Peabody Picture Vocabulary Test, Fourth Edition	PPVT-4	2007
Preschool Language Scale, Fourth Edition	PLS-4	2002
Receptive-Expressive Emergent Language Test, Third Edition	REEL-3	2003
Receptive One-Word Picture Vocabulary Test	ROWPVT	2000
Test of Auditory Comprehension of Language, Third Edition	TACL-3	1999
Test of Auditory Processing Skills, 3rd Edition	TAPS-3	2005
Test of Early Written Language 2	TEWL-2	2001
Test of Narrative Language	TNL	2004
Test of Pragmatic Language	TOPL	1992
Test of Written Language, Fourth Edition	TOWL-4	2009
Test of Written Spelling, Fifth Edition	TWS-5	2013
The Word Test 2: Elementary	Word test 2-E	2004
The Word Test 2: Adolescent	Word test 2-A	2005
The Diagnostic Assessments of Reading with Trial Teach Strategies	DAR-TTS	1991
Gray Oral Reading Tests, Fifth Edition	GORT-5	2012

Gray Silent Reading Tests	GSRT	2000
The Nelson-Denny Reading Test of Vocabulary, Reading Comprehension, and Reading Rate	NDRT	1993
Qualitative Reading Inventory, Fifth Edition	QRI-5	1994
Test of Word Reading Efficiency, Second Edition	TOWRE 2	2012
Woodcock Reading Mastery Tests-Revised	WRMT-R	1998
Kaufman Test of Educational Achievement, Second Edition Comprehensive Form	KTEA-II	2004
Wechsler Individual Achievement Test, Second Edition	WIAT-II	2001
Woodcock-Johnson III Tests of Achievement	WJ III ACH	2001
Kaufman Assessment Battery for Children, Second Edition	KABC-II	2004
McCarthy Scales of Children's Abilities	MSCA	1972
Stanford-Binet Intelligence Scales for Early Childhood, Fifth Edition	Early SB5	2005
Wechsler Intelligence Scale for Children, Fourth Edition Integrated	WISC-IV Integrated	2004
Wechsler Preschool and Primary Scale of Intelligence, Third Edition	WPPSI-III	1991
Woodcock-Johnson III Tests of Cognitive Abilities	WJ III COG	2001
Arizona Articulation Proficiency Scale, Third Revision	Arizona-3	2000
Goldman-Fristoe Test of Articulation, Second Edition	GFTA-2	2000
Kaufman Speech Praxis for Children	KSPT	1995
Khan-Lewis Phonological Analysis	KLPA-2	1986
Photo Articulation Test–3rd Edition	PAT-3	1997
Ages and Stages Questionnaires: A Parent-Completed, Child-Monitoring System, Second Edition	ASQ	1980
Test of Problem Solving 3: Elementary	TOPS-3	2005
Vineland Adaptive Behavior Scales, Second Edition	Vineland-II	2005
The Beery-Buktenica Developmental Test of Visual-Motor Integration, 5th Edition	Beery VMI	2004
Bayley Scales of Infant and Toddler Development-Third Edition	Bayley-III	2006
Peabody Developmental Motor Scales, Second Edition	PDMS-2	2000
Snijders-Oomen nonverbalní intelligenční test	SON-R 2½ – 7	2006
Inteligenční a vývojová škála pro děti ve věku 5—10 let	IDS	2009
Test mapující připravenost pro školu	MaTeRS	2013

Diagnostika struktury matematických schopností	DISMAS	2013
Baterie testů fonologických schopností	BTFS	2013
Stanford-Binetova inteligenční škála IV. Revize (T-35)	S-B IV	1960
Test kognitivních schopností	T-22	1998
Neuropsychologická baterie testů ke zpracovávání čísel a počítání u dětí	ZAREKI	2006
Diagnostika specifických poruch učení	T-239	2002
Baterie testů pro diagnostiku specifických poruch učení u studentů vysokých škol a uchazečů o vysokoškolské studium	DysTest	2014
Hamburger Lesetest für 3.und 4. Klassen	HAMLET 3-4	1995
Knuspels Leseaufgaben	KNUSPEL-L	1995
Salzburger Lese- und Recht-schreibtest	SLRT	1997
Würzburger Leise Leseprobe	WLLP	1997
Hamburg-Wechsler-Intelligenztest für Kinder	HAWIK-III	1995
Japanese Dyslexia detection tool of kana characters かな文字の失読症検出ツール	DTVP	2014
Modern Language Aptitude Test	MLAT	1959
Pimsleur Language Aptitude Battery	PLAB	1966
Language Aptitude Tests	LLAMA	2005
Measurement of foreign language learning ability: The CANAL-F theory and test	CANAL-F	2000
Defense Language Aptitude Battery	DLAB	1976
Parry & Child aptitude test	VORD	1990
Doughty et al., Linck et al. aptitude test	Hi-LAB	2010
Magyar Egyetemes Nyelve´rze´kme´ro (Hungarian General Aptitude Test)	MENYE	1996

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The Best Practices in STEAM Education: Using Local Wisdom to Improve Innovators' Competence

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Abstract
It is a challenge for elementary school teachers to design learning activities that blend local wisdom about Thai handicrafts with STEAM education management. Proactive learning management and local wisdom card games are used to help learners develop innovator competencies through the engineering design process. To inspire curiosity and innovation among learners. Take systematic and scientific action and develop innovator competencies in conjunction with local wisdom to develop a learning community for the transfer of knowledge, social processes, and local culture by means of local philosophers. The best practices were studied by 1) local philosophers and 2) teachers from all four regions of Thailand. There were interview forms and questionnaires used for the study. The content analysis of the data revealed that the best practices in STEAM knowledge management using local wisdom to develop innovator competency comprised eight components. 1) Thai cultural communication and local wisdom; 2) engineering design methods. 3) Educational innovations 4) STEAM education learning activities; 5) integrated learning activities 6) Inventions of innovators 7) assessment, and 8) development.

Keywords: The Best Practice, STEAM Education, Local Wisdom

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Introduction

The researcher places a heavy emphasis on how children and adolescents learn. The objective of cultivating student innovation competencies is to promote creativity and attract more academically curious students. It focuses on six characteristics of innovators: a focus on the future, social networking, creativity, project management, content knowledge and practical skills, and personality. A few examples are Wasan Suttawat and Pitak Siriwong (2015), Dyer et al. (2011), Couros (2014), Eriksson (2013), Hackney (2016), and Maeda (2013). The Engineering Theory of Innovation, upon which this study is based, posits that an essential aspect of innovation depends on innovators' analytic reasoning skills (Freeman & Socte, 2013). In engineering, learners must also continuously employ their skills, particularly through the use of the Engineering Design Process (EDP) as a tool for critical thinking and methodical practice, in order to acquire new knowledge. It comprises each of the six aforementioned innovation competencies. This study also references the Social Network Theory of Innovation, which was derived from the Engineering Innovation Theory, in order to establish a connection between learning and the development of innovative competencies. The establishment of a network for the transmission of information via traditional healers, local sages, indigenous groups, etc. (McMarsh, 2000).

Various learning activities, such as the study of the integrated STEAM Education curriculum, are implemented to help students improve their abilities. It is a learning management system that encourages students to solve problems and adapt to 21st-century changes. STEM education is the foundation of STEAM education. STEAM education makes a compelling argument for fostering creativity by extending STEM education by incorporating art disciplines to improve the efficacy of the right brain. And cultivate student satisfaction in accordance with the function of both hemispheres of the brain and, consequently, the growth of reasoning. According to Kim & Park (2012), p. 693-698, creativity and thinking go hand-in-hand with the development of cognitive abilities (Hellige, 1990). Utilizing liberal arts increases students' math and science learning achievements. In addition, learning is lasting due to practical application and tangible innovation.

According to Ostler (2012) and Supak Olapiriyakul (2019), the advancement of technology has caused education to take the form of STEAM education. And the requirement to enhance students' knowledge and abilities so that they have more applicable knowledge and abilities Therefore, the researcher focused on the development of learning activities. In other words, the Engineering Design Process (EDP) plays a significant role in STEAM-based education. It is the process of designing educational activities that encourage students to think synthetically. Students' problem-solving skills should be honed through creative thought, especially for situations that arise in everyday life. The engineering design process is an indispensable instrument for fostering systemic thought. Extend the students' knowledge and perspectives by encouraging the growth of creative and analytic thought, which will enable them to solve a variety of problems exhaustively and accurately using original ideas that will lead to the development of new technologies. And enhance the performance and aptitude of students in accordance with the characteristics that students of the 21st century should possess (Suthida Karimi, 2017: 24). Six phases comprise the engineering design procedure: Identification of the problem; Researching Related Data 3) Solution Creation 4) Construction and Planning Evaluation, testing, and design enhancement; and presentation. The engineering design method can be adapted to the requirements of the learner. or approaches to problem-solving and developing innovations that meet customer needs (Ozkan & Umdu Topsaka, 2021; Sutida Karimi, 2017, pp. 23–34).

It is a fascinating concept to use indigenous knowledge as a learning instrument. Because the modern generation is found to be interested in the social realm and to neglect it. As a corpus of information or a means of assisting locals with problem-solving, local knowledge is not given much weight. As a result of ongoing transmission from ancestors Residents of the area are the owners of the intellectual property. For locals to coexist in harmony, they must learn and transmit a way of life through rituals, cultures, and traditions through the social production process. Saneh Jamrik (1998) and the National Education Commission's Office (1998) Through STEAM education, students have the opportunity to study by applying local knowledge to learning administration and skill development. Develop your innovative and critical thinking skills. The local significance is valued by the students. Bahri et al. (2017) found that cultivating coffee trees in East Java necessitates a combination of STEAM education and indigenous knowledge. Indonesia can enhance academic performance. Similar to the research conducted by Oktoriyadi (2020), which combines STEAM education with regional knowledge from Indonesia, such as zoning, architecture, customs, and folk melodies. Additionally, instruct students in the cognitive, affective, and psychomotor domains.

Based on the study of related research cited above, Thus, the researcher recognizes the significance of preparing students to be innovators in all six areas by coordinating a learning management process using steam education and local knowledge. This study seeks to develop students in basic education. Focusing on the upper elementary level in the Bangkok region, including institutions under the university Office of the Private Education Commission Bangkok Education Office and Bangkok Primary Educational Service Area Office, can impart local knowledge. Incorporating village academics from the four regions into the design of the learning management unit In order for students to be able to innovate through learning in accordance with the STEAM education approach and engineering design process. Students learn independently. Encourage the self-learning of students. Therefore, the research team is interested in establishing a set of learning management activities using STEAM studies and indigenous knowledge to promote innovators' competence. For Senior Students in Elementary School.

Literature Review

STEAM education

STEAM education is a learning management system that encourages students to solve problems and adapt to 21st-century changes. Incorporating arts subjects (Arts: A) in addition to STEM education, which concentrates on developing left brain skills in numbers, calculation, reasoning, and science. Consequently, STEAM education excels at stimulating creativity and increasing the satisfaction of the students. This reflects the function of the two brains that alternately collaborate. Therefore, the development of both reasoning and creativity is necessary for the growth of cognitive abilities (Hellige, 1990; Kim & Park, 2012). In addition, Ostler (2012) and Supak Olapiriyakul (2019) discussed the significance of steam studies, which Ostler (2012) and Supak Olapiriyakul (2019) outlined. As a result of technological advancements, learning in the form of steam education has occurred. And the necessity to improve students' practical abilities and knowledge.

Local wisdom

The Royal Institute Dictionary (1999, p. 619) and Angkul Somkanay (1999, p. 264) define the term "local wisdom" as the knowledge, ability, and experience of villagers acquired through a lifetime of living and learning. Connecting with one another in all fields Not divided into disciplines Combine and interconnect them all. by transmitting knowledge acquired through the development process in accordance with the times. This is consistent with Samart Chantrasoon's (2000, p. 12) assertion that villagers can conceive of anything based on their potential. And it can be used to solve local problems in a contemporary manner. considered to be intelligent It is all the villager's knowledge."

Engineering Design Process; EDP

Because it encourages students to think synthetically, the Engineering Design Process (EDP) is an integral component of both STEM and STEAM education. Along with creative thinking in order to develop individualized problem-solving skills, particularly in commonplace problem situations.

Suthida Karimi (2017, p. 23–27; Keane & Keane, 2016; Khine, 2019; Ozkan & Umdu Topsaka, 2021) described the six-step engineering design procedure. Adaptable to learners' or problem-solving methods' ways of thinking and capable of innovating in response to requirements.

Suthida Karimi's (2017, p. 24) six-step engineering design procedure Step 1: Problem Identification Step 2: Search for Related Information Step 3: Step 4: Planning and Construction Steps 5 Testing, Design Improvement, and 6 Presentation.

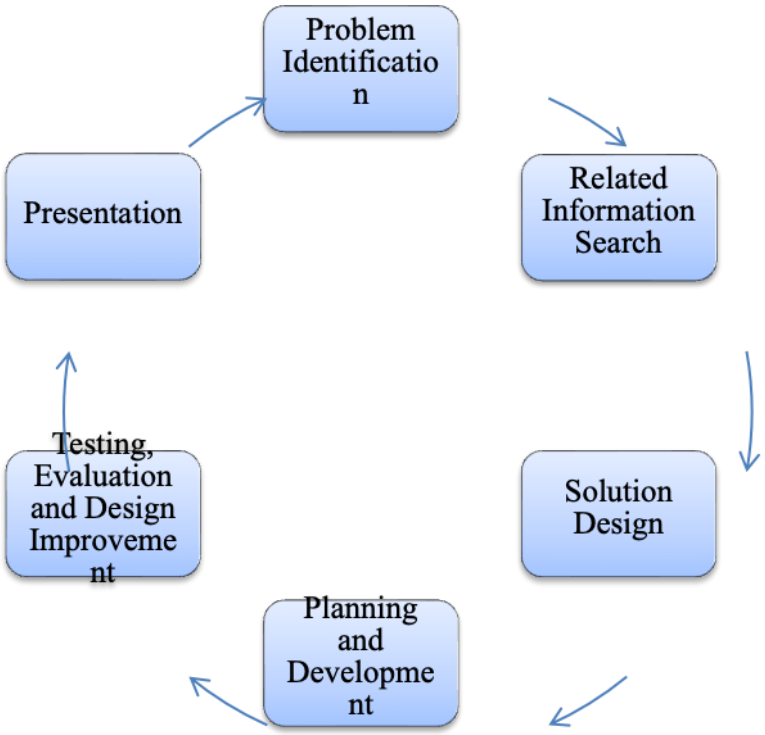


Figure 1: Suthida Karimi's (2017, p. 24) six-step engineering design procedure is depicted in this diagram

Conceptual Framework

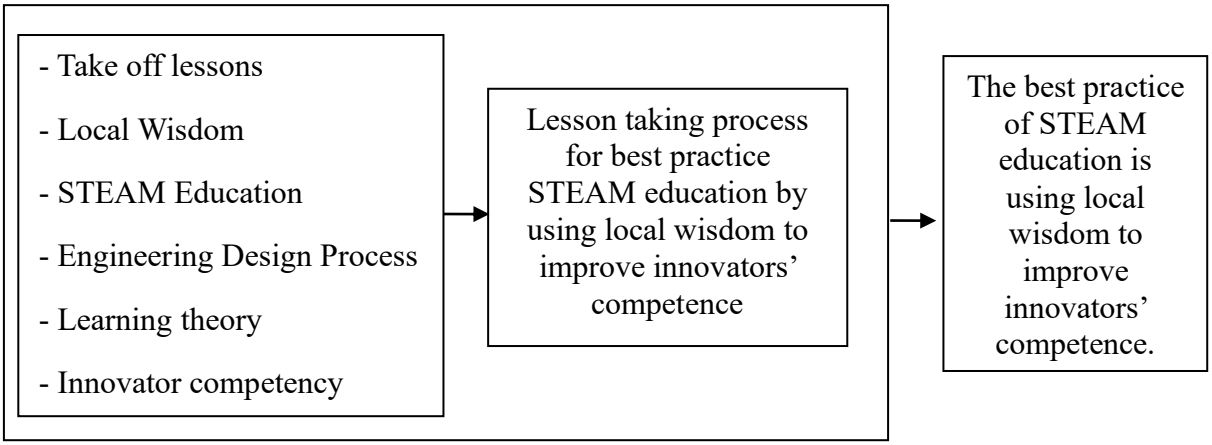


Figure 2: Conceptual Framework

Thailand is a small country. Asia is a tourism destination. On the basis of knowledge, culture, and custom, Thailand can be divided into four major regions. Thailand possesses diverse regional cultures. Every region has a unique identity. Thailand can be divided into four distinct regions, each with its own characteristics. Additionally, the handicrafts are intriguing. Crafts created for the purpose of preserving local traditions and culture.

The Bangkok's and other metropolitan areas' pupils continue to lack knowledge of crafts. Students continue to be unaware of local knowledge. Additionally, there are problems with learning management due to students' lack of creative thinking. Science's technological and procedural proficiency Consequently, this is where the research began.



Figure 3: Diagram showing examples of local wisdom

The initiative investigated in this study In order to develop learning management principles that encourage student innovation, fundamental information has been analyzed. Using information from four geographic regions: 1. elders knowledgeable about local wisdom; and 2. educators involved in the supervision of the learning process for STEAM education Faculty of Education administrators, educators, and instructors, as well as supervisors and graduate students.

Examine the perspectives of those who contribute to local knowledge. Examining the perspectives of local wisdom practitioners and educational personnel involved in learning management in educational institutions It is the application of study results, document analysis, and document synthesis as guidelines for examining opinions. By developing an interview form and a survey to collect opinions on local wisdom. In order to obtain in-depth knowledge, specificity is required. Four regions comprised the research areas: the northern, central, northeastern, and southern regions.

Each region contained the provinces of Khon Kaen, Chiang Mai, Suphan Buri, and Surat Thani. Bangkok was acquired by deliberate selection. 45 individuals were interviewed (people involved with local wisdom and educational personnel engaged in learning management in educational institutions via local wisdom). 100 individuals (those involved with local wisdom and educational personnel involved in learning management in educational institutions through local wisdom) responded to the survey.

Methodology

Procedure

1. Examine concepts, theories, and fundamentals
2. Examine the science subject group's content, subject matter, learning standards, indicators, learning outcomes, and fundamental learning subject matter. The Fundamental Education Core Curriculum
3. Examine the method of learning management with STEAM; examine using indigenous knowledge to promote innovator competency
4. Examine the perspectives of those involved in local wisdom
5. Lesson transcription procedure Visit the area and examine preliminary data gathered through in-depth interviews
6. Based on information gathered from in-depth interviews with village sages and pedagogical personnel in four regions of Thailand, five areas were identified
7. Include information gathered through interviews and questionnaires

Interview questionnaire and form

1. Examine concepts, theories, and relevant research
2. A questionnaire and interview form were created for the research project consultant to review the content's accuracy and completeness
3. Adjust the language of the acquired queries to be more succinct and clear before applying them in accordance with the suggestions of the experts
4. Modify interview forms and questionnaires based on the suggestions of experts. The modified questionnaire was then utilized to acquire actual data
5. Data Acquisition
6. Data analysis

Procedure

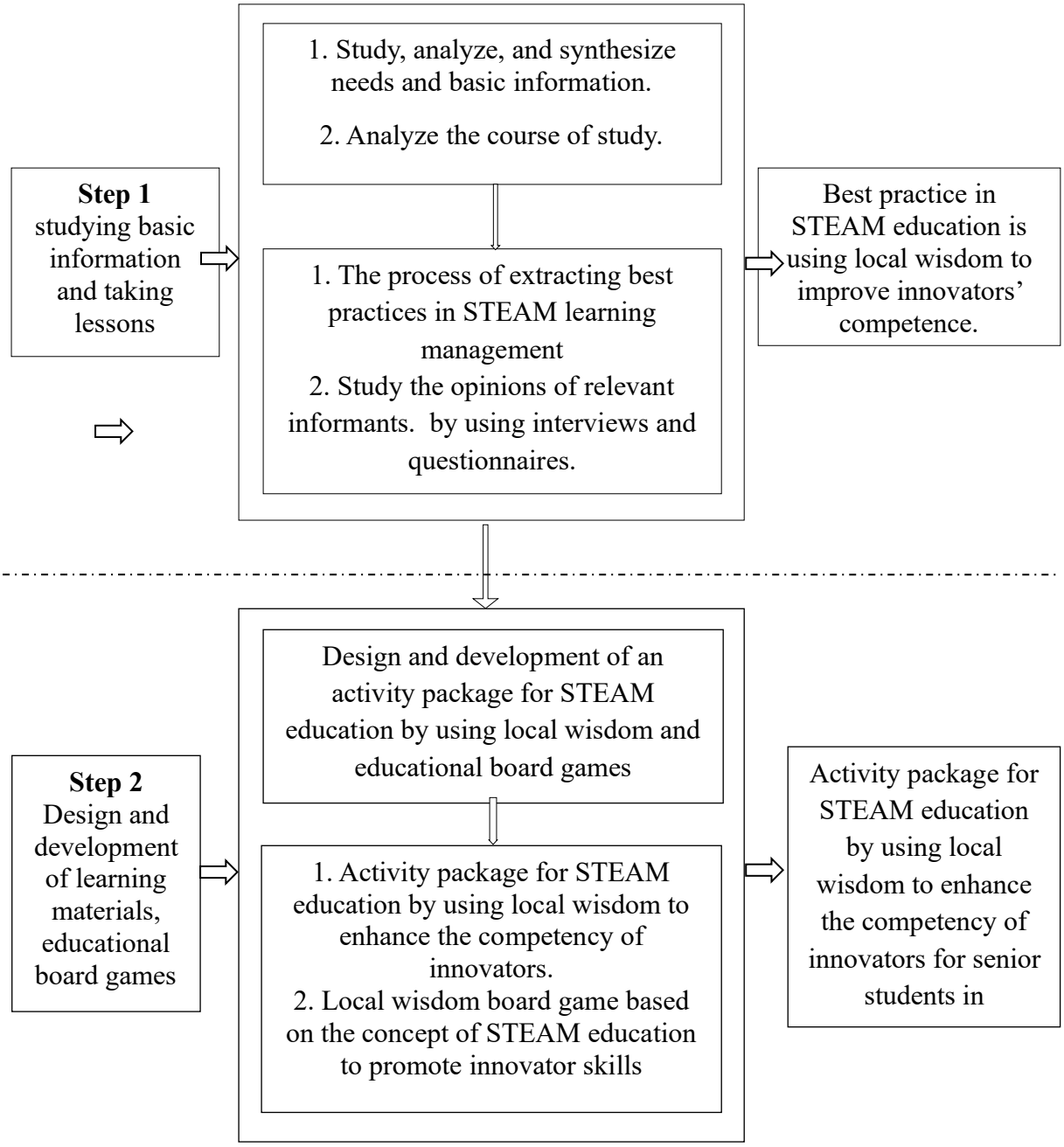


Figure 4: Procedure

Discussion

The best practices in STEAM education knowledge management utilizing local wisdom to cultivate innovator competency consisted of eight components. 1) Thai cultural communication and local wisdom; 2) engineering design methods. 3) Educational innovations 4) STEAM education learning activities; 5) integrated learning activities 6) Inventions of innovators 7) assessment, and 8) development.

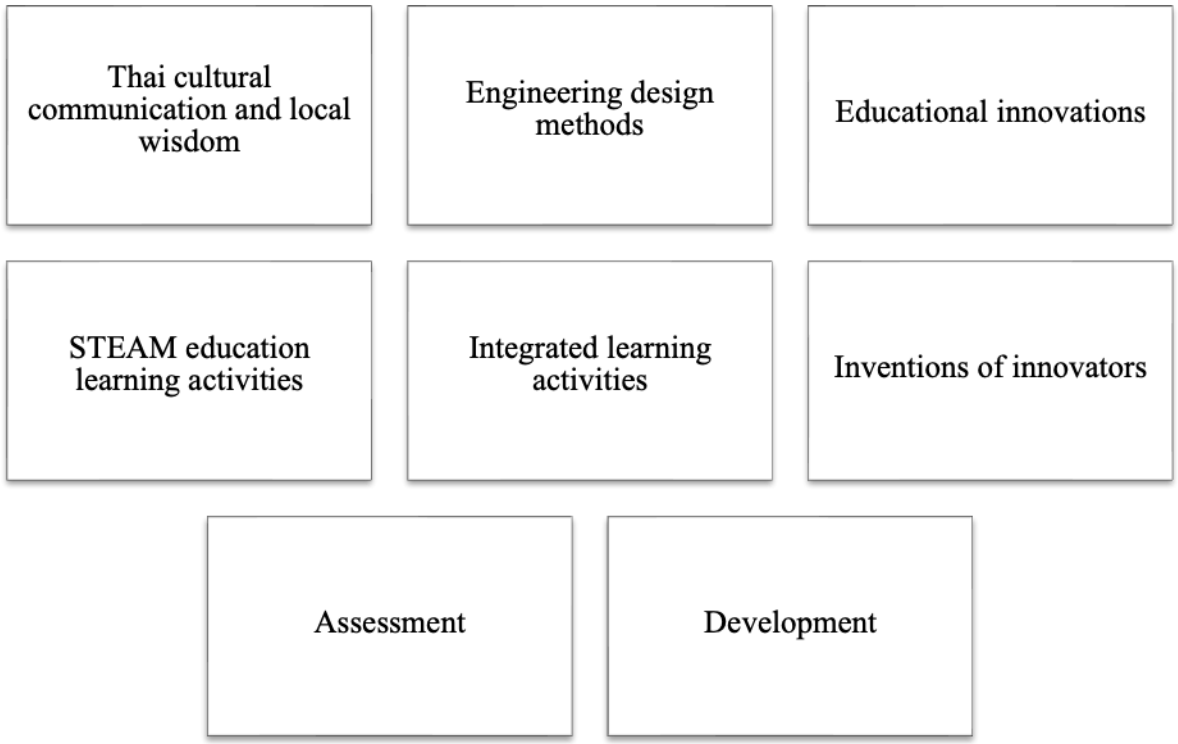


Figure 5: The best practices in STEAM education: using local wisdom to improve Innovators' competence.

Conclusion

Local philosophers and instructors from each of Thailand's four regions examined the best practices. The research utilized interview forms and questionnaires. The content analysis of the data revealed that the best practices in STEAM education knowledge management utilizing local wisdom to cultivate innovator competency consisted of eight components. 1) Thai cultural communication and local wisdom; 2) engineering design methods. 3) Educational innovations 4) STEAM education learning activities; 5) integrated learning activities 6) Inventions of innovators 7) assessment, and 8) development.

It is a challenge for elementary school instructors to design learning activities that combine STEAM education management with local knowledge about Thai handicrafts. Through the engineering design process, proactive learning management and local wisdom card games are used to help learners develop innovative competencies. To inspire learners' inquiry and creativity.

Create a learning community for the transmission of knowledge, social processes, and local culture by means of local philosophers by taking systematic and scientific action and developing innovator competencies in conjunction with local wisdom.

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Local Wisdom Board Game Based on the Concept of STEAM Education to Promote Innovator Skills

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Abstract
The objectives of this research were: 1) to develop local wisdom board game media based on the STEAM education concept to promote efficient innovators' competency; and 2) to study the level of satisfaction of students towards the local wisdom board game media. Based on the STEAM education concept to promote innovators' competency. The tools used in the research were: 1) learning materials for board games of local wisdom based on the concept of STEAM education to promote innovators' competency; 2) handbooks for learning materials for board games of local wisdom based on the concept of STEAM education to promote innovators' competency; and 3) a questionnaire to measure students' satisfaction towards learning media for local wisdom board games based on the STEAM education concept to promote innovators' competency. The sample consisted of fifth-grade students. One study group of 30 students was obtained by simple random sampling. The results showed that evaluation results of the quality of learning media, board games, and local wisdom based on the concept of STEAM education promote innovators' competency. The quality is very good. And the students were satisfied with the learning materials, board games, and local wisdom based on the concept of STEAM education to promote innovators' competency. At the most satisfactory level.

Keywords: Board Game, STEAM Education, Local Wisdom

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Introduction

Thailand is changing swiftly today. It is a continuous consequence of entering the era of the industrial revolution. Adaptability to change is a challenge the world faces. Therefore, the drive for Thailand's 4.0 policy (Thailand 4.0) is of vital importance. Human resource capital that is able to adapt to such changes will be the determining factor in the ability to deal with global change. Australia, the United Arab Emirates, and Israel ranked first, second, and third, respectively, in the 2017 International Institute of Management's International Entrepreneurial Skills Rankings, while Thailand placed twenty-first. Thailand ranked 34th in terms of quality of life, while Norway, Switzerland, and Austria rated first, second, and third, respectively (IMD: 2017). In 2018, it was determined that Lithuania, the United Arab Emirates, and Israel ranked first, second, and third, respectively, while Thailand ranked twenty-fourth. Thailand was ranked 37th in terms of quality of living, behind Austria, Norway, and Switzerland. First, second, and third, with Thailand falling in both categories. It was also determined that the country ranked 53rd in terms of national income deficit and 49th in terms of investment impact. (IMD: 2018) Thailand's prior national development has emphasized economic prosperity. The development of information technology by placing a premium on innovation and introducing new products. Promoting scientific process skills is the starting point for developing science teacher students' practical skills and critical thinking skills in order to extend to the creation of learning materials. Educational Board Game Design Learning Management Design Science Learning Activities to Expand Youth Access Therefore, it should be encouraged to integrate the development of scientific process skills into the process of learning management. For young people to recognize the significance of honed practical skills and imaginative thinking abilities So as to integrate and apply the design of learning management in daily life. Therefore, learning management that emphasizes empirical process skills should be prioritized. As a result of enhancing the skills of higher education students in the field of education.

Educational resources Educational board games Students pay close attention to board games as a form of learning media. Because the game's content is challenging, entertaining, and enticing, it also serves to promote the players learning in the following ways: 1) Develop pondering skills (pondering skills) Board games can aid in the development of learners' information-gathering skills. From comprehending the objective of the activity to remembering the norms and engaging in critical thinking while playing. 2) Develop problem-solving abilities. (Aptitude for Problem Solving) Board games frequently simulate situations in which participants must solve problems with limited resources and time. When a participant repeats an action at the optimal rate, their abilities will be effectively enhanced, and their self-esteem will also be bolstered. 3) Develop social competencies (social emotional learning competencies). The board games that are played in partnerships or teams which students must be able to divide the tasks and listen to one another's perspectives Consider your own motives. Encourage children to discover the feelings and motives of others. 4) Developing morals (ethical characteristics) Players must adhere to the rules of play during play. When he became corrupt, whether intentionally or unintentionally, he had the courage to acknowledge his error. This is an internal responsibility. and result in self-respect (self-esteem). 5) Developing self-esteem (high self-esteem) when first discovering something Indecisiveness may not be clearly known because not all data can be collected. However, by playing continuously, learners will be able to improve their performance until they reach their objectives (Wachirawit Iamwilai, 2020).

The researcher intends to conduct a study to develop learning media and a board game to investigate local wisdom. to promote innovators' competence As part of the development of a set of STEAM learning management activities, investigate the promotion of innovators' competency through the use of indigenous knowledge. For upper elementary students.

Literature Review

An educational game is an activity designed to help students develop their observational and logical reasoning skills. that are distinct from common games Generally, games will emphasize the importance of enjoyment. relationship and delight, but an educational game Will emphasize the significance of transformations within the individual. and cause external modifications. There are a variety of game-based learning formats, including board games, introduction games, assessment games, and recreational games, among others. The educational value of board games After the students have completed playing the game, a transcript of their reasoning will be provided. that throughout the game Why each character determines to act, why, and how events in the game can be related to real life to see each other's perspective (Nuchanat Nuchmee, Naruemon Sirawong, Kanokkorn Chantarungphak, 2021). The majority of board games foster decision-making skills, communication, interpersonal relationships, and a desire to hear others' perspectives.

Using board games as an instructional medium is a method for achieving learning objectives with students. By having students play board games according to the rules and conveying the contents and information of board games, you can teach them about board games. The learners' playing behavior, playing methods, and board game results were used to summarize their learning in the discussion (Napasri Sueng and Tiparat Sitthiwong, 2020). entertainment for students Players must adhere to the established guidelines. Encourage students to learn, remember, and reflect. Lessons are simple, and abilities for learning how to collaborate are acquired rapidly. The process of working and living together is ongoing. Evaluation of player accomplishments There could be a loss, a triumph, or no match. And there might be positive incentives to participate, such as points, candies, etc., as rewards. In the process of integrating lessons, teaching, or lesson summaries, board games can be used to support instruction. Board game advertising improves intelligence. Students should be able to play board games individually or in groups with straightforward rules. Board games will help students observe, reflect, and reason (Sueng, Sueng, & Sittiwong, 2020).

Utilizing board games for education It highlights the significant potential of the game. To answer the query, learning is enjoyable when it requires action or a decision. and feeling engaged in the conditions, constraints, and outcomes of that decision This is not something easily gleaned from standard lectures. but engaging educational games It's not for pleasure alone. But must still prioritize answering the essential concerns of learning. 1) Knowledge: the learner has acquired the expected knowledge, such as an understanding of the theory of economic cooperation. 2) Attitude: As a result of playing the game, the learner's perspectives on certain topics, such as the limitations of certain actors in society, have shifted. 3) Procedures. Issues learned, for instance, can influence whether or not other participants cooperate (Chananann Areekul, 2020).

Examine the perspectives of those who contribute to local wisdom. Examining the perspectives of local wisdom practitioners and educational personnel involved in learning management in educational institutions It is the application of study outcomes, document analysis, and document synthesis as guidelines for examining opinions. By developing an

interview form and a survey to collect opinions on local wisdom. In order to attain in-depth knowledge, it is necessary to provide specifics. The northern, central, northeastern, and southern regions comprised the four research divisions.

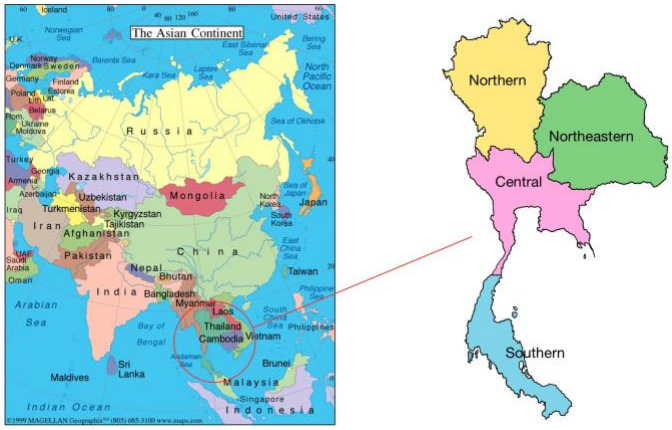


Figure 1: Local wisdom map

Conceptual Framework

Utilizing a learning management system that emphasizes student participation, the researcher has applied the concept of learning development to learners. Learn through enjoyable activities. Active learning management, which involves interacting with a diversity of learning activities through hands-on activities, serves as a conceptual framework for the following research:

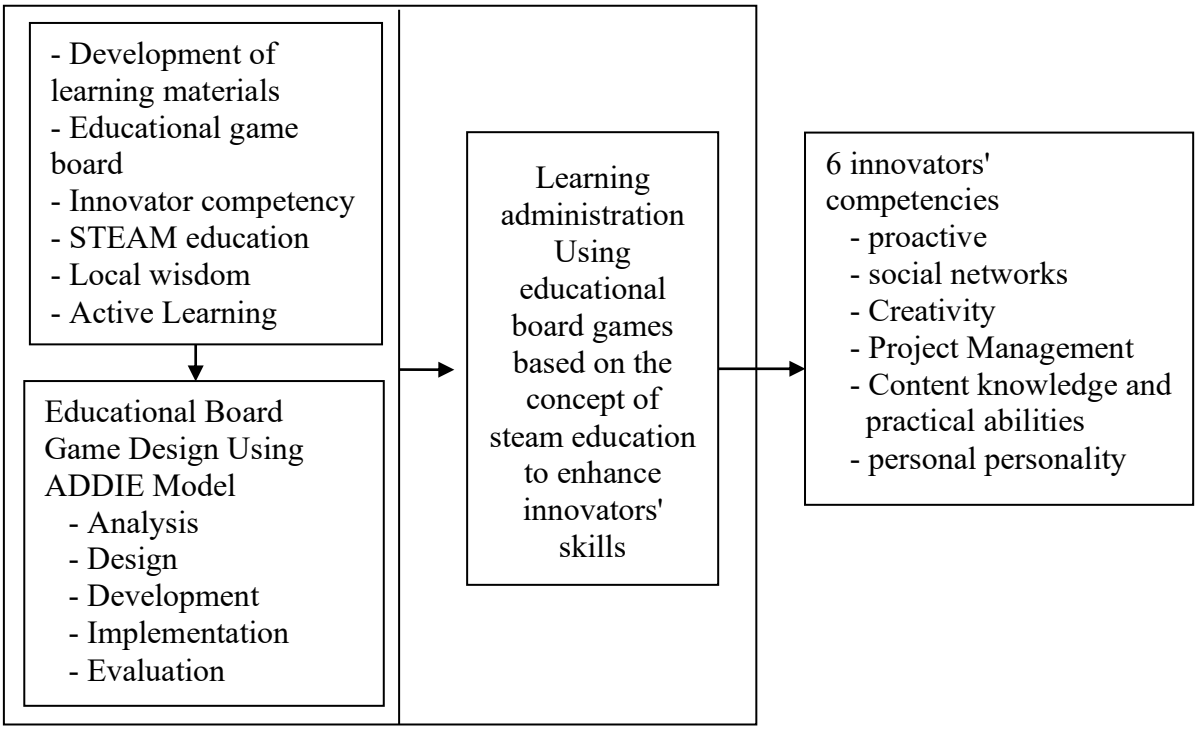


Figure 2: Conceptual Framework

Methodology

Procedure

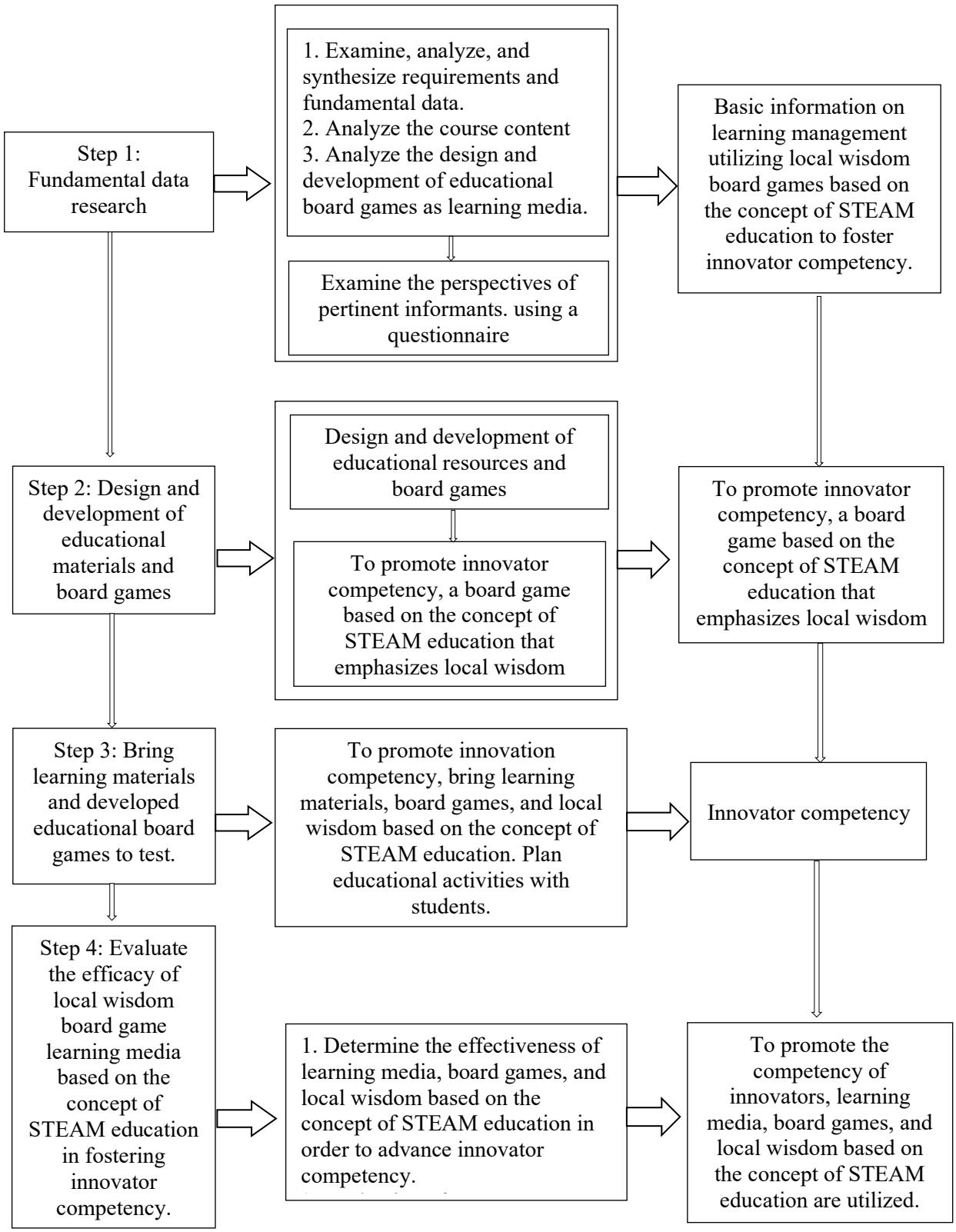


Figure 3: Procedure

Procedure

This research consisted of four steps: 1) a fundamental information study; 2) the design and development of educational board game learning media; 3) the trial use of educational board game media; and 4) the evaluation of learning materials for educational board games.

Steps: 1 A fundamental information study.

1. investigate the concepts, theories, and principles underlying the development of educational materials and board games.
2. Examine the content of indigenous knowledge and the guidelines for creating learning media and educational board games.
3. Examine the perspectives of those involved with educational board game learning materials. To investigate the perspectives of individuals involved with educational materials and board games.
4. Utilize the study's findings, analysis, and synthesis of documents as guidelines for researching the opinions of those involved in learning media and educational board games. And educational personnel engaged in learning management in educational institutions via educational materials and board games Creating interview forms and questionnaires to collect feedback on educational materials and board games Number of interviewees: 30 individuals 30 participants responded to the survey. Gather information in order to construct the next game board.

Steps: 2 The design and development of educational board game learning media.

The research tools consisted of 1) educational board game learning media and 2) a questionnaire to measure students' satisfaction with the board game educational media. The steps are as follows:

Educational board game learning media

1. Examine documents and research pertaining to the creation of educational materials and board games. and planning educational activities using instructional materials and educational board games.
2. Examine the content specifics.
3. Development of educational materials and board games.
4. Using the ADDIE Model, this investigation developed an educational board game.
5. Bring along educational materials and game boards. Validate the content's appropriateness, the language's usage, the coverage, and the objectives' conformity. then make improvements.
6. Bring learning materials and educational board games for evaluation by five specialists. The specialists are experts in the creation of instructional materials and pedagogical board games.
7. Bring learning materials and revised educational board games to test with sixty students in order to improve.
8. Introduce instructional materials and educational board games.

Examples of local wisdom board games



Figure 4: Examples of local wisdom board games

A questionnaire to measure students' satisfaction with the board game educational media

The satisfaction survey was used as a measure of sentiment. Students have both positive and negative opinions of learning materials and educational board games. which seeks to measure the satisfaction assessment form's behavior The researcher determined the behavior to measure based on five factors: 1) learning media components, educational board games; 2) learner performance; 3) STEAM education concepts; 4) local wisdom; and 5) classroom environment. Using instructional materials, educational board games, and number 25 items in accordance with the steps below:

1. Examine the concept of developing a satisfaction evaluation form. and developing a satisfaction survey covering the content and objectives.
2. Develop a satisfaction evaluation form that expresses emotions. Students have both positive and negative opinions of learning materials and educational board games. The

researcher establishes the measurement of behavior based on 5 factors with 5 items for each category, for a total of 25 items.
3. Present the satisfaction evaluation form to the research project consultant for verification of its contents.
4. Utilize the customer satisfaction evaluation form to evaluate the Index of Concordance by having five experts evaluate the questions' validity in terms of their content and clarity.
5. Twenty questions from the revised satisfaction assessment questionnaire were administered to 60 students, per the recommendation of the expert.
6. Using Cronbach's alpha coefficient procedure, the confidence value of the entire version of the satisfaction rating was calculated; this yielded the confidence value of the entire version. and to truly use the customer satisfaction survey.

Steps: 3 The trial use of educational board game media.

This research is a quasi-experimental research in the form of One group pretest-post test design.

Steps: 4 The evaluation of learning materials for educational board games.

1. The fundamental statistics used to interpret the satisfaction survey were: 1) mean, 2) standard deviation, 3) percentage, and 4) learning media effectiveness. Using E1/E2 formulas, comprehend the educational game board.
2. To calculate the content validity index (IOC) and to calculate the confidence value of the satisfaction questionnaire, the statistics were used to determine the quality of the instruments.
3. t-tests for dependent samples and t-tests for a single sample were used to verify the hypothesis.

Discussion

The results indicated that student satisfaction with the local wisdom board game in all five categories was as follows: The first aspect of learning media components, educational board games, was at a satisfactory level; the second was learner performance; the third was STEAM education concepts; the fourth was local wisdom; and the fifth was the classroom environment.

Conclusion

The objectives of this research were: 1) to develop local wisdom board game media based on the STEAM education concept to promote efficient innovators' competency; and 2) to study the level of satisfaction of students towards the local wisdom board game media. Based on the STEAM education concept to promote innovators' competency. The tools used in the research were: 1) learning materials for board games of local wisdom based on the concept of STEAM education to promote innovators' competency; 2) handbooks for learning materials for board games of local wisdom based on the concept of STEAM education to promote innovators' competency; and 3) a questionnaire to measure students' satisfaction towards learning media for local wisdom board games based on the STEAM education concept to promote innovators' competency. The sample consisted of fifth-grade students. One study group of 30 students was obtained by simple random sampling. The results showed that evaluation results of the quality of learning media, board games, and local wisdom based on

the concept of STEAM education promote innovators' competency. The quality is very good. And the students were satisfied with the learning materials, board games, and local wisdom based on the concept of STEAM education to promote innovators' competency. At the most satisfactory level. The results indicated that student satisfaction with the local wisdom board game in all five categories was as follows: The first aspect of learning media components, educational board games, was at a satisfactory level; the second was learner performance; the third was STEAM education concepts; the fourth was local wisdom; and the fifth was the classroom environment.

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A Case Study of Pre-service Teachers' Physics Laboratory Skill in Measurement and Uncertainty

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Abstract
In a physics laboratory, an experimental result and its uncertainty are significant because they permit others to evaluate the quality of the experiment. This is the most essential competency for high school science teachers. The purpose of this study was to explore laboratory skills in physics, particularly measurement and uncertainty. Data were collected from pre-service science teachers and pre-service physics teachers during the academic year 2022. The participants were given a measurement and uncertainty exam during class. Their responses were analyzed using the following procedures: reading an estimated value and uncertainty from a measurement, giving the uncertainty from the repeated measurement, propagating uncertainty, and writing the final results. The test revealed that the majority of responses lacked knowledge of uncertainty and the propagation of uncertainty. They provided incorrect answers and were unable to provide reasonable responses. In this work, the results will be discussed, along with the future direction of the research.

Keywords: Physics Laboratory Skill, Measurement, Uncertainty, Pre-service Teacher

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Introduction

An accuracy of an experimental result is essential for the scientific process. Each measurement has an associated uncertainty; therefore, for the accuracy of the interpretation, the measured data need to be accurate and precise. Normally, high school physics courses connect physics theory with practicing in order to help students improve experimental skills (Parappilly et al., 2018; Ruhaisa & Jiradawan, 2018). This is an important skill for physics teachers to help engage the students learning correctly. For our investigation, we found that the students who completed the fundamental physics laboratory courses often neglect the measurement uncertainty. In addition, this can lead to the problem that students consider a data record as a number without interpreting its significant figure (Jirungnimitsakul & Wattanakasiwich, 2017; Ruhaisa & Jiradawan, 2018).

This study investigates the high school physics laboratory skill, in particular, measurement and uncertainty from pre-service science teachers, pre-service physics teachers, and in-service teachers. This practical skill is important for the pre-service teachers to understand how to teach physics laboratory.

Methodology

Participants

Data were obtained in the academic year 2022 from undergraduate students including, 23 pre-service science teachers and 21 pre-service physics teachers. The researches were extended to 11 in-service physics teachers who have an experience to teach high school physics laboratory.

Measurement and data collection

In this study, the Thai version of the measurement and uncertainty test was constructed based on physics textbooks (Taylor, 1997). The test was distributed to the participants during the laboratory class. There were five open-ended questions designed to evaluate students' understanding and skills of measurement and uncertainty. The students were asked to solve and find the final answer to each question. The students were required to complete the test in 30 minutes. The data from the in-service teachers were collected at the same condition. All of their responses were analyzed based on reading an estimated value and uncertainty from a measurement, giving the uncertainty from the repeated measurement, making propagation of uncertainty, and writing the final answers.

The questions

Question 1: The result of measuring the diameter of a five-baht coin by using a ruler is shown in figure 1.

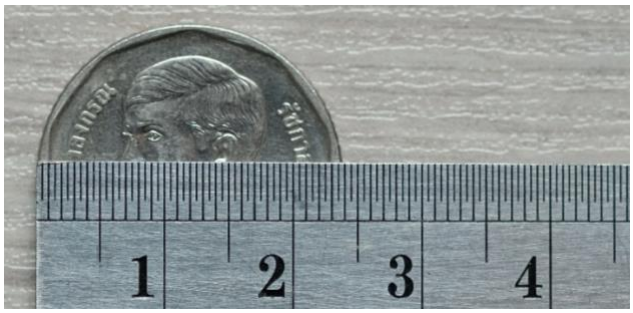


Figure 1: Measurement with a ruler

What is the diameter of the coin including its uncertainty from a single measurement that should be reported in the result?

Question 2: The result from measuring the diameter of a five-baht coin by using a vernier caliper is shown in figure 2.

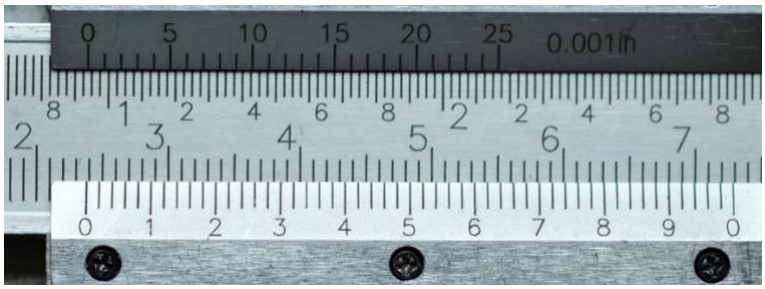


Figure 2: Measurement with a vernier caliper

What is the diameter of the coin including its uncertainty from a single measurement that should be reported in the result?

Question 3: Select the appropriate diameter of a coin, between the answer in Questions 1 and 2, to calculate the area of a coin including its uncertainty.

Question 4: Measure the length of an object. The length of this object should be reported 6 times (in millimeters) with an instrument with an uncertainty of 0.1 mm. The length is measured to be 23.1, 22.8, 22.7, 33.2, 23.0 and 22.6 respectively. How the object length should be reported?

Question 5: The length of the spring hanging in a vertical line with a stand is 56.1 ± 0.2 cm. After that, hang the lower end of the spring with clips, the length of the spring then becomes 59.56 ± 0.06 cm. What is the change in the length of this spring including its uncertainty?

Scoring and analysis

After the process of data collection, the answers of this work were analyzed by giving five marks for a full score. Each question was given one mark for the correct an estimated value and uncertainty. If they provided only the estimated value without the uncertainty, we gave them 0.5 mark. Another incorrect answer was zero. The answers of all participants were marked by the same researcher.

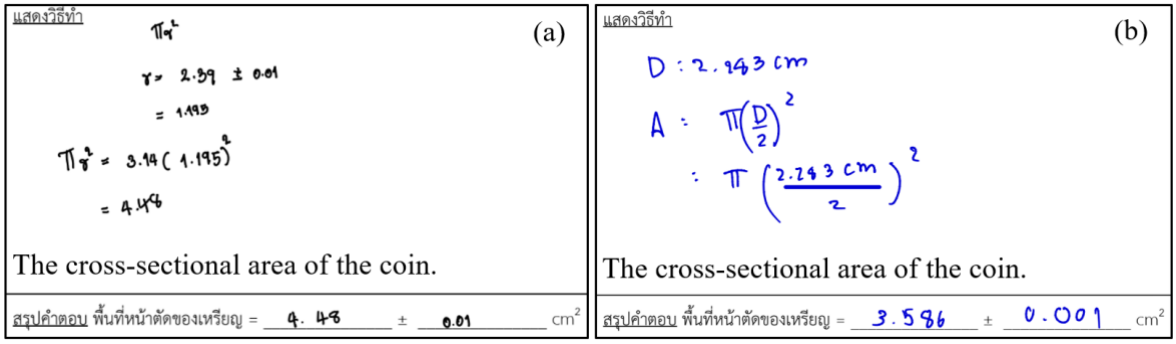


Figure 3: The incorrect answers were from question 3: (a) the answer from pre-service science teachers and (b) the answer from pre-service physics teachers

Results and discussion

Overall, all three groups average scored higher than 50%. In-service physics teachers had the highest average score. The average scores and standard deviation are presented in Table 1. All groups performed the lowest scores on question 3, propagation of uncertainty. Examples of incorrect answer in the question 3 is shown in figure 3. The students handed on the answer without the calculation part of an error and gave the error from the radius *r*. Actually, the possible answer could be 4.471 ± 0.007 cm^2. In this case, they might just understand error of propagation from the theory, but they did have difficulties in applying it to the real context.

Table 1: The mean score and standard deviation for each question in each group

	pre-service science teachers (N=23)	pre-service physics teachers (N=21)	in-service physics teachers (N=11)
Question 1 (a single measurement)	0.74 ± 0.44	0.90 ± 0.29	0.77 ± 0.39
Question 2 (a single measurement)	0.59 ± 0.48	0.86 ± 0.35	0.68 ± 0.44
Question 3 (propagation of uncertainty)	0.35 ± 0.48	0.10 ± 0.20	0.68 ± 0.32
Question 4 (repeated measurement)	0.64 ± 0.22	0.69 ± 0.13	0.75 ± 0.24
Question 5 (propagation of uncertainty)	0.54 ± 0.41	0.62 ± 0.26	0.82 ± 0.39
Overall test (full = 5.00)	**2.86 ± 0.42**	**3.17 ± 0.30**	**4.08 ± 0.37**

From the results shown in Table 1, it can be seen that there is a difference between each group. The in-service physics teacher will have the highest score at 4.08 ± 0.37. The lower scores were the pre-service physics teachers and the pre-service science teachers at 3.17 ± 0.30 and 2.86 ± 0.42, respectively. Comparing the scores in questions 3 and 5 of pre-service science and physics teachers to the in-service physics teachers, we found that the lower scores were from misunderstandings for finding the propagation of uncertainty. These are similar to other studies and important data for using for improving their laboratory skill (Jirungnimitsakul & Wattanakasiwich, 2017; van Kampen & Gkioka, 2021).

Conclusions

The results from the test revealed that the pre-service science and physics teachers had lower skill than the experienced teacher especially the propagation of uncertainty. Measurements and uncertainty are the core of physics, and it is important that the student teachers develop an understanding of this topic for transferring in future teaching. The possible reason is that students lacked studying and practicing the prior knowledge of measurement for high school physics. This may cause their weakness to apply the concept to real situations (José Luis, 1999). The results would be benefit to this research and the other researchers to use as a guideline to improve the quality of teaching and learning physics laboratory for pre-service teachers.

Acknowledgments

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Content and Language Integrated Learning for CSL Students Using a Picture-Book Approach: An Action Research in Hong Kong Kindergartens

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Abstract
This paper examines the function of content and language integrated learning (CLIL) approach in complementary multilingual kindergarten classrooms for non-Chinese-speaking (NCS) children learning Chinese characters in Hong Kong. The module of this study was implemented with a picture-book approach. The participants comprised 28 learners of Chinese in the third year of kindergarten (K3) from both two kindergartens in Hong Kong. The student participants came from Nepal, Pakistan, the Philippines, and India. The participants' learning of vocabulary was tested using a pre-test and delayed post-test design. The results reveal that the CLIL module with picture modulest desighad similar positive effects on both speaking and reading. The lessons were videotaped, and the teachers were interviewed after the one-year intervention. The results of the pre-test analyses are discussed along with how they could inform researchers, and pedagogical implications for teachers are presented.

Keywords: CLIL, Teaching Chinese as a Second Language, Picture-Book Approach

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Introduction

Before Hong Kong's handover to China in 1997, learning Chinese language was not mandatory for South Asian students in government-funded schools as the language subject could be replaced with a European language subject, such as French or German. However, since transfer of sovereignty, 'biliteracy and trilingualism' has officially become the established language policy for education in the Hong Kong Special Administrative Region (HKSAR). The goal is for all residents of Hong Kong, regardless of ethnicity, to develop a reasonably good command of written Chinese and English, as well as spoken Cantonese, English, and Putonghua. Therefore, Chinese proficiency has become an obligatory requirement for Hong Kong citizens. In this regard, ethnic-minority students who were born in Hong Kong are required to learn Chinese like the majority of ethnic Chinese students. However, catering to NCS students with varied Chinese-language capabilities has become a major difficulty for teachers.

According to an annual report from Oxfam (2018), non-Chinese-speaking (NCS) children have 20,000 hours less experience with listening to and speaking Chinese at the time when they are enrolled in Hong Kong kindergartens (at approximately 3 years old) than Chinese children who learn Chinese as their first language. While Chinese children are able to raise their hands and answer teachers' questions in the classroom, NCS children still struggle to comprehend what teachers are talking about. Due to the multilingual and multicultural backgrounds of NCS learners, especially kindergarten learners who are emerging bilinguals, it is difficult to help young NCS learners acquire Chinese in Hong Kong in such a multilingual context. Therefore, this study draws attention to the theory of content and language integrated learning (CLIL) to accommodate NCS children's diverse linguistic practices in a multicultural early-childhood classroom.

This paper examines the function of a content and language integrated learning (CLIL) module in two kindergartens and how their students create a variety of learning spaces through a CLIL module. The implications of CLIL are discussed in the context of language education for NCS learners, along with implications for future research.

Background

Teaching and Learning of Chinese in Hong Kong Kindergartens

In Hong Kong, it is normal for young Chinese children to start to learn basic Chinese characters when they are about 32 months old in their first year of kindergarten. However, learning content through Chinese is very challenging to both teachers and NCS students in Hong Kong kindergartens due to the lack of teaching training and learning materials. Thus, there is an urgent need to find more efficient ways to teach and learn Chinese, which is one of the major reasons why attention is being paid to CLIL. The term 'CLIL' was coined in 1994 by David Marsh and Anne Meijer's (among others) as an umbrella term to encompass a wide range of situations related to 'the experience of learning non-language subjects through a foreign language' (Marsh, 2012: 28).

CLIL is considered to be an alternative path to conventional classroom and is believed to be a way to transcend the perceived weaknesses of traditional teaching. It has become popular, and CLIL programmes have spread all over Europe in the last decade. In the past, learning content through a second language was limited to very specific social groups, but with CLIL

initiatives, a wider range of learners can now have access to this type of language education, not only those from privileged or elite backgrounds (Arantxa, David, 2015). Nevertheless, education authorities need to evaluate these new programmes and research particular projects to find out what the real benefits and limitations of CLIL might be. This is particularly necessary in Hong Kong, where kindergartens have many NCS children, and programmes that promote Chinese learning are often perceived as a new challenge. As a result, those programmes have been considered highly controversial.

This study considers the potential benefits and challenges of implementing CLIL for NCS children in light of existing research. It highlights the relative lack of attention that has been directed towards CLIL at kindergarten levels so far. Furthermore, a particular pedagogy that might be suitable for CLIL implementation with NCS children in Hong Kong is suggested.

Literature Review

CLIL and Second Language Learning

'CLIL is an approach in which a foreign language is used as a tool in the learning of a non-language subject in which both language and the subject have a joint role' (Marsh in Coyle: 2006).

CLIL is a teaching approach in which an additional language is used for the teaching and learning subjects with a dual focus on language and content. According to Coyle et al. (2010), CLIL is a post-method pedagogy model that has been influenced by different theories that have traditionally had an enormous impact on education. Some of the commonly mentioned benefits of CLIL include the triggering of high levels of communication between teachers and learners and among learners themselves, as well as improving overall language competence in the target language, particularly oral skills (Arantxa , David, 2015).

As Brown (2006: 91) notes, there are a multitude of reasons why children may have difficulty acquiring a second language, including complex personal, social, cultural, and political factors. In response to these, the CLIL approach may offer greater and more flexible opportunities to improve language learning. According to Marsh (2000), CLIL offers young learners more realistic and natural opportunities to learn and use an additional language in such a way that they soon forget about learning the language as such and focus only on learning the content.

CLIL and Vocabulary Learning

A widely discussed topic in language acquisition is the learning of vocabulary. Consequently, CLIL approaches have given special attention to this topic. It is argued that in a CLIL setting, there are more opportunities to learn vocabulary because it is used in contexts for real communication. As a result, learning takes place in a more meaningful way. Many studies seem to support the idea that CLIL has a positive effect on the acquisition of general vocabulary of a target language, with receptive vocabulary being more clearly affected than productive (Arantxa, David, 2015).

Nevertheless, more evidence is needed for the impact of the CLIL approach on more specific, content-related vocabulary in both production and reception. In order to fill this gap in the literature, this study examines the content-related vocabulary in both production and

reception in pre-test and post-test phases. The main target is specific content-related vocabulary. Picture books were made based on eight unit topics that are commonly used by kindergartens. The reason for choosing the vocabulary used is that learning vocabulary is one of the objectives of the curriculum. By targeting this particular type of vocabulary, we focus on how well NCS students learn Chinese by CILI approach, which is an area that has not been greatly researched.

Second Language Acquisition Theory

Second Language Acquisition (SLA) theory refers to the study of learning a second or additional language aside from one's first language. The first language is referred to as L1, while the secondary language is referred to as L2 or the target language. Dale, van der Es, and Tanner (2010, pp. 20-21) provide a useful overview of four areas of SLA theory that are relevant to CLIL teachers: input theory, intake theory, output theory, and social models of second language acquisition. Language input theories in SLA emphasize that the input given to learners (the language they read and hear) needs to be meaningful, relevant, and realistic. It should also be at a slightly higher level than the current level of the learner (i+1, where i represents the current language level) (Krashen, 1985). Input theory also recognises that learners will be able to understand more language than they are able to produce in the target language.

Intake theory also focuses on the input learners receive but places more focus on the need for learners to encounter L2 frequently, as well as the time needed to process this language (Long, 1983). Output theory argues that learners have to produce the second language in order to learn it. By speaking or writing, learners can then notice the differences between what they can produce and what they want to produce(Swain, 1985). Furthermore, output theory emphasizes the need for learners to be creative and make mistakes with the second language. Language production is key to learning L2 according to output theories of SLA (Swain, 1995).

CLIL in Early Childhood Education

Marsh (2012) has observed that since the mid-1990s, CLIL has expanded considerably in Europe, where 'early language learning, whether at kindergarten, pre-school or primary, inevitably involved forms of CLIL' (p. 133). He notes a number of new European initiatives to implement CLIL with pre-secondary learners, although it seems that not much data are available on the relative success of any of these, and it is necessary to admit that CLIL 'statistics are particularly hard to obtain on kindergarten and pre-schooling' (p. 175). There have been some specific studies on CLIL with pre-secondary learners (e.g. Buchholz (2007)), but again, they are mostly from Europe, which highlights the general lack of research on CLIL for young learners worldwide.

Part of the reason for this may be that in many regions, there is little practical knowledge about what CLIL and related approaches really represent and how to implement them, not to mention resources to carry out quality educational research. Even where such knowledge and resources are available, CLIL may often be understood as an approach that is more suitable for older children who are already equipped with more advanced academic/cognitive skills, as well as perhaps some competence in the vehicular language. However, it is also the case that CLIL approaches become less CLIL-like with younger children; in other words, educational approaches involving additional languages with younger children have long been

more CLIL-like than is appreciated by many educators (Marsh, 2012). Indeed, Coyle, Hood, and Marsh (2010) emphasize that 'it is often hard to distinguish CLIL from standard forms of good practice in early language learning,' in which children's 'main focus is on the doing – be it playing, singing, drawing, building models, or other activities' (p. 17). This reflects the findings of a European Commission study on teaching additional languages to very young learners (Edelenbos, Johnstone & Kubanek, 2006). Thus, good practice in teaching additional languages to children (see Bialystok, 2008; Cameron, 2001) is indeed also good CLIL practice to a certain extent.

This study considers the potential benefits and challenges of implementing CLIL for NCS children in light of the existing research. The study highlights the relative lack of attention that has been directed thus far towards CLIL in early-childhood education in Hong Kong. There are few research-based empirical studies that investigate the function of CLIL with a picture-book approach, particularly among NCS children. Therefore, the main aim of this action research is to investigate the impact of CLIL on learning Chinese characters among NCS students in Hong Kong kindergartens.

Methods and Participants

The Action Research

The present study is based on the hypothesis that a CLIL picture-book approach can help students with learning Chinese characters in a more effective manner than the traditional educational methodology. Two kindergartens were examined with regard to Chinese language teaching. The research questions are the following:

1) Can CLIL with a picture-book approach facilitate the learning of Chinese characters among NCS kindergarten students?
2) What is the function of CLIL for NCS children's learning of Chinese in Hong Kong kindergartens?

The participants in this study were 28 learners in the third year of kindergarten (K3) from two kindergartens in Hong Kong. The student participants came from Nepal, Pakistan, the Philippines, and India. An action research method was used to compare the performance of these NCS learners with respect to three aspects of Chinese character mastery: shape, sound, and meaning recognition. Data obtained from lesson observations and recordings of student interactions during the lessons. Audio and video recordings were taken, and semi-formal interviews were conducted with both of the teachers involved. All teacher participants were formally interviewed twice per year, and the researchers took detailed notes. Student work samples and other items were collected from the school and classroom, and video or audio were recorded from lesson observations and classroom discourses for detailed analysis.

Planning and participants

Two kindergartens (A and B) collaborated with us in this project. The students of Kindergarten A are entirely NCS children , whereas those in Kindergarten B are mainly local ethnic Chinese children. Prior to the trial teaching, staff of the research team visited the two partner schools to understand their usual teaching situations, prepared teaching materials and discussed the arrangement of the pre-test with the schoolteachers . The time schedule and arrangement of teaching materials were decided according to each kindergarten's school-

based curriculum. In addition, samples of NCS students' exercises and tests were collected to prepare for the comparative analysis in later stages. 20 NCS children from Kindergarten A and 8 NCS children from Kindergarten B took part in the pre-test and the post-test.

The curriculum content of CLIL approach

When organising curriculum content, fragmented and trivial learning content is not recommended, and in order to connect different learning area the researcher team had select familiar experiences or events related to children's daily life as the learning themes based on their interests, pace of development, abilities and prior knowledge. Featuring the 4 C elements of CLIL suggested by Coyle et al. (2010), the aim of the curriculum is to develop NCS students' interest in learning Chinese characters and culture, as well as to reinforce their understanding of Chinese language. The CLIL approach was taken as a reference for the character recognition strategy used in this study to examine the effectiveness of this approach in assisting NCS students' acquisition of Chinese characters. As a result, the existing Chinese character-recognition pedagogies can then be reflected upon and modified. The theoretical framework of the CLIL picture-book approach for Chinese characters is shown in Figure 1.

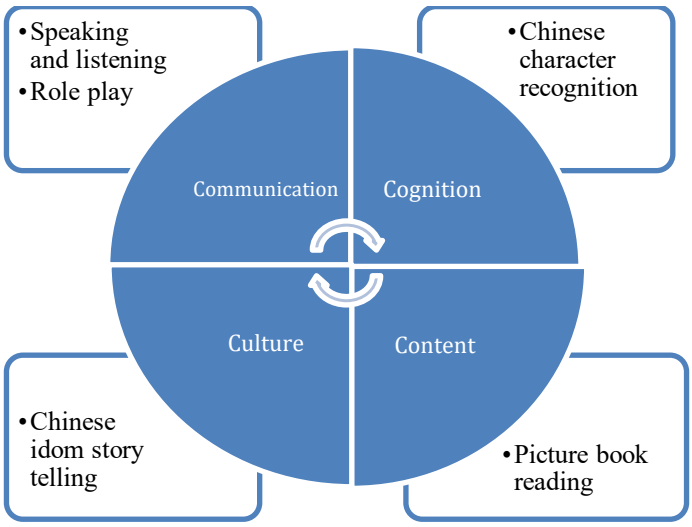


Figure 1: The theoretical framework of CLIL with picture-book approach for learning Chinese characters

Chinese Picture Books and Related Learning Materials

The contents of our picture books were based on eight unit topics that are commonly used by Hong Kong kindergartens. An integrated approach that coherently connects different learning areas, e.g. schools, families, friends and relatives, food, transportation, community, four seasons and festivals, etc. were adopted to facilitate a balanced development of children in the domains of ethics, intellect, physique, social skills. The picture book themes consists of a series of learning experiences (See Figure 2: The themes of picture books connecting different learning areas with an integrated approach).



Figure 2: The themes of picture books connecting different learning areas with an integrated approach

The Rationale for Using Picture Books

Picture books are an important medium through which young children acquire new language and concepts (Strouse, Nyhout, & Ganea, 2018). Recent research on picture books has attempted to identify what features of such books support or hinder children's learning and transfer of information to the real world (e.g., Ganea, Pickard, & DeLoache, 2008; Ganea & Canfield, 2015). Looking at picture books can be considered as an early form of reading. A picture book tells stories through pictures and words, and its visual and intuitive style of presentation matches the psychological features of children, as promoted by the *Kindergarten Education Curriculum Guide* (Education Bureau, 2019). The curriculum guide encourages teachers to guide children with observation, saying food names or the meanings of pictures, and to enhance their speaking and expression capabilities using pictures. The stories in picture books match children's life experiences, interests, and prior knowledge and are created with suitable levels of difficulty of text and repetitive sentences. The way of combining pictures and words also helps students establish in their minds a connection between the orthography and semantics of characters. Based on these characteristics, picture books were chosen as the main vehicle for reading materials in this study.

The picture books, worksheets, and character cards were all related as a set of learning materials. They had orthographic, phonological, and semantic inputs of Chinese characters as well as comprehensible output. Conducted in different forms of lesson organization, another goal of the study was to re-emphasize knowledge points at different time periods based on a set repetition frequency and repetition period. Frequent repetition helps students convert short-term memory to long-term memory and form a mental lexicon. Figure 3 shows the teaching process of picture-book approach for character recognition.

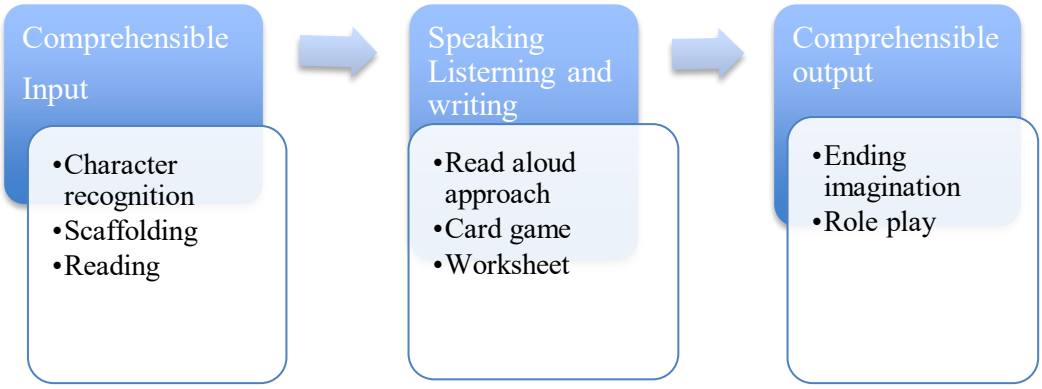


Figure 3: The teaching process of CLIL with a picture-book approach

The Assessment Tools

After finishing the preliminary work and the production of content-related materials, seven-month lesson observations and paired readings were performed twice a week. There were three lesson observations for each school and a total of 18 paired readings in the whole academic year. At the end of the experimental period, the children were given a post-learning assessment (post-test), which contained the same evaluation tools and contents as the pre-learning assessment given at the start of the experimental period. The study evaluated the effectiveness of the CLIL picture-book approach based on the results of the two assessments and analysed the differences in the children's Chinese proficiency.

Results and Analysis

Pre- and Post-Test Performance Comparisons

Table 3 and Table 4 show the average scores of the 28 NCS students in the pre-test and post-test and the comparisons using the paired-sample t-test from the two kindergartens in the three assessments. The statistics show that the NCS students from the two kindergartens had significant improvements in their overall results after the picture-book teaching, especially at Kindergarten B ($p = 0.00$, paired-sample t test). For the 20 students from Kindergarten A, the average pre-test score was 37.5, and the average post-test score significantly increased to 48.5 ($p < 0.05$, paired-sample t test; Table 3).

	Score	Pre-test	n =20	Post-test	n=20
Test items		Average score	Standard deviation	Average score	Standard deviation
Recognising characters with pictures	30	10.9	6.76	14.63	8.27
Distinguishing pronunciations	20	8.8	5.04	9.58	3.86
Associating words with pictures	30	8.57	9.63	17.54	7.8
Total score	80	37.5	21.29	42.17	21.05

*P<0.01

Table 3: Pre- and post-test results of Kindergarten A
(whose students are entirely NCS children)

	Score	Pre-test	n =8	Post-test	n=8
Test items		Average score	Standard deviation	Average score	Standard deviation
Recognising characters with pictures	30	9	4.14	8.25	8.03
Distinguishing pronunciations	20	4.75	4.65	7.5	4.87
Associating words with pictures	30	3.75	6.71	23.5	8.67
Total score	80	21.87	16.67	49.06	21.50

*P<0.01

Table 4: Pre- and post-test results of Kindergarten B
(whose students are mainly local children)

A much greater increase was observed for the 8 students from Kindergarten B with an average post-test score of 39, which is double the pre-test score of 20.5 (Table 4). The reason for this difference could be the fact that all students in Kindergarten A were entirely NCS students, but Kindergarten B had mainly native Chinese-speaking students. Therefore, the NCS children from Kindergarten B might have more exposure to Cantonese than those from Kindergarten A as a result of the interactions with ethnically Chinese children. According to the teachers from Kindergarten B, some of the NCS students made friends with the Chinese-speaking classmates, so they had many opportunities to hear and speak Cantonese in their daily conversations. This difference in the natural language environment may explain the discrepancies between the two groups of NCS students, as well as highlight the important role of real-life spoken communication in NCS students' acquisition of Chinese.

The improvement in speaking-related test on associating words with pictures at both schools was the most remarkable ($p < 0.05$, paired-sample t-test). The results indicate that the CLIL picture-book approach is very efficient in helping NCS students develop both of speaking (vocabulary production) and reading (vocabulary reception) by connecting character sounds with meaningful context. Compared to the other areas, the evidence shows that students'

content related lexicons grew richer, and their decoding ability was sharpened with the help of pictures. The results from the three assessments and lesson observations revealed that NCS children's improvement of vocabulary production was far more than the improvement in vocabulary reception due to much greater exposure to the comprehensible output.

The results of the assessment support that the CLIL picture-book approach can facilitate kindergarten NCS children's acquisition of Chinese characters, especially for their speaking development, as well as improve overall competence in the target language, particularly oral skills. The CLIL pedagogy provides NCS students with more real-life experience for them to become creative speakers with Chinese in the CLIL classroom.

The results of the assessments and lesson observations also indicated that improving learners' affective dimension has also been a beneficial effect of the proposed approach. NCS students seem to feel more motivated to learn and speak Cantonese in the classroom. This could result from experiencing less stress and anxiety in a learning environment where the focus is not only on language forms, but also meaning and real-life experience. Thus, we suggest that the CLIL picture-book approach helps to make the process of learning Chinese characters more meaningful and less stressful for NCS students.

Pedagogical Implications

Teacher Training in CLIL

An excellent teaching force is an important part of language education. It is obvious that teachers' continuous enhancement of professional knowledge can improve teaching quality, and facilitate the progress of development. To enhance professional competence, there is a need to provide indications to teacher-education institutions called upon to train CLIL teachers. It is suggested that some specific teacher-training courses in this area be provided for kindergarten teachers.

One highlighted aspect of teacher training for CLIL lessons is the teachers' lack of understanding of the role of language in learning. According to the interviews with the two kindergarten teachers, there is no normal training provided to a non-language subject teacher. It is probably not wholly considered in the training of second language teachers either as attention tends to focus on issues of language and language learning rather than on the role of language in learning in general. The teachers become unaware of the issues and of the need to have strategies for facing related problems. For this reason, certain aspects are highlighted for a CLIL training course, which the kindergarten teachers feel are important and needed despite their previous training and accumulated experience in the field. The needs highlighted are:

a. Understanding the skill to promote NCS students speaking Chinese
b. Understanding knowledge to create exercises and activities in CLIL lessons
c. Knowing strategies to overcome problems of comprehension in CLIL lessons

In order to construct a CLIL classroom, it is essential for teacher to sustain and enhance children's learning interest and motivation in learning Chinese, thus it is advised to focus on the teachers training by the following expects:

1. Provide children with opportunities to explore freely, discover knowledge and validate their discovery in learning Chinese by real life experience.
2. Take note of learner's difficulty and differences, encourage children to learn by using their senses and multilingual repertoire.
3. Promote all-round development by choosing real-life themes and provide children with interesting learning experiences by CLIL approach.

Given the paucity of CLIL materials, teachers need to be able to adapt for the specific needs and aims or objectives of the course and lessons. It is suggested that there are three possible ways for kindergarten teachers to acquire this competence: 1) working with language teachers to co-construct the curriculum; 2) joint work among teachers to develop and discuss materials, websites, and their use; 3) creation of specific CLIL websites on content areas, published periodicals for different subjects, and periodical newsletters on different themes. In addition, the government could centralize resources for the development and research of multi-model teaching materials in the future.

Conclusion

This study has investigated the function of CLIL for teaching Chinese to NCS children in Hong Kong kindergartens. After one year of trial teaching and lesson observations, the CLIL approach with picture books was found to be beneficial to the NCS children's oral skills. The results show that the proposed approach can also enrich their mental lexicon and possibly facilitate the transition between kindergartens and primary schools.

Although the project has made certain contributions to the teaching of Chinese characters to NCS children, there is still much to be explored. The present study is subject to several limitations. It adopted only two cases and the sample size of kindergarten B with a small number of NCS children. The findings cannot be generalised to other school contexts. Therefore, it is recommended that the scope of future study be extended to a larger group of NCS children and their teachers, so as to examine the impact of CLIL approach on a wider range of NCS children for a longer period of time.

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Procedural Checkpoint-Infused Laboratory Activity: Impact on the Attitude Towards Physics Among STEM Students With Varying Academic Achievement

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Abstract
As learners are now back in the classroom since the COVID-19 pandemic outbreak, it was observed that there is a growing negative attitude towards physics among the grade 12 STEM students. Self-assessment was used as a basis to enhance hands-on laboratory activities by infusing procedural checkpoint questions in laboratory worksheets that will elicit students' active participation during the activity. The researcher determined the impact of enhanced laboratory activities on the attitudes towards physics of students with different academic achievements. Groups of high achieving and low achieving students were exposed to laboratory activities based on traditional (TLA) and enhanced (PCILA) structure. Four factors of attitude towards physics course were measured using the Physics Course Attitude Scale (PCAS) by Cermik and Kara (2020), specifically the students' F1) interest F2) unwillingness F3) academic self and F4) necessity. Two-way ANOVA was used to determine the interaction of the factors on the attitude toward the physics course. Data reveals that among the factors of attitude, only interest is influenced by academic achievement of the learners and that neither academic achievement nor laboratory activities can be a predictor of students' attitude toward physics. Furthermore, the interaction of academic achievement and type of laboratory activity doesn't significantly change students' attitude toward physics course.

Keywords: Attitude, Physics, Achievement

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Introduction

Science education is an integral part of students' primary and secondary education. Among the science courses which appears problematic learners is Physics. Studies have revealed that most high school students perceive introductory physics as difficult particularly the application of knowledge into real-life and problem solving (Nava & Camarao, 2017). Apart from the cognitive requirement of the course, the transition to distance learning due to COVID in the last two years have contributed to students' negative view on physics. Some problems that contributed to such negative view are technical problems i.e., inter-connection, lack or resources at home, limited communication between teachers and classmates, and the reduced experimental activities (Stefanidou, 2022). As learners are now back in the classroom it was observed that there is a negative attitude towards physics among the grade 12 STEM students.

Students' Attitude towards Physics and their Achievement in the Course

The negative attitude of students towards Physics among grade 12 students poses a concern in their achievement in Physics. A key factor in the realm of learning has been found to affect students' achievement in science, one of which is the attitude towards the subject. The relationship of students' attitude towards science and achievement has been widely explored over the years. Correlational studies show that the attitude toward science of students in the secondary level has a significant relationship with their achievement in subject (Wilson, 1983; Shabbir Ali & Awan, 2013; Mao et. al., 2021). Research have cited that there is significant relationship between students' attitude and achievement in Physics. It implies that students with positive attitude towards physics are more likely to achieve in the subject. Thus, students' attitude can be a predictor of achievement in physics (Martinko & Vorkapić, 2017). It has also been recently found that the attitudes of students towards Physics is a crucial requirement for students who are new to learning Physics in order to continue and enhance the learning process (Hernanez-Suarez, et. al, 2022).

Laboratory Activities and Students' Attitude Towards Physics

Several pedagogical approaches have been developed in order to increase students' interest in Physics and one of which is the integration of hands-on laboratory experiments. Organ-Bekiroglu (2017) found that provision of technology supported and laboratory-based instructions to students leads to an increase in positive attitude toward physics. The study also showed that the impact on students' attitudes towards Physics is not significantly different than the impact of technology-based instructions. Furthermore, integrating technology and laboratory experiments such as virtual laboratory can enhance students' problem solving, critical thinking, creativity, conceptual understanding, science process skills, lab skills, motivation, interest, perception, and learning outcomes (Firman & Iwarto, 2017).

A substantial amount of research show that the use of nontechnology-based laboratory activities in Physics courses has a significant impact on the attitude of students in science. The integration of hands-on laboratory programs and instructions can positively improve the attitude of students towards science (Freedman, 1997; Adesoji & Raimi, 2004).

However, recent studies prove otherwise. Hands-on experiments do not significantly affect students' interest and perceived usefulness of the experiment. And that most students feel that more effort is needed in laboratory activities (Snetinova, et. al., 2018). Applying real and

virtual laboratory activities does not directly affect students learning outcomes neither can the achievement motivation be a predictor of student's learning outcomes (Ernita, et. al., 2021). These recent developments pose a question whether enhancing hands-on laboratory activities can still be utilized to enhance students' attitude toward science.

Procedural Questions as Self-Assessments on Students' Motivation and Attitude

Mcmillan & Hearn (2008) found in their study that greater student involved in the self-assessment process, that is involvement in reflection and monitoring of learning and thinking, results to greater student motivation by providing a greater sense of ownership and responsibility. There is also a strong correlation between self-assessment and motivation among learners (Prataman, 2018). Furthermore, as self-assessment has been proven to positively affect students' academic skills, it is also a strong chance of increasing secondary students' academic intrinsic motivation for self-assessment enables students to critically assess their work and provides them skills that they may utilize for their academic future (Bengston, 2020).

Some studies revealed that students' attitude towards physics subjects and motivation are interconnected such that there is a unidirectional relationship between motivation and attitude. If students' motivation rises, then the attitude rise, and if the motivation drops then the attitude drops as well (Astalini, et. al., 2019). In the Philippine context, the same relationship between motivation and attitude were found (Guido, 2020). Since the motivation and self-assessments may influence students' attitudes then, such connection may be implored to enhance hands-on experiments in order to be a tool to scaffold students' attitudes toward science.

Research Questions

Self-assessment will be used as a basis to enhance hands-on laboratory activities by infusing checkpoint questions in the worksheets that will elicit students' active participation during the activity. The researcher wants to determine if enhanced laboratory activities have an impact on the attitudes towards physics of students with different academic achievements. Specifically, the researcher wanted to know (a) if the infusing checkpoint questions in the laboratory activities will influence the attitude of the students toward the physics course (b) does the academic achievement of students influence their attitude toward the physics course (c) is there a significant interaction between students' achievement and the type of laboratory activity and whether they could influence the attitude of students toward physics.

Hypothesis 1: There is no significant difference between the students who answered the checkpoint infused laboratory activity in relation to their attitude toward physics course.

Hypothesis 2: There is no significant difference between the students with high achievement and low achievement in their attitude toward the physics course in terms of the following factors: a) their interest towards the subject; b) unwillingness to learn the subject; c) academic perspective of themselves in the subject; d) necessity to learn the subject.

Hypothesis 3: There is no significant interaction between the type of laboratory activity taken by students and their achievement level in relation to their attitude towards the physics course.

Methods

Sample

This study examined 48 grade 12 students under the age of 17 to 18 years of age and are enrolled in the Science, Technology, Engineering, and Mathematics (STEM). The participants were from the Biomedical and Information, Communication, & Technology specializations who are taking the General Physics 1 course in their first semester. Four sections from the said specializations were used with participants consisting of 19 males and 29 females. The said number of participants were grouped according to their academic achievement in their physics course. The academic achievement in physics of the students were determined using their midterm grade in the course. Only the students with extreme scores, the students with the highest and lowest marks, were allowed to participate in the study. A parent/guardian consent form was also provided to the participants before participating in the study.

Table 1. ***Descriptive statistics of the Achievement Level of Participants***

	No. of Students	Percent
High Achievement	24	50.0
Low Achievement	24	50.0
Total	48	100.0
Male	19	39.6
Female	29	60.4
Total	48	100.0

Measures

Four factors in the attitudes towards physics were measured, which are 1) Interest, 2) Unwillingness, 3) Academic self, and 4) Necessity using the Physics Course Attitude Scale (PCAS) by Cermik and Kara (2020). The survey is a Likert Scale with positive and negative statements about the four factors of attitude specifically, interest (n = 4), unwillingness (n = 6), academic self (n = 5), and necessity (n = 5). The students' achievement levels were also determined using their midterm grades in their physics course which is a numerical report of their performance in the subject. Their academic achievement level in their physics course was used in determining the groups in the study.

Procedures

The researcher designed an enhanced laboratory activity with checkpoint questions that would serve as students' self-assessment as they are conducting the activity. The traditional laboratory activity had the usual parts pf a laboratory activity such as (a) objectives, (b) introduction, (c) procedure, (d) data and results, (e) analysis and (f) guide questions while the enhance laboratory activity were infused with checkpoint questions that would enable students to become more involved in the activity. The enhanced laboratory activity was called Procedural Checkpoint Infused Laboratory Activity (PCILA). Sample procedural questions and their corresponding domains are shown in Table 2. These procedural questions infused in

the laboratory activity were validated by group of professional physics teachers before the deployment of the enhanced laboratory activity.

Table 2. ***Sample Procedural Checkpoint Questions and Laboratory Domains***

Domains	Question
Active Reflection	*Checkpoint 1:* *Which part of the procedure is difficult to conduct and how do you think this step would affect the data in the experiment?*
Pre-Data Analysis	*Checkpoint 2:* *Based on the current trend of the data gathered, what are the independent and dependent variables?*
Troubleshooting	*Checkpoint 3:* *What are the percent errors/percent differences of your data and the actual data? What do you think contributed to these errors?*
Extension	*Checkpoint 4:* *How would the procedures change if the equation for the acceleration due to gravity is modified into* $$g = \frac{a(m_1 + m_2)}{m_2 - m_1}$$ *instead of the initial* $$g = \frac{a(m_1 + m_2)}{m_1 - m_2}$$

The participating sections were grouped into four according to their achievement levels on the basis of their midterm grades. Each groups had equal number of high and low achieving students. Two groups were given the Procedural Checkpoint Infused Laboratory Activities (PCILA) and two groups received the Traditional Laboratory Activity (TLA). After the activity, the students answered the Physics Course Attitude Scale in the next session. Each response in the survey were sorted by factor. The hypotheses were tested by analyzing the gathered data using the Analysis of Variance (Two-Factorial) without repeated measures.

Table 3. ***Groupings Formed in the Study***

Groups	PCILA	TLA
High Academic Achievement Level	G-I	G-II
Low Academic Achievement Level	G-III	G-IV

Note: Procedural Checkpoint-infused Laboratory Activity (PCILA) & Traditional Laboratory Activity (TLA)

Due to the limited sample size in the study, the Shapiro-Wilk test and Levene's test of homogeneity were done to determine the normality and variability of the sample data. The preceding tables in the results present the normality and variability of the data as well as show how both the motivation groups and laboratory groups are normally distributed with p values greater than 0.05 in all factors of students' attitude towards physics tested. Furthermore, results of the Levene's Test in each of the four factors of attitude toward physics specified in the PCAS reveal that variances are equal across each group. With such results, the researcher then proceeded with using a parametric test in testing the hypotheses. The hypotheses were tested by utilizing the Analysis of Variance (Two-Factorial) without

repeated measures since the effect of two variables, achievement in physics and laboratory activities based on traditional and enhanced laboratory activity structure, were tested and that no pre and post assessments were done in the study.

Results

The researchers tested the influence of two independent variables, students' academic achievement level and the laboratory activity based on the traditional and enhanced checkpoint-infused laboratory activity structure, on the dependent variable, attitude towards physics of students using the Two-way Analysis of Variance (with no repeated measures). The statistical tool proved to be efficient in determining if each of the independent variables have a significant interaction with the dependent variable and if the interaction of the independent variables can significantly influence the dependent variable.

The interaction of the independent variables was tested on the four factors of attitude toward physics specifically, F1) Interest, F2) Unwillingness, F3) Academic Self, and F4) Necessity.

Interest (F1)

The Shapiro-Wilk test and Levene's Test in Table 4 and Table 5, respectively show that the data gathered from the sample are normally distributed and that there are equal variances across each group. These are enough to satisfy the assumptions for a parametric test to test the hypothesis.

Table 4. ***Shapiro-Wilk Test of Normality (F1)***

	Motivation	Shapiro-Wilk		
Factor		Statistic	df	Sig.
Interest (F1)	High	.967	24	.605
	Low	.830	24	.001
	Lab Activity	Statistic	df	Sig.
Interest (F1)	PCILA	.885	24	.010
	TLA	.945	24	.207

*p < .05

Table 5. ***Levene's Test of Equality of Error Variance (F1)***

F	df1	df2	Sig.
1.008	3	44	.398

Note: Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

Table 6. ***Analysis of Variance Between Effects of Academic Achievement and Type of Lab Activity on Interest (F1)***

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	5.796[a]	3	1.932	2.774	.052	.159
Intercept	457.876	1	457.876	657.511	.000	.937
Achievement Category	3.126	1	3.126	4.489	.040	.093
Type of Lab Activity	1.980	1	1.980	2.844	.099	.061
Achievement Category * Type of Lab Activity	.689	1	.689	.989	.325	.022
Error	30.641	44	.696			
Total	494.313	48				
Corrected Total	36.436	47				

Note: At 95% confidence intervals

The results for ANOVA (Two-Factorial) as shown in Table 6 present that the *p* value for academic achievement is less than .05 which indicates that the interest of students in physics is influenced by their academic achievement in their physics course. This means that students' performance in physics as measured from their numerical grades may influence interest to learn physics. Such result agrees with the results found in some earlier studies about the positive correlation between attitude and academic achievement of students (Wilson, 1983; Shabbir Ali & Awan, 2013; Mao et. al., 2021; Martinko & Vorkapić 2017). In contrary to the results for academic achievement factor, it can be gleamed from Table 6 that the type of laboratory activity factor has a $p = .099$ which indicates that the said factor has no significant influence on students' interest to learn physics. The type of laboratory activity taken by the students whether based on traditional or enhanced structure does not influence the attitude of the students in terms of the interest factor.

The interaction of the academic achievement factor and type of laboratory activity doesn't influence students' interest as indicated by the value $p > .05$. This means that the interaction of two factors is independent of students' interest to learn physics.

Though the *p* value for the interaction of the independent factors was not statistically significant, the interaction of the factors as shown in Figure 1 reveals that the group who took the PCILA had higher averages in F1 than the group that took the TLA. However, there is a large gap between the averages of the high and low achieving students who took the PCILA. This indicates that the academic achievement of the students may affect their interest (F1) averages.

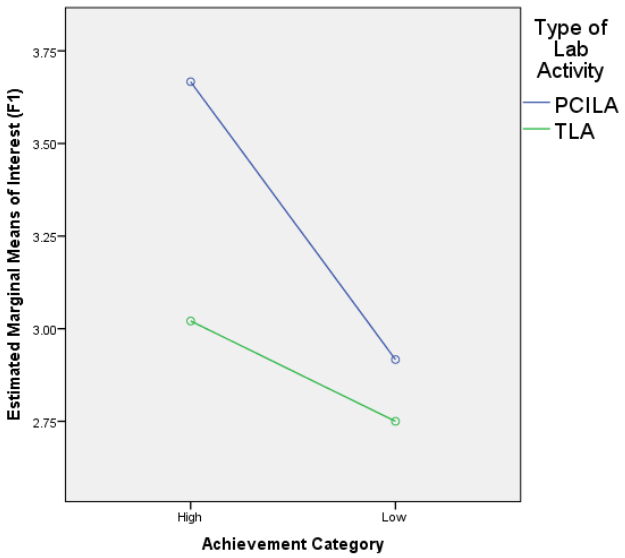


Figure 1. ***Academic Achievement and Type of Lab Activity Interaction***

Note: Procedural Checkpoint-infused Laboratory Activity (PCILA) & Traditional Laboratory Activity (TLA)

Unwillingness (F2)

The test of normality and homogeneity of the data as shown in Table 7 and Table 8, respectively, shows that the gathered data are normally distributed and have equal variances across each group. Thus, the assumptions for the parametric test that was utilized are satisfied.

Table 7. ***Shapiro-Wilk Test of Normality (F2)***

	Motivation	Shapiro-Wilk		
Factor		Statistic	df	Sig.
Unwillingness (F2)	High	.947	24	.236
	Low	.964	24	.528
	Lab Activity	Statistic	df	Sig.
Unwillingness (F2)	PCILA	.963	24	.495
	TLA	.985	24	.967

*p < .05

Table 8. ***Levene's Test of Equality of Error Variances (F2)***

F	df1	df2	Sig.
.656	3	44	.584

Note. Tests the null hypothesis that the error variance of the dependent variable is equal across groups

Table 9. ***Analysis of Variance Between Effects of Academic Achievement and Type of Lab Activity on Unwillingness (F2)***

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2.718[a]	3	.906	1.408	.253	.088
Intercept	348.481	1	348.481	541.791	.000	.925
Achievement Category	1.687	1	1.687	2.624	.112	.056
Type of Lab Activity	1.021	1	1.021	1.587	.214	.035
Achievement Category * Type of Lab Activity	.009	1	.009	.014	.905	.000
Error	28.301	44	.643			
Total	379.500	48				
Corrected Total	31.019	47				

Note: at 95% confidence interval

Table 9 reveals that the two factors, academic achievement and type of laboratory activity, have no significant influence on the F2 of student's attitude towards physics with p = .112 and p = .214, respectively. This indicates that students' unwillingness to learn physics course is influenced by their neither academic achievement nor the type of laboratory activity that they take. Furthermore, the interaction of the academic achievement factor and type of laboratory activity, has no significant effect on students' unwillingness to learn physics. Nevertheless, Figure 2 shows how the group who took the PCILA were recorded to have lower averages for F2, that is the students who answered the enhanced laboratory activity were less unwilling to learn the physics course.

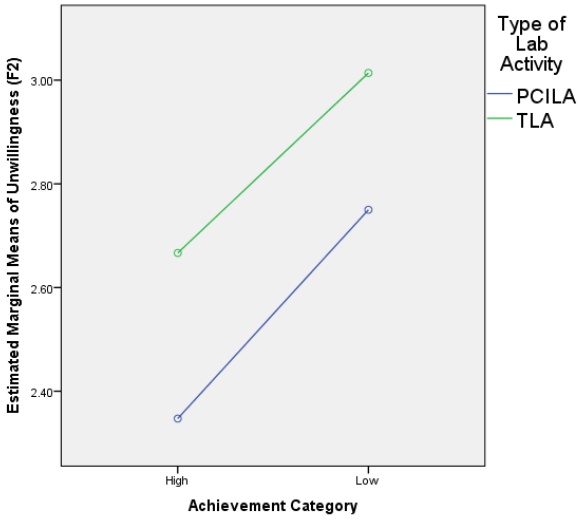


Figure 2. ***Academic Achievement and Type of Lab Activity Interaction***

It can also be gleaned from the plots in Figure 2 that the less performing students are more unwilling to learn the physics course and the high achieving students are less unwilling to learn the physics course regardless of the type of laboratory activity that they take.

Academic Self (F3)

The data gathered from the sample are normally distributed and there are equal variances across each group for the third factor of attitude towards physics, academic self. Just as the other factors, interest and unwillingness, the assumptions for a parametric test are met.

Table 10. ***Shapiro-Wilk Test of Normality (F3)***

		Shapiro-Wilk		
Factor	Motivation	Statistic	df	Sig.
Academic Self (F3)	High	.951	24	.288
	Low	.969	24	.641
	Lab Activity	Statistic	df	Sig.
Academic Self (F3)	PCILA	.940	24	.159
	TLA	.978	24	.862

*p < 0.05.

Table 11. ***Levene's Test of Equality of Error Variances (F3)***

F	df1	df2	Sig.
1.831	3	44	.155

Note. Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

Table 12. ***Analysis of Variance Between Effects of Academic Achievement and Type of Lab Activity on Academic Self (F3)***

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	3.345[a]	3	1.115	1.746	.172	.106
Intercept	379.875	1	379.875	594.844	.000	.931
Achievement Category	1.367	1	1.367	2.140	.151	.046
Type of Lab Activity	.827	1	.827	1.295	.261	.029
Achievement Category * Type of Lab Activity	1.151	1	1.151	1.803	.186	.039
Error	28.099	44	.639			
Total	411.319	48				
Corrected Total	31.444	47				

Note: at 95% confidence interval

A similar result from the two previous factors of attitude can be seen for both academic achievement and type of laboratory activity in terms of the *academic self* factor. With $p > .05$, it indicates that the academic achievement of the students and the laboratory activity based on

the traditional and enhanced structure have no significant effect on the way students view themselves as academically successful in their physics course.

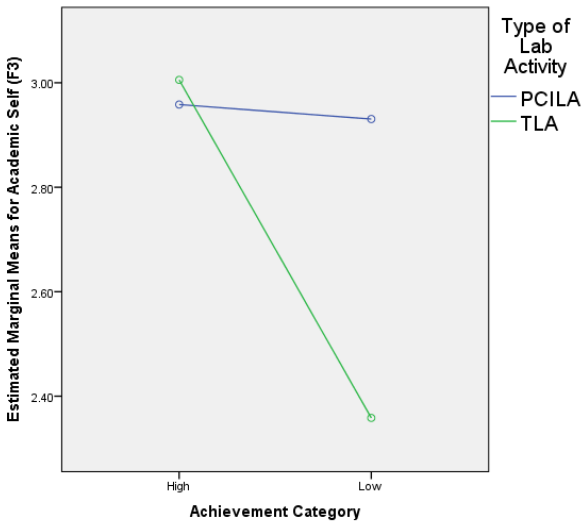


Figure 3. ***Academic Achievement and Type of Lab Activity Interaction (F3)***

Figure 3 shows that compared to the group who took the TLA, the students in the group who took the PCILA lesser deviation in the averages in the third factor, academic self. This indicates that the students in the PCILA with either high or low achievement in the physics course see themselves as successful in their physics course. Furthermore, the students who took the traditional laboratory activity and have low achievement in physics view themselves as more unsuccessful in the physics course than any other groups.

Necessity

Table 13. ***Shapiro-Wilk Test of Normality (F4)***

		Shapiro-Wilk		
Factor	Motivation	Statistic	df	Sig.
Necessity (F4)	High	.904	24	.026
	Average	.953	24	.322
	Lab Activity	Statistic	df	Sig.
Necessity (F4)	PCILA	.938	24	.149
	TLA	.908	24	.032

*$p < 0.05$.

Table 14. ***Levene's Test of Equality of Error Variances***

F	df1	df2	Sig.
3.373	3	44	.027

Note. Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

It can be gleaned from the results of the results of the Shapiro-Wilk test and the Levene's Test that the data for the factor being measured is not normally distributed and that the variances are equal in each group. Although this is the case the Two-way ANOVA can

tolerate small violations such as the normality of the distribution especially since the sample sizes of each group in the study are equal. Thus, ANOVA (Two-Factorial) was still utilized to test the hypothesis.

Table 15. ***Analysis of Variance Between Effects of Motivation and Type of Lab Activity on Necessity (F4)***

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.617[a]	3	.206	.367	.777	.024
Intercept	541.363	1	541.363	965.936	.000	.956
Achievement Category	.333	1	.333	.595	.445	.013
Type of Lab Activity	.270	1	.270	.482	.491	.011
Achievement Category * Type of Lab Activity	.013	1	.013	.024	.878	.001
Error	24.660	44	.560			
Total	566.640	48				
Corrected Total	25.277	47				

Note: at 95% level of significance

Given by the $p > .05$ presented in Table 15 for the independent variables (academic achievement and type of activity) indicates that the two factors do not significantly influence the way students view studying physics as necessary to be studied. Such value dictates that the null hypothesis is ones again failed to be rejected. The interaction of the two variables neither enhance nor limits the students to view physics as a course necessary to be studied. Furthermore, Figure 4 reveals that students with higher academic achievement tend to view physics as a necessity more than the students with lower academic achievement. The group who was given the PCILA had higher averages for the necessity factor (F4) than the group who was given the TLA.

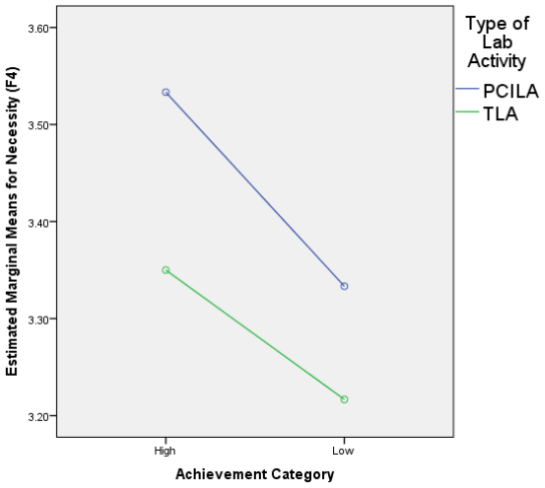


Figure 4. ***Academic Achievement and Type of Lab Activity Interaction (F4)***

Discussion

The study demonstrated how students' academic achievement and enhanced laboratory activity may be related to students' attitude towards their physics course in the hopes to

address students' negative attitude towards physics. The individual effects variables were analyzed as well as their interaction to have a more wholistic view of the study.

Academic Achievement and Attitude Toward Physics

The results of the study conducted as summarized in Table 16 reveals that among all the factors of attitude toward physics measured only the interest (F1) to study physics course of the students is influenced by the factor academic achievement. Such result agrees with the previously conducted studies on the relationship between achievement and attitude toward physics (Wilson, 1983; Shabbir Ali & Awan, 2013; Mao et. al., 2021). However, this result suggests that other aspects of students' attitude toward physics may not always be directly related to or influence by the academic achievement of students.

Table 16. ***Analysis of Variance for Academic Achievement and Attitude Towards Physics***

Attitude Towards Physics Factors	F	Sig
Interest (F1)	4.489	.040
Unwillingness (F2)	2.624	.112
Academic Self (F3)	2.140	.151
Necessity (F4)	.595	.445

*p < .05.

Physics Laboratory Activity and Attitude Towards Physics

The results for the effect of the laboratory activity based on traditional and enhanced structure on students' attitude toward physics course of its four factors is uniform. The laboratory activity taken by the students with either the traditional and enhance structure appears to have no different effect on attitude towards physics who have high and low academic achievement in physics. This result was not initially predicted as the two structures were although visually similar, the additional questions were considerably cognitive and reflective. These results may have been influenced by the limited sample size used in the study since using a bigger sample size would statistically increase the likelihood of rejecting the null hypothesis.

Table 17. ***Analysis of Variance for Laboratory Activity and Attitude Towards Physics***

Attitude Towards Physics Factors	F	Sig
Interest (F1)	2.844	.099
Unwillingness (F2)	1.587	.214
Academic Self (F3)	1.295	.261
Necessity (F4)	.482	.491

*p < .05.

Interaction of Academic Achievement and Laboratory Activity

As it was found that the academic achievement and laboratory activity based on traditional (TLA) and enhanced structures (PCILA) have no significant effect on no significant students' attitude toward physics, the following are the significant findings drawn from the data:

a) Students with high academic achievement and provided with the PCILA had the greatest average for interest (F1) in physics.
b) The students with either high or low academic achievement who took the PCILA had are more willing to learn physics than the students who took the TLA.

c) The group who answered the enhanced laboratory activity (PCILA) view themselves to be successful in their physics course more than the group who took the TLA. This result could be attributed to the complexity of the questions and time factor added by the enhanced laboratory activity. Accomplishing the enhanced laboratory activity boosted the academic self-view of the students even with low academic achievement.
d) Regardless of the academic achievement, the group who took the PCILA are reported to have viewed physics course as necessary for them to learn for their future academic path more than the group who took the TLA.

Conclusions

Despite the negative views of learners toward learning physics, it remains as an essential and integral part of the basic education curriculum especially in the STEM strand (Nava & Camarao, 2017). Although academic achievement was found to have a positive relationship with attitude toward physics (Wilson, 1983; Shabbir Ali & Awan, 2013; Mao et. al., 2021) the result of the study tells us that other factors associated with students' attitude may not be directly influenced by academic achievement. A significant finding of the study is how neither the academic achievement level nor laboratory activity based on traditional and enhanced laboratory activity can influence all the factors of attitude toward physics. The overarching results reveal that the academic achievement and laboratory activities cannot be a direct predictor students' attitude toward physics. Furthermore, the interaction of the two variables was revealed to have no direct influence on student's attitude toward physics. These results are associated with the limited participants included in the study as well as the delimitations set by time constraints. Nevertheless, these results verify the results in recent studies on the interaction attitude and laboratory activities particularly addressing the incongruence in the older and newer results of studies about the effect of laboratory activities on students' attitudes. The results of the current study agrees more with the results of the recent studies than the older studies. This study contributes to the growing premise in physics education that laboratory activities doesn't directly influence students' attitude towards physics and thus, must not be a basis for students' positive view of physics. (Snetinova, et. al., 2018; Ernita, et. al., 2021).

The researcher recommends replicating the study with greater sample size to better represent the population and to decrease the likelihood of committing a type II error. Repeated measures such as pre-and-point test must be conducted for a firmer result. Further investigation about the effect of laboratory activity on attitude toward physics is recommended, perhaps the variable connecting the affective aspect of attitude and cognitive aspect of laboratory activity.

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Teaching Science in Remote Schools: The Struggles and Successes of Teachers From the Perspective of an Ethnographer

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Abstract
The remote population in Ghana has been on the increase in the last decade with the number of males being slightly higher compared to females. This affected the share of educational resources as the remote schools were disadvantaged in human and material resources. However, the basic schools in the remote communities had their students in the junior high schools sit for the basic education certificate examination (BECE) together with their age-mates in the urban communities. We, therefore, studied the struggles and successes of two teachers (a male and a female) in an attempt to teach science concepts to students in remote basic schools effectively. The two teachers met our main selection criteria of gender and have taught science in a remote school for 5 years and above. Through observer participation, interviews, and field notes qualitative data were collected from teachers, both during school hours and outside school hours, over a period of 14 weeks. The data in a form of text were broken into units of analysis using content analysis procedures. It was found that being a female teacher and a family woman and teaching science in a remote school was challenging. Though teachers struggled to effectively teach science to students in remote schools there were instances some students had attained grade 1 in science in the BECE. Implications of the findings are discussed.

Keywords: Female, Male, Remote Communities, Science Teachers, Teaching Science

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Introduction

With the advent of the technology arises an increasing need for scientific literacy (Laidlaw, Taylor, & Fletcher, 2009), enabling the individual to invent, foster economic development, and aid problem-solving to make life worth living and much easier for humans' existence. One goal of science education is to prepare students to apply science in their everyday lives and society (Kahn, 2021). Scientific knowledge and science-based technology play a pivotal role in individuals' personal, social, and professional lives, and a comprehension of science and technology is thus central to a young person's preparedness for life (OECD, 2017). It is in light of these, the UN, World Bank, and OECD emphasize countries ensuring quality education and production of scientifically literate citizens. If there is an appropriate time scientific literacy would be of the essence to us, then, it is now as globally, humanity faces major challenges in providing sufficient water and food, controlling diseases, generating sufficient energy, and adapting to climate change (UNEP, 2012). This scientific literacy is developed through providing quality science education (OECD, 2019) to the citizenry.

In an attempt to instill scientific literacy among citizens exist a great disparity between the urban and rural (remote) areas (Murphy, 2022; Sumida & Kawata, 2021) despite a significant proportion of the population being remote settlers (Cheung, 2021). For example, Ghana has a total rural population of 43.3% of the total population, 30,832.019 (Ghana Statistical Service [GSS], 2021; World Bank, 2023) but there exist disparities between urban and rural education. In the case of the US, approximately 11.4 million children were growing up in remote areas, compared to 14.6 million in urban areas but remote science education was given little attention (Avery, 2013). Characteristically, remote areas are isolated with low population densities (Williams in Avery, 2013), and have fewer students in school/class perhaps because of the little to no priority given to education by the remote settlers (Pryor & Ampiah, 2003). Remote communities are often surrounded by fertile lands that are designed naturally to support their agricultural activities. Because, much of the research work into remote education has often found that the smaller number of children enrolled in schools in remote areas is a result of their engagement in agricultural activities (Pryor & Ampiah, 2003).

The existence of these disparities creates a major challenge for teachers teaching in remote areas. It is globally acknowledged that teaching in remote areas could be challenging (Avery, 2013; Cheung, 2021; Shikalepo, 2020; Zinger, Sandholtz, & Ringstaff, 2020). The challenges of teaching in remote areas are inadequate instructional resources, inadequate infrastructure, language barriers, unavailability of teacher professional development programs, community indifference to the education of children, and unavailability of social amenities (Adams & Woods, 2015; Buczynski & Hansen, 2010; Darling-Hammond, 2017; Garcia & Weiss, 2019; Shikalepo, 2020) For instance, Pryor and Ampiah (2003) reported that teachers expressed demotivation to teach in remote areas because of the conditions and behaviors of parents and students towards learning, hampering the work of teachers. Besides, some of the teachers in remote areas are young men (and women) from an urban background who intend to leave at the earliest possible to a community of urban characteristics. Those teachers disdain remote situations and were in pain to differentiate themselves from village people. For Adams and Woods (2015), when teachers who have been brought up and trained in urban areas are sent to remote and isolated communities to teach, they tend to have a monoculture that is different from their own. In Alaska, the weather conditions and cross-cultural classroom issues become major challenges to those teachers in adapting to the communities and providing instructions to students, and this is

worsened for beginning teachers. Leech, Haug, Rodriguez, and Gold (2022) asserted that those teachers who stay grew up in the area, already lived there as an adult, and/or had a spouse/partner with a job in the area. For Mulkeen (2006), children in remote areas may be considered more difficult to educate because they are likely to have less parental encouragement to go to school, and more alternative demands on their time, such as helping with agricultural tasks. When those children attend school, they may find the curriculum less relevant to their lives, and find less support for their learning from the home environment.

In professional development, teachers that need stronger support are those in remote areas (Garcia & Weiss, 2019). These professional supports such as the provision of professional development training will serve as the antidote to the deficiencies in pedagogical content knowledge (PCK) of the science teachers (Buczynski & Hansen, 2010). Teachers in remote areas need support but the support should transcend normal professional development to a professional learning community that provides teachers the opportunity to learn specific science domains and innovative practices for teaching science (Panizzon, 2011). However, in the US, the inequity in the provision of quality education to remote areas was further exacerbated by the lack of continuous provision of professional support to the teachers teaching in remote areas (Darling-Hammond. 2017).

In remote teaching, language is another strong factor in effective teaching. That is, in instances where the teacher does not speak the native language of the people, instruction is solely in English. However, students in these remote areas can form only a few phrases in English (Pryor & Ampiah, 2003), when the teacher's medium of instruction is English, he or she faces the challenge of explaining concepts to the understanding of students. In Ghana, the language policy for teaching and learning spelled out that the Ghanaian language is only used in kindergarten to primary school 3, and English is used in primary school 4 to 6 onwards (USAID, 2020). Consequently, science teachers in remote schools could be struggling to teach and observe the language policy.

In the context of science teaching, Cheung (2021) agreed with the literature that the low quality of education in remote areas is a result of the backwardness of curriculum content and instructional methods, insufficient funding, aging facilities, and shortage of teachers and teaching conditions. Sumida and Katawa (2021) in analyzing the gap between remote and urban education attributed the challenges to school and family characteristics. It is indisputable that science teachers play a pivotal role in guiding students to acquire the needed science knowledge and literacy, it is important that we pay attention to the teacher's environment, giving them the needed professional development training, and granting them access to the science instructional materials (Irby et al., 2021). Hence, providing science instruction should be a sustained priority (Zinger et al., 2020). However, it has remained a challenge and remote areas are the most affected. It must be noted that lack of content knowledge, time constraints, materials for hands-on activities and curriculum needs, isolation, and lack of professional development are the challenges the remote science teacher faces in their quest to instruct science. Similarly, John (2019) found that lack of laboratory equipment and poor implementation of practical experiments, a lack of qualified teachers, inadequate or poor status infrastructure, teachers had deficiencies in their PCK and were unable to explain science concepts well. These challenges may persist because attention has not been paid to teaching science in remote areas and no professional support might have been provided to the science teachers to be successful. On their part, Laidlaw et al. (2009) asserted that primary science is not being taught as effectively as it might be

because of low levels of teacher confidence and competence in relation to scientific PCK, insufficient resources, time constraints, and lack of support in the form of professional development.

Empirically, teachers in Ghanaian basic schools face a myriad of challenges in their quest to teach science (Adu-Gyamfi, 2014; Parker, Osei-Himah, Asare, & Ackah, 2018; Quansah, Sakyi-Hagan, & Essiam, 2019; Somuah & Orodho, 2016). For instance, the studies of Quansah et al. (2019) involving some remote junior high schools (JHS) in the Effutu Municipality in the Central Region, Ghana revealed that inadequate instructional materials and poor proficiency of learners in the English affected teaching and learning Integrated Science. Similarly, Adu-Gyamfi (2014) found the challenges to include loaded science examination papers, the attitude of students toward school science, the concept of improvisation, and students' preparedness toward new science lessons. In a related study, Tamanja and Pagra (2017) reported that lack of teaching and learning materials, a low pupil-teacher ratio, inadequate infrastructural facilities, a language barrier, and stress from the long ride of both pupils and teachers.

The results of the struggles of the remote science teacher have led to many of them seeking earlier transfers when posted to teach in remote areas (Leech et al., 2022; Pryor & Ampiah, 2003). Consequently, the shortage of high-quality science teachers is recorded in these remote areas (Cheung, 2021) because of the persistent difficulties in retaining teachers (Leech et al., 2022). In countries like the US and Japan (Cheung, 2021) and sub-Saharan African countries such as Mozambique, Lesotho, and Uganda (Mulkeen, 2006) to introduce remunerations and incentives with the view of attracting teachers to remote areas. However, Mulkeen (2006) argued that deploying teachers to remote schools remains a very daunting task and that countries that have strived to place incentives to attract teachers to remote areas have only gotten a minimal impact. Because such incentives have not been sufficient to match the numerous advantages the urban schools come with.

Another finding from the literature is the challenge of getting female teachers to teach in remote areas (Mitchell & Yang, 2012; Pryor & Ampiah, 2003). It is reported that systemic failures and designs have succeeded in denying women access to educational structures including not only teaching in remote areas but in urban areas as well (UNESCO, 2001). However, not that women are denied but they are simply not ready to teach in remote areas for varied reasons (Mulkeen, 2006; Pryor & Ampiah, 2003). Pryor and Ampiah (2003) found out that it was difficult to attract and retain women teachers in remote areas and that the only female teacher who was available moved there with her husband and regrets it. Mulkeen (2006) noted that in Malawi, female teachers rarely accept postings to remote areas unless they are with their husbands otherwise if even posted to the remote areas they request transfers based on marriage. Also, there have even been times when female teachers presented themselves as married to enable them to seek transfers. In analyzing teachers' gender in some African countries, it was reported that in Malawi, 82% of the teachers in the urban areas were females while 31% were females in the remote areas; in Mozambique, about 80% of the teachers were females, but they were unwilling to accept postings to the remote areas, and in Uganda and Tanzania, most female teachers are concentrated in urban areas and that it was difficult to attract female teachers to remote areas (Mulkeen, 2006). In Sekyere Odumasi District, Ghana, in 10 primary schools and five JHS in remote areas, Azewara, Korankye, Amankwah, and Takyi (2021) reported that there were only four female teachers in the JHS compared to 27 male teachers, and no female teacher in the primary compared to 35 males in the primary.

There are also widespread beliefs that women are 'natural' teachers for young children (Mitchell & Yang, 2012). Most studies have paid little attention to the experiences of female teachers both as teachers and as women, and when a remote component is also factored in, there is even less that is known about women's experiences. More in-depth studies of women teachers and their experiences, and study and expand pre-service teacher education programs that seek to provide experiences for new teachers in remote areas will be needed (Mitchell & Yang, 2012). In the midst of these challenges, we ask an overarching question;

What are the struggles and successes of the teacher teaching science in remote areas?

Research Area, Participants, and Methods

This ethnographic study was conducted in two remote schools in the Bawku West District [BWD] of the Upper East Region, Ghana. BWD was divided into 13 educational circuits, with 257 public and private educational institutions. There were 91 kindergartens, 99 primary schools, 55 JHS, five senior high schools, one vocational institute, and one craft center. The unprofessional teacher ratio was 1:168 for KG, 1:90 for primary schools, and 1:35 for JHS. BWD had 174 communities with the following health facilities. One hospital, nine health centers, eight clinics, 31 National Community Health Planning and Services (CHPS) compounds with structures and six CHPS zones without structures, two supplementary feeding centers, one nutrition rehabilitation center, and five recognized chemical shops (BWD, 2021). BWD was one of the 15 districts and municipalities in the Upper East Region. BWD was located in the northeastern section of the region, with Zebilla as its administrative capital. BWD was bordered to the north by the Republic of Burkina Faso, to the east, by Binduri District, to the west, by Nabdam District, and to the south, by East Mamprusi District. Significantly, two tributaries of the Volta River (White Volta and Red Volta) run contiguous to the district's eastern and western boundaries respectively. BWD was created in 1988 under the local government system by Legislative Instrument 1442 (GSS, 2014). BWD covered an area of approximately 1,096m and had a population density of 131.5 BWD was the biggest district in the region in terms of land area (GSS, 2014). It had the highest population of 144,189, comprising 49.1% males and 50.9% females, sharing 11.1% of the total population of the region (GSS, 2021). Of this population, 15.1% were settlers with urban infrastructure and 84.9% were remote settlers without urban infrastructure (GSS, 2021). The main Ghanaian language spoken in the district was Kusaal though other languages such as Mosie, Bisa, Frafra, and Twi, were spoken among minority ethnic.

In this research, two teachers teaching in schools located in communities where access to telecommunication networks was a challenge despite some few houses having access to electricity. The communities had a CHPS center that rendered health services to the inhabitants who were predominantly subsistence farmers, rearing livestock, and cultivating crops. The participant, John was a professional teacher, now pursuing a bachelor of education via sandwich mode. He taught science in this school for 5 years. John was not a native of the community but was posted there to teach after the completion of his initial teacher training. The second participant, Magdalene, was a professional teacher. She had taught science in a school in another remote community for 3 years before this present station where she had been teaching science for the past 5 years. Her highest academic qualification was a master's degree. She was born and bred in BWD.

The authors identified the schools and the science teachers in these schools during a teacher union sensitization tour. Author saw the environment of the school, interacted with the teachers, and sought for their consent to undertake research with them. Initially, only John was happy and gave his consent to participate. However, there were only three female teachers identified to teach science in the JHS in BWD. At first, one agreed to participate but declined days later with reasons that the researcher might be an investigator who wanted to seek information about her and subsequently use it against her job. Discussions with the rest of the female science teachers continued until one, Magdalene agreed to participate in the study. Magdalene like her other peers had married. She had three children, two of whom have started their primary education and the last one was still breastfeeding. After the participants had agreed to participate in the study, their headteachers were contacted. The purpose of the study was explained to the headteachers and permission was sought to conduct the study. The headteachers and the teachers were assured of confidentiality.

Author2 collected data using observer participation, observing how the teachers delivered their lessons, how their students show interest, and ask questions; inspecting their lesson notes, attendance register, instructional materials available, and teaching timetable, how they interact with colleague teachers and headteacher, and interviews in the form of normal conversation. A total of 14 weeks was spent collecting data. In week one, Author2 spent Monday to early Wednesday at about 9:45 am in the school of John and Wednesday from 12:15 pm to Friday with Magdalene. On Saturday and Sunday, Author2 visited the male participant at his residence. In the second week, Author2 spent Monday with the personnel in the district education directorate. This helped Author2 better understand and reconcile some of the issues raised by the participants. Author2 then visited the two participants from Tuesday to Sunday, a visit was paid to John at home as well. The activities in week1 and week2 continued till the 14 weeks were over. Both participants did not know about themselves until the last day of data collection. The data collected were carefully read through and themes were made out. The results and any inductive reasoning made of them were given to both John and Magdalene to critique to accept as true observations made.

Teaching-learning resources

Observations made in John's school showed inadequate teaching-learning resources for teaching science, an obsolete thermometer that was no longer functioning as the instructional material. John had well-prepared lesson plans, stating the relevant instructional materials required for the effective delivery of the lessons but the materials were not available. During his lesson delivery, he practically used exposition and one could see a clear difficulty in the conceptualization of concepts being communicated by John. John mentioned:

> *I will say today's lesson went well, though I needed to use some instructional materials to explain… but I don't have them. You know, without the materials the students cannot understand how you want them to.*

Even furniture for students to sit on and learn was woefully inadequate in Magdalene's classroom environment. It was not conducive enough for teaching and learning science. Observations of the classroom revealed students often compete for the little spaces of their dual desks. Magdalene had a well-prepared lesson plan showing indicators and the expected performance of her students. She indicated the instructional materials that needed to be used in teaching her lessons but no such material was available in the lesson delivery. Author2

enquired from her why she stated them even though she does not have them. Magdalene mentioned:

> *…If I do not indicate that, anybody supervising the lesson later may think I do not have a correct conception of science and its methodology.*

When Author2 enquired about her improvising, she responded:

> *…Yes, I can improvise but that takes time and I don't have much time. You see the charts, I need to look for colors, sit down and draw and that will take time.*

Magdalene added that she recently acquired a laptop and that is what she uses to download pictures to show her students.

> *The laptops they distributed. I mean the one teacher, one laptop, I received one. So, these days that is what I use to download pictures for my lessons. These days I don't think of improvisation*.

Teacher professional development

Teacher's content knowledge, teacher pedagogical content knowledge, and technological pedagogical content knowledge are major determinants of the teacher's success in explaining scientific concepts to students. Deficiencies in these are sometimes compensated for by providing continuous professional development to the teacher. John mentioned:

> *Some teachers say for the biology and Agricultural aspects, they can teach but for the chemistry and physics part they are afraid of those areas …Yes. I believe in-service training will afford me the opportunity to learn and learn from others...*

Observations made from his lesson notebook suggested consistently for 3 years John never taught some of the science topics in the JHS curriculum. For instance, John struggled to recall the topic of basic electronics as part of the JHS curriculum. John expressed:

> *You see this topic West African Examination Council does not construct their test items on it besides the materials are not there and we do not have a science laboratory.*

Magdalene recalled there were only three teachers for the entire JHS. Hence, she opted to teach mathematics and science. Since then, she has been teaching science and had developed an interest in teaching it. However, she had only attended one science workshop in the recent training for the implementation of the new science curriculum. Magdalene expressed:

> *No, I don't attend in-service training. It was just last year they invited us for the training for the new curriculum…*

Language barrier

Another challenge so identified was John's struggle to choose a medium of instruction. It was observed that at some point in time, John tried to use the native language of the students

to communicate some of the science concepts. Because most of the students could not express themselves well in English. John was always met with frustrations. He at a point quizzed:

> *What do you want me to do? Teach you English or 'Kusaal'*?

Largely, the class remained dominant by the few who could express themselves in English. Even so, that was not without errors. Those few students appeared to make John excited and most often called on them to work on any given task:

> *As you can see, when you came to my class, they could not speak English very well. If had I understood the local language, I would have used that one. ...but that is also not allowed.*

Absenteeism

Observations of the class register and students' attendance to lessons showed that John's students often absent themselves from school. During observations of John's lesson, of the expected 22 students, eight were absent. John expressed:

> *Oh! it is a common thing for students to be absent themselves here. You will not always get all the students in school. Today is even better...*

When Author2 visited John at his residence, I was taken to some illegal mining sites where we saw some of his students working there though they were young.

The duality nature of a female science teacher

One major challenge Magdalene faced was her combining household work with teaching. At home, she attends to her children and family chores. Though Magdalene was staying in a nuclear family, she had to prepare family meals, fetch water and wash their clothes. Magdalene mentioned:

> *Saturdays are so tight may be Sundays after church is better… Because of the pressure at home, I usually prepare only Monday lessons on Sunday evenings and prepare for the rest of the week on Tuesdays. …If you look at how women have so many things to do at the home, it is difficult being a good science teacher and a female…*

Teacher successes

Amidst the language barrier, lack of teaching-learning resources, and professional development programs for John, he managed to always get some of his students to do well in the external examinations (Basic Education Certificate Examination [BECE]). Analysis of their 2019 results revealed that of the 23 students who sat for the BECE, eight attained grades 1-5; 10 attained grades 6-8; and five attained grade 9. John mentioned:

> *My students' results. Hmm!!! Not bad though but I wish my students perform better than that. For grades 1, 2,3, and so on in science, …two of my students attained grade 1 in science. Some too got 2, 3 but most of them attained 7, 8, or 9.*

It thus, appears that John does a great deal of work in helping his students to succeed in their academic pursuits. John sometimes organizes a supplementary class for the few students who will come to help guide them learn the science, and that has helped greatly in the students' performance.

Beyond the challenges that Magdalene faced, she appeared to be excited about teaching science. Magdalene expressed:

> *…Eiii, the science, there is a lot. …But I just realise I like the subject. …I don't need to struggle. If you are teaching a subject that you struggle with, you may be boredom.*

Like John, Magdalene's students also do well in the external examinations. She noted that her students also attained grades 2, 3, 4, 5, and so on in the BECE.

Conclusion

The finding that science teachers in remote areas lack adequate instructional materials for the effective delivery of lessons resonates with the assertion of (Adu-Gyamfi, 2014; John, 2019; Parker et al., 2018; Quansah et al., 2019; Somuah & Orodho, 2016) that the teachers do not have adequate instructional materials. It is not out of place to reason that the absence of these instructional materials will further widen the existing disparities (Cheung, 2021; Murphy, 2022; Sumida, & Kawata, 2021) between the quality of scientific literacy (OECD, 2019) inculcated into the students in the remote areas. Since teachers use instructional materials as alternative channels of communication (Samuel, 2009), their absence implies that the science teacher will consequently resort to guiding students to rote learning. Though teachers made conscious efforts at some point in time to improvise these materials, lapses in improvisation also have repercussions on scientific conceptions by students. It could even be that the lack of instructional materials makes science teachers struggle and will want to leave the remote areas for urban areas (Leech et al., 2022; Pryor & Ampiah, 2003). The way forward will be granting them access to the science instructional materials to help in their instructions.

The findings that teachers teaching science in remote areas of Ghana for several years without receiving regular professional development training confirms teaching basic science is problematic because these remote teachers do not get support in the form of professional development (Darling-Hammond, 2017; Laidlaw et al., 2009; Zinger et al., 2020). Hence, we must pay attention to the teacher's environment, giving them professional development (Irby et al., 2021). Because, like any other teacher, remote teachers might have deficiencies in their PCK and will probably need to address that through professional development (Buczynski & Hansen, 2010). The Ministry of Education through the Ghana Education Service may have to extend professional development support to the remote teachers who so need it most (Garcia & Weiss, 2019) to help them develop professional learning communities (Panizzon, 2011).

The findings that remote teachers struggle in teaching science as a result of the language barrier agree with Zinger et al. (2020) that the challenge remote teachers face was the language barrier. The study further agrees with Pryor and Ampiah (2003) that, students in remote areas can make or form only a few phrases in English, and when the teacher's medium of instruction is English, he/she faces the challenge of explaining concepts to the

understanding of students. However, the national policy on the medium of instruction is English, hence, teachers must make a conscious effort to guide students to increase their vocabulary level and their ability to communicate in English, less remote science teachers will continue to struggle.

In remote schools, absenteeism is a major challenge to science teachers. Poised as they may be to instruct the science concepts to students, they are often met with student absenteeism. This finding resonates with the assertion of Pryor and Ampiah (2003) that the smaller number of children enrolled in schools in remote areas is a result of their engagement in agricultural activities, being the dominant occupation of their parents. Thus, parents pay no attention to their ward's education (Averey, 2003). This makes the remote science teachers frustrated as they keep on repeating lessons due to students' absenteeism. This struggle might be why most of the teachers posted to the remote areas tend to leave as early as possible (Leech et al., 2022).

Also, working as a family woman and teaching science is a very herculean task. Because female teachers are surrounded by many activities both at home and school. The overwhelming nature of home duties makes women unable to prepare lessons and organize teaching-learning resources for the week. However, male teachers are likely to use Saturdays and Sundays to prepare lessons for the week. These untold stories of female teachers agree with Mitchell and Yang (2012) that attention has not been paid to the experiences of female teachers both as teachers and as women, and it is direr when a rural component is also a factor. There is even less that is known about women's experiences. We may begin to re-examine this untold part of women teachers teaching science in remote areas, and this is a duty call on science educators and researchers.

The finding that fewer females teach science in remote areas is worth noting. Because is reported from earlier studies that there are few female teachers in remote areas (Azewara et al., 2021; Mulkeen, 2006). It is not just systemic failure (UNESCO, 2001) but the female teachers are not ready to accept postings to teach science in remote areas (Azewara et al., 2021; Mitchell & Yang, 2012). The justification for staying and teaching science in a remote area on the basis of being a native and having family living around (Pryor & Ampiah, 2003) is not good for professionalism. This in part, may explain why not so many women are teaching science in remote areas.

In this ethnography, two teachers were studied in teaching science in remote schools. Though the two teachers were experienced teachers, they had their struggles and successes in teaching science in remote schools in terms of teaching-learning resources, language barrier, and teacher professional development. Teachers in remote communities through insufficient teaching-learning resources managed to have their students attain grade 1 in science in BECE. Hence, MOE through the Ghana Education Service and non-governmental organizations should pay attention to the provision of instructional materials to these remote schools for effectively teaching science to bring out the best in their students. In addition, there were few numbers of female teachers teaching science in remote communities in the studied area, and they were confronted with managing their homes as wives and teaching science effectively to students, hence, the Government and its development partners should decipher a policy that will attract females into science, and in particular teaching science in remote schools.

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Delphi Surveys for Development of Sub-domains, Factors, and Items of Musical Self-Concepts Scales for Korean Secondary Students

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Abstract
Musical self-concepts affect people's musical development and learning, and there have been several psychometric scales to measure musical self-concepts mainly in Western contexts. In order to develop Korean version of musical self-concept scales for secondary students, this study conducted Delphi surveys to identify sub-domains, factors and items of the scale. From November 2021 to May 2022, 21 experts in music education and psychometric assessment gave opinions on preliminary sub-domains, factors and items for musical self-concept scales. The Delphi surveys were conducted in two stages. First Delphi questionnaire consisted of Likert scales for validation of developed 4 sub-domains and 25 factors with open-ended questions was distributed to 15 experts; collected data and opinions were analyzed and reflected to the revised version of the scales, which consisted of 4 sub-domains and 23 factors. Second Delphi questionnaire was for validation of 138 scale items that are based on revised sub-domains and factors. 11 experts responded to the Likert scales for appropriateness of each item and gave open-ended opinions about them; items were revised based on statistical analysis of the collected data. Through the two-stage Delphi survey, Korean version of musical self-concept scales for secondary students consisted of 4 sub-domains, 23 factors and 138 items were arranged for Exploratory Factor Analysis of the scales.

Keywords: Musical Self-Concept Scales, Musical Identity, Korean Secondary Students, Musical Preference, Scale Development

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Introduction

This paper reports the process of verifying the validity of sub-domains, factors and questionnaire items of newly developed psychometric scales, the Musical Self-Concept Scales for Korean Secondary Students by using the expert Delphi technique. Musical self-concept is 'perception of who I am in the music field' (Svengalis, 1978; Vispoel, 1993; Spychiger, 2017; Jung, 2021a). In the modern society, self-directed life has become important (McLean & Syed, 2015), and the research and discussions on self-understanding and identity have recently made meaningful progress. This trend is also in the field of music and music education, and studies have discussed that musical self-understanding or musical self-concept have a great influence on musical development in relation to one's motivation for musical learning and activities (Hargreaves, MacDonald, Miell, 2002; 2012). It is because musical self-concepts affect one's thoughts and behaviors by allowing one to predict and decide what one should and can do. Musical self-concept is closely related to forming one's musical identities, which is more holistic view about myself in music. There have been many studies conducted to develop psychometric scales to measure individuals' musical self-concepts (Fiedeler & Spychiger, 2017; Morin, et al., 2017; Spychiger, 2017; Svengalis, 1978; Vispoel, 1993), and most of them were developed in the Western culture contexts.

Musical self-concept is influenced by various contexts of a society such as history, culture, and education to which the individual belongs (Yeong, 2005), and thus the sub-domains and factors of the musical self-concept should be set differently depending on the given context. Therefore, beyond using the musical self-concept scales developed in the context of Western society as it is, this study was conducted to develop a musical self-concept scales for Korean secondary students considering their cultural or educational contexts. According to the affective domain psychometric instrument development procedure (McCoach, et. Al., 2013; DeVellis, 2022), the range of factors of musical self-concept was explored through literature review and analyzing prior Western based scales (Jung, 2021b).

The following matters were considered in developing the preliminary sub-domains and factors in the previous research stage. First, 'Self-understanding of musical ability' is commonly included in all prior scales, so it is also included to the preliminary sub-domain; and the factors of musical ability are 'music cognition', 'singing', 'instrumental playing', 'music creation', 'body movement', 'reading scores', and 'overall musical ability'. Second, in order to reflect the tendency of the recently developed scales to measure the degree of individuals' participation in musical activities other than musical ability, 'Voluntary participation on musical activities and training' was included as a sub-domain, by which to measure the "performative" aspect of musical identity (Hargreaves & Lamont, 2017). Third, 'Values of music' was set as a sub-domain to measure how much one put importance to the values or roles of music or musical activities such as 'regulation of emotion', 'social interaction', and 'willingness to continue musical activities. Finally, in order to develop a new scale to determine the degree of formation of music preferences and tastes, which is important in recent discussions on musical identity, Marcia (1980)'s four stages of identity development were applied to 'Development of musical preferences/taste' sub-domain (Dys, et al., 2017).

Subsequently, for the research stage of this paper, it aimed to verify the appropriateness of the developed preliminary sub-domains and factors for the context of Korea from experts' point of view followed by verifying the questionnaire items. In results of this phase of the study, a preliminary scale questionnaire items will be produced, and the final scale

questionnaire items will be selected through student surveys. Therefore, the research questions of this research stage are as follows.

1. 1st Delphi survey: What are the experts' opinions on the content validity of preliminary sub-domains and factors of the Musical Self-concepts Scales for Korean Secondary Students?
2. 2nd Delphi survey: What are the experts' opinions on the contents validity of preliminary questionnaire items developed according to the sub-domains and factors of Musical Self-concepts Scales for Korean Secondary Students?

Research Method

1. Research Procedure

Table 1 summarizes the entire research procedure for developing Musical Self-concepts Scales for Korean Secondary Students, and phase 2 and 3 are the process of validating the scales by Delphi surveys.

Phase	Procedure	Research Method	Results
1	Development of Preliminary Sub-domains and Factors of the scales	• Literature review • Analysis of former scales • Interviews on Korean secondary students	• Set preliminary sub-domains and factors of the scales: • 4 sub-domains, 25 factors
2	Validation of Preliminary Scale Sub-domains and Factors	• Delphi Surveys from experts(1st) and Validation	• Confirmation of sub-domains • 4 sub-domains, 23 factors • Development of preliminary questionnaire items
3	Validation of Preliminary Questionnaire Items	• Delphi Surveys from experts(2nd) and Validation	• Item selection • Development of preliminary survey scales
4	Preliminary Test: Factor Analysis and Item Selection	• Conduct preliminary survey to Korean secondary students • Exploratory factor analysis	Extracting factors and item selection - Development of main survey scales
5	Conducting Main Test and Analysis	• Conduct main survey to Korean secondary students • Exploratory factor analysis, confirmation factor analysis	• Optimizing scale length • Production of final version survey scales

Table 1: Research Procedure for Scale Development

2. Research Participants

In order to validate the appropriateness of the sub-domains of the scales established through prior research and interviews, Delphi surveys were conducted by 15 experts for the 1st and 11 experts for the second (Ayre & Scally, 2014; DeVellis & Thorpe, 2022; McCouch, et al., 2013). The general characteristics of experts who participated in the Delphi survey are shown in Table 2.

	Features	1st Delphi survey(15명)		2nd Delphi survey(11명)	
		n	Percentage(%)	*n*	Percentage(%)
Gender	Male	3	20	2	18.2
	Female	12	80	9	81.8
Age	25~30	0	0	1	9.1
	30~39	1	6.7	4	36.4
	40~49	5	33.3	1	9.1
	50 above	9	60	5	45.4
Position	College Professors(Former)	11(2)	73.3(13.3)	5(2)	45.4(18.2)
	College Instructors	1	6.7	1	9.1
	Secondary School Music Teachers(Former)	2(1)	13.3(6.7)	5	45.5
Career Years	1~3	0	0	1	9.1
	3~5	1	6.7	0	0
	5~10	2	13.3	2	18.2
	10~15	3	20	2	18.2
	15 above	9	60	6	54.5
Final Degree	Doctoral	13	86.7	6	54.5
	Master's	2	13.3	4	36.4
	Other	0	0	1(Artist Diploma)	6.7
Major of Final Degree	Music Edcuation	13	86.6	9	81.8
	Educational Psychometry/Statistics	1	6.7	1	9.1
	Other	1(Gifted Education)	6.7	1(Voice)	9.1

Table 2: Information of Experts for Delphi Survey

3. Data Collection and Analysis

1) First Delphi Survey

The 1st Delphi survey was done from November 27 to December 11, 2021. The main contents and structure of the survey paper are as follows.

- Study Overview and Description
- Defining and explaining the main concepts of the study: the definition of musical self-concept and its relationship to musical identity
- Overview of preliminary sub-domains and factors of the scales: 4 sub-domains and 25 factors (Table 3)
- Explanation and definition of each sub-domain and factor and 5-point Likert scale and opinions to evaluate the appropriateness

After collecting expert response results, the appropriateness of each preliminary sub-domain and factor was reviewed. The analysis criteria are as follows. First, among the Likert scale responses of the expert group for each sub-domain and factor, it was judged to be appropriate if the response rate of 4 or 5 points was 80% or more, and the standard deviation was low (sd<0.9). If the standard deviation is less than sd≧0.9 and the average value is less than 4, the appropriateness of the sub-domain and factor was examined more closely, whether to modify or delete it by reflecting the experts' suggestions (Lynn, 1986).

2) Second Delphi Survey

Reflecting the analysis of the results after the 1st Delphi survey, some sub-domains and factors were modified, deleted, and added; in result, 4 sub-domains with 23 factors were confirmed. Then, a total of 138 questionnaire items (6 for each factor), and the 2nd Delphi survey was conducted to validate the appropriateness of them. The survey was conducted about for two weeks from May 5 to 23, 2022. In the second survey, a 4-point scale was used to clarify the positive/negative judgment for each item (McCoach, et al., 2013, p.103). The main contents and composition of the survey are as follows.

- Study Overview and Description
- Definition and explanation of the main concepts of the study: the definition of musical self-concept and its relationship with musical identity
- Overview of sub-domains and factors of the scales: 4 sub-domains and 23 factors (Table 5)
- Description of each sub-domain and factor, 6 items for each factor and 4-point Likert scale and opinions to evaluate the appropriateness

After collecting expert response results, the appropriateness of 138 individual items was reviewe. The analysis criteria are as follows. First, it was judged that it was appropriate if the response rate of 3 or 4 points was more than 80%, and the standard deviation was low (sd<0.9). If the standard deviation is high(sd≧0.9), and the average value is less than 3, the appropriateness of the sub-domain was examined more closely, whether to modify or delete it by reflecting the experts' suggestions (Lynn, 1986).

Results

1. First Delphi Survey

The results of the 1st expert survey are shown in <Table 4>. The sub-domain variable name is numbered to MS, which stands for Musical Self-concept, respectively, 'MS1. Self-understanding of musical ability', 'MS2. Voluntary participation in musical activities and training', and 'MS3. Musical values' and 'MS4. Development of musical preference and taste'.

Code. Sub-domain	Code. Factors	Code. Sub-domain	Code. Factors
MS1. Self-Understanding of musical ability	MS1.1. Music Perception MS1.2. Singing MS1.3. Instrument Playing MS1.4. Music Creation MS1.5. Body Movement with Music MS1.6. Reading MS1.7. Overall Musical Ability	MS3. Musical values	MS3.1. Regulation of Emotion MS3.2. Social Interaction MS3.3. Self-Expression MS3.4. Important Hobby MS3.5. Seeking Musical Careers MS3.6. Overall Importance/Value of Music MS3.7. Willing to Continue Musical Activities
MS2. Voluntary participation in musical activities and training	MS2.1. Music Listening MS2.2. Music Training MS2.3. Music Making(Playing and Creation) Activities MS2.4. Participation to Music Events MS2.5. Searching Music Related Information MS2.6. Writing about Music MS2.7. Finance Expenses to Musical Activities	MS4. Development of musical preference/taste	MS4.1. Achievement MS4.2. Moratorium MS4.3. Foreclosure MS4.4. Diffusion

Table 3: Preliminary Sub-domains and Factors

Code	Response Rate on 4, 5	M	*SD*	Code	Response Rate on 4, 5	M	*SD*
MS1	86.7	4.40	0.737	MS3	73.3*	4.27	1.033***
MS1.1	73.3*	4.27	1.033***	MS3.1	80.0	4.27	1.280***
MS1.2	93.3	4.67	0.617	MS3.2	93.3	4.73	0.594
MS1.3	80.0	4.47	0.834	MS3.3	100.0	4.93	0.258
MS1.4	73.3*	4.07	0.961***	MS3.4	100.0	4.67	0.488
MS1.5	60.0*	3.93**	1.033***	MS3.5	86.7	4.20	1.082***
MS1.6	86.7	4.47	0.915	MS3.6	86.7	4.40	1.121***
MS1.7	66.78*	4.13	1.060***	MS3.7	86.7	4.53	0.743
MS2	100.0	4.67	0.488	MS4	80.0	4.40	0.828
MS2.1	93.3	4.60	0.632	MS4.1	86.7	4.40	1.121***
MS2.2	93.3	4.60	0.632	MS4.2	66.7*	4.13	1.246***
MS2.3	100.0	4.80	0.414	MS4.3	73.3*	4.13	1.457***
MS2.4	100.0	4.67	0.488	MS4.4	66.7*	3.93**	1.438***
MS2.5	86.7	4.53	0.915				
MS2.6	73.3*	4.20*	1.146***	(*Response rate on 4,5<80%, **M<4, ***$SD \geqq 0.9$)			
MS2.7	86.7	4.33	0.900				

Table 4: Results: 1st Delphi Survey

The analysis of expert opinion results for each sub-domain and factor, and explanations and modifications are as follows.

(1) MS1: Self-understanding of Musical Ability

First, the response rate of MS1.1 was lower than 80% and had high standard deviation, and there were opinions on the appropriateness of using music ‘perception’ for the factor name due to the wide range of meaning and differences for ‘perception’ among scholars. Hence, the name of the MS1.1 was changed to 'Music cognition and discrimination', and the definition was modified to 'evaluation of the ability to listen to music and distinguish or identify its characteristics.'

Second, the response rate of MS1.4 was lower than 80%, and there were many opinions on including more specific musical terms such as ‘composition’, ‘arrangement’, and ‘improvisation’ other than ‘creation’ to clarify the meaning. Therefore, those three terms were included to the factor name of 1.4 as ‘music creation (Composition, Arrangement, Improvisation).’

Third, MS1.5 did not satisfy the standards, and there were many opinions on if ‘body movement with music’ is for musical ability because it could be confused with dance or sports activities. Since there were also diverse discussion on ‘body movement with music’ during student interviews (Jung, 2022), it seems difficult to reach a common consensus on presenting body movement with music as a factor. Therefore, it was decided to exclude.

Fourth, MS1.7 did not satisfy the standards, and there were many opinions on whether it was necessary to present the ‘overall musical ability’. Some of the preceding foreign scales included a factor or items asking for the evaluation of overall musical ability, in addition to factors such as singing, instrumental playing, and composition (Spychiger, 2107; Svenalis, 1978; Vispoel, 1993). Paying attention to the psychometric expert's opinion that the overall musical ability can be measured by statistically combining the value results of musical ability factors, this factor was excluded.

Additional opinion about the MS1 was that the presented factors of musical ability were focused on musical performance, but understanding musical knowledge such as music theory also needs to be included in the range of ability. This has not been included as a musical ability in previous studies, but it is reasonable to consider the Korean music education context, which emphasizes the curriculum to understand music concepts and elements. Also, during the student interviews, many students expressed confidence for their musical ability based on their understanding of musical knowledge. Therefore, it was decided to add ‘Understanding and Knowledge in Music’ as a factor of MS1.

(2) MS2: Voluntary Participation in Music Activities and Training

For the MS2, although the standards of response rate and standard deviation were satisfied, there were opinions of using term ‘training’ because it could be considered too serious for non-music major students. Therefore, the name of MS2 was changed to ‘Voluntary participation in music activities and learning (practice).'

Factor MS2.6 needed to be reviewed because the response rate was less than 80%, and the standard deviation is above the standard. Experts’ opinions on MS2.6. ‘writing about music’

are as follows. ‘listening’ and ‘writing’ are highly related activities, so there was an opinion on integrating them rather than put it as an individual factor. Therefore, the factor was excluded because the writing activity may not be universally carried out activity and that it may not play an appropriate role as a factor due to its high correlation to other factors.

(3) MS3: Value of Music

For MS3.5(Seeking Musical Careers), there were opinions that questioned the appropriateness of it as a component of musical self-concept because it overlaps MS3.7(willing to continue musical activities). In the case of MS3.6(overall importance/value of music), there was an opinion on whether it was a necessary factor because it was considered to be the sum of other factors. In addition, there was a suggestion to include the aesthetic value of music. Accordingly, the researcher added the ‘aesthetic value in music’ factor instead of excluding ‘willing to continue musical activities’ and ‘overall importance/value of music.’

(4) MS4: Development of Musical Preference/Taste

Sub-domain MS4 satisfied the validity criteria, while the factors in MS4 did not reach the standards. First of all, there were many opinions on use of more appropriate translation words for factors rather than using the terms from the theory as they were because the terms such as ‘achievement’, ‘moratorium, foreclosure, and diffusion’ are somewhat hard to understand. Therefore, the factor names for MS4 were changed to ‘MS4.1: well-defined, MS4.2: suspended, MS4.3: conforming, and MS4.4: indifferent’. Second, the psychometric expert suggested that the measurement method for MS4 should be different from other sub-domains because the four factors of the MS4 shows the developmental phases of musical preference and taste. Hence, the statistical analysis method for MS4 will be reviewed based on the preliminary and main test results.

2. Second Delphi Survey

After the first Delphi, scales were revised and confirmed as 4 sub-domains and 23 factors (Table 5). Then, the second Delphi survey was conducted to verify the validity of 138 items developed for each factor. This section reports what was considered while developing questionnaire items for each sub-domain, and discusses experts' opinions on items, sub-domains, and factors that have not reached the validity criteria without presenting every analysis result.

Code. Sub-domain	Code. Factors	Code. Sub-domain	Code. Factors
MS1. Self-understanding of musical ability	MS1.1. Music Cognition and Discrimination MS1.2. Singing MS1.3. Playing Instruments MS1.4. Music Creation(Improvisation, Composition, Arrangement) MS1.5. Score Reading MS1.6 . Understanding and Knowledge in Music	MS3. Musical Values	MS3.1. Regulation of Emotion MS3.2. Social Interaction MS3.3. Self-Expression MS3.4. Meaningful Activity MS3.5 Aesthetic Value in Music MS3.6. Will to Continue Musical Activities
MS2. Voluntary Participation on Musical Activity and Learning(Practice)	MS2.1. Music Listening MS2.2. Music Learning(Practice) MS2.3. Music Playing MS2.4. Music Creation MS2.5. Participation to Music Events: Audience MS2.6. Searching Music Related Information MS2.7. Finance Expenses to Musical Activities	MS4. Development of Musical Preference/Taste	MS4.1. Well-defined MS4.2. Suspended MS4.3. Conforming MS4.4. Indifferent

Table 5: Confirmed sub-domains and factors(4 sub-domains, 23 factors)

(1) MS1: Self-understanding of Musical Ability

MS1 is a sub-domain that evaluates what one thinks of one's ability in musical activities. According to previous studies, perception on one's own musical ability is influenced by absolute and relative (compare with others) evaluations along with others' feedback through various music experiences (Schmitt, 1979); also, those evaluations include not only current ability but also future development potential (Spychiger, 2017). Therefore, 36 scale items were developed with sentences that include the findings from those studies. As a result of the content validity analysis individual items in the MS1, only 1.1.6 (Friends ask me for help when it is difficult to identify characteristics of music while listening: 3,4 response ratio-72.7, M=3.18, SD=0.874) did not reached validity criteria. 1.1.6 was the only item that contains the request of others to mean others' recognition of one's musical ability, which is from a preceding scale (Austin, 1990). There were opinions that such an expression was likely not necessarily based on the others' perception of one's abilities but because of social friendship or personality. Accordingly, the item was revised to 'People around me admit that I'm good at identifying characteristics of music while listening.'

(2) MS2: Voluntary Participation in Music Activities and Learning (Practice)

The MS2 consists of items to evaluate whether one is participating in musical activities and learning(practice) with one's own initiative, which aims to assess musical self-concept according to one's participation in various musical activities based on one's own will (Müllensiefen, et al., 2014). Individual items for each factor were whether one participates in music activities(e.g., I listen to music because I want to do); whether one participates in music activities in one's spare time (e.g., Whenever I have time, I use my time to sing, practice musical instruments, and study music); whether one considers a waste of resources(time, money, etc.) to participate in music activities (e.g., I don't feel that creating/arranging music is waste of my time, I don't feel that musical activity is waste of money); whether one is immersed to musical activities(When I perform music, I lose track of

time and immerse myself in it); whether one prioritizes music activities (e.g., If I am given a variety of activities to choose from in and out of the school, I prefer to participate in online/offline concerts as an audience); and whether actively participating in music activities (When I don't understand something about music, I don't feel shame to ask my teacher or friends who know music better). As a result of the content validity analysis of 42 individual items in MS2, all met the validity criteria except 2.6.4 (I find, organize, and write about the information of music I want to know: 3, 4 response ratio-72.7, M=3.27, and SD=0.905). This item was revised to 'I find, organize, and record information about the music I am interested in.'

(3) Value of Music

MS3 consisted of items asking how meaningful and important the roles of music or music activities are to the respondents. As a result of the content validity analysis of 36 individual items in the MS3, all of the items except 3.4.3 (I don't want to live in a world without music: 3,4 response ratio-72.7, M=3.27, and SD=0.905) met the validity criteria. For the item, there were opinions that the expression of the item could be somewhat misleading and extreme expression. Accordingly, the item was revised to 'I don't want to stay in a place without music.'

(4) MS4: Development of Musical Preference.Taste

In MS4, six items were presented to explain the characteristics of each stage by dividing the factors into four developmental phases of musical preference/taste 'well-defined / suspended / conforming / indifferent' to determine how much one's musical preferences and tastes have been formed. To this end, it was intended to include the meaning of presence or absence of search for various music, and whether the commitment to a specific musical genre is high to make an item. Examples of items for each factor reflecting this include 'well-defined: There is definitely certain sort of music that I usually listen to', 'suspended: I listen to various music regardless of the atmosphere of music, 'conforming: I listen to or play a certain music because my parents and teachers recommended it', and 'indifferent: I think it's a waste of time to look for and listen to various music.'

As a result of the content validity analysis of 24 individual items in the MS4, all items met the validity criteria and that each item was appropriate for evaluating the factors. However, the individual items in the MS4 were revised and supplemented by reflecting some experts' opinions that the expression of the items was somewhat difficult or unclear. In addition, like the first Delphi, there is an opinion of a psychometric expert that the analysis method between the MS4 and other sub-domains should be differentiated, so it should be decided based on the results of preliminary tests.

Conclusion

This study used the Delphi survey to verify the validity of the sub-domains, factors, and questionnaire items of newly developed Musical Self-Concept Scales for Korean Secondary Students. As a result, 4 sub-domains, 23 factors, and 138 items were confirmed. Through the expert verification process, the sub-domains, factors, and items of the scale appropriate for the context of Korea were embodied, and the scales were differentiated and specialized from preceding scales in the following aspects.

First, in the MS1, the ‘body movement with music’ factor was excluded from the ‘Self-understanding of musical ability’ sub-domain, and the ‘understanding of knowledge in music’ factor was included. ‘Body movement’ had been included in several prior scales due to its high connectivity with music from various perspectives (Vispoel, 1993; Morin et al., 2017; Spychiger, 2017; Fiedeler & Spychiger, 2017). On the other hand, there was no prior scales that suggested the degree of knowledge understanding, such as music theory, as a musical ability. But when considering student interviews and Korean national music curriculum which put importance on understanding musical knowledge, including the ‘understanding of knowledge in music’ as a factor of musical ability seems reasonable.

Second, MS2 and MS3 considered the musical participation of non-musical majors developing the sub-domain names, factors, and items. Reflecting the expert's opinion that ‘training’ may be to serious for non-music majors, MS2 was revised to ‘Voluntary participation in music activities and learning (practice)’. In addition, if the ‘seeking musical career’ is included in the MS3 as a factor, non-music majors’ test results is likely to be low. Therefore, the factor is excluded.

Third, in accordance with recent discussions that value the relationship between music preferences/tastes and musical identity, ‘Development of music preferences and tastes’ was set as an MS4, and the developmental phases were presented as a factor based on Marcia (1980)’s theory. Since the MS4 is four factors that show step-by-step differences, it is necessary to use a different method from other sub-domains to analyze the results. Accordingly, based on the results of the preliminary and main student surveys in the future, it is necessary to devise analyzation method for MS4.

Based on the questionnaire items developed and confirmed through this expert verification, preliminary and main surveys should be conducted for secondary school students to further verify the validity of factors and items through exploratory and confirmatory factor analysis. After the future process, the factors that make up the Musical Self-Concept Scales for Korean Secondary Students will be more systematic, and the scales will be standardized by selecting discriminating items from among a number of items included in the preliminary test.

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Getting Ready for F2f Learning: Teaching Factory in the Fashion Design Program

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Abstract
This study investigates the implementation of teaching factory learning at SMKN 1 Bancak in Semarang Regency, Indonesia, for the 2021/2022 academic year. The research utilizes a qualitative methodology, including observations and interviews with vice principals and teachers to gather primary data. The study aims to assess the readiness of SMKN 1 Bancak in implementing teaching factory learning and identify the obstacles that arise during the preparation process. The study found that the school's readiness for teaching factory learning is satisfactory, based on seven critical aspects of implementation. However, the study also identifies obstacles such as a lack of equipment and materials, limited teacher personnel who master fashion competence, and limited work equipment. The school has taken steps to overcome these challenges, including borrowing equipment from industrial partner, procuring uniforms and work equipment, and providing education and training for teachers. This study provides valuable insights into the readiness of a school for implementing teaching factory learning and identifies the challenges that may arise during the preparation process.

Keywords: Teaching Factory, School Readiness, F2F Learning, Online Learning, Fashion Design Program

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INTRODUCTION

Vocational High Schools (SMK) are educational institutions aimed at developing life skills by training students to master the skills needed in the workforce (including the business and industrial sectors). The provision of education in vocational schools must produce graduates with skills relevant to their fields. Referring to Government Regulation No. 19 of 2005 concerning National Education Standards, which also clearly states the competency standards of SMK graduates in order to improve intelligence, knowledge, personality, noble character, skills, and the ability to live independently and pursue higher education according to their jobs. Schools need to equip students with skills and competencies in line with the needs of the job market.

One of SMK's efforts is to equip students with direct work experience in the business and industrial world, especially through the workshop teaching model. This refers to the Guidelines for Factory Training Implementation issued by the Professional Development Branch, which states that Factory Training is a learning model in SMK/Manufacturing Services related to applicable standards and procedures in the industry and takes place in an atmosphere similar to what happens in the industry. (Amin, 2020). This factory training is now known as teaching factory.

Teaching factory is a learning concept in a real-life environment, which can bridge the competency gap between industry needs and school knowledge. Teaching factory is a business and production-oriented learning. Innovative learning and productive practice are educational methods that are oriented towards managing students in learning to be in line with industry needs or demands (Kuswantoro, 2014). The establishment of teaching factories in vocational schools can close the skills gap between industry demands and the skills created by vocational schools. The implementation of teaching factories requires the absolute involvement of industry stakeholders in assessing the quality of educational outcomes in SMK.

Teaching factory learning ran smoothly before the Coronavirus Disease 2019 (Covid-19) pandemic, but after the Covid-19 pandemic appeared, the implementation of teaching factory learning could not be carried out. The implementation of social distancing as an effort to reduce the spread of COVID-19 caused the government to eliminate face-to-face learning in schools starting from the primary level, junior high school, senior high school/vocational school, to university. There was a total change in the learning system or learning process. The learning process that used to be face-to-face in the classroom is now done remotely or online.

In the current situation, after the vaccination program runs smoothly, the government plans to hold face-to-face learning but still under health protocols, or called learning in the new normal conditions. The implementation of teaching factory learning in the new normal era is related to human "compromise" against the Coronavirus Disease 2019 (Covid-19). Therefore, the new normal era is a new normalcy, which is a normal human life but with a new way of living. This new lifestyle is associated with the application of health procedures such as physical distancing, regular hand washing with soap or hand sanitizer, wearing masks, and so on. This will happen in all aspects of community life in Indonesia, including education.

"The lesson plan for face-to-face learning in the new normal after nearly 1.5 years of online learning requires readiness from schools and students. Readiness, according to Slameto, is the condition of someone who feels prepared to take an action, respond, or answer in a certain

way to a situation (Slameto, 2005). One's readiness is influenced by three aspects, namely: 1) physical, mental, and emotional condition; 2) needs, motives, and goals; and 3) skills, knowledge, and understanding that have been acquired.

The implementation of Teaching Factory (TEFA) requires preparation from the school. There are several components that need to be prepared, starting from conditioning the school, determining the product-service, learning tools, human resources, management, industrial relations, and information on products and/or services. The readiness of the school in implementing TEFA can be seen from these components. The level of readiness of each component will affect the results of TEFA implementation. The better the school's readiness in each component, the better the implementation of TEFA will be, so that the objectives of TEFA can be achieved.

Observations at SMKN 1 Bancak, especially in the fashion program, show that the students have good practical skills. The facilities for fashion practice are also fully available, but due to online learning, students rarely use them. The research by Hasanah & Purnamawati revealed that vocational schools are considered ready for TEFA implementation if the infrastructure is available, supported by a good curriculum, and management (Hasanah & Purnamawati, 2017). The preparation (planning) for TEFA includes: human resources, production, and finance (Suryana et al., 2019). Some things that need to be prepared for Teaching Factory in the fashion program are human resource competencies, partnerships with the business/industrial world, availability of facilities, and products that support Teaching Factory learning (Santosa, 2018).

Based on the background of the problem above, the research problem is formulated as follows: 1) How prepared is SMKN 1 Bancak in teaching factory learning at F2F learning?; 2) What are the obstacles that arise and their solutions in preparing for teaching factory learning at F2F leaning in SMKN 1 Bancak?

METHOD

Research Design

This study is a qualitative-research conducted in the field. Qualitative research, according to Sutama (2016), aims to understand social phenomena from the participants' perspective. This qualitative research is used to describe the readiness of the school in implementing TEFA learning in F2F learning. The research design uses a single case study. The case study design in this research is intended to describe the readiness of the school in implementing TEFA learning in F2F learning at SMKN 1 Bancak, Semarang Regency. The aspects of readiness studied include school conditioning, product-service determination, learning tools, human resources, management, industrial relations, and product information.

Procedure of Collecting Data

The data used in this study are primary data obtained from interviews with informants, including the head of the expert group, vice principal, and teachers at SMKN 1 Bancak. Secondary data sources were obtained from documentation. Data collection techniques used in this study include interviews, observation, and documentation. Interviews were conducted with informants, while observation was used to observe the implementation of TEFA learning in the classroom. Documentation was used to record archives and documents.

Data Validity

Data validity was ensured using source and technique triangulation, which involved comparing data from different sources. Data from interviews were cross-checked with data from observations and documents.

Data Analysis

Data analysis used an interactive qualitative analysis process, which included data collection, data condensation, data reduction, data presentation, and conclusion drawing.

FINDINGS

The readiness of SMKN 1 Bancak in Teaching Factory Learning for F2F Learning

1. Preparing learning facilities for F2F learning

The readiness of the implementation of Teaching Factory learning in SMKN 1 Bancak in the 2021/2022 academic year has been well-established. This can be seen from the seven important aspects of Teaching Factory application, namely the aspects of preparing learning facilities, product-service determination, learning tools, human resources (HR), management, industrial relations, and product information.

Table 1. Preparing Learning facilities for F2F learning

	Findings
Preparing learning facilities for F2F learning	1. School conditioning is related to the condition of school rooms, especially the practice rooms (laboratories) where TEFA is carried out.
	2. Referring to the guidance of the Directorate of Vocational Education and Training, laboratory rooms should be clean, tidy, and equipped with supporting facilities and furniture.
	3. Safety lines/signs/markings should be implemented between work areas and public areas to ensure safety.
	4. Facilities for cleanliness, first aid, fire extinguishers, signs, instructions, explanations, and work safety warnings should be available.
	5. The arrangement of a workspace that reflects the industrial work environment will help students to adapt more easily to the work environment in the future.
	6. Schools can optimize their available resources to develop a work environment similar to that in the industry.

Based on the research findings, it can be concluded that appropriate educational facilities and infrastructure in accordance with industry standards will support learning activities. Such facilities and infrastructure essentially shape work habits similar to those in the industry. The facilities and infrastructure referred to are production facilities in the form of equipment and materials used to support teaching factory learning activities in vocational high schools, in terms of quality, quantity, use, and maintenance. In terms of quality, facilities and

infrastructure are closely related to feasibility and compliance with industry standards. In terms of quantity, it is related to adequate facilities and infrastructure. Use and maintenance are related to compliance with industry procedures. Therefore, it is crucial to optimize the resources available in vocational schools to develop a conducive learning environment that mirrors real-world industry settings.

2. Product-service determination

Table 2. Product service determination

	Findings
Product service determination for TEFA learning	1. The selection of products produced in TEFA learning has represented the competencies needed in the Fashion department.
	2. The production volume is to fulfill the product user needs from the partnering company
	3. The main consideration in determining the product in the implementation of TEFA at SMKN 1 Bancak is that the product must be able to deliver student competency achievement.
	4. The selected product must have good market potential to meet external needs.
	5. The selected product must be able to be produced with available resources.
	6. The selected product must be developed and improved sustainably in relation to production volume.
	7. The selected product type should be closely related to the basic competencies in the competency curriculum.
	8. The production process activities carried out by students essentially manifest the learning process to master those competencies.
	9. The fulfillment of students' competencies may be achieved through the completion of several types of products, either goods or services, in accordance with the competencies they are learning.
	10. One type of product may require the involvement of basic competencies from other majors or programs at the school

Overall, the findings suggest that the selection of the appropriate product is crucial for the success of TEFA learning. The product should not only fulfill the needs of the partnering company but also allow students to achieve their competency goals. In addition, the selected product should have good market potential, be producible with available resources, and have room for sustainable development and improvement. The product type should be closely related to the basic competencies in the competency curriculum, and the production process should allow students to master those competencies. Finally, the completion of several types of products may be necessary to fulfill all the competencies, and the involvement of other majors or programs may be required in certain cases.

3. Teaching material

Table 3. Preparing teaching material

	Findings
Preparing teaching material for TEFA learning	1. Teachers at SMKN 1 Bancak have prepared several teaching materials for TEFA learning, including syllabi, lesson plans, media, assessment instruments, and schedules.
	2. These teaching materials are essential for creating and completing a product in the TEFA learning process, whether it is a good or a service.
	3. The preparation of teaching materials is done after analyzing whether the product to be created contains the competencies that students need to master.
	4. The TEFA learning process aims to integrate the culture and activities of the partnering company into the learning process.
	5. The teaching materials are a manifestation of the vocational curriculum and should be closely related to the competencies in the curriculum.
	6. The TEFA learning process is designed to simulate the production process in the partnering company, and students are expected to perform the same tasks as workers in the company, including following the rules and regulations of the workplace.

In conclusion, the findings highlight the importance of preparing teaching materials in the TEFA learning process. These materials should be carefully crafted to reflect the competencies in the curriculum and the product being created. Moreover, TEFA aims to integrate the culture and activities of the partnering company into the learning process, making it a more immersive and practical experience for students. The simulation of the production process in the partnering company is also a critical aspect of the TEFA learning process, as it enables students to perform the same tasks as workers in the company and learn to follow workplace rules and regulations. Overall, the TEFA learning process offers a valuable opportunity for students to gain practical skills and prepare for the workforce.

4. Preparation of human resources

Table 4. Preparing of human resources

	Findings
Preparation of human resources	1. The preparation of human resources is important for the success of the TeFa learning process.
	2. Teachers with appropriate competencies in fashion design are assigned to facilitate the TeFa learning process.
	3. The learning process is aimed to apply the industrial work culture to the students through teacher guidance and partnership with the industry.

	4. Teachers need to understand and be familiar with the production process in the partnering company to provide appropriate guidance to the students.
	5. Teacher readiness is crucial in measuring the readiness for implementing the teaching factory, as they are directly involved with the students in the process.
	6. According to Permendiknas No. 16/2007, a teacher's qualification is determined by their academic qualifications and competencies, which can be obtained through formal education or certification.

In SMKN 1 Bancak, the preparation of human resources, particularly teachers with appropriate competencies, is important for the success of the TeFa learning process. The learning process aims to apply industrial work culture to the students through teacher guidance and partnership with the industry. The readiness of the teacher is crucial in measuring the readiness for implementing the teaching factory. Therefore, teachers need to understand and be familiar with the production process in the partnering company to provide appropriate guidance to the students. The teacher's qualifications are determined by their academic qualifications and competencies, which can be obtained through formal education or certification.

5. Teaching factory management

TEFA management operates based on seven guiding principles, including independence, accountability, responsibility, transparency, partnership, effectiveness, and efficiency.

Table 5. Teaching factory management

	Findings
Teaching factory management	1. Independence means that TEFA operates autonomously without relying on external parties for guidance or direction.
	2. Accountability refers to the responsibility of TEFA to document and report on its activities to the school leadership.
	3. Transparency in TEFA management helps to foster trust and prevent suspicion among stakeholders.
	4. Partnership is essential in TEFA management, where the goal is to establish mutually beneficial relationships that are interactive, active, and positive.
	5. Effectiveness is a critical measure of TEFA's success in achieving its desired outputs and goals.
	6. Efficiency is another essential factor in TEFA management, as it ensures that the required outcomes are achieved with minimal resource sacrifice, particularly cost, time, and effort.

Based on the Table 5, these principles ensure good governance and prevent deviations and mismanagement. Independence means operating autonomously without relying on external

guidance. Accountability involves documenting and reporting activities to school leadership, while transparency fosters trust among stakeholders. Partnership aims to establish mutually beneficial relationships, and effectiveness measures TEFA's success in achieving its goals. Efficiency ensures achieving outcomes with minimal resource sacrifice.

The study shows that SMKN 1 Bancak's preparation for implementing cooperation with industrial partners has been successful. This success can be attributed to the use of TEFA, which requires a link and match between the school's learning patterns and the industry's needs. This link and match are established through the development of an industry relationship or industrial partnership. Here are some further explanations about industrial partners in preparing TEFA learning.

Table 6. Industrial partners

	Findings
Industrial partners in preparing TEFA learning	1. The implementation of TEFA requires the school to align its curriculum and teaching methods with the needs of the industry to provide relevant training and practical experience to students.
	2. Industrial partnership or relationship is crucial in TEFA implementation, as it provides students with exposure to real-world situations and enhances their employability.
	3. An effective partnership between the school and industry requires a clear understanding of each other's needs, goals, and expectations to ensure mutual benefit.
	4. TEFA's success in developing an industry relationship depends on the school's ability to establish trust, maintain transparency, and communicate effectively with the industry.
	5. The link and match between the school's learning patterns and the industry's needs facilitate the transfer of knowledge and skills, making students more job-ready and competitive.
	6. Industrial partnership or relationship in TEFA implementation provides a platform for collaboration between the school and the industry, promoting innovation, and sharing best practices.
	7. The implementation of TEFA in schools can contribute to the development of a skilled and competent workforce that can support the growth of the industry and the economy.

6. Product information

The research shows that SMKN 1 Bancak has made efforts to inform the public about its products. However, it is stated that the responsibility for marketing the products belong to the industrial partner. The school is only helping with the marketing process and is not fully involved in it. The school's focus is on production, and marketing has not been fully integrated into its operations. In conclusion, the findings suggest that SMKN 1 Bancak needs to improve its marketing efforts and work more closely with its partner company to promote

its products effectively. The school should also consider integrating marketing into its operations to ensure that it meets its goals for product promotion and sales.

Barriers to TEFA Learning through F2F (face-to-face) Learning

The research findings indicate that the preparation for TEFA learning in the Fashion Department of SMKN 1 Bancak has been carried out optimally, but some obstacles have been identified, including constraints in the areas of infrastructure and human resources.

Table 7. Barriers to TEFA Learning through F2F (face-to-face) Learning

Constraints	Explanation	Solutions
Facilities and equipments	Lack of equipment, materials, and work equipment.	The school borrows equipment and materials from their industrial partner
	Facilities and infrastructure were incomplete and non-uniform work equipment, with many students not using gloves and masks.	SOP has been established for students to comply with the use of masks and gloves
Human resources	The lack of teachers with appropriate competencies in the Fashion Department.	Several teachers will be assigned to assist in TEFA learning and will be provided with education and training on fashion competencies before the implementation
	The supervising and technical implementing teachers from the partner DUDI company only consist of one person each	assign additional teachers from the school to assist with the implementation of the TEFA program. Beforehand, these teachers should receive education and training on the competencies required in the field of fashion. This education and training can take the form of a training program provided by the partner DUDI company. By increasing the number of supervising and technical implementing teachers, the school can ensure that the TEFA program is adequately supported and implemented effectively.

DISCUSSION

The excerpt discusses the importance of educational facilities, infrastructure, and industrial relations in vocational education. According to Barnawi & Arifin (2012), educational facilities are all equipment, materials, and furniture used directly in the educational process,

while infrastructure refers to all school equipment that indirectly supports the learning process. In accordance with the National Education Ministry Regulation No. 40 of 2008 on the Standards of Education Infrastructure for Vocational High Schools (SMK), an SMK must have infrastructure categorized into general learning spaces, support spaces, and special learning spaces, along with equipment in each room.

The excerpt also emphasizes the importance of industrial relations in vocational education. As stated by ATMI Biz-Dec (2015), a school-industry relationship can support practical activities that apply industrial culture, such as quality standards, target times, production process efficiency, shift work, clear work procedures, practical results as a source of income, clear functions and responsibilities for each accountable person, a safe and comfortable working environment, and smooth learning activities. Through collaboration with industries, schools can benefit from training and facilities that will create an industrial culture within the school. This collaboration will provide schools with a standardization of production-based learning activities similar to those in the industrial world.

In line with TEFA Learning Guide issued by the SMK Development Directorate (2020), the work uniform worn by students during TEFA learning must comply with safety and health requirements as a standard work procedure. Gloves are required for production activities. The requirement for safety and health compliance in TVET programs is mandated by government regulations and guidelines. In Indonesia, for example, the Directorate of Vocational High School Development released a guide for TVET learning in 2020, which stipulates the use of appropriate personal protective equipment, including gloves, during practical activities (Direktorat Pembinaan SMK, 2020). This emphasizes the importance of creating a safe and healthy learning environment for students (Al-Dhafiri, A. A., Al-Shammari, N. M., Al-Jabri, M. M., & Al-Atawi, A. M., 2021; Oyewale, O. S., & Olowolaju, T. O, 2019; Nwaru, J. C., & Adogu, P. O. U., 2021).

The goal of the school-industry internship program (teaching factory) in vocational schools, according to Amin (2020), is to support work readiness, combine skills, and enhance the professional character of SMK graduates according to the needs of the business world and companies. This is achieved through product/service-based learning activities that take place in an environment, atmosphere, governance, and actual business/ company standards. Wahjusaputri & Bunyamin (2021) also state that teacher and student competencies can be enhanced through training such as the TF-6M program tailored to industry needs, online learning through the KKSI (Creative Camp for Indonesian Vocational Schools), and facilities such as laboratories or workshops that must comply with industry standards.

CONCLUSION

In conclusion, the readiness of implementing the teaching factory in SMKN 1 Bancak for the academic year 2021/2022 has been running well. This can be seen from seven important aspects of teaching factory implementation, including school conditioning, determination of product-services, learning tools, human resources (HR), management, industrial relations, and product information. However, there are some obstacles found in the preparation of TEFA learning in SMKN 1 Bancak, such as the lack of equipment, materials, work equipment, and limited personnel who master the competency of fashion. Efforts to overcome the lack of equipment include borrowing equipment and materials from DUDI partners, providing uniforms and work equipment, and conducting education and training for teachers.

These efforts can improve the quality of the teaching factory and provide a better learning experience for the students.

Based on the conclusions drawn, it is suggested that the school should plan more carefully for the implementation of TEFA, particularly in terms of the school's human resources. The school should conduct training for the fashion teachers before implementing TEFA. Moreover, the school should improve its ability to allocate budget for the implementation of TEFA to avoid the shortage of equipment and materials.

Following the TEFA guidelines from the Directorate of SMK Development, the school needs to evaluate the implementation of Teaching Factory in terms of target clarity, market segments, market reach, and adjust methods and actors in promotional activities. The school should develop a plan for Teaching Factory product information and its implementation in accordance with the predetermined product targets. Communication media for Teaching Factory include brochures, leaflets, online media, and other forms of media that the school can use to provide information on the Teaching Factory's product.

The school needs to have various ways to provide information about the Teaching Factory's products, such as brochures, leaflets, websites, and other forms of media. The product information aspect is essential to develop marketing skills in students. The school needs to manage the marketing media that can be utilized while minimizing expenses, considering that the school's funding structure does not accommodate the needs of funding for promotional activities.

Based on the conclusions drawn, here are some suggestions for teachers and students to improve the implementation of TEFA. Suggestions for teachers: 1) Conduct an evaluation of the TEFA implementation and identify areas of improvement; 2) Provide training to teachers who need to improve their competencies in the area of fashion design; 3) Plan and allocate the budget for the TEFA implementation more effectively, to avoid a shortage of equipment and materials; 4) Implement regular monitoring and evaluation to ensure that the quality of TEFA implementation is improving. Suggestions for students; 1) Increase motivation and enthusiasm for learning and participating in TEFA activities; 2) Identify and maximize their talents in fashion design, so that they can contribute to the success of the program; 3) Take advantage of the learning opportunities offered by TEFA to develop entrepreneurship skills and prepare for future careers in the fashion industry.

Overall, the success of the TEFA program depends on the collective efforts of all stakeholders involved, including the school, teachers, and students. By working together and taking these suggestions into consideration, the quality of TEFA implementation can be improved and the program can better achieve its goal of producing quality and skilled entrepreneurs in the fashion industry.

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Challenges and Approaches in Adopting EIL in a Japanese EFL: Internal and External Factors

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Abstract
This study explores how the English education policy in Japan (external factor) and Japanese EFL learners' mindsets toward their dialects (internal factor) affect their attitudes toward Japanese English. Also, we discuss how their attitudes toward dialects influence their self-esteem and self-confidence. First, the Japanese English education policy focuses on American or British English and strongly encourages learners to speak either of the two varieties in place of Japanese English (a unique variety of English spoken in Japan from the World Englishes point of view). In other words, it prioritizes American or British English over learners' own English (Japanese English), which results in their negative attitudes toward Japanese English. Second, we review some studies showing how Japanese speakers' negative attitudes toward dialects in general influence their perception of Japanese English (internal factor) and how they eventually influence their self-esteem and self-confidence, negatively affecting L2 performance. Finally, in this paper, we propose effective ways to introduce the concepts of "English as an International Language (EIL)," "World Englishes (WE)," and "Intercultural Competence (IC)" into English education based on the pedagogical implications of previous EIL studies. By learning these new ideas, Japanese EFL learners can gain the confidence to accept and speak Japanese English, leading to greater self-esteem and confidence in using English.

Keywords: English Varieties, Japanese English, Dialect, Self-Esteem, Self-Confidence, EIL, WE, IC

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1. Introduction

With globalization progressing at an unprecedented rate, English continues to play an essential role as a global language with which people from different countries can communicate worldwide. The number of English speakers is approaching 1.5 billion, with 75 percent of them being non-native speakers with diverse linguistic and cultural backgrounds. This increasing demand for English proficiency highlights the need for well-designed English education policies and curricula to nurture and produce global talents capable of negotiating with people from different parts of the world and addressing common issues through English communication. In Japan, it has been over 130 years since English started to be taught in schools, with students nowadays spending an average of 6 to 10 years learning the language. However, many Japanese people lack confidence in speaking English and hesitate to communicate with foreigners.

Among many approaches proposed for increasing the communicative competence of Japanese learners of English, English as an International Language (EIL), involving the paradigm shift in the way English is viewed, put forth by Smith (1976) has been considered one of the most empowering ideas for EFL learners. Smith (1976) claims "It (English) is yours (no matter who you are) as much as it is mine (no matter who I am)" (p.39). According to him, English does not belong to specific people such as Americans and British but to everyone. Whether you speak English as your first, second, or foreign language does not matter. Further, people can speak English as their own language as well as their mother tongue. Following the idea, people can obtain ownership of English, that is, they can be native speakers of their own English. It is expected that Japanese EFL learners change their negative attitudes toward Japanese English and gain confidence in using their own forms of the language through the introduction of EIL.

Despite EIL's positive effects on EFL learners attested through many studies (e.g., Ke & Suzuki, 2011; Lee et al., 2017; Saito, Heo & Perkins, 2020), there remains resistance to it among Japanese learners of English as well as in the current EFL curricula. The present study touches on some of the sources of this resistance, learner-internal as well as external factors. Then, we discuss our ideas and the pedagogical implications of EIL studies for successfully implementing EIL activities in an EFL context.

2. Standard English Myth and Cultural Impact

2.1 Impact of American and British Cultures on Japan

The influence of American and British cultures has been significant and far-reaching, particularly in the areas of media and entertainment. Especially, American movies, TV shows, music, and fashion have been popular in Japan for many decades, and have had a major influence on Japanese popular culture. The use of English loanwords in Japanese is extremely common, particularly in the areas of fashion, food, and technology. This is because these varieties are seen as prestigious and have high social status, and are therefore considered desirable to learn for the purposes of international communication and career advancement.

2.2 School English Education in Japan

The English education policy in Japan positively highlights "Standard English," such as American and British English, based on the social background described in Section 2.1 and

also the idea of native-speakerism, and has urged students (Japanese EFL learners) to emulate the American or British accent. Thus, many students blindly believe that "Standard English" is the best variety they should learn and speak. According to scholars such as Matsuda (2003) and Hanamoto (2010), many Japanese EFL learners view "Standard English" as a high-status English variety, while considering "non-standard English," including Japanese English, as a low-status English variety. Namely, Japanese EFL learners prefer "Standard English" over their own English (Japanese English) and aim to speak the variety by following the English education policy in Japan.

When viewed from a sociolinguistic perspective, achieving the goal of producing native-like English speakers in Japan is challenging and may not be a realistic expectation. Language and the speaker's culture and identity are two sides of the same coin, inseparable and mutually dependent on each other. In other words, people speak a language by reflecting their culture and identity (Niemeier, 2004). Given that, it is impossible for Japanese EFL learners to speak "Standard English" since they do not have its culture and identity to reflect in their English. Due to this unreasonable and unachievable goal of English education, many learners give up on learning English in the middle and do not have sufficient confidence to communicate in English. However, if you look at it the other way, Japanese EFL learners can be confident in English if they accept and speak Japanese English by reflecting their Japanese culture and identity. It is like empowering Japanese EFL learners with an achievable goal (Japanese English) in the course of their English study rather than complementing their "imperfect" English, saying that "you did your best although you did not quite reach the goal."

3. Dialect Use and Its Influence on Self-esteem, Self-confidence, and L2 Performance

3.1 Correlation between L1 Dialect and L2 Accent

In the previous section, the power of American and British culture in Japan and the English education policy were discussed as external factors hindering the implementation of the EIL paradigm. In this section, we address one of the learners' internal aspects that connect to this unfortunate situation. One can speculate that the negative perception of Japanese English is not only socially imposed but also arises from individual learners' experience of using dialect in general. Some scholars (Choomthong & Manowong, 2020; Matsura & Chiba, 2014) argue that speakers' dialectal backgrounds affect their mindsets toward L2 accent. In other words, people with positive or negative mindsets toward their regional L1 dialects are likely to show positive or negative attitudes toward L2 accent, respectively. Building on the implications from these studies, our previous study (Saito, 2023) hypothesized that one of the internal factors contributing to the negative perception of Japanese English is the unfavorable mindsets of Japanese EFL learners toward their own dialects. We implemented an activity in an English class at a Japanese college and investigated our students' mindsets toward their L1 dialects and attitudes toward Japanese English to examine the correlation between these two components. Through the questionnaire and reading/writing task, we analyzed the correlation. The result showed that the correlation is positive, that is, the students who are negative about their dialects tend to show negative attitudes toward Japanese English or vice versa. One of the findings here is that speakers' overall unfavorable perception of a non-prestige or non-standard variety holds them back from using the given "dialect" in certain situations.

3.2 Impacts of Learners' Attitudes Toward "Accent" on Self-esteem

Considering L1 dialect and L2 accent (Japanese English) are a part of the speaker's culture and identity, it is conceivable that being negative about their own language directly causes low self-esteem and self-confidence, which results in low motivation and performance in their English studies. Jorgensen and Pedersen (1989) declare that learners might develop a sense of inadequacy if their dialects are not recognized and respected in the educational context. Further, Romaine (2000) affirms repeatedly correcting dialects would cause learners to experience a decrease in self-esteem, which leads them to be less confident and motivated to learn English. Also, Reaser and Adger (2008) proclaim that viewing dialects as errors discourages learners from engaging in English study and potentially results in their academic underachievement. Conversely, then, if Japanese EFL learners' L2 accent (Japanese English) is accepted and respected, they will gain self-esteem, which brings more confidence in speaking English, more motivation to practice speaking English, and higher performance in speaking English.

3.3 Effect of L2 Speaking Confidence on L2 Performance

Related to this, many scholars assert that self-confidence is crucial for EFL learners to achieve high L2 performance (e.g., Cho, 2013; Clement, Dornyei, & Noels, 1994; Ortega, 2015). For instance, Cho (2013) affirms that self-confidence and L2 confidence are both interrelated to L2 performance, i.e., EFL learners with high confidence are likely to achieve high performance in speaking English. Additionally, the learners' high performance brings them 'willingness to communicate (WTC)' which connects to the high frequency of using English. Needless to say, the more learners practice speaking English, the more they can develop their English proficiency.

Given the advantages of high self-esteem and self-confidence in speaking English, EIL can be incorporated into English education to help Japanese EFL learners recognize that Japanese English is an equally valid form of English alongside American and British English, and to encourage a positive shift in their attitudes towards the language. Introducing EIL into English education can play an important role in boosting Japanese EFL learners' self-confidence which drastically influences their motivation and performance in English studies. For example, in Saito, Heo, and Perkins (2020), it was found that Japanese EFL learners' overall L2 speaking confidence was moderately increased after learning about EIL and participating in intercultural communication with participants from other expanding circle countries.

4. Introduction of EIL, WE, and IC in a Japanese EFL

4.1 Introduction of World Englishes

People reflect their cultures and identities in their English. Obviously, their cultures and identities are all different, so their Englishes are also different. This viewpoint naturally brings the concept of World Englishes (WE) (e.g., Kachru, 1985; Kirkpatric, 2007) which introduces English use reality where people all over the world speak their own English for global communication. We believe that the first step to change Japanese EFL learners' attitudes toward Japanese English is the introduction of WE at the very beginning of EFL education. During the implementation of EIL activities in our previous research (Saito, Heo & Perkins, 2020; Saito, 2023), we learned that many participants in the study did not know

the reality and misunderstood that many people would speak only two English varieties in the world: American or British English. Further, they believed that they would not be able to successfully communicate with people from different countries by speaking Japanese English due to its accent. Therefore, it is essential for Japanese EFL learners to recognize the reality by knowing about WE and Japanese English, one of the local varieties of English. Especially with the changing dynamics in the global society, a shift from the traditional American and European-centered view of the world to a more diverse and multipolar global landscape, the benefits of introducing WE will be highlighted more and more in the future. There is no better time than now to introduce WE, and it can be a good stepping stone to introducing EIL.

4.2 Introduction of EIL and Japanese English

As introduced in Section 3.1, Saito (2023) examined the relatedness between Japanese speakers' attitudes toward their own Japanese regional dialects and their ideas about Japanese English. Given the result that they are positively correlated (negative mindset toward their L1 dialects paired with a negative perception of Japanese English), it was found that whether EFL learners have negative or positive mindsets toward the L1 dialect can be a criterion for accepting and speaking Japanese English. The approaches for introducing EIL or Japanese English can then differ depending on the dialect group or the dialectal background of learners. For those who have negative perceptions of dialects, more in-depth WE or EIL materials can be provided or explained during the introduction phase, more clearly highlighting the positive impact of EIL. Without a firm belief in a teaching material/method, students often fail to achieve a goal set in a classroom. Those who are positive about dialects, on the other hand, can focus more on the actual practice of EIL, such as intercultural communication with expanding circle country speakers, without detailed introduction to EIL or the value of Japanese English, as they are the ones who can readily accept the idea of EIL and can be positive about Japanese English. The result of Saito (2023) tells us that it is important to recognize who can be negative about Japanese English and encourage them to accept the use of Japanese English to gain self-confidence in speaking English. To realize it, we expect "English as an International Language (EIL)" to change the learners' attitudes toward Japanese English and lead them to accept and speak Japanese English.

4.3 Intercultural Communicative Competence

After introducing WE and EIL, it is also important to introduce 'Intercultural Competence' (IC). Byram (2012) defines IC as the knowledge and abilities that allow individuals to communicate effectively and appropriately with people from diverse cultural backgrounds. Further, Hammer (2015) defines IC as "the capability to shift one's cultural perspective and appropriately adapt one's behavior to cultural differences and commonalities (p.483)." Based on the definition, the use of IC can facilitate genuine global communication by encouraging individuals with diverse cultural and linguistic backgrounds to value and comprehend various forms of English, as well as the culture and identity of the person speaking it. Sharifian (2009) also emphasizes that intercultural competence needs to be viewed as a core element of proficiency in English for international communication. In reality, however, many Japanese EFL learners consider themselves as the ones who should understand American or British English and make themselves understood by speaking American or British English. In other words, they do not expect Americans and British to understand Japanese English. In the context of IC, this viewpoint does not describe real global communication. While it is important for Japanese people to strive to understand American and British English, they should also anticipate Americans and British to understand Japanese English. By

understanding each English variety from both sides, people can achieve real mutual understanding in English based on the concept of IC.

5. Conclusions

This study addressed some internal as well as external factors that impede the adoption of EIL or Japanese English in a Japanese EFL context. Factors such as the deep-rooted prestige of American and British culture and English in Japanese society and learner-internal factors such as their perception of "dialect" affecting their attitudes toward Japanese English were discussed. Reflecting on internal and external factors, we affirmed the importance of the introduction of EIL, WE, and IC and suggested how we can effectively introduce these concepts to a Japanese EFL context. By incorporating these three components into English education, learners can realize the reality, recognize numerous local English varieties, and use Japanese English. Once their own English including their culture and identity is accepted and respected through English education, it is expected that they will gain self-esteem and self-confidence that promote their high motivation and performance in English studies. Given these advantages, we will continue to work on the introduction of EIL in an EFL classroom and design concrete activities to further examine our EIL-driven methodologies.

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Evaluation of Cocuricular Implementation in the Project of Strengthening the Profile of Pancasila Students at Private Vocational School Yplp Pgri 1 Makassar

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Abstract
Curriculum is guidelines in activity nature of learning dynamic based on relevance. Objective from study This For know results and descriptions from cocurricular program implementation theme work. On research This done evaluation curricular that is Project Strengthening Profile Pancasila Students at School Intermediate Vocational Private YPLP PGRI Makassar City. In phase This school carry out activity with use Lifestyle theme sustainable, Wisdom local, and Employment. On research This held using the Context, Input, Process, and Product (CIPP) evaluation model which focuses on 3 aspects namely Input, Process, and Product. Approach study use Approach quantitative and qualitative. Population in research this is whole inhabitant school consists from teachers and students in class X and determination sample using probability sampling. Data collection techniques used is survey with distribute questionnaire instruments on input and product aspects, then interviews on the process aspect. Quantitative data analysis processed in a manner descriptive statistics, then interview with question open. Research results show that implementation cocurricular are in category ok. As for them is from facet input aspect ie competence cocurricular teachers in the category well, the process aspect of the activity beginning, process, and closing are in category well, and aspect product results experience learning on category ok. Recommended for Education unit for more increase teacher competence of facet planning, implementing, and evaluating in order to obtain more results Good again, intertwine partners outside school, then with exists evaluation this can made reflection and consideration for implementation cocurricular in even semester next.

Keywords: Evaluation, CIPP, Implementation, Cocurricular

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Introduction

Every country has made changes to the curriculum. In Indonesia, the government has implemented various educational curriculum models starting from Post-Independence until now. Based on Kompas news, Indonesia has made changes 11 times. Namely: 1947 Curriculum (1947 Lesson Plan), 1952 Curriculum (Decomposed Lesson Plan 1952), 1964 Curriculum (1964 Education Plan), 1968 Curriculum (Old Order-New Order), 1975 Curriculum (Instructional Development Procedures), 1984 Curriculum (How to Learn Active Students), 1994 Curriculum & 1999 Curriculum Supplements (Caturwulan), 2004 Competency-Based Curriculum (KBK), 2006 Education Unit Level Curriculum (KTSP), 2013 Curriculum (K-13), 2021 Curriculum (Independence Curriculum).

The independent learning curriculum is the ideas and principles of Ki Hajar Dewantara which focus on the principle of independence according to the interests, needs, and characteristics of students in applying flexible and essential material. The purpose of changing the curriculum is to improve the quality of education. This is due to the rapid development of technology and information. With this convenience, the concept of Freedom to learn focuses on freedom and creative thinking (Rahayu et al., 2022). Make it easy for children to access various information through gadgets and the internet. Therefore, according to the independent learning policy, it is hoped that it will be able to make the world of education carefree, namely the role of technology in influencing the resolution of problems in social life (Marisa, 2021).

The implementation of the independent curriculum in schools is currently still in the process of transitioning from the K13 curriculum to the independent learning curriculum. Therefore, schools still use 2 curriculum models. For example, class X vocational high school uses the independent learning curriculum and classes XI, XII still use the K13 curriculum.

At schools the independent learning curriculum is known as the Education Unit Operational Curriculum. There are 3 learning activities namely: Intracurricular, Cocurricular, and Extracurricular. Co-curricular is a new learning activity known as the Pancasila Student Profile Strengthening Project which has an allocation of 30% of lesson hours from Intracurricular.

Through the Pancasila Student Profile Strengthening Project, it provides an opportunity for students to "experience knowledge" as a process of strengthening character as well as an opportunity to learn from the surrounding environment. At the implementation stage the teacher needs to pay attention to the design of the assessment in strengthening the learning project. There are things that must be considered, namely the assessment method must consider the conditions of students, the objectives of achieving the project must be considered in its manufacture and focus on the dimensions, elements and sub-elements of the Pancasila Student Profile (Setiyaningsih, 2022). In the preliminary interview study it was found that co-curricular implementation was still not optimal and was carried out in a hurry. Therefore, researchers are interested in conducting an Evaluation of the Implementation of the Pancasila Student Profile Project with a focus on teacher competence and co-curricular learning outcomes on the theme of work.

The formulation of the problem that arises is how the input aspect is viewed from the competency of the coordinating team and teachers at SMK YPLP PGRI 1 Makassar, what are the aspects of the process of implementing work-themed co-curricular activities, and what are

the product aspects of co-curricular learning outcomes on the theme of work at SMK YPLP PGRI 1 Makassar. Based on the formulation of the problem, the purpose of this study was to determine the competence of the coordinator and teacher team at SMK YPLP PGRI 1 Makassar, find out the advantages and disadvantages of co-curricular implementation at SMK YPLP PGRI 1 Makassar, then find out the impact of co-curricular learning outcomes at SMK YPLP PGRI 1 Makassar.

Literature Review

The independent curriculum is a curriculum with a variety of intracurricular learning, where the content will be more optimal so that students have enough time to explore concepts and strengthen competence. Within this curriculum there are projects to strengthen the achievement of Pancasila student profiles which are developed based on certain themes set by the government. (Rachmawati et al., 2022).

The project to strengthen the profile of Pancasila students is a cross-disciplinary learning in observing and thinking of solutions to problems in the surrounding environment to strengthen various competencies in the Pancasila Student Profile. Implementation of the project to strengthen the Pancasila student profile is carried out flexibly in terms of content, activities, and time of implementation. The project to strengthen the profile of Pancasila students is designed separately from intracurricular activities. Objectives, content, and project learning activities do not have to be related to intracurricular objectives and subject matter. Education units can involve the community and/or the world of work to design and organize projects to strengthen the profile of Pancasila students.

The initial stage of the school principal forms a team of Facilitators as implementers of learning activities. The profile project facilitator team consists of a number of educators whose role is to plan, implement, and evaluate the profile project. The facilitating team is formed and managed by the head of the education unit and the profile project coordinator. The number of profile project facilitator teams can be adjusted to the conditions and needs of the educational unit, seen from:

The design of Project Learning activities is that the facilitating team determines 2-3 dimensions that will be used as indicators or assessments in each project theme. Based on these considerations, the profile of Pancasila students consists of six dimensions (Ministry of Education and Culture, n.d.), namely: 1) faith, fear of God Almighty, and have noble character, 2) independence, 3) mutual cooperation, 4) global diversity, 5) critical reasoning, and 6) creative.

The Ministry of Education and Culture determines the theme for each profile project implemented in an education unit. Eight themes for SD-SMK and equivalent developed based on priority issues in the 2020-2035 National Education Roadmap, Sustainable Development Goals, and other relevant documents. The themes in question are: Sustainable Lifestyle, Local Wisdom, Unity in Diversity, Awaken the Body and Spirit, Voice of Democracy, Engineering Technology, Entrepreneurship (Not an Option for SMK), Employment (Compulsory for SMK).

CIPP Models

CIPP stands for Context, Input, Process and Product. This concept was offered by Stufflebeam with the view that the important purpose of evaluation is not to prove, but to improve. "The CIPP approach is based on the view that the most important purpose of evaluation is not to prove but to improve". iv (Madaus et al., 1983). The four aspects are as described below:

1. Context
   This stage involves studying the program environment. The objective is to define the relevant environment, describing the desired and actual conditions associated with that environment.

2. Inputs
   Input evaluation basically provides information regarding the use of resources. It focuses on the feasibility of the evaluator assessing the school's ability to carry out the evaluation. According to Mars there are five elements that influence curriculum implementation, namely: support from the principal, support from fellow teachers, support from students, support from parents, and support from within the teacher are the main elements (Rusman, 2012).

3. Process
   This third stage discusses the implementation decisions that control and manage the program. It is used to determine the suitability between planned and actual activities. The strategy is to address the main features of the project design. For example, certain content selected new instructional strategies, or innovative student-teacher planning sessions. Process evaluation occurs during implementation. This is a pilot process carried out to debug (find and remove defective parts) the program prior to implementation across the district. This allows the evaluator to anticipate and overcome procedural difficulties.

4. Products
   Product evaluation has evaluators collecting data to determine whether the final curriculum product currently in use achieves what they expect. To what extent is the goal achieved? Product evaluation provides information that enables the evaluator to decide whether to continue, discontinue, or modify the new curriculum.

In carrying out an evaluator may only carry out one type or a combination of two or more types of evaluation (Stufflebeam, 1983). That is, an evaluator does not always have to use all four. It seems that the most accountable separation is the evaluation of the context independently, while the evaluation of inputs, processes and products must be carried out in one series (Hasan, 2009).

Method

This research is an evaluation research using the Context, Input, Process, and Product (CIPP) model, but researchers only focus on aspects of Input, Process, and Product. The researcher used a quantitative approach with the population in this study being all school members and determining the sample for students and teachers using non-robability sampling. Data collection techniques used are questionnaires, documentation studies and interviews. The validation used is expert judgment. Data analysis was carried out in a quantitative descriptive

manner on the input aspect, namely teacher competence and product, namely the impact of cocurricular learning outcomes or projects on strengthening the Pancasila student profile, then a descriptive interview analysis was carried out on the process aspect to the vice principal of the curriculum section and the Coordinating Team.

No	Presentase	Klasifikasi
1	80 – 100 %	Baik Sekali
2	66 – 79 %	Baik
3	56 – 65 %	Cukup
4	40 – 55 %	Kurang Baik
5	< 39 %	Tidak Baik

Results

Input Variables

Evaluation of teacher competency input regarding co-curricular in terms of 5 aspects, namely co-curricular understanding, objectives, content, process, evaluation. The results of the descriptive analysis of the five aspects can be seen in the table below.

Tabel 1. Variabel Input

Indkator	Mean	Median	Modus
Understanding	2,84	3	2
Goals	2,55	2	2
Contens	2,5	2	2
Process	2,68	3	4
Evaluation	2,64	2,5	4

The questionnaire was distributed to 11 teacher respondents for the co-curricular teacher's "Understanding" indicator obtained an average value of 2.84 from a maximum score of 4, and a median value of 3, then a mode value of 2. On the "Purpose" indicator, co-curriculars obtained an average value of 2, 55 out of a maximum score of 4, and a median value of 2, then a mode value of 2. In the co-curricular "Content" indicator, an average value of 2.5 is obtained from a maximum score of 4, and a median value of 2, then a mode value of 2. In the "Process" indicator cocurricular obtained an average score of 2.68 from a maximum score of 4, and a median value of 3, then a mode value of 4. In the cocurricular "Evaluation" indicator obtained an average value of 2.64 from a maximum score of 2.5, and a median value of 2, then the mode value is 2. The Process and Evaluation Indicators are in a good category because the average value and values that appear frequently are high with a maximum score

of 4, while in the Comprehension, Purpose, and Content aspects it is necessary to increase because the average value is still sufficient or standard , then the value that occurs frequently is 2.

Data analysis and input evaluation were carried out using MS. Excel 2019. The identification results are shown in the input aspect, namely teacher competence regarding understanding, objectives, content, process, and co-curricular evaluation can be seen in the following table.

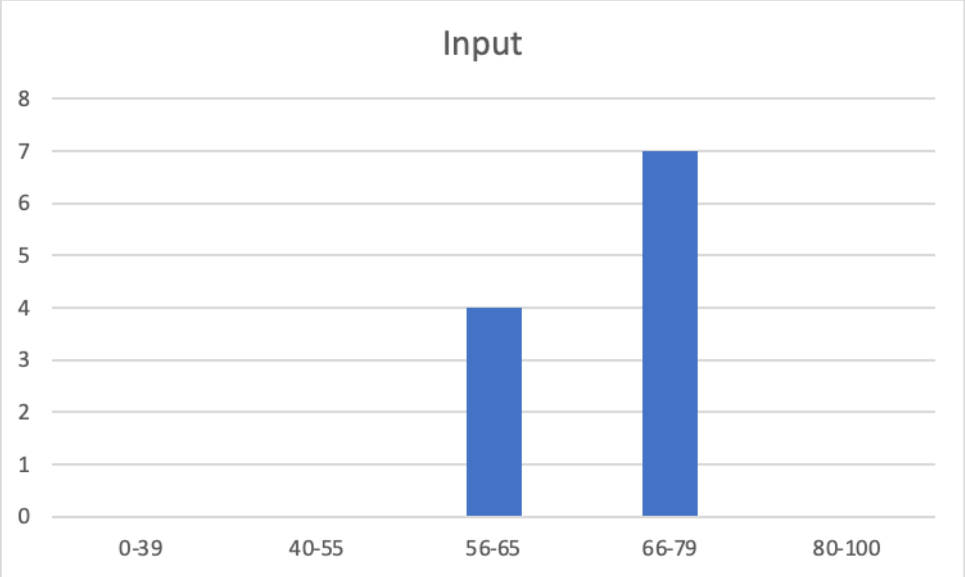


Figure 1. Input Aspect teacher cocurricular competencies

Results data study seen there are 4 teachers in the category “Enough” is in the range value 59 – 65 %, then there are 7 teachers who are in the "Good" category are in the range value 66 – 79 %.

Process Variables

Process evaluation was carried out using the interview method which was reviewed from 5 aspects of the initial activities, implementation of learning, closing activities, partner involvement, and the advantages and disadvantages of P5 activities. The interview was conducted together with the deputy head of Vocational School YPLP PGRI 1 Makassar in the curriculum section as the person in charge and the coordinator chairman. In the early stages of P5 implementation, the coordinating team and teachers conducted discussion activities with all implementing committees for schedule planning and technical implementation. Furthermore, the coordinating team together with the vice principal of the school optimized coordination and collaboration with all members. Then the activity was closed by giving directions in carrying out the P5 closing activities properly, to be able to give good impressions, experiences, and positive things so that they could be developed for further P5 activities. Do not forget that the implementation of the evaluation is carried out using the rubik's scoring system.

This co-curricular learning is carried out independently so that it has not established partners or agencies outside the school. In practice, there are advantages and disadvantages. The advantages in implementing it are collaboration between teachers and students, gaining valuable experience in implementing cocuricular starters, mutual respect for opinions,

interactions that occur can establish good cooperation between students. While the drawbacks are that it still needs to develop understanding related to the implementation of cocuricular, it needs assistance from cocuricular experts or practitioners so that the implementation of cocuricular is of higher quality and not in a hurry, there are still some students who have not actively participated and contributed.

Product Variables

Product Evaluation of the impact of co-curricular learning on the theme of work in terms of the 3 dimensions of the Pancasila student profile project that have been determined, namely: the independent dimension, critical reasoning, and creative. The results of the three-dimensional descriptive analysis can be seen in the table below.

Tabel 2. Variabel Produk

Indkator	Nilai rata-rata	Median	Modus
Independent Dimension	2,57	2	2
Critical reasoning Dimension	2,6	2	2
Creative Dimension	2,67	3	3

This questionnaire was distributed to 75 student respondents based on the results of the descriptive analysis that the independent dimension obtained an average value of 3.04 from a maximum score of 4 with an achievement level of 75.92%, a percentage range greater than 50% included in the "good" category. In the critical reasoning indicator, an average value of 3.04 is obtained from a maximum score of 4 with an achievement level of 76%, the percentage range is greater than or equal to 76% included in the "very good" category. Then on the creative indicator, an average value of 2.77 is obtained from a maximum score of 4 with an achievement level of 69.67%, the percentage range is greater than 50% included in the "good" category.

Data analysis and input evaluation were carried out using MS. Excel 2019. The identification results are shown in the product aspect, namely the results of co-curricular learning experiences in terms of the independent dimension, the critical reasoning dimension, and the creative dimension can be seen in the following table.

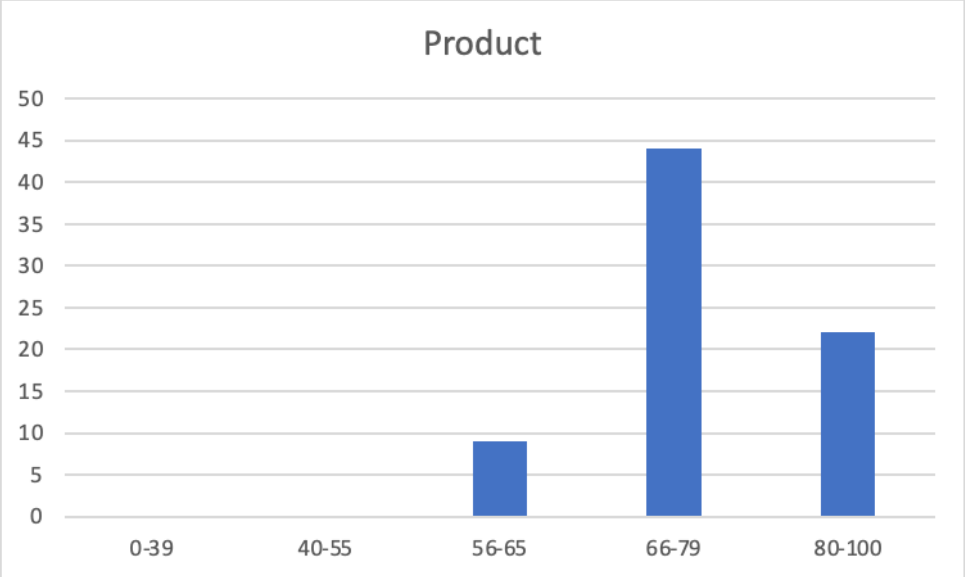


Figure 2. Product Aspect Students Outcomes learning experience

From the research data, it can be seen that there are 9 students whose learning experience results are in the "Enough" category, which is in the 59-65% range, and there are 44 students whose learning experience results are in the "Good" category, which is in the 66-79% range, then there were 22 students whose learning experience results were in the "Very Good" category in the range of 80-100%.

Discussion

Based on the Ministry of Education and Culture No.56/M/202. the project to strengthen the profile of Pancasila students is a project-based cocurricular activity designed to strengthen efforts to achieve competence and character in accordance with the profile of Pancasila students which is based on Graduate Competency Standards. Cocurricular is one of the learning activities in the independent learning curriculum which has a time allocation of 30% of intra-curricular activities. One example of the activity is visiting industry, field trips, and certain activities outside of intracurricular class hours. The input aspect that plays an important role in implementation is the teacher, therefore the teacher is required to master and understand cocurricular activities. This is useful so that teachers can design learning well. From the research data, there are several teachers who still have sufficient cocurricular competence. This is because the indicators of understanding, objectives, and content regarding cocurriculars are still relatively sufficient, while the process and evaluation indicators regarding cocurriculars are classified as good.

The cocurricular project planning flow begins with forming a team of project facilitators to strengthen Pancasila student profiles, identify the level of readiness of educational units, design dimensions, themes, and time allocation for projects to strengthen Pancasila student profiles, compile modules, and design reporting on project results (Rachmawati, 2022). The facilitating team consists of teachers and homeroom teachers as well as deputy principals who are tasked with planning, implementing and evaluating activities.

The results of a joint interview with the deputy head of school indicated that the process of implementing co-curricular activities was still in a hurry because this was the school's first experience implementing it. This is because the school chose an independent path to develop

co-curricular project activities. Initiating co-curricular project activities is carried out by inviting students to see real situations in everyday life both in class and outside the classroom. One example of a strategy is to ask a trigger question or start from an authentic problem. Then in optimizing the implementation of key projects is the involvement of students in the learning process, providing space and opportunities to develop, cultivating a culture of positive work values, the effectiveness of continuous activities, and periodic adaptation according to the learning context. Closing co-curricular project activities can be done by planning learning celebrations and reflecting on activities.

Optimization of partner involvement has not been carried out optimally, because the school organizes projects independently. The Pancasila student profile project activity aims to provide opportunities for students to experience knowledge while at the same time strengthening the Pancasila character from their environment. Optimizing partners can be done by involving the surrounding community outside the school environment, industry, parents of students, and the government.

Cocurricular learning outcomes are learning experiences possessed by students consisting of three-dimensional Pancasila student profile projects that have been determined by the school. From the results of the study, it was obtained that the average student experience was in good condition. This is based on good input and process factors as well.

Conclusion

The results of the study show that co-curricular implementation is in the good category. The input variable is in a good category for the co-curricular competence of the Pancasila teacher student profile project. It needs a little addition in terms of aspects of understanding, objectives, and co-curricular content of the Pancasila student profile project. The process variable is in a good category even though the implementation of activities is still in a hurry and has not yet established partners with the community outside the school. Even though this is just the beginning of implementation, the team of facilitators and deputy principals have had the courage to implement it by choosing the independent route. Then the experience of student learning outcomes is in the good category, because the input and process variables have been implemented properly.

Recommendations

For the education unit to improve teacher competence in terms of planning, implementation, and assessment so that the dimensions of the Pancasila student profile project of students can be even better and more perfect. It is also hoped that education units will establish partners with institutions outside the school, to provide broader knowledge for students. Then with this evaluation it can be used as a consideration for co-curricular implementation in the next even semester.

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STEAM (Science, Technology, Engineering, Art, and Mathematics) Implementation and Challenges in Elementary Schools in West Java

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Abstract
STEAM education plays a crucial part in education in the 21st century. Teachers, being one of the most essential components of delivering education, play a crucial role in implementing STEAM learning. This study seeks to investigate the deployment of STEAM learning in primary schools and the obstacles elementary school teachers encounter in applying STEAM. This study is a survey-based descriptive quantitative investigation. This study's participants were 50 primary school teachers from West Java. A questionnaire was used to collect data on the implementation of STEAM learning and the difficulties associated with it. The results of the study indicate that instructors have incorporated STEAM learning through student-centered learning, learning through inquiry and problem-based models, assessment, reflection, and collaboration, as well as applying integrated learning in both content and skills. Teachers cite pedagogical obstacles, technological obstacles, facilities, STEAM learning materials, and implementation time as obstacles to the implementation of STEAM education. It may be stated that the instructor has implemented learning activities that contribute to STEAM education. However, technical training for teachers on the technical implementation of STEAM and the supply of supporting resources, particularly technology-based facilities, are required to facilitate the implementation of STEAM in primary schools.

Keywords: STEAM Education, Difficulties, Elementary School, West Java

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Introduction

Education of the 21st century is characterized by the rapid development of science and technology in affecting the order of human life especially in the field of education. Education in the 21st century requires education that has the ability in the fields of science, technology, as well as various skills such as communication skills, critical thinking, creativity and the ability to collaborate. (Nuragnia et al., 2021). The skills and abilities of the 21st century are essential to make students adapt and respond to the developments of the times. Therefore, it is important for students to have 21st century skills developed in line with scientific and technological developments. Education of the 21st century is expected to form individuals who have the skills to transform the science learned in real life and use technology appropriately in the face of the global competition, especially in 21st Century learning. (Indriyanti et al., 2020). One of the learning approaches due to the rapid development of science and technology in the 21st century is the approach of science, technology, engineering, art, and mathematics. (STEAM).

The Science, Technology, Engineering, Art, and Mathematics (STEAM) approach is one of the educational approaches that integrates science, technology, engineering, art, and mathematics comprehensively as patterns in problem-solving. STEAM learning makes learning more interesting and makes learners more creative in finding real-life problem solutions. (Atmojo et al., 2020). Learning with STEAM approaches forms students to understand the phenomena that occur in everyday life and provide solutions to these problems. The STEAM approach encourages learners to find the correlation between the science they learn with everyday life.

Steam education has attracted a lot of world attention in recent years. This can be seen from the growing trend of research-research on STEAM education internationally. (Li Wang, 2020). Several countries such as the United States, Japan, Hong Kong, and several other countries have implemented and developed the STEAM approach in their educational curricula. (Lin, 2021). In addition, Steam learning has already begun to be introduced to every level in Indonesia. One of the regions in Indonesia that first implemented STEAM learning in schools was West Java. At the age of primary school in West Java, teachers have already begun to implement STEAM learning in the learning process. Teachers become one of the important aspects of educational success as well as a key aspect in the implementation of STEAM learning in elementary schools. In addition, in the STEAM approach, teachers act as facilitators and learners as central to the collaborative learning process, integrating science, technology, engineering, art, as well as mathematics integrally. Therefore, the curriculum should focus on improving skills and soft skills that are adapted to the development of the times so that it facilitates teachers in the implementation of STEM approaches in the learning process. (Sriyanto, 2020).

Steam training has been implemented in several primary schools in West Java. However, there are still many obstacles facing teachers in the application of STEAM learning in primary schools. One of the obstacles faced is the teachers who still have very little knowledge about the STEAM approach in primary school. This is due to the lack of socialization and training carried out by the government especially in the field of education regarding learning STEAM in primary schools. Therefore, this research will exhibit on the implementation of learning as well as the challenges faced by teachers in the application of STEAM learning in primary schools. This research is expected to be a refraction for the

government especially in the field of education in taking policy for the progress of Indonesian education.

Method

The method used in this study is descriptive quantitative research with survey methods. Quantitative descriptive research is research carried out to gather in-depth information and describe a situation or phenomenon that occurs. (Kurniawan, 2018). Survey method is a method of research conducted to obtain the facts of existing phenomena. (Sukmadinata, 2010). The sample on this study was 50 primary school teachers in 10 districts in West Java. In each district, five primary school samples were taken for the process of collecting research data. The collection of data in this study uses elevators, interviews, and documentation done to elementary school teachers. The data was collected in January 2023 through the dissemination of elevators and interviews with elementary school teachers. The lifting question tool is designed to explore the implementation of STEAM learning that includes teacher perception, learning strategies, and learning approaches. The angket used to know the challenges faced by teachers in the implementation of STEAM uses the angket from Nistor et al. (2018). Data analysis in this study uses quantitative descriptive. This data analysis is obtained from the results of interviews, documentation, and logs that are systematically structured and concluded into sentences that are easy to understand. (Wicaksana et al., 2022).

Findings and Discussion

Perceptions of Teachers Regarding Science, Technology, Engineering, the Arts, and Mathematics (STEAM)

Based on the results of the research data that has been carried out shows that of 100 respondents about 30% of teachers have followed STEAM training implemented by the educational intensity. Teachers revealed that STEAM training provides benefits in knowledge of learning methods and models that can be applied in the classroom. In addition, the teacher also revealed that STEAM training helps in implementing exciting learning so that it can increase the motivation of students in learning. In addition, the benefits of STEAM training revealed by teachers are the addition of teacher insight into problem-based and project-based learning so that it can facilitate learners in learning that focuses on developing creative and innovative thinking skills. (Park et al., 2016). Meanwhile, there are still 70% of teachers who have not received STEAM training. 70% of the total teachers that have not carried out STEAM education are teachers with teaching experience in primary schools for more than 5 years so less interested in the development of learning. This shows that STEAM training has not reached teachers evenly and has not been implemented in every district in Western Java. In fact, if you look from where the teaching area is, most teachers teach in a rather developed area and not a remote place.

STEAM Education Implementation in Elementary Schools in West Java

Implementation of STEAM learning is revealed through several questions related to the implementation of learning implemented by teachers such as the learning model Project Based Learning (PjBL), the problem-based learning model (PBL), learning model Inqiury, and learning model Discovery Learning.

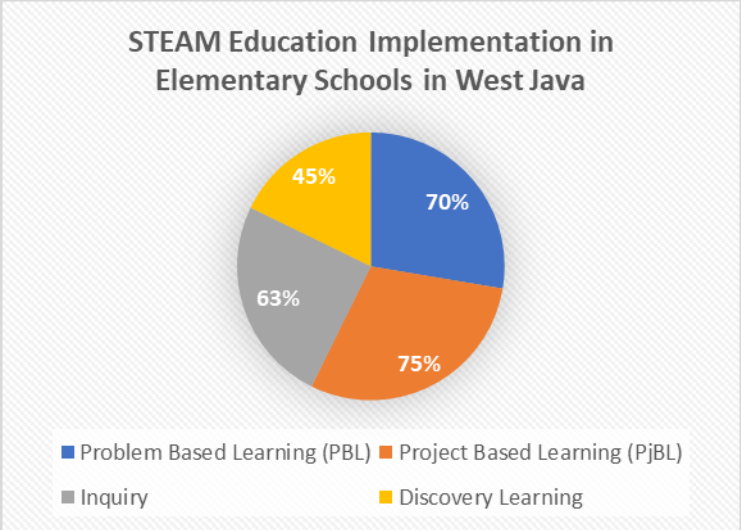


Figure 1.

According to research, 70% of teachers implement STEAM learning by integrating through a Problem Based Learning model. (PBL). The implementation of learning centered on the students according to the basis of the learning theory of STEAM is constructivism (Milara, 2019). This theory relates to the learning experience of learners as they seek to understand something through learning experiences (Gross & Gross, 2016), so that learning centered on learners provides more varied learning experiences that are tailored to the needs and learning experiences of students. To be able to improve problem-solving skills and think creatively in STEM learning, teachers need to facilitate learning so that students can play an active role. (Talib et al., 2019). The relatively high percentage of teachers who conduct learning centered on the student participant is also supported by data showing that 70,31% of the teachers carry out learning that is tailored to the needs and conditions of the student, including the student's learning style.

This is related to one of the basic theories of learning STEAM which is holistic learning. (Yakaman, 2010). Holistic learning is influenced by one's environment or influence that will help determine what one will do with the environment or objects already provided. The differences in the views of each individual into holistic learning cannot be given equally to the learners. Therefore, the learning activities must be adapted to the needs and conditions of the students in the implementation of learning. (Yakaman, 2010). STEAM learning is considered to be one of the learning that promotes holistic education. (Park et al., 2016). Data from the research also shows that about 75% of teachers implement STEAM integrated with the Project Based Learning (PjBL) model in the learning process. The STEAM-based PjBL learning approach is implemented in five stages: the reflection phase, the research phase, the discovery phase, the application phase, and the communication phase. Fitriyah's (2021) research suggests that STEAM-based PjBL learning can boost students' creative and critical thinking skills. This is demonstrated by the significant value of less than 0.05 and the computed F value of 35.55.

In addition, the application of STEAM learning in primary schools is integrated with the learning inquiry model. Based on the results of the study, 63% of teachers have applied inquiry learning that is integrated with STEAM learning in the classroom. Constructivism is the theoretical foundation of STEAM learning (Yakaman, 2010) that emphasizes learning experience through authentic inquiry, project, and problem-solving processes (Milara & Cortés, 2019). STEAM learning is context learning (Henriksenet al., 2019; Yakaman, 2010)

so according to John Dewey only through context learning learners get real understanding (Milara & Cortés, 2019). STEAM learning supports the transition from traditional learning to strategic and project-based learning as well as collaborative learning (Milara & Cortés, 2019). Research data also showed that as many as 45% of teachers implement STEAM learning by collaborating on the Discovery Learning learning model. (DL). Discovery Learning has applied STEAM-based collaborative learning in the classroom showing that learning practiced by teachers has already led to STEAM learning. In addition, the ability to collaborate is also one of the goals in STEAM learning. (Quigley & Herro, 2016).

Challenges of Implementing STEM Education in West Java's Elementary Schools

Steam learning with all its benefits, of course, is not out of the challenges in its implementation process. Based on the results of the research showed the challenges of implementing STEAM learning in primary schools in Western Java, namely pedagogical aspects, facilities for support, access to content, and timing.

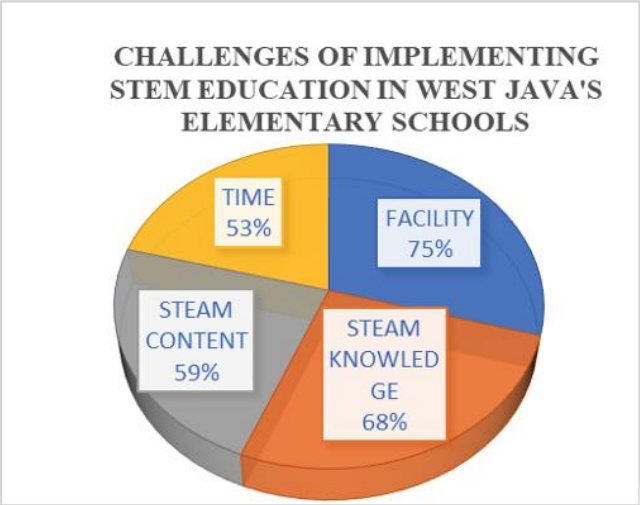


Figure 2.

The availability of facilities in support of the implementation of STEAM is approximately 75%. These barriers include the availability of computers, the Internet, and less adequate projectors for use in the STEAM learning process. The availability of technology-based facilities has become one of the important factors in STEAM learning. Technology is needed by both students and teachers to be able to access information related to STEAM learning more easily. This is also in line with the results of research showing that the IT-based learning facilities available in schools influence the learning outcomes of students. The skill of students in using technology is also one of the forms of integration of technological aspects in STEAM learning. The definition of technology in STEAM learning by the National Council of US (Bahrum et al., 2017) consists of the entire system ranging from the people involved, organizations, knowledge, processes, and devices used to create and operate the technology tool as well as its own. Thus, it can be understood that the aspect of technology is not just something related to electricity. Technology can be the skills of the students in using the tools and also the products produced by the students themselves. In addition to technology facilities, teachers revealed that the availability of school facilities is one of the challenges in the implementation of STEAM learning. These facilities include interactive media and furniture in less adequate classrooms. Teachers feel less available media ready to use that can be used to support learning (Rafiqa et al., 2020).

Another challenge perceived by teachers in the implementation of STEAM learning is the support of knowledge about the less adequate of 68%. This includes the lack of pedagogical models on how to teach STEAM attractively. In line with a statement by Shernoff et al. (2017) that revealed the lack of STEAM learning given to teachers and teachers also felt a lack of training on STEAM Learning. One teacher revealed that the STEAM training provided by the government tends to focus only on theory. In addition, 59% of teachers also encountered challenges in accessing STEAM content. These challenges include administrative, budgeting and availability of STEAM content in Indonesian. The data suggests that one of the challenges in STEAM learning is the lack of teaching resources about the application of STEAM in elementary schools. Previous research also revealed that a lack of resources such as facilities, budgets and access to content (Shernoff et al., 2017) is one of the challenges of STEAM implementation perceived by teachers.

Time settings are also a barrier in STEAM learning. 53% of teachers in Western Java experience time constraints in the application of STEAM teaching. This is because STEAM learning focuses on hands-on activities so that teachers need to have practical activities in the learning process. The results are also consistent with previous research that revealed that one of the challenges in implementing STEAM learning included time and time planning issues in the implementation of STEAM Learning. (Herro et al., 2019; Shernoff et al., 2017). The government has provided STEM/STEAM training to teachers. However, many teachers argue that STEAM training is especially helpful in providing insights into project-based learning and problems that can be implemented in STEAM learning. However, some teachers argue that the training provided is still theoretical so it still has challenges in the technical problems of the implementation of STEAM. (Herro et al., 2019; Shernoff et al., 2017).

Conclusion

The education provided by the instructor has led to STEAM education. This is evidenced by the comparatively high proportion of teacher data indicating the implementation of student-centered learning. Teachers also employ inquiry, project-based learning, and problem-based learning methods. Several obstacles exist in the implementation of STEAM learning, including a lack of pedagogical support and understanding, technical issues, time, access to STEAM material, and infrastructure, particularly technology-based facilities. Teachers most typically cite technical and time constraints as obstacles to STEAM adoption. Therefore, instructors require training in methodologies and time management for the application of STEAM education. In addition, it is vital to offer supporting facilities, particularly technologically-based facilities that facilitate instructors' access to STEAM-related instructional materials.

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Japanese University Students' Learning Experiences and Attitudes Toward Computer Programming

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Abstract
In Japan, the development of human resources with programming skills has become an urgent issue. Meanwhile, the experience of learning programming varies from learner to learner. Interest in programing may differ depending on each learner's area of expertise. Thus, this study aimed to investigate learners' learning experiences and attitudes toward computer programming. A questionnaire using a five-point Likert scale was distributed to 117 Japanese university students from three classes: one in science and two in humanities. The findings suggest three main points: (1) A little more than 40% of students in humanities and two-thirds of the students in science did not have any programming experience—these numbers were higher than we expected. (2) Regarding students' awareness of programming skills use in their future careers, the average scores for all three classes reached 4 or higher, suggesting that both science and humanities students were fully aware of the importance of programming skills, although such responses were significantly higher among the science students. (3) Regarding interest in computer programming, the average score for both humanities classes was 3.1, whereas that for the science class was 4.5, which shows that interest in programming was significantly lower among humanities students. Furthermore, the results from the two humanities classes indicated that, of the students who indicated little or no interest in computer programming, 50% (humanities class 1) and approximately 70% (humanities class 2) had never learned programming. Liberal arts students' experience in learning programming may be affected by their interest in it.

Keywords: Programming Education, Programming Skills for Future Career Plans, Student Interest in Computer Programming, Information Technology Literacy

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Introduction

Computer programming-based information technology (IT) has been firmly established in our lives. Various types of jobs will require human resources with programming skills soon. In Japan, the shortage of IT human resources is a major concern (Mizuho Information & Research Institute, Inc, 2019), and reinforcement measures are being implemented to raise the level of IT skills. As a part of the policy for promoting programming education (MEXT, 2018a), Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT) has deemed programming education mandatory in all curriculum guidelines (elementary school to high school) (MEXT 2017a, 2017b, 2018b). The Ministry of Internal Affairs and Communications (MIC) has also been working on a project to promote programming education among young people (MIC, 2016).

Despite these efforts, a survey (Fuse & Okabe, 2016) revealed that less than 20% of students received programming education before entering university. According to Fuse (2018), high schools were offering fewer programming classes than expected. Another survey (Obara, Tamada, & Matsuda, 2022) showed that many students entering university had high expectations regarding programming, as programming education has become a hot topic in society; however, after taking programming classes, they found that programming was not their forte, while they also had negative attitudes toward programming. Conducting a programming workshop for elementary school girls, Komura (2020) found that their interest in learning programming was directed more toward drawing illustrations and making movies rather than interactive programs that respond to user manipulation.

Different students may have different learning experiences, and interest in programing may differ depending on each learner's area of expertise. When learning programming, different individual learners may feel interested in different subject matters. To promote programming education, it is necessary to understand the current state of individual learners' experiences, interests, and needs for programming learning and to design curriculum for programming education based on such an understanding.

This study aimed to investigate learners' learning experiences and attitudes toward computer programming, thus exploring the current situation of learners, and identifying countermeasures for dealing with the problems that emerged in the survey. The researchers distributed a questionnaire study to 117 Japanese university students; the research questions were as follows:

1. Have students ever learned about computer programming before?
2. Do students perceive that they will require computer programming skills in their future careers? Are there any differences in how needs are perceived across faculties?
3. Are students interested in computer programming? Are there any differences in students' interest in such programming across faculties?
4. Is students' interest in computer programming related to their previous experiences with learning programming, developing logical thinking attitudes, using software, or any perceived demand for programming skills in their future careers? Are there any differences in this relationship across faculties?

In the following sections, this paper first provides the methods used to conduct the present study, delivers the study findings, and discusses these findings. Finally, the researchers present their conclusions and recommendations for further studies.

Methods

Participants

This study's participants comprised 117 first-year students from three classes—one in science and two in humanities—at a university in Japan. Table 1 reports the number of students and their majors. The students were informed about the study's purpose, and their informed participation consent was obtained. They were further informed that their data would remain confidential.

Class	Grade	Faculty	Number of Students
A	First year	Economics	39
B	First year	Global Human Sciences	39
C	First year	Engineering	39

Table 1: Number of participants and their majors

Data Collection and Analysis

The questionnaire shown in Table 2 was distributed to the participants to gather their subjective responses to items regarding their previous experiences with learning programming (Q1), their awareness of the importance of programming skills for future careers (Q2), and their interest in computer programming (Q3). They were also asked about their logical thinking (Q4 and Q5) and their experiences with software use (Q6). Participants had to choose their responses for Q1 from among the five options shown in Table 2. The participants' responses to Qs 2 to 6 were scored on a five-point Likert scale (1 point: "Strongly Disagree"; 2 points: "Moderately Disagree"; 3 points: "Neutral"; 4 points: "Moderately Agree"; and 5 points: "Strongly Agree").

Items Regarding Students' Perceptions of Programming Skills Requirements in Future Careers, Interest in Computer Programming, Logical Thinking, and IT Literacy
Q1. Have you ever learned about computer programming before?
1. I have learned programming in school classes (elementary through high school).
2. I have learned programming in an extracurricular club at school (not a school class).
3. I have learned programming at a private institute or cram school outside of school.
4. I have learned programming from parents, relatives, or acquaintances.
5. I have never learned programming before.
Q2. I will require programming skills after I get a job or in the future.
1. Strongly Disagree 2. Moderately Disagree 3. Neutral 4. Moderately Agree 5. Strongly Agree
Q3. I am interested in computer programming.
1. Strongly Disagree 2. Moderately Disagree 3. Neutral 4. Moderately Agree 5. Strongly Agree
Q4. I am good at thinking about things in order.
1. Strongly Disagree 2. Moderately Disagree 3. Neutral 4. Moderately Agree 5. Strongly Agree
Q5. I am good at thinking about things logically.
1. Strongly Disagree 2. Moderately Disagree 3. Neutral 4. Moderately Agree 5. Strongly Agree

Q6. I often use software applications (e.g., Microsoft Word, Excel, and PowerPoint).
1. Strongly Disagree 2. Moderately Disagree 3. Neutral 4. Moderately Agree 5. Strongly Agree

Table 2: Questionnaire items

Through a Kruskal-Wallis test and a Wilcoxon rank-sum test, we attempted to investigate whether there were any statistical differences among the ratings of the three classes or between the respective classes. Further, a correlational analysis was also used for investigating how the items were related to one another in the respective classes.

Results and Discussion

This study analyzed the results of the above-discussed questionnaire to answer its research questions regarding students' learning experiences and attitudes toward computer programming as well as the relationships between their interest in programming and the other questionnaire items. This section describes the overall questionnaire results and any data trends that were observed. The questionnaire response results are listed in Figures 1–6 along with the corresponding percentages of participant responses for individual items.

First, this study examined whether the participants had learned programming before. Figure 1 correlates to item Q1, which concerns students' previous experiences with learning programming. Figure 1 shows the corresponding percentages of the different participant responses to item Q1.

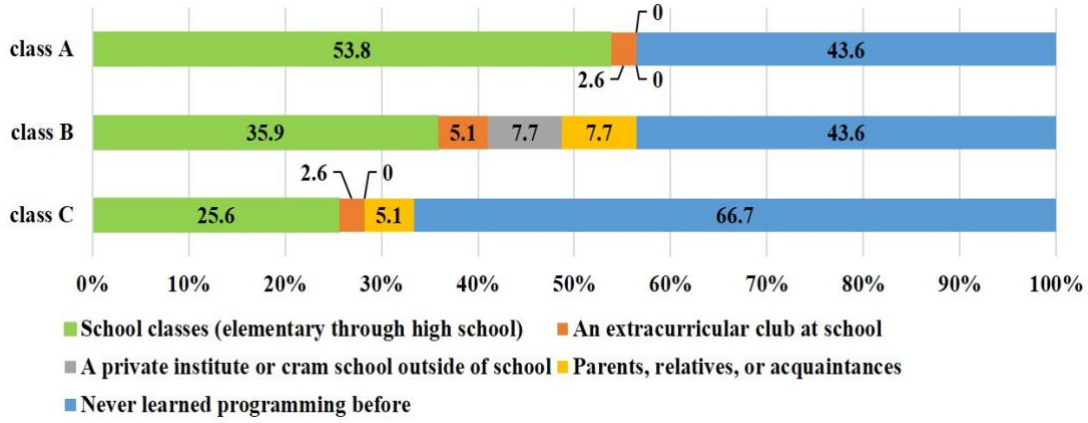


Figure 1: Corresponding percentages of participants' responses to item Q1.

According to the results for item Q1 (see Figure 1), 53.8% in class A (Economics), 35.9% in class B (Global Human Sciences), and 25.6% in class C (Engineering) chose "I have learned programming in school classes (elementary through high school)." The results suggested that participants' responses did not depend on whether they were in the science or humanities classes. It was observed that experiences with learning programming differed across individual students. Until programming education becomes more widespread in curricula from elementary school to high school, it should be promoted according to the programming learning experience of individual students.

Second, this study analyzed how the participants perceived a need for programming skills in their future careers. Figure 2 correlates to item Q2, which concerns students' perceived need for programming skills in their future careers. The percentages of participants who selected the different responses for Q2 are listed in Figure 2.

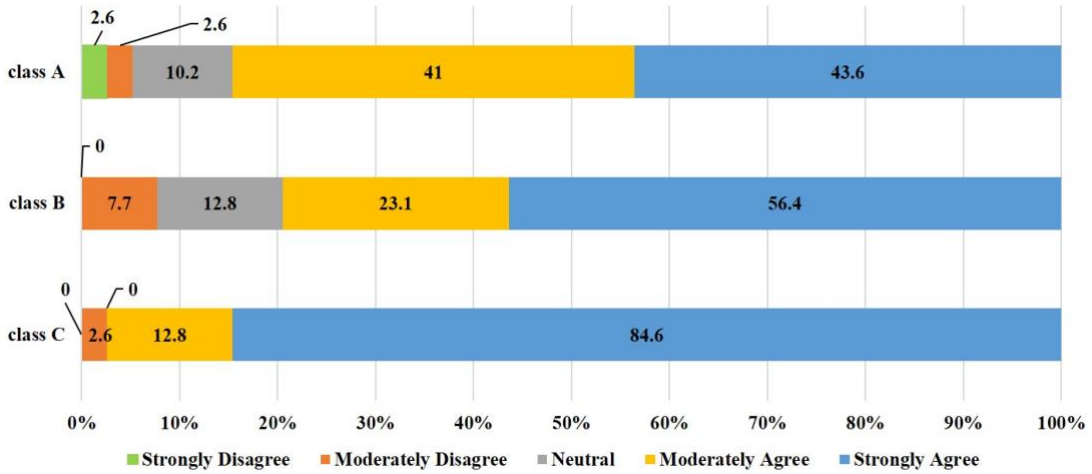


Figure 2: Percentages of participants' responses to item Q2.

According to the results for item Q2 (see Figure 2), 84.6% of the participants in class A (Economics) indicated their agreement—that is, they strongly and moderately agreed that they would require programming skills in their future careers. In class B (Global Human Sciences), 79.5% of the participants indicated their agreement with Q2. In both humanities classes, around 80% of participants indicated a positive agreement with Q2. Further, 97.4% of class C (Engineering) indicated their agreement with Q2. Regarding students' perceptions of the need for programming skills in their future careers, 80% to 90% in all classes provided positive responses.

Third, this study analyzed the nature of the participants' interest in computer programming. Figure 3 correlates to item Q3, which concerns students' interest in computer programming. The corresponding percentages of the participants' different responses to Q3 are listed in Figure 3.

According to the Q3 results (see Figure 3), 94.8% of participants in class C (Engineering) indicated their agreement with item Q3—that is, they strongly and moderately agreed that they were interested in computer programming. Meanwhile, 49% in class A (Economics) indicated their agreement with item Q3. Similarly, in class B (Global Human Sciences), 51% indicated their agreement. Around 50% of the participants in humanities were interested in computer programming. Regarding students' interest in computer programming and its relationship with their major, considerably more science students (rather than humanities students) responded positively to the item.

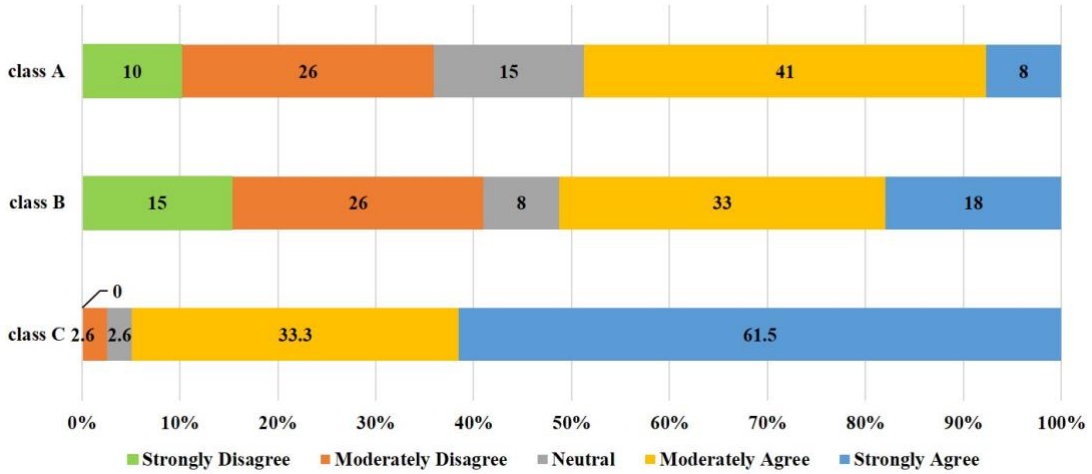


Figure 3: Percentages of participants' responses to item Q3.

Fourth, this study analyzed how the participants rated their own logical thinking attitudes. Figures 4 and 5 correlate to items Q4 and Q5 respectively, which concern students' logical thinking. The corresponding percentages of participants' different responses to Q4 and Q5 are listed in Figures 4 and 5, respectively.

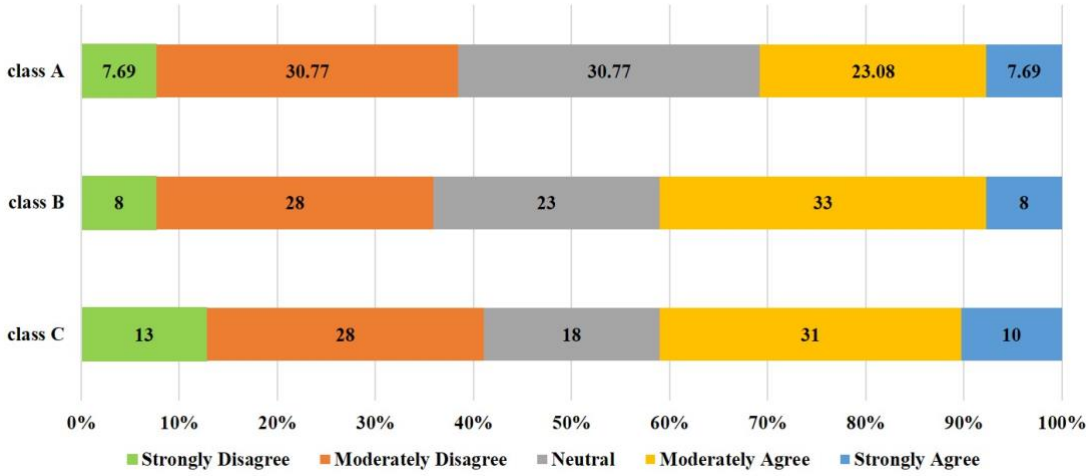


Figure 4: Percentages of participants' responses to item Q4.

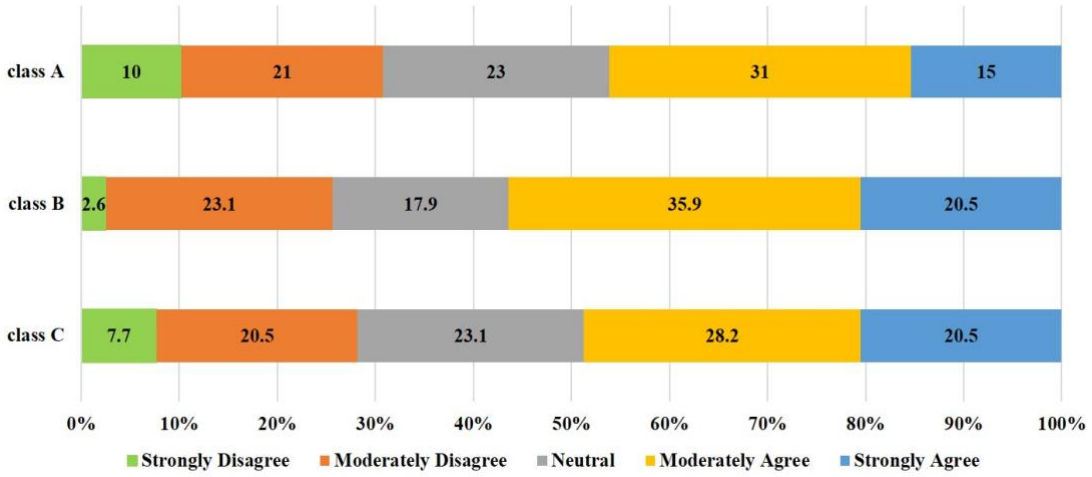


Figure 5: Percentages of participants' responses to item Q5.

According to the Q4 results (see Figure 4), 30.77% of the participants in class A (Economics) strongly and moderately agreed with Q4. In both class B (Global Human Sciences) and class C (Engineering), 41% of the participants indicated their agreement with item Q4.

According to the Q5 results (see Figure 5), 56.4% of the participants in class B (Global Human Sciences) strongly and moderately agreed with Q5. Slighter fewer participants (48.7%) in class C (Engineering) agreed with Q5, and even fewer participants (46%) in class A (Economics) indicated their agreement with Q5.

Regarding students' logical thinking attitudes, slightly fewer participants in class A (Economics) indicated positive responses for items Q4 and Q5.

Finally, this study analyzed how the participants rated their computer software experiences. Figures 6 depicts the percentages of responses to the items of Q6, which concerns students' computer software experiences. The corresponding percentages of participants' different responses to Q6 are listed in Figure 6.

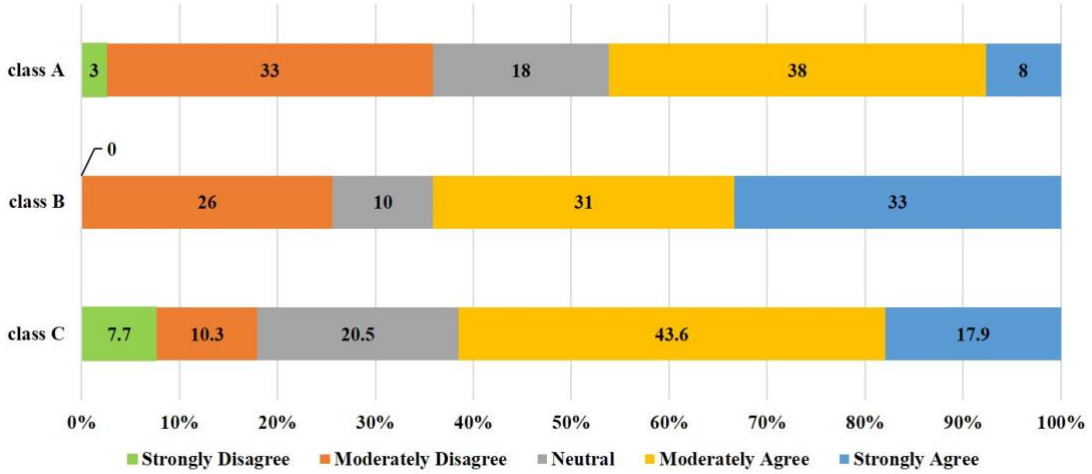


Figure 6: Percentages of participants' responses to item Q6.

According to the Q6 results (see Figure 6), 64% of the participants in class B (Global Human Sciences) and 61.5% in class C (Engineering) strongly and moderately agreed with Q6, while 46% in class A (Economics) indicated such agreement.

Regarding computer software experiences, the results suggest that fewer participants in class A (Economics) indicated positive responses for Q6 as well as Q4 and Q5.

Research question 1: Have students learned about computer programming before?

To address the first research question, this section analyzes whether and how the participants had learned programming before joining university. Figure 1 shows that 43.6% in class A (Economics) and class B (Global Human Sciences) and 66.7% in class C (Engineering) chose "I have never learned programming before." A little more than 40% of students in humanities and two-thirds of the students in science did not have any programming experience—these numbers were higher than we expected. Given the trend of promoting programming education nationwide, providing programing education to these university students, who have not yet learned programming, is an urgent issue.

Additionally, among students who learned programming outside of formal school classes, 2.6% in class A (Economics), 20.5% in class B (Global Human Sciences), and 7.7% in class C (Engineering) learned programming in an extracurricular club at school, at a private institute or cram school outside of school, or from their parents, relatives, or acquaintances. The number of private programming schools is increasing, and more students will be expected to study in these private programming schools. Based on these trends, students will be expected to have different learning experiences with regard to learning programming. The results thus suggest the need for designing curricula that consider the learning experiences of individual students.

Research question 2: Do students perceive that they will need computer programming skills in their future careers? Are there any differences in how such needs are perceived across faculties?

To address the second research question, this section analyzes whether and how the participants required programming skills in their future careers and how these needs were perceived across faculties. The average scores of their responses were calculated using a five-point Likert scale for each class to investigate overall student perceptions. The average scores were 4.2 for class A (Economics), 4.3 for class B (Global Human Sciences), and 4.8 for class C (Engineering). Given these high average scores, it can be surmised that many students across all classes perceived that they would require computer programming skills in their future careers.

Next, the Kruskal-Wallis test and the Wilcoxon rank-sum test were conducted using the Q2 data in order to determine whether the three classes differed from one another in a statistically significant manner at the 0.05 level. The results of the Kruskal-Wallis test revealed significant differences among the three classes ($p = 0.001$). Next, using a Wilcoxon rank-sum test, we attempted to investigate whether any statistical differences could be detected with regard to each class. The results revealed significant differences between class A (Economics) and class C (Engineering) ($p = 0.000$) and between class B (Global Human Sciences) and class C ($p = 0.005$), although no significant differences were found between class A and class B ($p = 0.510$).

These results ultimately suggest that the participants from all classes strongly perceived that they would require computer programming skills in their future careers, even though such responses were significantly higher among the science students. With regard to the science students, two-thirds of them did not have any programming experience from the results of research question 1. The lack of experience in learning programming may make them more aware of the need for programming in the future.

Research question 3: Are students interested in computer programming? Are there any differences in students' interest in such programming across faculties?

To address the third research question, this section analyzes whether and how the participants were interested in computer programming and whether there were any differences in their interest in programming across faculties. Regarding interest in computer programming, the average scores for the three classes were as follows: 3.1 both for class A (Economics) and class B (Global Human Sciences) and 4.5 for class C (Engineering). This showed that interest in programming was considerably lower among humanities students.

Next, the Kruskal-Wallis test and the Wilcoxon rank-sum test were conducted using Q3 data in order to determine whether the three classes differed from one another in a statistically significant manner at the 0.05 level.

Application of the Kruskal-Wallis test to the Q3 data revealed significant differences among the three classes ($p = 0.000$). Next, using a Wilcoxon rank-sum test, we attempted to investigate whether any statistical differences could be detected with regard to each class. The results revealed significant differences between class A (Economics) and class C (Engineering) ($p = 0.000$) and between class B (Global Human Sciences) and class C ($p = 0.000$), although no significant differences were found between class A and class B ($p = 0.848$).

These results reveal that the students were fully aware of the importance of programming skills, regardless of whether they studied in a science or humanities class. However, it should be noted that interest in computer programming was significantly lower among the humanities students. Given this finding, it is necessary to develop a computer programming curriculum that could effectively interest humanities students.

Research question 4: Is students' interest in computer programming related to their previous experiences with learning programming, developing logical thinking attitudes, using software, or perceiving a need for programming skills in their future careers? Are there any differences in this relationship across faculties?

Based on the results regarding the third research question, this study investigated what could facilitate or hinder programming learning. To explore the elements related to students' interest, this study investigated how students' interest in computer programming could be related to their previous experiences with learning programming, developing logical thinking attitudes, using computer software, or perceiving a need for programming skills in their future careers.

First, this study investigated how students' interest in computer programming was related to their previous experiences with learning programming. We assessed how many of those students in different classes who strongly and moderately disagreed with Q3 (i.e., their interest in computer programming) had never learned programming. We found that 14 students in class A (Economics), 16 students in class B (Global Human Sciences), and only one student in class C (Engineering) responded negatively to Q3. Among the students who responded negatively to Q3, 50% (seven students) of those in the Economics class and 69% (11 students) of those in the Global Human Sciences class had never studied programming. One student in the Engineering class, who had negative attitudes toward interest in programming learning, also had no experience with learning programming.

Regarding students' interest in computer programming and their previous experiences with learning programming, the results suggest that the presence or absence of experience with learning programming may have been related to interest in programming in the humanities classes. Regarding the Engineering class, we believe that the reliability of its relevant data will be a future issue since there was only one applicable respondent for the item.

Next, this study analyzed how students' interest in computer programming (Q3) was related to logical thinking attitudes (Q4 & Q5), computer software experiences (Q6), or their perceptions of the need for programming skills in their future careers (Q2). We calculated

Spearman's rank-order correlation coefficients between items Q3 and Q2, Q3 and Q4, Q3 and Q5, and Q3 and Q6 from the questionnaire (see Table 3).

	Class	Q2	Q3	Q4	Q5	Q6
Q2	A	–				
	B	–				
	C	–				
Q3	A	0.22	–			
	B	0.51*	–			
	C	0.47*	–			
Q4	A	0.31	0.10	–		
	B	0.23	0.25	–		
	C	-0.08	0.13	–		
Q5	A	0.07	0.18	0.57*	–	
	B	0.21	0.41*	0.60*	–	
	C	0.10	0.51*	0.70*	–	
Q6	A	-0.07	0.29	0.11	0.34*	–
	B	0.35*	0.34*	0.38*	0.31	–
	C	0.12	0.27	0.27	0.30	–

*$p < .05$.

Table 3: Correlations among questionnaire items

The results of the correlation coefficients between Q3 and Q2 in the three classes (see Table 3) demonstrated that, both in class B ($r_{Q3Q2} = 0.51$) and class C ($r_{Q3Q2} = 0.47$), a significantly positive relationship existed between students' interest in computer programming and their perception of the need for programming skills in their future careers. However, the correlation coefficient between Q3 and Q2 was not statistically significant for class A ($r_{Q3Q2} = 0.22$).

Regarding the perceived need for programming skills in future careers, a positive relationship was observed between students' interest in computer programming and their perception of the need for programming skills both in class B (Global Human Sciences) and class C (Engineering). The results suggest that the students' perception of the need for programming skills in their future careers could influence their interest in computer programming.

Further, this study also calculated the correlation coefficients between items Q3 and Q4, and Q3 and Q5 in order to examine how students' interest in computer programming was related to their logical thinking attitudes.

The results of the correlation coefficients between Q3 and Q4 in the three classes (see Table 3) (class A, $r_{Q3Q4} = 0.10$; class B, $r_{Q3Q4} = 0.25$; class C, $r_{Q3Q4} = 0.13$) demonstrated that no

significant relationship existed between students' interest in computer programming and their logical thinking attitudes. Further, the results of the correlation coefficients between Q3 and Q5 revealed that a significantly positive relationship existed between students' interest in computer programming and their logical thinking attitudes both in class B ($r_{Q3Q5} = 0.41$) and class C ($r_{Q3Q5} = 0.51$). However, the correlation coefficient between Q3 and Q5 was not statistically significant for class A ($r_{Q3Q5} = 0.18$).

These findings regarding students' logical thinking attitudes revealed that, both in the Global Human Sciences class and the Engineering class, there was a positive relationship between students' interest in computer programming and their logical thinking attitudes as well as their perception of the need for programming skills in future careers. This suggests that students' logical thinking attitudes could influence their interest in computer programming.

Finally, this study also calculated the correlation coefficients between Q3 and Q6 to investigate how students' interest in computer programming was related to their computer software experiences.

The correlation coefficient results between Q3 and Q6 revealed a significantly weak positive relationship between students' interest in computer programming and their computer software experiences only in class B ($r_{Q3Q6} = 0.34$). However, the correlation coefficients between Q3 and Q6 were not statistically significant for both class A ($r_{Q3Q6} = 0.29$) and class C ($r_{Q3Q6} = 0.27$). Overall, regarding computer software experiences, this factor was found to have a weak positive relationship with students' interest in computer programming only in the Global Human Sciences class.

These results also suggest that students' computer software experiences could slightly influence their interest in computer programming.

Findings

Although this study should be improved further, its results revealed some critical findings regarding Japanese university students' learning experiences and attitudes toward computer programming. First, more than 40% of students in the humanities class and two-thirds of students in the science class did not have any previous experience with learning programming—these numbers were higher than we expected. Second, participants in all the classes strongly perceived that they would require computer programming skills in their future careers, although the science students who held this perception formed a significantly higher percentage of the respondents than the humanities students. As mentioned above, a larger percentage of the science students had no experience in learning programming than did liberal arts students. The lack of experience in learning programming may make them more aware of the need for programming in the future. Third, interest in computer programming was significantly lower among humanities students. Finally, among the students who indicated little or no interest in computer programming, 50% in the Economics class, and approximately 70% in the Global Human Sciences class had never studied programming. Among the humanities students, the presence or absence of experience with learning programming may have been related to interest in programming. Further, a positive relationship was observed between students' interest in computer programming and their logical thinking attitudes as well as their perception of the need for programming skills in future careers both in the Global Human Sciences class and the Engineering class. Although further investigations are necessary, students' logical thinking attitudes and their perception

of the need for programming skills in future careers could influence their interest in computer programming. Furthermore, a weak positive relationship was observed between students' interest in computer programming and their computer software experiences only in the Global Human Sciences class. These results showed that students' computer software experiences could slightly influence their interest in computer programming.

To summarize the results, students were fully aware of the importance of programming skills for their future careers, regardless of their major fields of study. However, interest in computer programming seemed to be significantly lower among the humanities students.

The study results thus suggest that, when designing a curriculum and syllabus for programming classes, preparing materials that are relevant to students' post-graduation career paths based on their expertise may help stimulate those students' interest in programming. Furthermore, we suggest that a syllabus should be created with an awareness of fostering logic and that the curriculum must include classes that can familiarize students with software use before they can begin to learn programming.

Limitations and Recommendations

The present preliminary investigation study examined the experiences and attitudes of Japanese university students with regard to computer programming. First, the current survey must be promoted to a larger number of students. In particular, the number of learners experiencing programming learning is expected to increase due to the growth of private programming schools. It is thus important to continue conducting the survey over time. Second, individual students' interests in and attitudes toward learning programming will depend not only on their fields of expertise but also on their personal programming learning experiences and preferences. The relationship between interest in computer programming and other items of the current survey must be analyzed more deeply.

Conclusions

This study investigated Japanese university students' learning experiences and attitudes toward computer programming. A questionnaire using a five-point Likert scale was distributed to 117 Japanese university students in three classes; the results suggested three main findings. (1) Regarding their previous experiences with learning programming, a little more than 40% of students in humanities and two-thirds of the students in science did not have any programming experience—these numbers were higher than we expected. (2) Regarding the students' perception of the importance of programming skills in their future careers, the average scores for all three classes reached 4 or higher. The results ultimately suggested that both science and humanities students were fully aware of the importance of programming skills for their future careers, although science students' responses were more positive than those of humanities students. As mentioned above, a larger percentage of the science students had no experience in learning programming than did liberal arts students. The lack of experience in learning programming may make them more aware of the need for programming in the future. (3) Regarding interest in computer programming, the average score for both humanities classes reached 3.1, whereas that for the science class was 4.5; this showed that interest in programming was significantly lower among humanities students. Furthermore, the results of the two humanities classes indicated that, among students who had little or no interest in computer programming, 50% in the Economics class, and approximately 70% in the Global Human Sciences class had never learned programming.

Thus, for liberal arts students, their experience in learning programming may be related to their interest in it.

The current study had certain limitations. As a continuation of this study, the researchers would like to consider dividing learners into types with regard to their interest in learning programming by adding more survey items.

Acknowledgments

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The Development and Application of the Wearable Device for the Deaf Performers

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Abstract
This research aimed to develop a vibrating bracelet to meet the needs of deaf actors, exploring the influence of communication methods and empathy while working with them. The study identified the limitations and expertise of the actors, reviewing the action instruction method and performance guidance. Through performance training, the study aimed to understand the abilities and cultural peculiarities of the deaf. The vibrating bracelet was developed to collect data and strengthen the content of the drama according to the needs of the deaf actors, and interviews were conducted to understand the impact on their communication methods. The study aims to cultivate inclusive art performing arts creation and performance talents. During testing, the "excited" and "smooth" heart rates were used as the judgment results and compared with the facial expression recorded videos and line graphs. Emotional nodes of the deaf students during rehearsals were compiled as emotional judgments according to the results. It was initially defined that a heart rate of 83 bpm triggers a long vibration to indicate the performer's "excited" emotion. If the bracelet detects the performer's emotion as "gentle," the type of vibration will be defined before concluding the study. The comprehensive curatorial performances will promote the concept and method of "inclusive art" and practice and discuss the spirit of equal rights in art.

Keywords: Vibrating Bracelets, Deaf Performers, Inclusive Art, Emotion Recognition, Empathy, Creative Practice Research

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1. Introduction

User-centered design (UCD) is a critical approach for designing effective human-computer interactions (Fleming & Levie, 1993; Liang & Hsu, 2001). It involves continuously assessing whether the various components of a system meet the user's needs and operational objectives to align the final system as closely as possible with the user's mental model. In psychology, emotional states and cognitive processes are usually based on physiological signals such as heartbeat, dermal signals, eye tracking, and brainwave maps (Gerjets et al., 2014; Krumpe et al., 2018; Poh et al., 2010). However, accurately collecting and analyzing these physiological signals with current information devices remains a challenge, especially in educational settings where such devices often require equipment to be set up on the student's body to detect physiological signals, creating a barrier to teaching. Nonetheless, these physiological signals, including brain area features, can be used to identify pleasure states and accurately identify human emotions. For example, enhanced vibrotactile multimedia technology can stimulate the audience's visual, auditory, and tactile senses, which can also be applied in the performing arts arena, especially for audiences with partial sensory limitations. Inclusive Arts aims to make art accessible to all people because "art exists for all people" (Nixuan Zhou, 2019) and should be a source of warmth and inspiration. By considering the perspective of people with disabilities in the creation of art, artists can transcend the senses and create a mature and progressive viewing-friendly space (Claire, 2018).

The human senses play a vital role in perception, with humans relying on multiple senses, namely sight, hearing, taste, smell, and touch, to perceive their surroundings. Traditional multimedia only engages two senses, namely hearing and sight, but the human experience of watching multimedia content can be enhanced by engaging more than two senses simultaneously. Multimedia content that engages more than two senses at the same time is called mulsemedia, and recent interest in multimedia aims to provide an immersive, real-world environment during multimedia interaction. Multisensory media can provide a new dimension for developing immersive systems in various areas, including education, healthcare, advertising, and home entertainment. Recent advances in wearable sensing technologies have enabled researchers to analyze the impact of multimedia on human emotions and behaviors, with devices involving touch, smell, and taste in addition to vision and hearing used to construct multimedia environments. A framework has been proposed for conveying multisensory effects into a hybrid system (Fleming & Levie, 1993).

Audio information can be conveyed effectively through tactile stimuli, which has led to the development of electro-haptic stimulation (EHS) as a new approach. Research has shown that EHS can significantly improve speech noise performance, sound localization, and sensitivity to sound properties such as pitch (Fletcher, 2021). As the number of people with hearing loss is predicted to nearly double in the next 30 years, tactile technology can offer significant benefits, especially for those with severe hearing loss who use artificial electronic ears. An effective tactile device can improve spatial awareness, help in hearing in noisy environments, and provide an inexpensive way to obtain the benefits of a second AI without the need for a second expensive surgery (Huang, Sheffield, & Lin, 2017). However, to provide benefits to users, optimal signal processing strategies and device configurations still need to be established. Over the next five years, the number of researchers in this area is expected to increase significantly, and advanced neuroimaging methods such as near-infrared spectroscopy and brainwave mapping may be applied to understand the underlying mechanisms behind auditory and tactile enhancement (Fletcher, 2021). The development of tactile stimulation technology may also lead to the reduction of auditory work and improve

speech use, and the benefits of tactile stimulation on hearing may become clearer with further research. Therefore, based on the above research theories, the application of auditory and tactile related techniques and systems can be enhanced in the field of performing arts for people with hearing loss. The development of an effective, inexpensive, comfortable, discreet, and easy-to-install tactile device can offer significant benefits to those with hearing loss, especially for enjoying performing arts.

This research aims to develop a new type of "barrier-free interactive performance" by integrating interactive content technology with performing arts, through the use of wearable devices such as vibrating bracelets, networks, and interactive interfaces. The main objective is to understand the needs of deaf performers and deaf audiences during performances and communication, and to improve communication with deaf performers during performances by using technology to increase the accessibility of art to deaf audiences. The specific research questions are:

(a) How can wearable devices, such as vibrating bracelets, be used to assist deaf performers in their performances and improve communication with them?
(b) What is the impact of the use of vibrating bracelets by deaf performers on the performance venue, in terms of audience engagement and overall experience?
(c) What is the effectiveness of the performances by deaf performers who use vibrating bracelets to assist their performance, in terms of artistic expression and audience reception?

2. Literature review

2.1 Deaf Performance and Technology Art

The life experience, lifestyle, language, thinking, behavior, and psychological characteristics of deaf individuals are unique and shape their culture. Sign language is the primary means of expression in the drama of the deaf, and it challenges established prejudices and mainstream cultural appearances. Deaf individuals have dual or multiple narrative abilities and can serve as both narrators and performers. To promote cultural equality and universal design, new technologies can be used in various artistic and cultural fields to create a friendly and easy-to-use environment for individuals with sensory and behavioral disabilities. Assistive technology has evolved from a narrow focus on equal rights to a broader sense of inclusive technology, providing substantive equality without discrimination. In the future, captioning could be part of the overall design, with personalized options such as preferred language, font style, and size. Augmented reality (AR) or mixed reality (MR) could personalize captioning and integrate audio input to meet the needs of users with different needs (Chen, 2019).

2.2 The Importance of Tactile Sensation as a Substitute for Hearing

According to Fleming & Levie (1993), the design of any computer hardware and software must take into account the user's senses (vision, hearing, touch, smell, motor coordination, etc.), cognition (intelligence, motor control, memory, motivation, etc.), and individual differences (age, gender, education, learning style, etc.); sensory media can be used in different areas such as education, healthcare, advertising, and home entertainment. The development of immersive systems in different fields such as education, healthcare, advertising and home entertainment provides new dimensions. In addition, recent advances in wearable sensing technologies provide researchers with a broad scope to analyze multimedia

and its effects on human emotions and behaviors, detailing devices that involve touch, smell, and taste in addition to vision and hearing to construct multimedia environments. Whenever a person is subjected to certain emotional stimuli, their feelings are conveyed through physiological cues such as brain activity, heart rate, facial expressions, body posture, or changes in sound. These cues are used to link an individual's emotional state to external stimuli. The use of speech, facial expressions and their integration for emotional recognition has been explored. Since these brain area features have been used to identify pleasure states, it has been found that olfactory augmented content can more accurately identify human emotion than traditional multimedia. Vibrotactile-enhanced multimedia is used as a visual, auditory, and tactile stimulus. Heart rate and eye tracking data were used to analyze the effect of vibrotactile-enhanced multimedia on user perception. Overall, we can conclude that tactile-enhanced multimedia content can be more effective in evoking user emotions and, for affective computing, can improve the accuracy of emotion detection when presenting such content to users.

2.3 The Relationship between Heart Rate and Emotions

When individuals are exposed to emotional stimuli, their feelings are communicated through physiological cues, such as brain activity, heart rate, facial expressions, body posture, or changes in voice. Traditional methods of emotion recognition using speech and facial expressions have limitations, such as privacy concerns and camera positioning. Therefore, researchers have explored emotion recognition from physiological cues, such as brain activity, skin conductance, and heart rate. Brainwave maps have been increasingly used for emotion recognition due to the availability and ease of use of low-cost wearable headsets. Emotional markers in brainwave maps are not easily deceived by voluntary behavior and can accurately identify the emotional state of the mind. Changes in skin conductance are also observed in different emotional states.

Alternative aids, such as wearable bracelets, can partially alleviate the language learning, communication, and navigation deficits of the deaf, blind, and deaf-blind. Haptic feedback provided by these bracelets can give vibrotactile cues to deaf people with disabilities and monitor their physiological activities. This allows for more effective interaction between performers with disabilities and deaf people, ultimately increasing performance efficiency. The smart bracelet can also monitor and measure specific parameters, such as heart rate, blood oxygen, EEG, and ECG to detect and collect signals that can help understand emotional ups and downs. Heart rate feedback can be used to mediate anxiety through wrong heart rate feedback. However, more research is needed to analyze the accuracy of long-term physiological data collection and analysis.

Sorgini et al. (2018) suggest that haptic feedback can provide information to the physically impaired. Similarly, Yağanoğlu (2021) and Dong et al. (2021) found that wearable bracelets are low cost and lightweight, making them a potential alternative aid for deaf people with disabilities. Shu et al. (2018) also note that more research is needed to analyze the accuracy of long-term physiological data collection and analysis.

3. Research methods

In the initial phase of this study, students were chosen to participate in a dance class at an educational institution in December. The data on their heart rates was collected using bracelets, and emotional nodes were identified through data analysis. The vibration frequency

that corresponded to these emotional nodes was defined and incorporated into the bracelet for future development.

In the first part of the study, eight performers (three deaf and five hearing) will send and receive vibration signals during their performance, enabling them to feel each other's emotions through vibrations, in addition to sign language and visual cues. In the second part, which will take place next year, the audience will wear bracelets during the performance to feel the performers' emotions and enhance their empathy. The facial recognition system will be used to compare and analyze the audience's emotions.

The primary goal of this research is to conduct a comprehensive field analysis. Through interviews, the researchers intend to gain a deeper understanding of the perspectives, opinions, and interpretations of deaf performers, related theatre professionals, and critics. This will also aid in gaining a more dynamic and complete knowledge of the overall field shaping and changes, which is crucial for conducting field research and analyzing the findings. The research process is outlined in Figure 1.

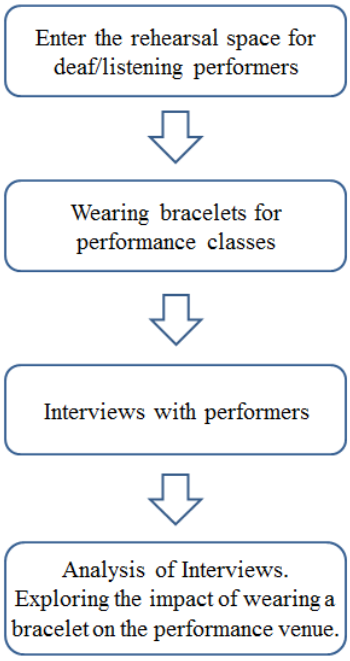


Figure 1: Research flowchart of master research.

3.1 Research subjects

This study was conducted in a performance program at Taipei School for the Hearing Impaired to observe the deaf population. Through the course, we discovered the physical feasibility and extensibility of the deaf students and selected student performers for future performances. This research is an experimental performance combining the use of vibro bracelets and performance, and the process of receiving and sending messages and vibrations to assist in the emotional communication between deaf performers. The subjects of this research are three deaf students and five students in the dance class of Double Park Junior High School.

3.2 Instruments

This year's research focuses on interviewing deaf students, developing a vibrating bracelet, detecting heart rate and applying it in the exhibition, and developing an emotion recognition system to be used in conjunction with the vibrating bracelet next year. The research tools are as follows.

3.2.1 Interview outline

In this study, the interviews were divided into pre and post technology use. Before technology use, two questions were designed: the first part was basic questions, and the second part was about the performers' limitations and imagination, to understand the performers' limitations and imagination about technology use before technology use. After technology use, the first part was to explore the impact of technology-assisted performance on the venue, to understand the personal feelings of the performers and the impact of their past experiences on the use of technology on their performance and the venue; the second part was to explore physical concerns, the impact of technology integration into performance on their own bodies and their own views on the changes; and the third part was to suggest future applications, suggestions and expectations for the application of technology in the venue after integration into performance. The outline of the visit is shown in Table 1 and Table 2.

Items	Topics
1	Basic Questions
1-1	Gender/Age/Grade
1-2	Hearing Impairment Level "A. Can't use sign language but use spoken language (mild), B. Can use sign language but use spoken language (moderate), C. Can't use spoken language but use signed language (severe)
1-3	Frequency of exposure to performing arts
2	What arts-related activities have you participated in so far? (e.g. exhibitions, movies, performances...) etc.)
3	What difficulties did you face when you were exposed to art activities? What are your bad experiences? (e.g. unfriendly spaces...) etc.)
4	During the dance classes, did your listening skills affect your understanding of the classes? (Skip to question 6 if you have not used it before)
5	Continuing from the previous question, can you briefly explain?
6	Have you ever used aids in dance classes, such as floor vibrations, hearing aids, etc.? etc.? (If not, skip to question 8)
7	Has the use of aids such as hearing aids in dance classes ever been affected by too much movement? (Like too much movement and hearing aids fall off)
8	In what way do you understand the content of the dance classes in order to perform the corresponding dance movements?
9	What percentage of the dance classes did you need the teacher's help to translate and understand? How does it affect the rehearsal?
10	How did you feel about participating in the dance classes?
11	What did you learn the most from the dance course?
12	What was your most impressive activity in the dance program?
13	What part of the class did you find difficult or disturbing?
14	Continuing from the previous question, what adjustments or improvements would you like to make?

Table 1: Interview outline before wearing a vibrating bracelet

Items	Topics
1	Have you had any innovative experiences or feelings after wearing a vibrating bracelet in a performance? Describe what it was like?
2	How did you feel the difference between wearing the bracelet and wearing it before?
3	Do you feel the emotions of others more after using a vibrobracelet than before wearing a vibrotactile bracelet?
4	Do you feel a change in the way you communicate after wearing a vibro bracelet?
Cognitive Load	
Items	Topics
1	Wearing a vibrating bracelet to rehearse a performance and feel the emotions of others requires many things to be considered at the same time.
2	Wearing a vibrating bracelet is very complicated to feel the emotions of others.
3	Wearing a bracelet not only reduces other external influences, but also allows you to feel others' emotions properly.
4	With the bracelet, I can understand the flow of emotions more correctly.
5	Wearing a vibrating bracelet contains elements that allow me to feel emotions.
6	It is difficult to use the bracelet to feel emotions in rehearsal.
7	The design of the bracelet makes it very difficult to feel emotions during rehearsals.
8	It is difficult to identify the emotional feelings and connect key messages during rehearsal while wearing the bracelet.

Table 2: Interview outline after wearing a vibrating bracelet

3.2.2 Vibrating Bracelet

At this stage, we asked the three body teaching team to guide emotional dance movements in the performance rehearsal, and let the students play and conceive the movements, as well as to collect data related to the students' heart rate, etc. At present, we have conducted three heart rate collections, each time for about 90 minutes, with each second as the unit of data recording. In addition to the analysis of the corresponding emotional data, the frequency of vibration corresponding to the emotion will also be discussed as the basis of the subsequent bracelet vibration and corresponding emotion, after confirming the frequency of corresponding emotional vibration, the manufacturer will import it into the vibration bracelet. The bracelet data collection software was developed by Walden Digital Technology Co., Ltd. and was mainly used to collect data from the rehearsal of the Kai Chung students. The data collected was analyzed using the Mongodb database with the Studio 3T GUI interface. The development process is shown in Figure 2.

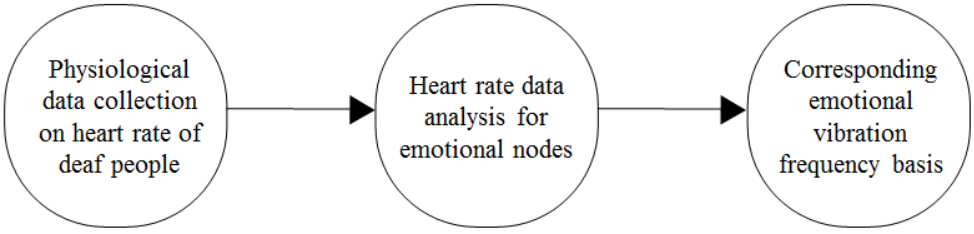


Figure 2: Vibrating bracelet development process

This bracelet was developed with the assistance of Stronghold Research. The message transmission instructions are shown in the diagram. During the performance, the main performer will send heart rate physiological signals to the data collection server software via the Gateway receiver. The software is responsible for data storage and bracelet message reception and transmission settings. Its main function is to identify emotional nodes and send

corresponding emotional vibration messages to other performers and viewers via the Gateway (one-to-many transmission of vibration messages). During the vibration period, the physiological data of other performers and viewers will still be sent to the data collection server software via Gateway. The stored physiological data can be compared with the emotion recognition system software for difference analysis.

The system consists of 10 vibration bracelets, 2 Gateway message receivers, 1 AP signal base station, 1 mini PC, 1 set of Dashboard signal collection software, and a keyboard, mouse, and monitor. To set up the system, connect the mini PC to the AP and start the Dashboard system. Then, turn on the message receiver and connect it to the network via the AP. Once the message receiver changes from colored light to white light, the system will begin collecting physiological data from all the powered-on bracelets.

The show will start with eight performers (three deaf and five hearing) at the end of this year. In addition to the performers, more audience members will wear the bracelets in next year's show, and the signals will be transmitted in the same way. Next year's performance will also feature an emotion recognition system, mainly used to compare the emotions of the audience's faces when wearing the bracelets and to analyze the data of their feelings.

The data collection software interface allows users to confirm data collection and the real-time status of each bracelet. Users can also set physiological alert ranges based on their condition, and the color of the interface will change if the data is abnormal. After collecting the data, Studio 3T and MongoDB are used to export the data.

4. Result

In this study, the heart rate data of the three subjects were analyzed by using a bracelet to detect the heart rate of deaf performers, and by analyzing the heart rate data of the deaf performers through their exciting movements and slow movements during rehearsals. The heart rate data were collected by the bracelet second by second, and the data were analyzed in order of size, and the top third of the data (high heart rate) was selected. The "agitated movements" among the high heart rate data were retained for analysis to define the heart rate benchmark of the performers during the "agitated movements". The data were collected in three sessions, 9/11, 9/18 and 9/25. Heart rate physiological data were collected from three students at Taipei School For The Hearing Impaired, the MongoDB database is exported to Studio 3T software (as shown in Figure 3) as a csv file of the ring physiological data，The physiological data on heart rate of students from Taipei School For The Hearing Impaired were collected on 9/11, 9/18 and 9/25. The total number of heart rate data and the corresponding quantities are shown in Table 3.

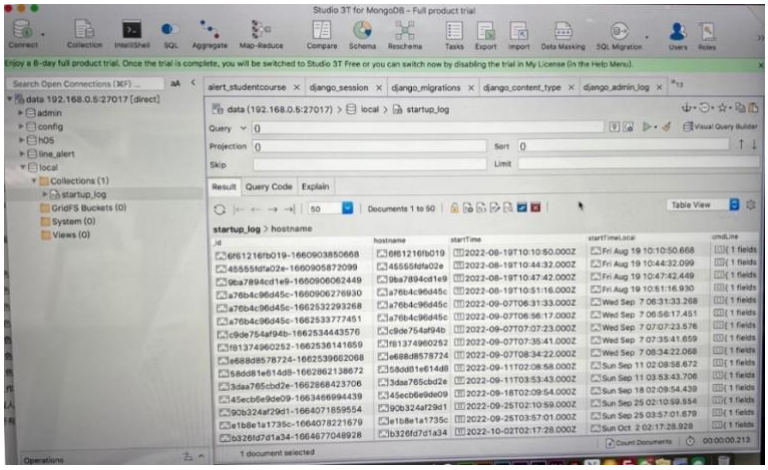


Figure 3: MongoDB database using Studio 3T software to export hand-loop physiological data

	9/11	9/18	9/25
Total number of heart rate data (pens)	4,768	6,845	5,266
High heart rate data number	1,589	2,281	1,755

Table 3: Data Collection Date and Number of Data

For the first session, which focuses on the 9/11 event, each student collected a total of 4,768 data points. The study then took the top one-third of the data (1,589 data points) and specifically looked at the heart rate data during "exciting movements." In this study, "exciting movements" are defined as completing one cycle of movement within 1-3 seconds, with large and abrupt limb extensions, fast movement speed, and large displacement distance. "Smooth movements," on the other hand, are defined as movements that last for more than 3 seconds, with smaller limb extensions, slow and gentle limb extensions, or slow movement speed and smaller displacement distance. The results collected by the three students are shown in Table 4.

	S1	S2	S3
Number of heart rate data during excited movements (counts)	311	186	98
Average heart rate (beats per minute)	104.2	87.1	70.6

Table 4: Number of Excited Action Heart Rate Data and Average Heart Rate (9/11)

According to Table 4, there were 311 data points for student 1's excited exercise heart rate, with an average heart rate of 104.2 beats per minute (bpm); 186 data points for student 2's excited exercise heart rate, with an average heart rate of 87.1 bpm; and 98 data points for student 3's excited exercise heart rate, with an average heart rate of 70.6 bpm. According to the definition of the Ministry of Health and Welfare in Taiwan, the heart rate for children and adolescents aged 6 years or older in a quiet state ranges from 60 to 100 bpm. In this study,

heart rate data were collected from students during "excited exercise," so the heart rates were generally higher than the minimum standard defined above (60 bpm). However, student 3's average heart rate was closer to the performance in a non-excited or calm state. After interviewing student 3, it was found that because the first rehearsal was the first time the student wore the wristband during the course, the student was generally unfamiliar with the wristband's operation. Moreover, after the rehearsal, student 3 also stated that the wristband did not display the screen correctly multiple times during the course, indicating a possible malfunction. This could explain why student 3's data differed from the other students, and the student's heart rate data for the first class was not adopted. The second course was held on 9/18, and each student collected 6,845 pieces of data. The first third of the data (2,281 pieces) were selected, and only data collected during "excited exercise" were kept. The results collected by the three students are shown in Table 5.

	S1	S2	S3
Number of heart rate data during excited movements (counts)	433	316	250
Average heart rate (beats per minute)	82.5	94.26	86.94

Table 5: Number of heart rate data and average heart rate for excited actions (9/18)

Based on Table 5, the number of excitement-induced heart rate data collected for Student 1 is 433, with an average heart rate of 82.5 (beats/min); for Student 2, the number of data collected is 316, with an average heart rate of 94.26 (beats/min); for Student 3, the number of data collected is 250, with an average heart rate of 86.94 (beats/min). The results of this study were all based on heart rate data collected from students during "excitement-induced" activities, so the heart rate generally exceeded the minimum standard defined by the Ministry of Health and Welfare (60 beats/min) for children and adolescents aged 6 and above in a quiet state. On 9/25, which was the third session of the course, each student collected 5,266 data points, and the first third (1,755 data points) were selected and only data collected during "excitement-induced" activities were retained. The results of the data collected by the three students are shown in Table 6.

	S1	S2	S3
Number of heart rate data during excited movements (counts)	262	517	534
Average heart rate (beats per minute)	91.84	104.78	91.25

Table 6: Number of Heart Rate Data and Average Heart Rate for Exciting Actions (9/25)

According to Table 6, Student 1 had 262 data points for heart rate during "exciting activities," with an average heart rate of 91.84 beats per minute (BPM); Student 2 had 517 data points with an average heart rate of 104.78 BPM; and Student 3 had 534 data points with an average heart rate of 91.25 BPM. The data collected for this study were all taken during "exciting activities," so heart rates were generally higher than the minimum standard set by the

Ministry of Health and Welfare in Taiwan (60 BPM). Upon analyzing the data for the three students, and excluding the data for Student 3 during the first class, the lowest heart rate recorded was 82.5 BPM. This study will use a heart rate of 83 BPM as the threshold for triggering vibration to indicate "excitement." In the future, we will continue to investigate heart rate data during "calm" emotions and define the corresponding vibration pattern.

5. Conclusion

Through interviews with three performers from Taipei Municipal School for the Hearing Impaired, we gain a deeper understanding of deaf students. Deaf students face difficulties in understanding things without auditory aids, and without internal guidance from teachers, they may not participate in extracurricular or artistic activities. Additionally, varying degrees of hearing impairment also lead to differences in their ability to understand. Fully deaf students generally have lower comprehension abilities compared to students who can hear some sounds. In terms of technological support for performance, the students hope that vibrating objects can assist them in understanding course content during class. In future plans, in addition to deaf student performers, the research will also continue to explore the relationship between deaf artists and technological assistance, as well as the impact of audience empathy.

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"Top-Bottom Deconstruction": A Global Space for Art Education in Rural Society

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Abstract
Let us look at globalization as a trigger for the current creative arts education movement. Not only in big cities but the stretching development of arts education can also be seen in small towns and rural communities. Interestingly, globalization is not seen as an essential foothold in developing art education. Therefore, this research wants to conduct a discourse on how the global space of art education in rural communities is created, termed "top-down deconstruction". This research has the nuances of a narrative literature review by taking Derrida's deconstruction concept as a basis for discussing the context of "global space", which has only been seen from one side so far. The study results show that globalization creates an attitude of adaptation and resilience in rural communities to technology as one of the elements of modern education. Globalization also constructs art in public spaces as a democratic alternative for rural communities. Furthermore, the development of art education in rural communities is also accommodated by rural art, which artists and collectives are now loving as their creative space in collaboration with the community. Thus, the global space created can become the central axis, which forms the cultural identity of the local community and creates an alternative space for modern art education.

Keywords: Deconstruction, Global Space, Art Education, Rural Society

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Introduction

Modernization in the perspective of classical modernization theory highlights that Third World countries are underdeveloped countries with traditional societies (Adom, 2019). At the same time, Western countries are seen as modern countries (de la Garza, 2022). However, what needs to be noted is that in the new modernization theory, tradition can be seen as a positive force supporting development --- including how traditional society relates to village demography. The linkage is traditional culture as a dynamic entity and constantly changing, able to make reasonable adjustments to local conditions. As a universal and comparative phenomenon, modernization in education is characterized by several tendencies (Cannon, 2018; Hudson, 2020), namely: (1) agreeing to new ideas and daring to try out new methods and techniques, (2) readiness to express opinions, (3) oriented to the present and the future rather than the present past, (4) respecting timeliness, (5) planning, organization, and efficiency, (6) seeing this world as something that can be calculated, (7) believing in science and technology, (8) seeing the importance of the equal distribution of justice.

A good modernization of education is characterized by the emergence of these eight criteria collectively in a social institution of a village. The eight articles become the attitudes and beliefs of all elements of society, personal and institutional, including the world of arts education. Thus, as an institution, education, in principle, bears the mandate of "future ethics." This means that future ethics requires humans not to avoid responsibility for the consequences of every action they commit in the present. Therefore, in the ethics of the future, humans have to dare to answer challenges to the uniquely human ability to anticipate, formulate values, and set priorities in an uncertain atmosphere so that future generations do not become prey to the processes that become getting out of hand in their later times (Savoie, 2017).

Based on the description above, art education in the village is a field that has a noble value because teaching is an obligation for everyone who has the knowledge and makes it ethical. Furthermore, the development of science that guides human life in every era is a significant concern in seeing how reality exists in a society that shapes its culture. The process of globalization in the world is inseparable from the birth of the industrial revolution in the western world, which until now has always been the primary reference when studying science itself. The process of the journey of the industrial revolution from the so-called industrial revolution 1.0 to the 21st century, called industrial revolution 4.0, will even step into the industrial revolution 5.0 in the discourse on the globalization of education (Maria Zulfiati et al., 2019; Sampurno & Camelia, 2020; Suardana, 2020).

In connection with the globalization of education in rural areas, the understanding of reality is indeed inseparable from the culture that exists in each community, which all depends on the elements of place, time, and atmosphere regarding the process of cultural inheritance through the methods used by the supporting community for the process of transferring their culture, which at this point we can call the path of education (Abrefa Busia, 2022; Liu et al., 2023; Moed, 2022). The concept of science presented in schools so far uses a perspective called having to be scientific. *Scientific* is defined as everything that can be proven to exist by the naked eye or by the five senses (Kim, 2020). This view is inseparable from the strong presence of the positivistic paradigm, which is the primary reference in education. On the other hand, as a project, globalization and rural education modernism cannot be separated from the philosophical assumptions that shape the worldview and become the basic foundation of all its epistemological structures. Among other things, the assumption that

knowledge is always objective, neutral, and free-valued states that humans are subject, while nature is the object, that our knowledge of reality is positive, vivid, and distinctive (Cook-Sather & Alter, 2011; Keenan & Kadi-Hanifi, 2021).

Therefore, this research wants to conduct a discourse on how the global space of art education in rural communities is created, termed "top-down deconstruction." Globalization of education in rural areas as a reality can be clearly defined, concrete, structured, and of course, measured using scientific methods. All subjects presented by the elementary to the tertiary level curriculum are inseparable from the scientific concept. This is a significant criticism for viewing disciplines that fall into the category of humanities, which so far must also be measured from a positivistic perspective. So a deconstructive approach is needed that emphasizes educational space's broader and naturalistic context.

Method

This research has the nuances of a narrative literature review by taking Derrida's deconstruction concept as a basis for discussing the context of "global space," which has only been seen from one side so far (Corson, 2020; Mahon, 2017; Sparrhoff, 2015). The context of this research is in the narrative literature of factual issues about art education in rural areas in Indonesia and urban art education spaces in 2013-2023. Data were obtained from literature studies and analyzed using Derrida's deconstruction concept and Paulo Freire's critical education approach (Freire, 1970; Lee, 2017; Pittri et al., 2023).

Results and Discussion

Art education, which in the course of its history has become a scientific discipline that has been known for only prioritizing aspects of imitation, expression, and imaginativeness, loses its power when it is juxtaposed with other exact sciences such as science, technology, engineering, and mathematics (Bowen et al., 2014; Cera, 2013; Sampurno et al., 2020; Stabler, 2021). This positivistic paradigm has become the dominant factor where art is a subject whose substance is only a complementary subject so far in educational institutions because of the difficulty in measuring the scientific realm of this field (Brinkley-Etzkorn, 2018; Zimmer et al., 2021). In addition, it is exacerbated by the perspective held by the art community and even art educators who eventually unknowingly understand the truth of the reality of art by using a scientific perspective that speaking of art, must be in the form of a physical form that is displayed and fulfills aesthetic requirements or standards globally defined (Botella et al., 2013; Ulger, 2019).

This concept certainly exacerbates how art education practices have been running in schools in rural educational institutions. To understand the concept of reality that must be presented in this era, of course, we need to look at globalization's journey so fast in this era. The conception of reality in the 21st century, which is known today as the postmodern era and even the most extreme mention at the same time, says it is post-truth but does the emergence of this context of understanding also take place in the process of art education in formal institutions known as schools, so far, school is understood as an ecosystem space capable of carrying out the task of transferring culture in a society (Castro, 2016; Gardner, 2003; Lu, 2010; Wiratmoko & Sampurno, 2021).

“Top-down” is a postmodern term used in many fields with great fanfare and frenzy. This fanfare causes any reference to him to run the risk of being branded as serving a shallow and

empty intellectual mode (Baudrillard, 2020; Gojkov, 2019). The problem is that, on the one hand, the term is already trendy; on the other, it has always avoided being adequately defined. The extent of the area in which the term is used alone is quite astonishing. It is used scattered everywhere so that it is not surprising that its meaning becomes blurred.

Art, in a very general sense in today's era of global capitalism, has a crucial role in creating a system of social differentiation through the signs and symbols it offers (Indrajaya, 2018). One of the goals of art in a global capitalist society is to create a system of differentiation, a form of power created through art. Nonetheless, there is an exciting relationship between art as a discourse and power as a mechanism in today's global capitalist discourse; art is touched, forged, printed, and defined by the power within this global capitalist society (Lin et al., 2015). However, as a form of art practice, it produces separate powers of differentiation, prestige, status, comfort, health, and symbolism, a form of power that dominates postmodernism discourse. As part of the global capitalist discourse, postmodernism explores new forms of power: commodity power, symbolic power, symbol and object-producing power, space, and postmodern life (Chaney, 2020; Dunn & Castro, 2012; Houston, 2004).

Rural area art education expresses ideas and feelings that cannot be communicated through other media, such as language and mathematics (Schafft, 2016). It correlates with nature as a unified element. On the other hand, even though language is also a medium of symbolic communication, its expression is conceptual. It does not yet accommodate the impulse for emotional expression, which animates the pattern of human life. Furthermore, during what is known as the postmodern period, art no longer only had a traditional and modern background. However, the presence of subjects becomes essential in responding to new traditions, especially in urban areas, which are demographically inhabited by members of a heterogeneous, multicultural society—compared to rural communities. Art products produced by urban communities are relatively more complex and are often known as urban art (Jurriëns, 2021; Manca et al., 2017).

The term "urban" is not only known but also experienced by residents of cities and villages, especially in developing countries. Urban means something directly or indirectly related to urbanization (population movement from villages to cities) (Sintos Coloma, 2020). Urban society is classified as a multi-ethnic society because it consists of various tribes and groups, even between nations, that are gathered from various ethnic groups in one central city (metropolis). Urban residents have diverse cultures because each resident has a different cultural background depending on where they come from. In addition, *urban society* is defined as people who have the ambition to fulfill their needs to be better than before (Ding & Schuermans, 2012). The type of urban movement in Indonesia is heavily influenced by factors (1) position or prestige, (2) economy, (3) culture, (4) religion, and (5) education. All these give form and content to works of art, especially in language, clothing (fashion), and housing (architecture). Urban in Indonesia combines elements from city to village and village to the city as urban is related to geography. Urban space is not only rural culture that will adapt to the city but also occurs between urban and rural adjustments.

Two main factors, education and tourism, make rural areas often exposed to nature become areas that develop rapidly and tend to be busy (especially in these two respects). Unfortunately, the alternative space in the rural concept needs to have tradition. On the other hand, art is no longer just a background of tradition but instead responds to new traditions, especially in rural areas demographically inhabited by members of society who are more heterogeneous due to globalization compared to rural communities in the past. Art products

produced are relatively more complex. Art products from rural communities are known as traditional rural art. *Rural traditional art* is an art that characterizes rural and natural developments, where these developments then give birth to a system in society that is structurally and culturally different from the structure and culture of rural society in the past (Crouch & Nguyen, 2021; Emdin, 2020; Wargo et al., 2022). Furthermore, this concept places art no longer based on tradition but instead responds more to new traditions.

Urban art was born because of a longing to respond to the creativity of people who live in urban areas with all their problems. Then came the effort of a group of people to exhibit and bring art into the midst of society by exercising freedom of expression in public spaces. The expression shown is an expression that tries to portray the problems that often occur and dominate urban society, including social, economic, political, and cultural issues, through art media and is motivated by the growth and capitalization of the city itself. Nowadays, art is no longer just a representation displayed in galleries but a medium of expression that fights in public facilities with other media such as advertisements on social media, the internet, TV, advertising billboards, promotional posters, billboards, and others (Lehner, 2021). All of these expression media dominate almost every public facility.

Urban art succeeded in cutting the distance between the public as an appreciator and a work of art and replacing the function of art that was previously noble, classic, pure, high, and traditional. Art is positioned as something conservative and full of exaltation values. Urban art succeeds in undermining these values by presenting them to the public through media that are closely related to the daily lives of urban people. If you draw local elements in urban art, paintings on the backs of trucks and rickshaws are examples of urban art. The purpose of urban art is rooted in differences in political attitudes, anti-establishment, vandalism, and resistance to the dominant system in society. The concrete form of urban art can vary as long as the art conveys the spirit of urban dynamics. In addition, art life in urban society in Indonesia has experienced the acculturation of village culture with urban cultures, such as the emergence of public aesthetic spaces in the form of mural art with traditional cultural or Javanese aesthetics, which tend to bring out *wayang* characters in every work that is created.

The process of occurrence of traditional inventions is divided into three types: first, forming traditions to make social symbols and identity collectively. Second is an interest in strengthening one party's position in a particular institution where with this traditional invention, they can perpetuate their interests and ensure mastery over one institution at a time. Third, looking at the legitimate interests of an institution to form a cultural system that will be used in that community.

Derrida's reflections on deconstruction and related concepts, such as *différance*, justice, and responsibility, can provide a powerful paradigm for developing a greater awareness of the issues at stake in education (Garrison, 2017). Rejecting dullness and dichotomy, Derrida argues that Western metaphysics relies on a binary spectrum of presence and absence, body and mind, form and content, good and evil, and speech and writing, giving priority to the primary rather than the latter. Derrida urges readers to read texts critically, increasing their critical potential so that they can bring about political and social change. Derrida supports an interdisciplinary curriculum in one way or another. Derrida is against defining concepts in instructional materials. It is rooted in the metaphysical presence of Aristotle, and it cannot lead to an understanding of matter and phenomena (Corson, 2020; Evans, 2019; Koopman, 2005). According to Derrida's structure, integrity, logical sequence, and meaning aspects of instructional materials are unreal and imaginary. Instructional materials cannot search for the

absolute truth. The power of language, words, and inter-textual relationships shapes reality. Derrida states that there is no neutral place in instructional materials. Instead, he stated that there is no hypertext in the curriculum (Singer et al., 2006). What seems obvious has been created by and depends on language and other semiotic systems. Thus, in the context of the globalization of rural art education, educators should encourage students or learners to interact with texts rather than teach them a constant set of interpretations so that they can interpret texts according to rural values. Therefore, learners should be encouraged to be critical, pay attention to contradictions and gaps in the text, and not be indifferent to such contradictions that are not harmonious.

A rural educator might consider Derrida's deconstruction as a teaching method (Crawford, 2017; King et al., 2019). In this procedure, which is sometimes spoken of as a substitute for a scientific procedure, texts have an infinite number of interpretations, and no interpretation has an advantage over the other, especially in arts education. Here, the emphasis is on personal feelings and experiences. Interpretation is a significant concern in deconstructionism: an introspective postmodernist and anti-objectivist interpretation. In rural art education, deconstruction can enter the cognitive realm in the learning process. This refers to the conception that humans have three types of knowledge that distinguish them from other creatures: analytical knowledge, which is knowledge built through the power of reason in producing scientific truth, which is dominant in science and technology.

On the other hand, ethical knowledge is knowledge about the character and goodness (beliefs, values, or moral character) of a community or nation that is learned through social sciences and humanities and aesthetic knowledge, namely knowledge about taste or emotional qualities, which include aspects of understanding, beauty, and comfort which is the predominant quality of the art. These three aspects of knowledge must appear simultaneously without dominating one aspect of knowledge again so that arts education will have its place in the structure of the educational curriculum and eliminate the dichotomy that has always been applied between science and art. The paradigm of art education in rural areas regarding science and humanity is that they do not know each other, see other parties from their point of view, and are suspicious of each other. The deconstruction method can break this paradigm. The melting of the boundaries between fine arts, theatre, dance, and music marks the elimination of barriers between various artistic tendencies—intervention of scientific and social disciplines, especially those coined as widespread knowledge or utilizing the latest technology (Ihde, 1995). Postmodern art education in rural areas can be produced using various working methods and processes with multidisciplinary, interdisciplinary, and transdisciplinary approaches.

The practice of art education in rural areas should be built collaboratively and integrated with multidisciplinary, interdisciplinary, and transdisciplinary scientific methods and prioritizing research or research approaches in the process. Local wisdom, broadly known as rural traditional cultural capital in the context of postmodern culture in the era of disruption, can be explored to become the basis of multicultural Indonesian arts education if this cultural capital is understood organically; transformed in every space and time—awareness of the scientific basis of science and art in the field of education in the archipelago. The era of disruption can provide an excellent opportunity to change the paradigm of the arts education curriculum based on an inter/multi/transdisciplinary approach to creativity if there is a change in mindset that is not dichotomous/diametric between locality and globality. The profile of art education teachers in the era of disruption 4.0 can carry out art education for generation z if their

competencies are based on skills relevant to the demands of the 21st century and they understand science and art in a non-dichotomous manner.

Conclusion

The concept of rural space in the shifting process of art education in rural areas is the primary concern in the deconstruction method and its relation to the problem of globalization. The physical space or classrooms in the educational process known so far is the school, a physical space in the form of room dividers in a physical building called the school. In deconstruction to present a critical thinking process, more is needed. The concept of space is needed, which presents students to be able to carry out a process of dialogue and dialectics toward the physical reality that can be seen directly regarding diversity so that it will produce a process of critically interpretive reading without being dictated or dogma by the truth of reality that the thought of an educator alone has presented. The concept of space in rural art education as an implication of globalization can present fantasy and imaginary space in thinking more freely, allowing students to present hyper-reality concepts in space and time with various learning processes.

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Towards Efficient and Effective Doctoral Education in Biomedical Sciences: Nurturing Transferable Skills

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Abstract
Graduate education funding organisations in Japan focus on nurturing transferable skills in doctoral students to help them broaden their minds and see beyond academia. Biomedical doctoral students prioritise practical research, dedicating themselves to basic research and devoting their time to a research-centred daily life; their specialty is narrowed down to its deepest level. Moreover, most of the students have a part-time job outside the research activities. In this context, this study seeks to investigate what would be an effective and efficient approach for training students so as to cover a range of transferable skills, considering that students come from diverse backgrounds and have different lifestyles. This study introduces a holistic approach used in a credit module conducted in English at an interdepartmental doctoral training programme within biomedical sciences at a traditional national university in Japan. The module aims to improve students' transferable skills as a scientist. Each session includes a series of research communications where students introduce and exchange research concepts and approaches, followed by discussions in a student-led symposium format. The findings of a questionnaire survey reveal students' reflections and evaluations of the module as well as their perceptions of whether the module was efficient and effective. The module also contributed to increasing participants' interest in interdisciplinary learning overall.

Keywords: Doctoral Education, Transferable Skills, Interdisciplinarity

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Introduction

Graduate education funding organisations in Japan focus on nurturing doctoral students with transferable skills to broaden their minds and see beyond academia, instead of only research experiences, and they stipulate such education upon receiving the education funding.

The following question arises: What would be an efficient and effective approach for training doctoral students such that a range of transferable skills would be covered, given that students come from diverse backgrounds and have different lifestyles? This study aims to show student responses to an activity module that seeks to nurture transferable skills among doctoral students in biomedical sciences in an interdisciplinary setting.

Biomedical doctoral students prioritise practical research, dedicating themselves to basic research and devoting their time to a research-centred daily life; their specialty is narrowed down to its deepest level. As a Ph.D. professional, their priority is to acquire superior research skills and produce cutting-edge research results for a doctoral degree. Moreover, most doctoral students have a part-time job outside their research activities.

Efficiency can be part of effectiveness, and education should be concerned with not being a burden on their research activities. It is desirable to provide doctoral education by considering the connection between education and research as well as research-integrated education by ensuring that education contributes constructively to their research.

This study introduces an approach involving a student-led symposium to acquire transferable skills with an aim to achieve efficiency and effectiveness at module level. This approach was evaluated based on student responses to a questionnaire survey.

Integrative and interdisciplinary training

Universities have adopted diverse ways for implementing interdisciplinary education. Leišytė et al. (2022) suggest that more study should look at the reasons behind the adoption of regulations and policies that make interdisciplinarity successful for various “types” of universities. Integrative interdisciplinary projects have become an increasingly common approach to manage the balance of technical professional competence and transferable skills; however, the desirable approaches differ for the following groups: graduates, undergraduates, or even students of younger ages. According to Lowe and Goldfinch (2021), there has been minimal research on ‘the level’ of integrative skills that might be considered as appropriate at different stages of degree programmes and whether the learning outcomes of integrative projects vary with their stage in degree programmes. In the study by Li (2020), about half of the students did not view the value of interdisciplinary education for academic research; nevertheless, students were generally in favour of such education and agreed that it was necessary and beneficial.

Transferable skills and integrated holistic approach

Theoretical models and approaches for developing transferable skills are available in the literature. Transferable skills must be gained through repeated experiences over a long-term period. Porter and Phelps (2014) state that it is necessary to become deeply integrated within a holistic doctoral education experience for Ph.D. studies and for professional development;

such a broader integration requires substantial reform in universities in terms of defining the impact of research and flexibility in doctoral degree requirements.

The mainstream attempts in enhancing transferrable skills involved problem-based learning activities. Vidic (2008) introduced and encouraged the development of transferable skills using problem-based learning. Students learn through experiences and from each other's behaviour, which is an important factor in such cooperative learning. Enhancement of transferable skills via student-led formats have also been reported. Chadha (2006) mentioned that a student-led workshop in which students are assessed on both their professional knowledge and transferable skills by applying approaches for a 'holistic view' was successful in a curriculum model. Camarinha-Matos et al. (2020) demonstrated student-led conference based on a holistic approach, along with evidence based on student feedback that confirmed the validity and effectiveness of the proposed approach.

Journal clubs constitute a popular approach at the graduate level and are more pertinent to one's research field; these usually involve meetings with people in similar fields. Kaur et al. (2020) indicated that providing repeated and blended sessions in a journal club is effective in developing critical appraisal skills of postgraduate students, and a multisession format may be beneficial to develop critical-thinking skills. In contrast, people from outside the close fields also participate in an interdisciplinary setting; consequently, they may need explanations in the form of a research presentation that communicates the wider context, as in the case of the Three Minute Thesis. According to Hyland and Zou (2022), the Three Minute Thesis competition cultivates students' academic, presentation, and research communication skills.

Efficiency and effectiveness

Doctoral students in biomedical sciences are busy just as many professional researchers. In addition to regular graduate school activities, research for doctoral thesis, and miscellaneous duties at the laboratory of their affiliation, these students are required to publish as a candidature, work as a teaching or research assistant or as medical practitioners in the case of some students. Students are required to take several educational modules in addition to their research. The study by Jordan and Howe (2018) showed that the principal problem with the graduate teaching assistants emerged as time pressures. Lei (2019) revealed that doctoral students are under increasing time pressures to publish in order to meet institutional publication requirements.

The 'effectiveness' of a teaching programme or module is typically evaluated through a questionnaire survey; however, fewer studies are concerned with 'efficiency' compared to 'effectiveness'. Previous studies have given scant attention to the lifestyle of doctoral students and the busyness and time burden they experience. This study aims to contribute to this 'efficiency' aspect based on the students' responses.

Efficiency and effectiveness are sometimes interpreted similarly and differently. In the statistical procedures, efficiency is a measure of the quality of an experimental design or test hypothesis, calculated based on test scores. For example, the efficiency and effectiveness of a learning module can be analysed using mean values and percentages based on the test scores. Meanwhile, with regard to 'satisfaction' measurement, Waaijer et al. (2017) measured job satisfaction regarding job content, terms of employment, and work-life balance by asking the respondents to rate the variables on a five-point Likert scale. Likewise, the term 'efficiency'

does not imply a statistical analysis of variance in this study, but instead is based on student feedback using a Likert scale on how efficient the module approach was when concerned with their outside activities.

Time efficiency is a strength brought by the online learning style. The online environment will continue to change and evolve with time. Two major alternative teaching styles have emerged in the new-normal era after COVID-19: hybrid, a mix of online and onsite, and hybrid-flexible (HyFlex), where students choose their modality within the same course (James et al., 2022). In case of the latter, students may end up choosing the online modality throughout, which could lead to a risk of not being able to enhance in-person skills.

Methods

Participants

Of the 41 graduate students who participated in the proposed module, 40 participants completed the survey. Based on the Japanese graduate educational system, 12 participants were first-year student in a doctoral course and 28 participants were second-year students in a master's course. Participants belonged to graduate schools in fields related to biomedical science: medicine, health science, dentistry, pharmaceutical sciences, and biosciences.

Design

This credit module was held in the afternoon period throughout the academic year at a traditional national university in Japan; it was conducted in English to set an international tone.

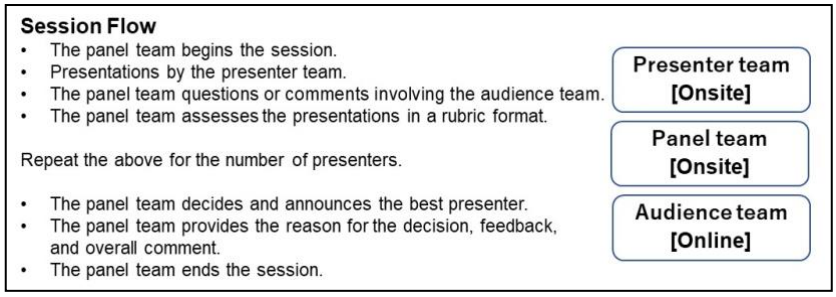


Figure 1. Session flow

As Figure 1 shows, each session includes a series of international symposia. Students introduce and exchange their research concept and approach, followed by discussions. The rationale for this module is to make one's research presentation to an audience comprising the researchers from different backgrounds – biomedicine, public health, statistics, epidemiological studies, medicine, health studies, imaging, deep learning and so on – ranging from dry to wet research, leading to a multidisciplinary group. As a rule, students were not to use presentation tools; they were required to stand right in the centre, in front of the screen, talking to the listeners.

In the introduction session of the module, the instructor explained the purpose and flow of each session. The presenter team began with providing the big picture in real life, instead of starting with definitions as done in scientific presentations at academic conferences; the presenters then got progressively more specific, linking back to the bigger picture at the end. The panel team chair facilitated the session as well as peer review using a rubric-based

assessment of the presenters similar to a real conference. Participants were grouped into the presentation, panel, and audience teams in turns.

Skills expected to be covered

The module employs role play to enhance transferable skills. Students are expected to develop an awareness of the various fields in biomedical sciences through outputting own research and inputting others' research and actively participating in discussions, chairing, and facilitating the session. Regardless of the roles taken – presenter, panel, and audience – each of the following skills will be put into practice.

As English was the medium of instruction, the module provided an international setting, thereby enhancing global skills. The interactions in an interdepartmental environment inevitably provide interdisciplinarity skills that are enhanced by knowing other research groups' activities, exploring links with others' research activities and methods, and obtaining feedback from an interdisciplinary audience. Communication skills were enhanced by presenting to non-technical audience and discussions. Facilitation and leadership skills were promoted by acting as panel, chairing, leading and facilitating the session, giving constructive feedback and comments, dealing with difficulties, and time management. The audience can also exhibit leadership by, for example, asking questions.

Data collection

A questionnaire survey in the form of self-reflection and module evaluation was administered at the end of the module. The survey consisted of eighteen items, with six being assessed on a Likert scale.

Results

For the statistical analysis, R and RStudio were used. The unit in all the tables is the number of participants or responses. Where applicable, students' feedback and comments were obtained using open-ended questions on how the students would improve the module or what the students would do differently.

To the question, 'Did the module activity provide you with more experiences than other similar modules you have taken? If you have not taken any other similar modules, leave this question blank', 19 students responded 'yes', 5 responded 'no', and 16 left the question blank, which could imply that they have not taken other similar modules before.

Skills

By comparing the pre- and post-module levels, students evaluated the improvement in each of the skills in Table 1.

	Very much	Somewhat	Neutral	A little	Not at all
Leadership Skills	5	16	17	1	1
Facilitation Skills	4	20	13	2	1
Communication Skills	13	23	4	0	0

Table 1. Number of responses to how the skills improved (n=40)

In all the three skills, the median was in the 'somewhat' category.

Efficiency and effectiveness

Tables 2 and 3 show the comparison between doctoral students and master's students in relation to efficiency and effectiveness of the module, respectively.

	Efficiency				
	Very much	Maybe	Neutral	Hardly	Not at all
Doctoral	4	6	2	0	0
Master's	10	12	3	2	1

Table 2. Efficiency by doctoral and master's students (n=40)

	Effectiveness				
	Very much	Maybe	Neutral	Hardly	Not at all
Doctoral	4	6	2	0	0
Master's	11	10	3	2	1

Table 3. Effectiveness by doctoral and master's students (n=39)

More dispersion was found in master's students' responses (n=28 vs. n=12 for doctoral students). Overall, Table 4 shows the cross tabulation of efficiency and effectiveness.

		Effectiveness					
		Very much	Maybe	Neutral	Hardly	Not at all	(n/a)
Efficiency	Very much	11	2	0	0	0	1
	Maybe	3	14	1	0	0	0
	Neutral	1	0	4	0	0	0
	Hardly	0	0	0	2	0	0
	Not at all	0	0	0	0	1	0

Table 4. Efficiency and effectiveness of the module (n=40)

Approximately 80 percent answered 'very much' or 'maybe' for efficiency, and approximately 79 percent answered 'very much' or 'maybe' for effectiveness. Both in efficiency and effectiveness, the median is in 'Maybe' category respectively. A correlation between efficiency and effectiveness was found, with a Spearman's ρ-value of 0.766. As for correlation between preparation time for presentation and efficiency (effectiveness), a Spearman's ρ-value of 0.032 (0.132) was calculated.

Tables 5 and 6 show the cross tabulation of employment status and efficiency and effectiveness, respectively.

	Efficiency				
	Very much	Maybe	Neutral	Hardly	Not at all
Full-time work	2	0	1	0	0
Part-time work	6	9	3	1	1
Not working	5	8	1	1	0
Do not wish to answer	1	0	0	0	0

Table 5. Employment status and efficiency (n=40)

	Effectiveness				
	Very much	Maybe	Neutral	Hardly	Not at all
Full-time work	2	0	1	0	0
Part-time work	9	5	3	1	1
Not working	3	10	1	1	0
Do not wish to answer	1	0	0	0	0

Table 6. Employment status and effectiveness (n=39)

A couple of comments were seen regarding class time table, with students requesting to avoid afternoon period and hold the module in the morning or evening instead, so that it will not interrupt their daily experiments.

Table 7 shows the preferred venue for each role activity.

	Presenter	Panel	Audience
Onsite	32	33	12
Online	8	6	27

Table 7. Preferred venue (n=40)

Although the majority preferred the audience to be online, some comments pointed out that the audience involvement was not enough. The panel invited questions from the audience, but the questions from the audience remained low in all sessions. Related comments in the student feedback are as follows: 'No online. All students should attend at the classroom'; 'We want to get more questions or comments from an online audience.'

Interdisciplinarity

Table 8 shows the responses related to interdisciplinarity.

	Yes	To some extent	No
Were there any similarities between your research concept/approach and others' presentation talks?	6	23	11
Did the module benefit you in increasing your interest in interdisciplinary learning?	30	10	0
Do you wish to interact in the same way in any field other than the biomedical science field?	30	n/a	10

Table 8. Interdisciplinarity (n=40)

No negative responses were received for the question on the module's benefits in terms of increasing an interest in interdisciplinary learning. Not all wished to interact with fields other than the biomedical science field. Those who responded yes to 'Do you wish to interact in the same way in any field other than the biomedical science field?' were asked a follow-up

question to determine to what extent they wish to interact beyond biomedical sciences; the responses are shown in Table 9.

	Yes
Natural science	20
Engineering	15
Information	15
Social science	6
Economics/law	5
Linguistics/literature	1

Table 9. Interests in other fields beyond biomedical sciences (Multiple answers)

The supporting comment for 'linguistics/literature' answer was 'I will invite the members from "completely different fields" outside biomedical sciences, to be fairer, let them choose the best presentation.'

Conclusion

The purpose of this study was to seek an efficient and effective training approach that covers transferable skills for doctoral students. The study adopted a holistic approach to providing doctoral education by connecting education with research and ensuring that the learning contributes constructively to students' own research. According to the survey results, approximately 75 percent of the students responded positively that the module approach was both efficient and effective. The module also contributed to increasing participants' interest in interdisciplinary learning and leadership, facilitation, and communication skills.

Limitations and prospects for improvement

Reflecting on the student feedback, a blended approach is proposed. This would involve not just a symposium format but a pre-conference event in the form of groupwork under a certain topic, which enables students to get to know the other members prior to a symposium, could increase student satisfaction. In the responses, some students suggested using presentation topics outside one's research: 'set a big theme and students discuss to come up with good answers or ideas'; 'add a session, in which doctoral students talk about their lives, values, and future plans'; 'not only research presentation but also life-presentation may improve communications'. If the module focuses on enhancing communication skills, such topics might be suitable.

Although communication skills in English was one of the transferable skills to be enhanced, the language barrier might have been a challenging factor. Some still had conversation in groupwork in Japanese. One student stated, 'I will make everyone use English strictly in all classes.'

Many people spoke about their research in depth, while others did not. Although it is necessary to talk about one's research in depth and with clarity, students from completely different fields may find it difficult to understand; however, those close to the field may find similarities and consequently, discussion is enhanced. To encourage joint research or to get feedback on the presentation, the presentation content must be in depth to a certain extent. On the other hand, to understand what other people are doing and to acquire general knowledge,

a non-technical presentation as in the case of Three Minute Thesis is desirable; however, it is often too shallow and the students find it difficult to decide what to discuss. In future, a presentation template could be provided to support the presentation attempted in this module; students could pitch their research content to be more interesting so that others feel like listening further.

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How Did Traditional Nomadic Herders Increase in the Past Decade? –The Relations of Higher Education, TVET, and Career Trajectory

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The Asian Conference on Education & International Development 2023
Official Conference Proceedings

Abstract
This study aims to reveal the growth factors in nomadic herders, featuring the relations of higher education, TVET, and the job market in Mongolia. Past studies demonstrated the dramatic decrease of herder households in young generations in Mongolia due to the vulnerability under climate change and preference for an urban lifestyle after the mobility to the capital city owing to the transition to higher education. On the other hand, government statistic shows that the rate of herder households in the early twenties has increased in the past ten years. Analyzing qualitative data collected from the interviews with ten young nomadic herder families, four vocational and technical education institutions, and two higher education institutions in October 2022, the author discovered both negative and positive factors of why people chose to be nomadic herders despite the hardship. First, the high unemployment rate impacts the negative choice of nomadic herders. Another accelerating factor is the government policy to support poor herders under thirty-five years old. In this policy, young people register as poor herders to receive grant funding, although they do not make a living by raising cattle. Positive factors are the firm belief and respect for nature and animals. Young nomadic interviewees showed sound responsibility to succeed in their family business without wondering about other directions. This study also clarified the contradiction between government statistics and the actual number of young herders. Young herders exist in the research target area in statistical data, but the absolute herders decreased in the past decade.

Keywords: Nomadic Herders, Higher Education, TVET, Career Trajectory, Mongolia

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Introduction

Mongolia borders Russia in the north and China in the south. Mongolia comprises herder households nationwide, which is 19.92% of the country's households (National Statistics Office of Mongolia: NSO 2022). In 1924, Mongolian People's Republic was founded, and it had been a socialist state for almost 70 years until it renamed the country to Mongolia in 1992 while transitioning to democracy.

Past studies show that young generations and small-sized households lost their interest in traditional herder pastoralists (Soma 2020) because they prefer working in the mining and quarrying sector or involving themselves in the service sector in the capital city to staying in the countryside to succeed in their family herding business (Yasui 2019). Indeed, herding has many hardships, including a heavy 24-hour workload without a holiday. Along with the severe natural disasters followed by the abrupt climate change, less experienced herders will likely lose their cattle, such as sheep, goats, cows, and horses, during winter and spring. Many vulnerable families who lost their cattle have moved to the capital city in recent decades. Their mobilisation aims to take the opportunities for new jobs, better social and health services, and a better educational environment (Konagaya 2013, Hoshino 2013, and Nakamura 2017, 2020).

Many studies demonstrate the problem of urbanisation. 84.1% of universities are in the capital city, Ulaanbaatar (NSO 2021, Ariuntuya 2021). As of 2020, 138,237 students out of 147,293 study in UB (93.85%) (NSO 2021). After graduating from universities and other higher education institutions, young people choose to stay in the capital because they do not see any advantages if they return to their hometown or rural area to start their job carrier (Yasui 2021).

Although the past literature describes many hardships in succeeding the traditional herding work in young generations, the national statistical data shows that the number of herder households has increased since 2012 (NSO 2021) (Figure 1). The number was 207,824 in 2012 and grew to 242,024 in 2020 (NSO 2021). During these years, the natural disaster of a severe cold climate, called Dzud in Mongolia, occurred from winter 2015 to spring 2017. Even after this period, the number of herder households kept increasing despite the significant loss of livestock (NSO 2021).

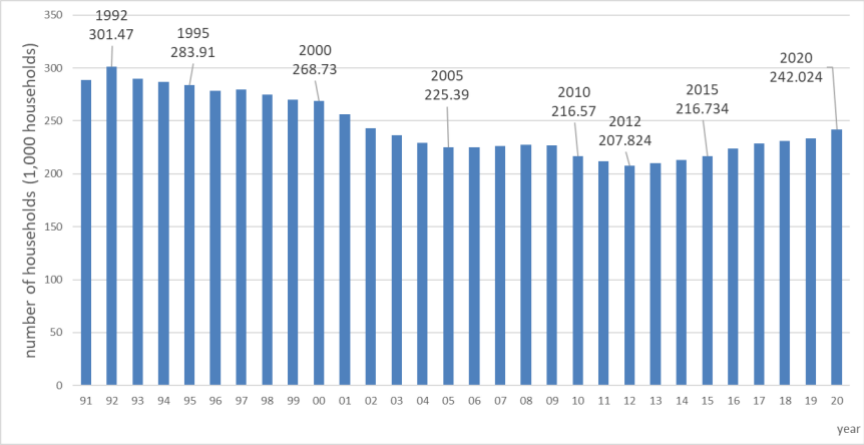


Figure 1: Total number of herder households

Source：the author made the figure based on Mongolian Statistical Information Services (NSO 2021)

This study aims to reveal the growth factors in nomadic herders, featuring the relations of higher education, Technical and Vocational Education and Training (TVET), and the job market in Mongolia. Based on the qualitative data analysis, the study clarifies both positive and negative factors and motives why young generations decided to become nomadic herders despite many hardships.

Methodology

This paper uses the national statistical data from the National statistics office of Mongolia (NSO) and the datasets of semi-structured interviews with rural nomadic herder families, vocational and technical education institutions, and higher education institutions. In October 2022, the author researched one of the rural prefectures and the capital city in Mongolia. Table 1 shows the list of interviewees.

Table 1: List of interviewees

Category	gender (age)	details
Nomadic family	male (19)	7 years of herding, working with parents
	male (28)	14 years of herding, working with parents
	male (28)	9 years of herding, parents were nomad
	female (30)	6 years of herding after marriage
	female (30)	11 years of herding, parents were nomad
	male (34)	15 years of herding, parents were nomad
	male (37)	20 years of herding, parents were nomad
	female (36)	13 years of herding after marriage
	male (38)	16 years of herding, parents were nomad
	female (37)	16 years of herding after marriage
	male (42)	20 years of herding, parents were nomad
	female (39)	20 years of herding, parents were nomad
	male (39)	22 years of herding, parents were nomad
TVET institutions	**school location**	**school type, the year of foundation**
	VTPC in A Prefecture	private school, founded in 2012
	VTPC in A Prefecture	private school, founded in 19xx
	VTPC in A Prefecture	public school, founded in 1942
	VTPC in Ulaanbaatar	private school, founded in 1993
	Polytechnic college in the suburb of the capital city	public school, founded in 1954

Change in the number of herders by age group

Table 2 shows the comparison rate from 2009 to 2018, which illustrates the number of herders and total population by age group. The number of herders decreased compared to the population change in the age groups of 15-19, 25-29, and 30-34. These data support the past literature in that young people prefer an urban lifestyle after mobility to the capital city. However, in the age groups of 20-24 and 35 years and above, the number of herders shows solid growth in the past ten years when comparing the population growth. Young generations in their 20s and 30s comprise many university and TVET graduates due to the increasing enrolment rate in these institutions (Figure 2 and Figure 3). According to Gantogtokh (2018), the continuous rate in higher education was 14.0% in 1991, drastically rising to 69.0% in 2017. Students study in various academic domains in universities or take professional courses in TVET institutions, but most do not specialise in animal husbandry (NSO 2021). Young generations who became herders had studied different majors apart from herding. Under these circumstances, there must be some motive for why they chose to become herders.

Table 2: Employment in animal husbandry by age group (2009-2018 comparison)

Age group		2009-2018 comparison
15-19	number of herders	68.46%
15-19	total population	79.61%
20-24	number of herders	**87.82%**
20-24	total population	**82.50%**
25-29	number of herders	89.24%
25-29	total population	117.94%
30-34	number of herders	118.21%
30-34	total population	128.83%
35-39	number of herders	**147.01%**
35-39	total population	**118.10%**
40-44	number of herders	**177.62%**
40-44	total population	**122.06%**
45-49	number of herders	**172.82%**
45-49	total population	**118.94%**
50-54	number of herders	**145.83%**
50-54	total population	**140.73%**
55-59	number of herders	**187.72%**
55-59	total population	**178.28%**
60-64	number of herders	167.41%
60-64	total population	173.30%
65-69	number of herders	**131.81%**
65-69	total population	**113.85%**
70+	number of herders	**224.45%**
70+	total population	**117.53%**

Source: the author made the table based on Mongolian Statistical Information Services (NSO 2021)

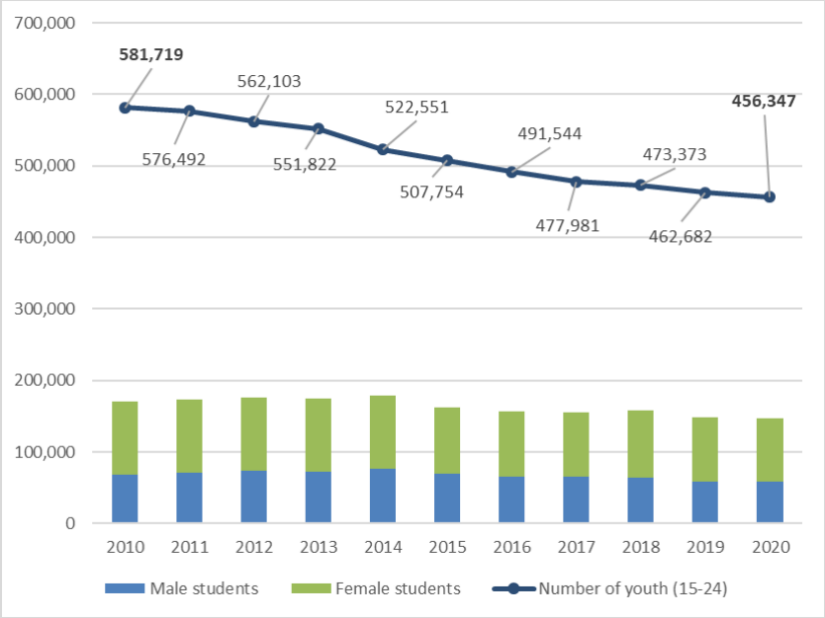


Figure 2: Young population and student number in higher education (2010-2020)
Source: the author made the figure based on Mongolian Statistical Information Services (NSO 2021)

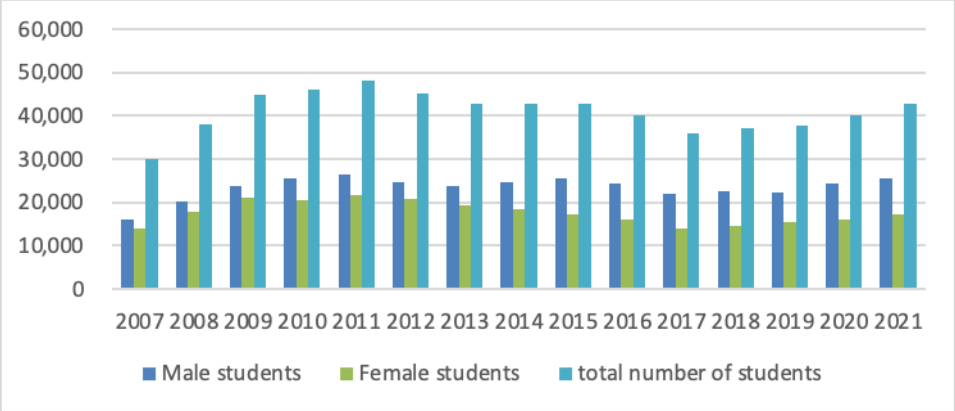


Figure 3: Student number in TVET (2007-2021)
Source: the author made the figure based on Mongolian Statistical Information Services (NSO 2021)

Factors and motives to become traditional nomadic herders

Negative factors and governmental policy

The semi-constructed interview's target area is one of Mongolia's rural prefectures. The prefecture is in the Khangai (mountainous) region, where the highest number of herders exist in the country. In the prefecture centre, the research team asked the prefectural government official, district mayor, village leader, and residents to find young nomadic pastoralists in the community. It was not easy to reach young herders because local people acknowledged that young people rarely succeeded in the family herding business in recent years. After interviewing nomadic herder families and school teachers and staff, some negative factors and the related government policy were identified.

Young people aged 20-24 are the generation right after the completion of higher education or TVET. These young people need help finding a job due to the high unemployment rate in the country. As shown in Figure 4, youth with high educational attainment show a higher unemployment rate than those who completed primary and secondary education. Therefore, young people in their early 20s are likely to choose to become herders when they have no other job opportunities.

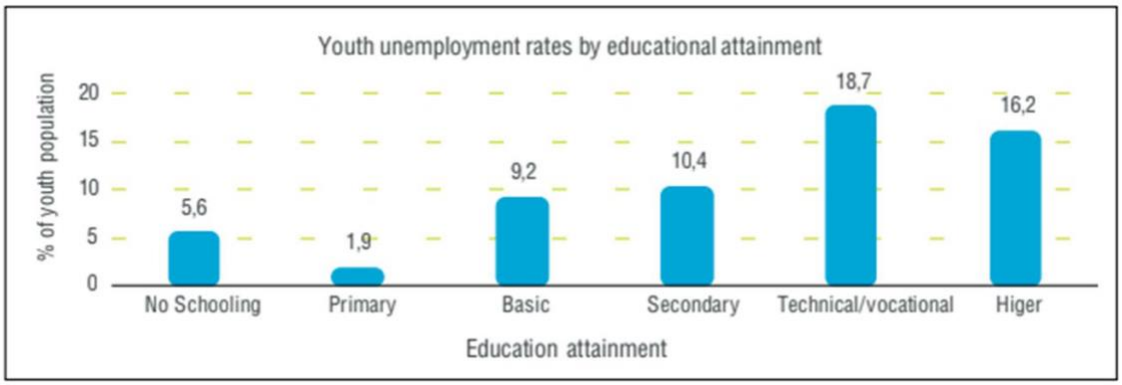


Figure 4: Youth unemployment rates by educational attainment, 15- to 24- Year-Olds, 2011
Source：TVET Policy Review Mongolia 2019 (UNESCO・Mongolia Ministry of Labour and Social Protection 2019: 46)

In addition, the government policy to develop the herding sector backed young, poor herders to give a grant. Under this policy, young herders under thirty-five years old who have less than 100 cattle (sheep, goats, and other animals) can receive a grant of approximately 2,830 USD. With this grant, they can buy a motorbike and other indispensable tools for herding business. Owing to the introduction of this policy, the registered number of young herders increased; however, most of them do not make their living with herding. They keep a small number of animals but rely on families and relatives to raise their cattle and do other side business. This reality must be clarified between government data and the number of young herding people in the research target area.

Positive factors and motives to succeed traditional nomadic herding

By analysing the qualitative data from semi-constructed interviews, many positive factors and strong motives were identified. All interviewees in the target area were born into nomadic families. They have a solid responsibility to succeed in the family business. They are willing to be a traditional nomadic herder. Those herders take pride in herding work and respect nature and animals. They admit to the severe conditions of nature and hard work as pastoralists. However, they accept all these hardships and succeed in their parents' family business without wondering about other future directions.

> "I graduated from a university in UB. I specialised in rare metal, so I might have been able to find a job in the mining sector. But I wanted to come back to my hometown."
> *(28-year-old male)*

> "Did not think about other jobs."
> *(30-year-old female, 34-year-old male and many others)*

> "I took after my parents' cattle."

(19-year-old male, 28-year-old male, and many others)
"I love nature and horses. Why should I choose a different job?"
(39-year-old male)

Conclusion

Despite the hardship, this study clarified the negative and positive factors of why people chose to be nomadic herders. First, the high unemployment rate impacts the negative choice of nomadic herders. Another accelerating factor is the government policy to support poor herders under thirty-five years old. Positive factors are the firm belief and respect for nature and animals. Young nomadic interviewees showed sound responsibility to succeed in their family business without considering other trajectories. This study also clarified the contradiction between government statistics and the actual number of young herders. Young herders exist in the research target area in statistical data, but the absolute herders decreased in the past decade.

In this research, the author conducted the interviews in a limited target area with ten young nomadic herder families, four vocational and technical education institutions, and two higher education institutions. This paper demonstrates only one case study; further research will complement the study results.

From the perspective of the high unemployment rate for highly educated youth, the country needs to expand the job market for skilled young generations. In considering the vital responsibility of young nomadic herders to inherit the tradition, policymakers should support protecting traditional nomadic herders. Finally, as for the inconsistency or the contradiction between the government statistics and the number of young herders, the government needs to revise the government grant funding policy, which will involve the young herders in the actual herding business.

Acknowledgements

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Savor a Kahoot!-Licious Classroom: Embodying Gamification in a Business School as a Recipe for Innovation Among the Digital Natives

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Official Conference Proceedings

Abstract
Innovative teaching intends to create a resonant enhancement of learner competency and competiveness. This research intends to find whether the spice of innovative teaching has gone far enough to be carefully chopped, marinated, and blended for the digital natives. One of the main contributing factors for the learning benefits of technology is gamification which is used to facilitate classroom management and collect immediate feedback from the teaching process. It turns the teaching and learning processes virtual because it is compatible with every digital device, so that the creation of Kahoot! came as a godsend to the classroom. Therefore, the purpose of this research was to reveal how the behavioral and attitudinal mindset among adult learners learning business English was affected because of the implementation of Kahoot!. This study was carried out in a business school during the pandemic. A total of two Business English Training courses were examined. These courses were taught by the same instructor using a uniform textbook. Kahoot! was incorporated into these courses at the end of a teaching session when a unit was finished. A questionnaire consisting of a total of 18 items, grouping under categories on learning environment, applications of Kahoot!, and anticipation of gamification, was distributed at the end of the semester. Descriptive statistics was conducted to summarize the learning experiences. Responses identified that Kahoot! has a positive impact and further assured the engaging attributes of gamification.

Keywords: Kahoot!, Gamification, Innovative Teaching, Digital Natives

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Introduction

To maximize learning effectiveness, innovative teaching spreads across a wide range of disciplines in higher education. Innovative teaching is hinged on different levels of implementation on teaching strategies or materials. Innovative teachers apply a wide range of strategies for student engagement and motivation (Busson & Cubukcu, 2021). In consequence, an increasing need for technology supports in business education could be fulfilled among the millennial generation.

Millennials are digital natives having plenty of interactions with technology. Technology has embedded virtually in every aspect of their lives so that its effect is unmeasurable. They generally pick up technology faster than that of digital immigrants. And for some reason, this generation inclines to receive quick rewards or fast accesses because of the prevalence of digital aids. Therefore, effective technology-related tools should be created to sharpen learners' skills (Gündüz & Akkoyunlu, 2020). Compatible and adaptable teaching strategies are to be identified to best fit students from Business Schools. Business English education, especially, should evolve along with the ever-changing trends.

The Application of Mobile Device

When paired with teaching and learning, technology has opened many windows for tracking and diagnosing learning progresses. It facilitates learning in a remote and feasible way. To call for this need, suitable measures should be adopted to respond to the new normal. One of the main contributing factors for the learning benefits of technology is smart phones. Smart phones are ubiquitous among college students. Having one or more of them has become so unremarkable when comparing to the past.

The advance of smart phone ushers and facilitates learning experiences in higher education mentality (Elkhamisy & Wassef, 2021; Owen & Licorish, 2020). Lahlafi and Rushton (2016) posited that using smart phones in class does motivate learning. In a sense, smart phones serve as a platform to provide ever-present learning opportunities (Gündüz & Akkoyunlu, 2020). The proliferation of smart phones improves learning experiences and makes teaching easier (Martínez-Jiménez, Pedrosa-Ortega, Licerán-Gutiérrez, Ruiz-Jiménez, & García-Martí, 2021). It is worth noting that the introduction of gamification results in upskilling. What sets apart smart phones from other learning platforms is that the using of it ensures learner engagement (Gündüz & Akkoyunlu, 2020), fosters intrinsic motivation (Iaremenko, 2017), and promotes retention (Elkhamisy & Wassef, 2021; Owen & Licorish, 2020).

This idea of gamifying learning is growing fast and attracts a group of faithful teacher fans because it is designed as a synchronous interactive learning device. The application of gamification generates more student engagement (Koppitschn & Meyer, 2021; Martín-Sómer, Moreira, & Casado, 2021; Owen & Licorish, 2020), comparing to the teacher-centered approach in traditional classrooms. This digital medium also encourages classroom dynamics (Elkhamisy & Wassef, 2021) that attentive learners are exposed. The reduced interaction could be compensated to some extent for experiencing sounds and graphics along the way (Owen & Licorish, 2020). Kauppinen and Choudhary (2021) pointed out that for those who actively participated in gamification have a higher tendency to succeed in the future.

Innovative educators apply game-based learning in business education (Busson & Cubukcu, 2021) to simplify the learning process. To gain the upper hand, gamification should also work

in tandem in language learning (Iaremenko, 2017). Kahoot! in particular, serves as an innovative teaching tool in business education (Martínez-Jiménez et al., 2021) which has been gaining market acceptance in the past few years. Teaching materials can be constantly reinforced and tailored via Kahoot! (Martínez-Jiménez et al., 2021).

Advantages of Kahoot!

It is grounded on the previous ideas that Kahoot! benefits learning (Elkhamisy & Wassef, 2021; Lee, Hao, Lee, Sim, & Huang, 2019). By playing games of knowledge, Kahoot! has made a profound impact on creating enjoyable learning environment (Gündüz & Akkoyunlu, 2020; Toma et al., 2021). To stay ahead of traditional teaching environment, it is also treated as one of the principal modes of teaching innovation (Ali, Askary, Mehdi, Khan, Kaukab, & Qamar, 2021). The application of Kahoot! is on the rise particularly for the sake of motivating and inspiring the learning process (Alawadhi & Abu-Ayyash, 2021).

A number of research has corroborated the finding that Kahoot! facilitates teaching (Alawadhi & Abu-Ayyash, 2021). As a game-based platform, Kahoot! creates a learner-centered environment in which learner engagement is enhanced and motivated (Camerona & Bizo, 2019). It also facilitates teacher-student interaction (Castro et al., 2019). Obviously, it has become a productivity tool in the classroom for the past few years. It could be used in every class (Gündüz & Akkoyunlu, 2020). It especially motivates learning when it is implemented in the beginning of a class (Gündüz & Akkoyunlu, 2020) or at the end of a learning session (Martín-Sómer et al., 2021; Owen & Licorish, 2020). It is better applied weekly or biweekly to maximize learner engagement (Kauppinen & Choudhary, 2021). Castro et al. (2019) adopted Kahoot! when their four-unit teaching cycle was finished. Even though Kahoot! was not practiced in every session, the researchers proved it eminent and influential. It is believed that Kahoot! is adopted in a satisfactory manner which celebrates learning expeditions (Kohnke & Moorhouse, 2021; Toma, Diaconu, & Popescu, 2021). This is an entertainment where knowledge building is the major reward.

The pinnacle of Kahoot! is that it makes learning interesting by turning it into a collaborative (Kohnke & Moorhouse, 2021; Mays et al., 2020) and interactive (Khalilian et al., 2021; Iaremenko, 2017) game show. Thanks to its interactivity, competiveness is developed (Kohnke & Moorhouse, 2021) because of its ranking board (Castro et al., 2019). One of its best dispositions to maximize the learning effect is its repetitive practices of the content (Akkus, Ozhan, & Cakir, 2021). It can be adapted to a wide range of subjects (Iaremenko, 2017) with images to choose from (Toma et al., 2021).

Apart from its benefits within teaching and learning, Kahoot! features several digital advantages which may bring possibilities to the fingertips. It is a free medium (Iaremenko, 2017; Kohnke & Moorhouse, 2021) in promoting digital literacy (Toma et al., 2021). It provides instant feedback (Martínez-Jiménez et al., 2021; Toma et al., 2021) and real-time self-assessment (Toma et al., 2021) that these perks may be difficult to filled by conventional ways of teaching. It is user-friendly (Kohnke & Moorhouse, 2021) because it offers opportunities for later reviews (Akkus et al. 2021; Owen & Licorish, 2020). In addition, a pause section is found after every question so that explanation could be made and mistakes addressed to facilitate learning (Martínez-Jiménez et al., 2021). It serves as an attention getter (Owen & Licorish, 2020) so that learners may understand to-be-taught content easily (Ali et al., 2021; Camerona & Bizo, 2019; Toma et al., 2021). The immersive angle of Kahoot!

refines cognitive skills (Elkhamisy & Wassef, 2021) and encourages critical thinking (Castro et al., 2019).

Kahoot! for Learning Diversity

Kahoot! caters to different age groups. According to Toma et al. (2021), using Kahoot! does not require any digital skills, especially during assessment periods; therefore, when it is adopted, it takes learners of all ages on an infinite journey of learning (Kohnke & Moorhouse, 2021). For example, the modality of it was proved to offer elementary schools pupils (Mays et al., 2020; Toma et al., 2021) and junior high school students (Lee et al., 2019) learning supports. It also unleashes the possibilities in college learners (Alawadhi & Abu-Ayyash, 2021; Camerona & Bizo, 2019; Castro et al., 2019; Elkhamisy & Wassef, 2021; Gündüz & Akkoyunlu, 2020; Iaremenko, 2017; Martín-Sómer et al, 2021; Owen & Licorish, 2020). To that end, the burden and stress of learning can be relived among learners from different ages.

The possibilities of learning are immense in a wide range of subjects. In the light of this, Kahoot! was practiced in learning business management (Martínez-Jiménez et al., 2021), database management systems (Akkus et al., 2021), marketing (Koppitschn & Meyer, 2021), entrepreneurship (Kauppinen & Choudhary, 2021), English (Iaremenko, 2017; Mays et al., 2020; Medina & Hurtado, 2017), management and administration of nursing (Castro et al., 2019), animal science (Camerona & Bizo, 2019), geography (Toma et al., 2021), earth science (Lee et al., 2019) and information science (Owen & Licorish, 2020).

Kahoot! starts to gain ground in language learning. It might not stop at a certain threshold to some degree; however, it is treated as a must in classrooms (Iaremenko, 2017; Medina & Hurtado, 2017). It facilitates instructors of language to create intriguing learning experiences (Kohnke & Moorhouse, 2021). A stupendous effectiveness has found in the learning of vocabulary (Iaremenko, 2017; Medina & Hurtado, 2017) and grammar (Iaremenko, 2017; Khalilian et al., 2021).

Using Kahoot! as assessments is a new wave to revolutionize the academics. It is easier to apply than pen-and-paper tests (Toma et al., 2021). Exam questions could be implemented in synchronous courses in which students are capitalized on informal assessment (Medina & Hurtado, 2017), formative assessment (Elkhamisy & Wassef, 2021; Martín-Sómer et al., 2021; Toma et al., 2021), summative assessment (Martínez-Jiménez et al., 2021), and standardized assessment (Toma et al., 2021). It also gains considerable advantages by leveraging the teaching-learning-assessment (Toma et al., 2021). It may be an alternative to Kahoot! as one of the assessment tools in different disciplines, because learners' mental ability is triggered (Ali et al., 2021) and learning feedback is received (Lee et al., 2019).

Kahoot!, a learning booster, promotes academic performances (Elkhamisy & Wassef, 2021; Kohnke & Moorhouse, 2021). In terms of the learning outcomes, grades are improved (Toma et al., 2021). When more questions are added to each playing session, a better learning results can be obtained (Akkus et al., 2021). Passing rates become higher when Kahoot! is implemented in a classroom (Martínez-Jiménez et al., 2021), which pinpoints a more sustainable acquisition of knowledge. Those who received higher scores in Kahoot! may achieve better academic performances (Martínez-Jiménez et al., 2021), even better future performances (Kauppinen & Choudhary, 2021). Martín-Sómer et al. (2021) further confirmed about the efficacy of Kahoot! indicating that when it is practiced regularly, learners' test

scores were highly related to their final exam scores. It is suggested that Kahoot! serves as an indicator of disclosing a higher or lower score in achievement tests.

Kahoot! and Learner Perception

With respect to the effectiveness of Kahoot!, it increases learning interests, enhances understanding of the learning materials; and ultimately, retains the knowledge (Elkhamisy & Wassef, 2021; Martín-Sómer et al., 2021). Being an alternative method of learning, Kahoo! has made the process interesting. Students value positively on the process of learning (Camerona & Bizo, 2019; Gündüz & Akkoyunlu, 2020; Iaremenko, 2017; Medina & Hurtado, 2017; Owen & Licorish, 2020).

Kahoot! users reported that they became attentive learners (Camerona & Bizo, 2019; Lee et al., 2019) because of its user-friendly and straightforward interface (Kohnke & Moorhouse, 2021; Medina & Hurtado, 2017). Students also revealed that Kahoot! encourages participation (Akkus et al. 2021; Iaremenko, 2017; Martínez-Jiménez et al., 2021) and alleviates anxiety (Lee et al., 2019) during the class. It is especially interesting that students are into the "three-person podium" ranking which further shapes their desire to outclass their peers (Toma et al., 2021). With a view to this, Kahoot! promptly paves the way for a competitive learning environment in promoting learning effectiveness (Toma et al., 2021). Furthermore, students acknowledged the implementation of Kahoot! because it helps to clarify misconceptions (Elkhamisy & Wassef, 2021) and facilitates concept-building (Martín-Sómer et al., 2021). They believed that it may be better if Kahoot! is used continuously (Elkhamisy & Wassef, 2021) or regularly (Martín-Sómer et al., 2021).

Side Effects of Kahoot!

It is suggested that the implementation of Kahoot! does not promise a higher grade in the summative assessment. Castro et al. (2019) incorporated 20 percent of final exam questions from previously-practiced Kahoot! questions. They discovered that the expected high achievers did not get correct answers, even in the easy questions. Academic performances are not significant (Alawadhi & Abu-Ayyash, 2021; Camerona & Bizo, 2019; Lee et al., 2019), so does the motivation level (Castro et al., 2019; Lee et al., 2019). For instance, learners do not think highly of the motivation drive of Kahoot! for reviewing contents and having debates (Castro et al., 2019).

Furthermore, playing Kahoot! is time-consuming and distracting (Owen & Licorish, 2020) because most time spent in the gamification results in "winning the game," instead of learning something (Koppitschn & Meyer, 2021). Playing it means "stealing class time" that may interrupt the overall instruction (Akkus et al. 2021). The competitive nature of it did not trigger further engagement for college learners. According to the survey of Owen and Licorish (2020), freshmen learners particularly pointed out that the playing time should not last for more than six minutes in a one-hour session. In a sense, class sessions should contribute more to lectures in lieu of playing games.

Even though learners became very competitive in playing the game, they may spend less time thinking about correct answers (Koppitschn & Meyer, 2021). Learners usually do not receive sufficient time thinking of correct answers (Elkhamisy & Wassef, 2021). Whether a full coverage of the learning materials could be covered became a huge concern, especially for the freshmen (Owen & Licorish, 2020). Kahoot! is treated as a supplementary tool to the

traditional learning (Castro et al., 2019; Owen & Licorish, 2020) and it may not replace lectures on PowerPoint slides (Owen & Licorish, 2020). It is helpful for theoretical courses (Akkus et al. 2021) and may not be feasible for other hands-on ones. On the contrary, Castro et al. (2019) proposed that when Kahoot! is practiced in theory-based courses, it arouse minimum student motivation. Therefore, the learning outcome is unsatisfactory (Koppitschn & Meyer, 2021).

In Lee et al.'s (2019) experiment, they intended to examine if Kahoot! benefits learning achievement. A pre- and post-test was implemented to see if there are any significant differences in leaner motivation. No significant difference was found on the learning performance on homework and exam before and after the application of Kahoot!. The interpretation of the findings, according to the authors, attributes to the learners' losing interest. The students were interested in completing exercises in Kahoot! in the beginning and they discovered a regular pattern of playing Kahoot! games as time goes by, so that the learning turned out to be relatively static.

Methodology

This study was carried out in a business school in Taiwan during the pandemic. A total of two Business English Training courses using a uniform textbook and taught by the same instructor were examined. There were 48 students including 28 females and 20 males. All of them had their own smart phones with wireless connection when in-class gamification activities were practiced.

Kahoot! was incorporated into these courses at the end of a teaching session when a unit was finished. By default, a total of 10 test items were found in each Kahoot! game. Half of them were multiple choice questions while the rest of them were either true or false or puzzle. The students were provided with 20 to 30 seconds to respond. The response time was decided according to the length and difficulty of the questions. A questionnaire concerning the efficacy of using Kahoot! was distributed when this course is finished.

Survey Design

To see the effectiveness of Kahoot!, the students were asked to fill out a questionnaire at the end of the semester. Questions on learning efficiency of Kahoot! were adapted from that of Martín-Sómer et al.'s (2021). This questionnaire consists of a total of 18 items. To be specific, a total of 2 items targeted on learners' perception on language usage from the learning environment category, 10 items on learners' perception (on a five-point Likert scale) after using Kahoot! under the Kahoot! application part, and 6 items on learners' preference of using Kahoot! in the anticipation of gamification section.

The research design adapted the frame work of Martín-Sómer et al.'s (2021). Their original design was: (1) Kahoot! was implemented at the end of a teaching session; (2) A control group was not found; (3) A total of ten Kahoot! question types, including multiple choice and true-false, were practiced; (4) Two surveys, containing six questions, were carried out. Changes were made for this research from Martín-Sómer et al.'s (2021) were: (1) Kahoot! question types expanded from two to three types, puzzle questions were added; (2) Survey questions expanded from six to 18; (3) Survey answers on students' learning perception about Kahoot! were expanded from four (strongly agree, agree, disagree, and strongly disagree) to five (strongly agree, agree, neutral, disagree, and strongly disagree), using a five-point Likert

scale; (4) Two surveys were downsized to one. In addition, two of the survey designs adapted from that of Martín-Sómer et al.'s (2021) remained the same in this research, they are: (1) Kahoot! was conducted when each teaching session is finished, and (2) There were no control group.

Data Collection

Data analysis was performed by SPSS 22.0. Descriptive statistics was conducted to summarize the learning experiences. Data collection was performed through a survey at the end of a semester.

Results

The results collected from the questionnaire are discussed as follows. Table 1. highlights learners' perception on language use. More than 85% (n=41) of the students think "fluency" is the most important element in using English. Others indicate that "appropriateness (8.3%)" and "accuracy (6.3%)" are the most crucial one in using the language. However, when asked about if Kahoot! will be helpful in supporting accuracy, fluency, or appropriateness of the language, a small fraction (n=4, 8.3%) of the answers agree on Kahoot!'s promoting "fluency." More than 70% of the students (n=34) indicate that Kahoot! provides more advantages on "accuracy" than "appropriateness" in using English.

Table 1. Language usage

Language Usage			
		n = 48	%
Which of the following elements is the most important one in using English?	Accuracy	3	6.3%
	Fluency	41	85.4%
	Appropriateness	4	8.3%
Which of the following advantages will Kahoot! provide in using English?	Accuracy	34	70.8%
	Fluency	4	8.3%
	Appropriateness	10	20.8%

Table 2. shows learners' perception, on a five-point Likert scale, after using Kahoot!. The mean score on "I feel engaged and develop a sense of participation from Kahoot!" is the highest (4.23), whereas "Kahoot! may be beneficial and helpful for my midterm or final exams" is the lowest (3.46). In general, features on Kahoot!'s "easy application (4.19)", "completion with peers (4.10)", "engagement (4.23)", and "learning from mistakes (4.04)" appear to have higher mean scores than "attention (3.52)", "more familiarity with content (3.75)", "frequency of application (3.73)", "application to other classes (3.77)", "learning motivation (3.88)', and "midterm/ final assistance (3.46)."

Table 2. Learners' perception after Kahoot!

No.	Statement	**Grading**					Mean (sd.)
		Strongly agree	Agree	Undecided	Disagree	Strongly disagree	
1	It's easy to apply from my mobile device.	22	20	2	1	3	4.19 (1.065)
2	I may compete with my peers.	19	21	5	0	3	4.10 (1.036)
3	I feel focused and attentive when answering questions from Kahoot!.	13	15	8	8	4	3.52 (1.288)
4	I feel engaged and develop a sense of participation from Kahoot!.	25	16	3	1	3	4.23 (1.096)
5	I am more familiar with the content after playing Kahoot!.	16	16	7	6	3	3.75 (1.229)
6	I can learn from my mistakes after playing Kahoot!.	20	19	3	3	3	4.04 (1.148)
7	I hope Kahoot! can be applied more often in this class.	15	16	10	3	4	3.73 (1.216)
8	I hope Kahoot! can be applied to other classes as well.	15	17	10	2	4	3.77 (1.189)
9	Kahoot! triggers my learning motivation.	18	15	10	1	4	3.88 (1.196)
10	Kahoot! may be beneficial and helpful for my midterm or final exams.	9	19	10	5	5	3.46 (1.220)

As shown in Table 3, 41 students (85.4%) reported that they like Kahoot! being implemented as part of the learning method. However, while two students (4.2%) disagree with such opinion and five students (10.4%) preferred to stay neutral.

When asked about the reason why students like the implementation of Kahoot!, the majority of the students (85%) consider "learning from playing" as one of the benefits of implementing Kahoot! to the class, whereas 72% think highly of Kahoot! because it "highlights learning weakness." Nearly half of the students favor the competitiveness in using Kahoot!. Only 21.3% of them appreciate the picture and sound effect of Kahoot!

When students were asked about the drawbacks of using Kahoot!, 70.8% mentioned about the insufficient answering time, 64.6% on not being able to change answers, 20.8% on rankings being shown, 16.7% on the stimulating picture and sound effect, and 6.3% on their preferences of using paper-based practices.

The students were also asked about their preferred question types. The data revealed that multiple choice (n=41, 85.4%) is the most preferable one, while puzzle (n=2, 4.2%) is the least. A small portion (n=5, 10.4%) reported their preference on true or false questions.

Moreover, students were asked about the frequency of applying Kahoot! in the classroom. More than half (n=26, 54.2%) consider having it when a unit is finished, some (n=17, 35.4%) on a weekly basis, others (n=3, 6.3%) reveal to practice it when two units are finished, and still others (n=2, 4.2%) claim that it should not be practiced at all.

The last question asked the students if Kahoot! trigger learning incentives in English learning. The majority of the students (n=36, 75%) think positively, three students (6.3%) oppose this view, and nine students (18.7%) stay neutral.

Table 3. Learners' preference

		n	%
Did you like Kahoot! when it was implemented as part of the learning method in the class for this semester?	Yes	41	85.4%
	No	2	4.2%
	Neutral	5	10.4%
Why did you like the implementation of Kahoot!? Explain your reasons.	Learning from playing	40	85.1%
	Highlighting learning weakness	34	72.3%
	Competing with peers	23	48.9%
	Stimulating sound/ picture effects	10	21.3%
	Others	0	0.0%
Why didn't you like the implementation of Kahoot!? explain your reasons.	Stimulating sound/ picture effects	8	16.7%
	Rankings are shown	10	20.8%
	Insufficient answering time	34	70.8%
	Not being able to change answers	31	64.6%
	Paper-based practices are better	3	6.3%
	Others	5	10.4%
Which kind of test question types do you prefer from Kahoot!?	True or false	5	10.4%
	Multiple choice	41	85.4%
	Puzzle	2	4.2%
How often should Kahoot! be applied in class?	Every week	17	35.4%
	When 1 unit is finished	26	54.2%
	When 2 units are finished	3	6.3%
	Never	2	4.2%
Will Kahoot! trigger your incentives in learning English?	Yes	36	75.0%
	No	3	6.3%
	Neutral	9	18.7%

Discussion

The findings of this research have provided insight into the application of Kahoot! among EFL graduate school learners in the learning of Business English. Gamification is engaging and practical for the digital natives that creating a Kahoo!-licious learning environment does trigger learning incentives. This study confirms positive results on learning efficacy from that of Martín-Sómer et al.'s (2021), implying that Kahoot! is significant for adult learners when it is practiced at the end of a learning session; yet, contradicted with their results on Kahoot!'s facilitating achievement tests. According to the survey of this research, students were asked whether or not Kahoot! may be beneficial

for their midterm or final exams. Most answers were not in favor of its capability of acing achievement tests.

Even though a large number of students found it easy to apply from their mobile device and receive instant feedback, many of them do not appreciate the time limit in answering Kahoot! questions. This finding is in line with Castro et al.'s (2019), pointing out the insufficient answering time. They set a 20-second time limit for each multiple choice questions; however, their participants mentioned that more time should be allowed in choosing the correct answers. According to the design of the questions from this research, students had 20 to 30 seconds to respond; however, these time limits may not be enough for them. This may relate to the distraction of the sound effects, anxiety of playing the game, internet connection, non-native-like reading speed, or difficulty of reading if seated at the back row of the classroom. This study has demonstrated a positive impact of Kahoot!, but future studies may further verify a desirable response time for its users.

Conclusion

Kahoot! has made learning in a streamlined manner. Although Kahoot! has gained momentum among college education, the investigation of into the Business English sector is sparse. This study provides an overarching framework which allows language instructors to maintain classroom dynamics in a graduate school setting. Digital aids may be seen as a prerequisite for learner participation, and as a part of learning process in graduate studies during the pandemic. They should be a tool to temper enthusiasm into language classrooms.

The pandemic has changed the scenario of Business English learning to a certain extent. Learning losses during the pandemic should not be accumulated or compounded, but could be mitigated or compensated with the help of digital devices. These devices render learning with more possibilities. Therefore, this research dedicates to acknowledge the critical role technology plays to the new normal shaping the business education in Taiwan. Gamification does trigger motivation and engagement among Business School learners.

Limitation

The results described are only valid in an EFL setting for some graduate students at a business school. This study was conducted on only two classes which made it difficult to estimate the validity of the data. The sample of this research was relatively insufficient to address an overall learning outcome. Since Kahoot! is not mandatory in every educational curriculum, whether or not it will build learners' anticipation may be vague. Further research may be conducted to explore how the behavioral and attitudinal mindset among graduate students learning business English is affected.

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The Impact of Singapore's SkillsFuture Credit on Training Participation

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Abstract
The proportion of short and non-standard contract jobs has risen over the years and workers are frequently moving in and out of work, facing a more fragmented career than before. These trends have raised concerns on the training participation of workers in these jobs as they are less likely to train than workers in permanent jobs. This is against a backdrop where many economies are undergoing structural changes with an increase in the share of high skilled jobs which requires workers reskill and upskill constantly. As such, there has been a renewed interest in the provision and use of Individual Learning Accounts (ILAs) among policymakers to raise training participation rates, given that ILAs provide workers with autonomy, allowing them to take ownership of their skills development. This paper investigates the impact of Singapore's SkillsFuture Credit (SFC), which is a form of ILA, on the training participation of workers with short or non-standard contracts, using a quantitative study which collects job related and training data in Singapore (n=4,333). Findings have shown a higher proportion of workers on contracts have utilised the SFC for work-related training compared to workers in permanent job, providing evidence that the SFC has indeed encouraged such workers to take up training. Further analysis is also being conducted to explore training and workers' career progression as well as participation in future training.

Keywords: Adult Training Participation, Contract Workers, Individual Learning Accounts, SkillsFuture Credit

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Introduction

There has been a significant increase in short and non-standard contract jobs and workers working as independent contractors, freelancers, and gig workers over the last decade. In May and November 2022, employers had posted 26% more contract openings than in the same period of the previous year (Rogers, 2022). In addition, it is estimated that 36% of US workers are part of the gig economy, a significant increase from 2005 where only 10% of the US workforce was part of the gig economy (TeamStage, 2023).

One of the main factors driving this trend is the rise of technology platforms that make it easier to match people with gigs and businesses with independent contractors (Gibbons, 2022).

Another driver leading to more contract and gig work is the desire for more flexibility and autonomy in work arrangements (Reisinger & Fetterer, 2021). Many employees are seeking to have more control over when they work, and to have the ability to work from anywhere in the world. With platforms like Uber, Lyft, TaskRabbit, and Upwork, people can find work on a flexible basis, without having to commit to a traditional 9-to-5 schedule.

At the same time, many companies are moving towards short-term contracts which allow these companies to reduce cost by avoiding the expenses associated with hiring full-time employees, such as salaries, benefits, and taxes (Hays, 2023). This is particularly attractive to companies that have fluctuating workloads or seasonal needs.

However, contract and gig work also have their downsides. Many workers with short or non-standard contracts lack benefits and protections that traditional employees enjoy, such as health insurance, paid time off, and retirement benefits (Towers-Clark, 2019). It is also known that contract and gig workers may face challenges in participating in training due to their temporary employment status. Employers may be unwilling to invest in training given that the worker is only expected to be with the company for a short period (Jonker & Grip, 1999). Such workers may not have access to the same training opportunities as permanent employees, and this is reflected in the findings shown in Table 3 in the “Results” section.

The lack of training and training opportunities are of concerns to many policymakers. This is because training participation is essential to employees as many economies are undergoing structural changes with an increase in the share of high skilled jobs. At such, workers need to learn new skills and knowledge that can allow them to remain relevant and to enhance their employability. This leads to a renewed interest in the individual learning accounts which can make the rights to training “transferable” from one job or employment status to another (OECD, 2019).

The SkillsFuture Credit (SFC) Scheme

Singapore launches the SkillsFuture movement in 2015, delivering a range of initiatives to develop the skills and mastery needed to adapt to a rapid changing global economy. Among all the SkillsFuture initiatives, the SFC, which is similar to an individual learning account, is the one scheme known by almost all Singaporeans. The aim of the SFC is for individual to take ownership of their skills development and lifelong learning (SkillsFuture Singapore, 2022). Under this initiative, an initial opening credit of SGD$500 was given to all Singaporeans aged 25 and above. Individuals are given the autonomy to decide how the

credits should be used and when to use it. The credits have no expiry and can be used together with existing Government course subsidies for a wide range of approved work skills-related courses, making the training even more affordable. A top-up of SGD$500 was given at the end of 2020 with an additional SGD$500 credit given to workers between the age of 40 to 60.

With the above as backdrop, this paper aims to investigate the impact of Singapore's SFC on the training participation of workers with short or non-standard contracts and more specifically answering the following research questions:

- Are short- term and non- standard contract, casual, and independent workers more likely to make use of SFC?
- Would the workers have taken up the training even without the SFC?
- How relevant are the training to the career development of the workers?

Methods and Data Source

The Skills and Learning Study: Background and Design

The data described in this paper is obtained from part of the Skills and Learning Study, a large-scale nationwide survey conducted by the Institute for Adult Learning, Singapore.

The Skills and Learning Study is in its third iteration of a nation-wide skills utilisation study that collects quantitative data on skills utilisation, job quality and lifelong learning in Singapore. The study aims to measure and track skills utilisation over time, as well as to analyse organisational factors that influence the demand for skills utilisation. As part of the study, other demographic, occupational and training information of the participants, used of the SFC were also collected.

The Skills and Learning Study has collected a representative sample of 5,996 Singapore residents, aged 20 to 70 years old, selected using simple random sampling from the national population. Data collection is conducted over a period of ten months, from Oct 2021 to August 2022 and attaining a response rate of over 60%. The respondents are put through a one-and-a-half-hour survey interview, conducted face-to-face by trained interviewers.

For this paper, only respondents aged 25 and above and in labour force would be used in the analysis.

Measurement and Scale

Different Types of Employment Contract

A series of questions were asked to identify whether the respondents were in the labour force and the type of employment contract at the point of the interview. Through the survey questions, working respondents indicated as either self- employed or an employee as well as their contract relationship with their employers. Table 1 below presents the different types of employment contracts.

Table 1: Different types of employment contract

No.	Types of employment contract	Definition
	Open-end & fixed term contracts	
1	Permanent employees	Employees with indefinite or permanent contracts
2	Longer term contracts	Contracts of length 2 years or longer
3	Short term contracts	Contracts of length less than 2 years
4	Casual work	Casual work with no contract or verbal contract
	Self- employed	
5	Own account workers	Freelancer on contract for service, gig workers etc.
6	Self- employed (with employees)	Employers with employee(s)

Used of the SkillsFuture Credit

The SFC top-up of $500 was on 31 December 2020 and since the survey started at the fourth quarter of 2021, we attempted to capture the use of the SFC by asking:

- Has any of your training or learning that happened in the last 12 months been funded or partially funded by SkillsFuture Credit? (Yes / No)

Deadweight Loss of Subsidies

The deadweight loss effect attempts to measure the cost of the training subsidies given that the training courses would have been participated by the employees even in the absence of the training subsidies.

- Would you have participated in the training even without the SkillsFuture Credit? (Yes / No)

Career Development

Finally, we investigate if the training taken using SFC was related to the workers career development.

- To what extent is the training subsidized by SkillsFuture Credit relevant to your career development? (Not at all / A great deal)

Results

Work- Related Training Participation

First, we look at the work- related training participation rate of workers by the different kind of employment contract. From Table 2 below, both permanent employees and workers on longer- term contracts have training participation rate of over 70% in the last 12 months at the point of their interview. Casual workers had the lowest training participation rate at 33.3% while those on short term contracts has a training participate rate of 63.4% which is higher than the participation rate of self-employed (47.7%) and own account workers (42.8%).

Employer Support

Next, we look at the level of support the workers received from their employers. Table 3 shows a higher proportion of permanent employees and workers with longer term contract reporting adequate support from their employers (over 70%) and we have also observed a higher proportion of such workers getting funded by their employers for training (over 60%). In contrast, only 64.8% of workers with short-term contract reported that they have received adequate support from their employers and less than 50% have been funded by their employers.

The above findings highlighted that casual workers and own account workers were less likely to participate in work- related training. For workers on short term contracts, they received significantly lesser employers' support and a smaller proportion participated in training that was funded by their employers. For workers on casual work, the proportion is lower with only 38.5% reporting that they received adequate support and 32% received funding for training.

Table 2: Work- related training participation by different kind of contract

Kind of employment contract	Participated in work- related training (%)
Permanent employees	70.8
Longer term contracts	72.4
Short term contracts	63.4
Casual work	33.3
Self- employed (with employees)	47.7
Own account workers	42.8

Table 3: Support from employers

Types of employment contract	Your employer provides adequate opportunities for you to pursue work related training? (%)	The training or learning that happened in the last 12 months been funded or partially funded by Employer? (%)
Permanent employees	76.7	63.1
Longer term contracts	77.6	61.0
Short term contracts	64.8	47.8
Casual work	38.5	32.0

Utilization of SkillsFuture Credit

Next, we employed a logistic regression model to examine the relationship between utilizing the SFC by the different kind of employment contract. The dependent variable is the used of SFC for training where "1" represents SFC has been used while "0" represents SFC has not been utilized. The explanatory variable is the different kind of employment contract, and the controls include establishment size, gender, age, and occupations.

It is noted that the pseudo R square is relatively small at 0.02, however, the main aim of this regression analysis is to explain the relationship between type of employment contracts and the outcome variable, which is the utilization of SFC and not to predict the outcome variable, therefore, the pseudo R square value is not crucial (Moksony, 1999).

The results from the logistic regression show that workers on short- term contracts are almost 2 times more likely to utilize the SFC than permanent workers while workers on longer term contract are 1.74 times more likely. However, we did not observe significant different in the used of SFC between permanent employees, casual workers, own account workers and the self- employed.

Table 4: Logistic regression model on utilization of SFC

	Odd ratio
Employment contract	
Reference: Permanent employees	
Short term contract	1.97***
Longer term contract	1.74***
Casual workers	0.82
Own account workers	1.00
Self- employed with employees	1.12
n= 4,333	
Pseudo R sq.= 0.02	
The analysis controls for age, gender occupation, firm size	
***p< 0.05	

Deadweight Loss

From table 5, we observed that more than 50% of the workers with short- term contract and casual workers would not have gone for the training if the training were not subsided by SFC. This has provided some evidence that individual learning accounts, like the SFC, have indeed, encourage contract workers to take up training. However, it is crucial that the training attended is relevant and can help the workers with their career.

Table 5: Deadweight loss of the SkillsFuture Credit

Types of employment contract	**Would have participated in the training even without the SkillsFuture Credit (%)**
Permanent employees	57.3
Longer term contracts	55.2
Short term contracts	45.6
Casual work	45.5
Self- employed (with employees)	72.4
Own account workers	52.5

Career Development Relevance

Table 6 below shows that less than 60% of the contract workers reported that the training subsidized by the SFC are relevant to their career development. In contrast, the proportion is higher for permanent employees at 70.8%. Similarly, for the self- employed and own account workers, the career development relevance of their training is high at 68.8% and 77.8% respectively.

Table 6: Career development relevance

Types of employment contract	**The training subsidized by SFC is relevant to my career development (%)**
Permanent employees	70.3
Longer term contracts	50.0
Short term contracts	57.5
Casual work	57.7
Self- employed (with employees)	68.8
Own account workers	77.8

Discussion and Conclusion

The findings have provided evidence that ILA like the SkillsFuture Credit is more likely to be made use by contract workers for participation in work-related training, compared to the permanent employees. In addition, the deadweight loss for the workers with short- term contract is relatively lower than the permanent employees. In other words, a higher proportion of workers with short- term contract, compared to permanent employees, would not have participated in training if the SFC was not available. However, it is observed that a higher proportion of contract workers, compared to permanent workers, reported little career development relevance for the training that they had attended using the SFC. This shows that other than the SFC, more support is necessary to ensure that workers truly benefited from the training. Some of the support may include:

Creating Awareness

It is important for workers to come to realization that they need to learn continuously to remain relevant and employable, they need to constantly upskill and reskill. It is also vital for workers to be updated of the evolving industry that they are in and to be able to seek out related training that would help them to upgrade and stay relevant.

Skills Assessments

It may be useful if skills assessments can be offered or accessible to contract workers to help them identify their strength and weaknesses, and to determine the types of training they need to improve their skills. Together with the skills assessment, professional guidance is necessary to advise the workers on career choices.

Training Programs Designed for Contract Workers

Other than the provision of financial support via SFC, offering training programs which can help contract workers develop the skills and knowledge they need to perform their jobs more effectively, and increase their changes of findings new work. These programs can be co-developed with employers to ensure industry relevance, and that contract workers have access to the skills and knowledge they need to perform in their jobs.

What is the Right Amount?

It may be worthwhile to investigate what is the right amount to be provided by the SFC. The initial $500 provided was sufficient for a worker to enroll in a course with no payment required or a reasonably low course fee. The main objective of lifelong learning is continuous learning and thus, how to we ensure that workers, if without the support of their employers, can still continuously participate in training with no concern over course fees.

In conclusion, the SFC provides the initial support for contract workers to participate in training, however, this needs to be accompanied by a range of support programs so that contract workers can maximize the benefits from the training and to develop the skills required to remain relevant and advance in the career. On the other hand, targeted help may be necessary for casual workers and own account workers to increase their training participation.

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Analyzing the Architectural Internship Program in India and Recommending Guidelines

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Abstract
An internship is a period of professional work experience that plays a significant role in the lives of architecture students. During that period, they would learn the work culture of an office and understand the work environment, enabling them to handle projects individually and understand the details for execution. Further, it would facilitate personal development. The internship program in India has yet to have a programmatic approach. The student's exposure will differ based on the firm they select. It is high time to note that the students should gain knowledge in all areas of the architectural field, both in terms of office and site environments. This study aims to discover areas in which students are currently exposed to work in an internship and propose certain guidelines to be followed. The survey questions were formed by areas, which are divided into six categories adopted from the literature study Practice Management, Project Management, Programming & Analysis, Project Planning & Design, Project Development & Documentation, Construction & Evaluation, with the percentage interval ranging from 0%, 10–30%, 31–50%, 51–70%, 71–90%, and 100%. Furthermore, a question set with a 5-point Likert scale was asked to know about their experience, and open-ended questions were asked to know about their expectations. A survey was conducted among the students who completed their internship; there were 249 respondents from different architectural colleges in India. The results show a lower score for exposure to practice management, project management, programming analysis, construction, and evaluation.

Keywords: Architectural Internship Program, Guidelines, Architectural Students, Work Environment, Internship Experience

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Introduction

Architectural internships are essential to students' journey with an architecture background. The internship program, regarded as an essential component of higher education, allows students to "complete" their education by bridging the knowledge gap between the classroom and the real world.(Katula & Threnhauser, 1999). Students are better prepared for their future professions after internships because they have a greater awareness of what is expected of them in the actual work world and are more confident in their professional abilities. (Gündeş, 2017; Jackson & Jackson, 2009). Internships, according to Taylor (1988), are "organized and career-relevant job experiences attained by students before they graduate from an academic degree" (p. 393).(Jawabri, 2017; P. Maertz Jr et al., 2014). Students have said that internships significantly contribute to their educational experience and that case studies, discussions, and simulated business scenarios have proven highly effective.(Jawabri, 2017). The working environment comprises various factors, including opportunities for learning, chances for professional advancement, assistance from coworkers and supervisors on-site, organizational satisfaction, and chances to build networks (D'Abate et al., 2009).

The use of internships has been seen favourably by institutions to create thorough curricula that include opportunities for the real-world application of knowledge. This draws in both students and future employers since well-run internships assist in developing valuable professional skills (Lam & Ching, 2007). So, the internship has been thoughtfully considered in framing the rules and regulations, monitoring students' progress, and ensuring they cover all areas of their professional background. The COA (Council of Architecture) frames and regulates India's internship rules and regulations. The rules are framed as follows: do an internship for six months, during which 90 working days must be spent in the firm. However, the detailed approach was formed only in 2021, and there is the question of following and carrying on as per the rules in all firms. Moreover, the rules must be framed in detail by considering the student's professional development. In the USA, the Intern Development Programme (IDP) formed by NCARB has properly structured rules and regulations with proper divisions in the type of work and an hourly approach that helps the interns learn about all types of work in the office and site environment.

The research aim is to analyse the following aspects:

1. To analyse the architectural internship programme in India and the student's experience during their internship period.
2. To find out any issues faced by the students during their internship period.
3. Creating the survey questions by incorporating the AXP (IDP) approach and finding out the current scenario of the student after their internship experience.
4. Collaborating the IDP guidelines with the Indian context and proposing guidelines for a successful internship program.

Theoretical Background

Intern Development Program

The National Council of Architectural Registration Boards created the IDP (Internship development program) in 1976 after collaborating with the American Institute of Architects. AXP is called the Architectural Experience Programme and was started by NCARB to understand the daily realities of architectural practise. An essential step on the road to becoming an architect is completing the Architectural Experience Programme. NCARB

(National Council of Architectural Registration Boards) is a non-profit organisation composed of architectural licencing boards of 55 states and territories that formulated the AXP, which has 96 tasks that are performed in six experience areas, which are practise management, project management, programming and analysis, project planning and design, project development and documentation, construction, and evaluation (NCARB, 2020).

Practice Management

Gaining knowledge of how to operate a business, including project management, project safety, client coordination, and maintaining solid relationships with the office and clients. Practise management is where you will learn the ins and outs of running an architecture practise, including managing a business, promoting your firm, getting projects, interacting with clients, and maintaining a productive and professional work environment.

Project Management

It aids in completing the project according to the specifications given in the contract and acquiring expertise in project coordination, execution, and other related tasks. One will learn to deliver projects that adhere to your contractual obligations in project management, preparing one to plan, organize, supervise, and carry out a project.

Programming & Analysis

It is the project's first stage, and experience may be earned by investigating site information, code requirements, and client needs to determine a project's feasibility. The initial stage of a project, sometimes referred to as pre-design, is called programming and analysis. One will be done in such a way that you need to investigate and assess the client's needs, building codes, zoning laws, and site information to provide suggestions regarding a project's feasibility.

Project Planning & Design

The schematic design stage covers knowledge of creative concept development layouts, conceptual model development, schematic presentation preparation, coordination with clients and consultants, and adherence to codes and laws. Schematic design is covered under the project planning and design section. One will learn to draw out the building design, analyse building rules and laws, coordinate schematics with consultants, and convey design thoughts to clients.

Project development & Documentation

When the schematic design has been approved, the next phase begins—acquiring knowledge of generating approval and construction documentation to work with the appropriate authorities to get approval. One will gain expertise with projects in project development and documentation by concentrating on construction documentation and working with regulatory bodies to obtain the required approvals for construction after the schematic design has been authorised.

Construction and evaluation

The project's final phase involves site visits and contractor and client meetings while working with building officials. In Construction and Evaluation, one will participate in the project's post-construction and construction administration phase, which involves visiting the job site, meeting with contractors, clients, and building officials, and creating punch lists that will eventually complete the project.

This research takes these six areas and surveys the architectural students once they complete their internship.



Figure 1: Areas suggested to be covered during the internship period.

Methodology

Participants

A total of 249 students, of which 145 are girls, and 104 are boys, are from different architectural colleges, which cover state government, private colleges, self-supporting colleges, and central government colleges in India. The students participated from all zones: North, East, West, South, North-east, and Central, and the participants ranged from 17.7%, 1.3%, 2.5%, 72.2%, 2.5%, and 5.1%, respectively. The participants' ages range from 21, 22, and 23 in the 9th and 10th semesters, or 24.4% and 75.6%, respectively.

Instrument and Methodology

The questionnaire was administered to conduct the survey among the students who completed the internship. The survey was conducted in a mixed mode, both online and offline. The aim of the survey question was explained to the students, and they were asked to fill out the form based on their experiences. Instructions are also given to keep their personal information private for accurate results. The batches differed according to the regulations of the colleges.

The colleges under government and government aid have the rule of an internship for six months in the ninth semester. The colleges that come under deemed and central government colleges have the regulation for six months in the 8th semester. The questionnaire were asked once they completed their internship period, the 10th semester for government and government-aid colleges and the 9th semester for deemed colleges and central government colleges.

The questionnaire was prepared based on the AXP Internship Experience Programme and previous publications and student reviews. The questionnaire was designed into three segments: the first segment was developed as a percentage interval method divided into six categories taken from the literature study: practise management, project management, programming and analysis, project planning and design, project development and documentation, construction and evaluation, with the interval ranges being 0%, 10-30%, 31-50%, 51-70%, 71-90%, 100%; the second segment is the five-point Likert scale questions focusing on the students' internship experience once they complete their internship. Moreover, the third segment focuses on open-ended questions to learn about their personal experience.

Finding / Results

Practice Management

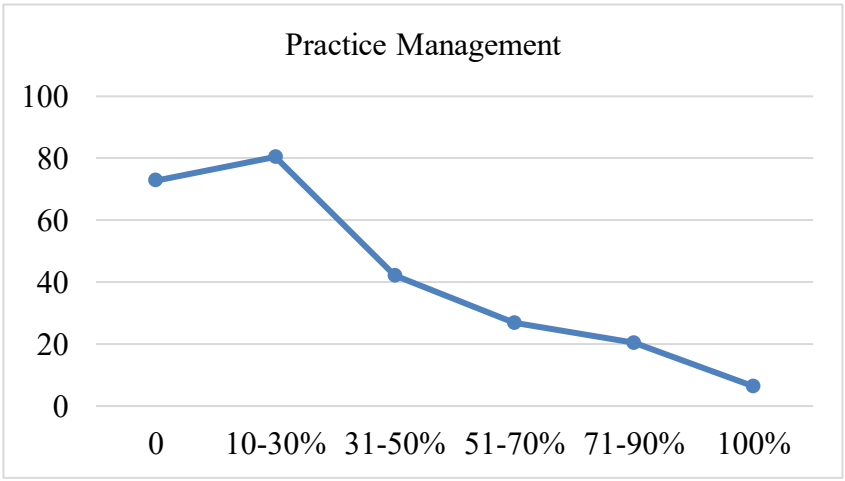


Figure 2. The graph shows the number of people and the percentage of work students covered in Practice Management.

Figure 2 shows that 73 students in 249 samples reported they were not exposed to Practice Management itself, which shows 29.3% of students were not aware of this work, which creates a lack of information about client interaction, ideas of securing projects, marketing the firms, managing the business, and sustaining the professional and positive work environment. They were followed by 80, 42, 27, 20, and 6 students in 10–30%, 31–50%, 51–70%, 71–100%, and 100%, respectively.

Project Management

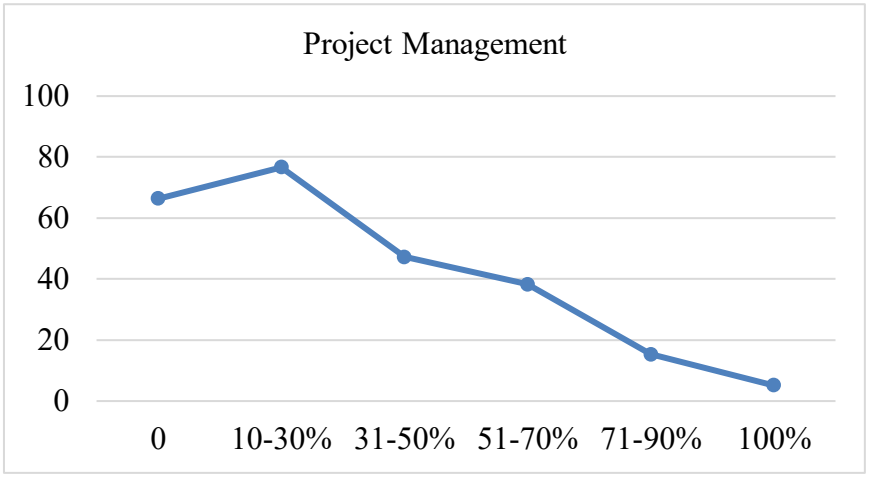


Figure 3. The graph shows the number of people and the percentage of work students covered into Project Management.

Figure 3 shows that the 66 students in 249 samples reported they were not exposed to Project Management itself, which shows 26.50% of students were not aware of this work, which creates a lack of information regarding the preparation of a budget, coordination with the client and team members, how to execute the project, project documentation, contracts, dealing with the roles and responsibilities of the team members, resolving the conflicts during the design and construction process, and other works related to project management. They were followed by 77, 47, 38, 15, and 5 students in 10–30%, 31–50%, 51–70%, 71–100%, and 100%, respectively.

Programming & Analysis

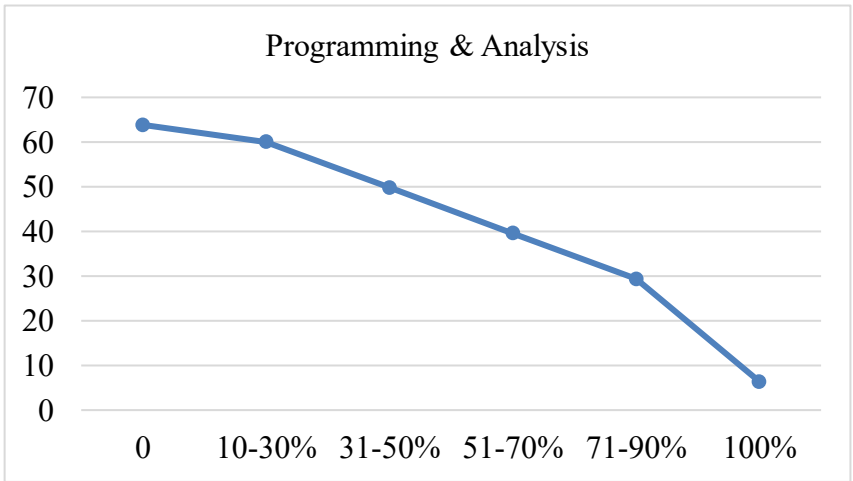


Figure 4. The graph shows the number of people and the percentage of work students covered in Programming & Analysis.

Figure 4 shows that the 64 students in 249 samples reported they were not exposed to Programming & Analysis itself, which shows 25.70% of students were not aware of this work, which creates a lack of information towards evaluating and researching the client's requirements, understanding about the building codes and zoning regulations, and developing site analysis diagrams in order to document the existing site condition, regulatory

requirements, reviewing the legal documents which related to the site, and analysing the constraints of the project in developing the conceptual budget and assessing the environmental impact to formulate the design decision. Other results are followed by 60, 50, 40, 29, and 6 students in 10–30%, 31–50%, 51–70%, 71–100%, and 100%, respectively.

Project Planning & Design

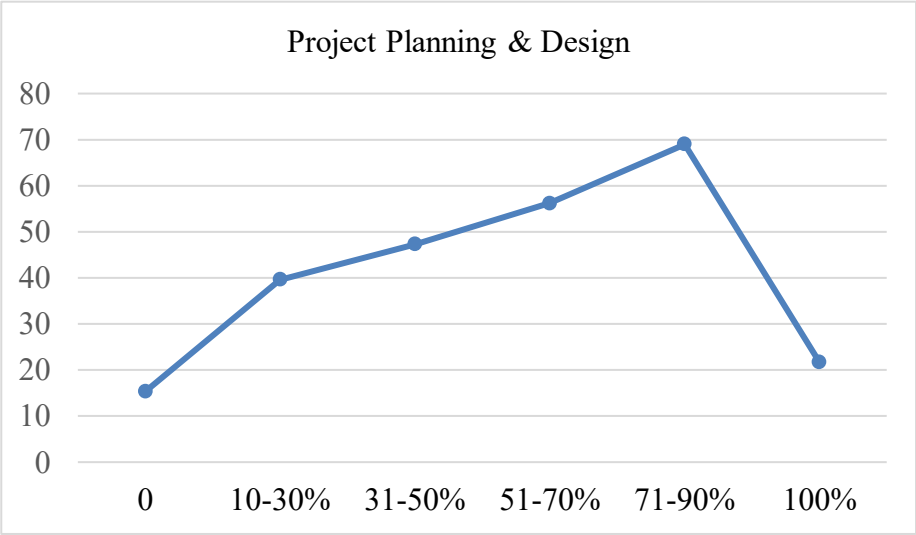


Figure 5. The graph shows the number of people and the percentage of work students covered in Project Planning & Design.

Figure 5 shows that 69 students did 71–90% of the Project Planning & Design work, indicating that 27.7% were working in this stage. This stage focuses on the layout of the building design, reviewing the building codes and regulations, preparing the design alternatives for the client's review, overseeing the design integration of building components and systems, preparing cost estimates for the work, designing the landscape elements for the site, and other works related to project planning and design. Other results are followed by 15, 40, 47, 56, and 22 students in 0%, 10%–30%, 31–50%, 51–70%, and 100%, respectively.

Project Development & Documentation

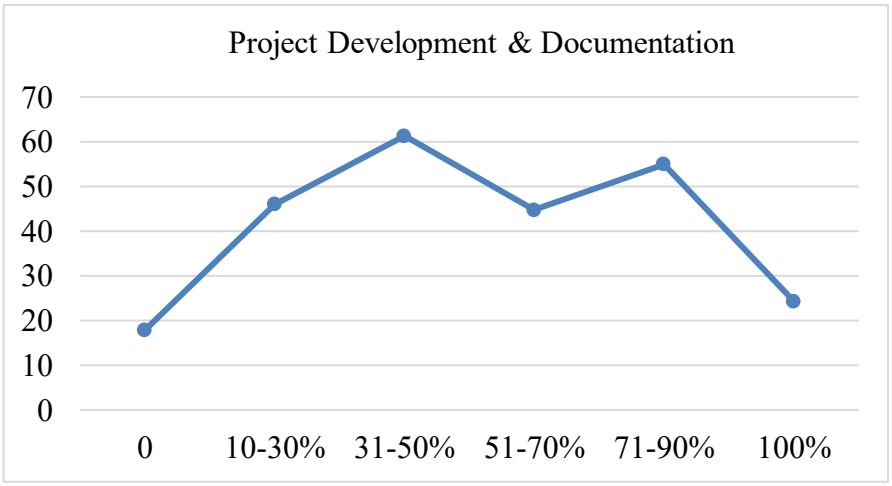


Figure 6. The graph shows the number of people and the percentage of work students covered in Project Development & Documentation.

Figure 6 shows that 61 students did 31–50% of the work in Project Development & Documentation, and 55 students did 71–90% of the work, which means that 24.5% and 22.08% were working at this stage. This stage focuses on the project after the schematic design has been approved. This stage focuses on creating the construction documents, preparing the drawings for regulatory approval, selecting the fixtures and furniture, another requirement that meets the client's requirement, preparing views (3-D drawings), preparing detailed drawings (2-D drawings), and updating the work estimate cost. Other results are followed by 18, 46, 45, and 24 students in 0%, 10%–30%, 51–70%, and 100%, respectively.

Construction & Evaluation

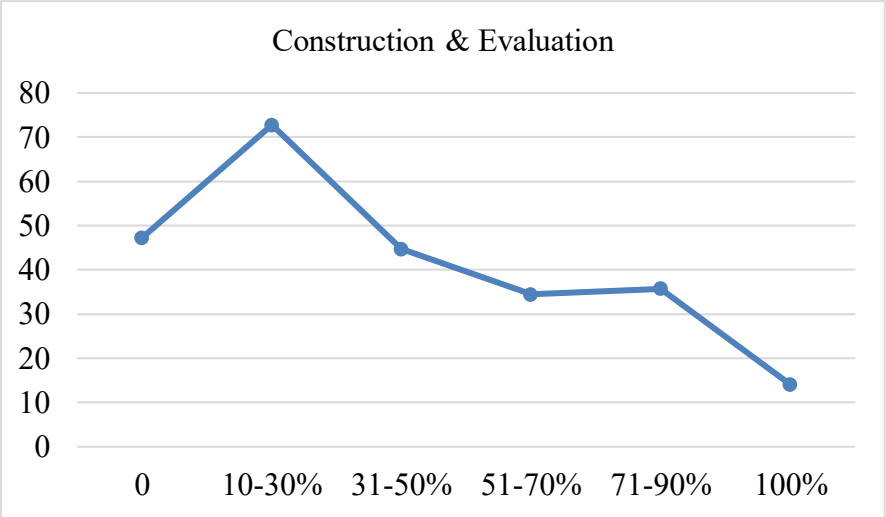


Figure 7. The graph shows the number of people and the percentage of work students covered in Construction & Evaluation.

Figure 7 shows that 73 students did 10–30% of the work in Construction & Evaluation, and 47 students never worked in this stage (0%). The results say that 29.31% of students worked in 10–30% of the construction and evaluation stage, and 18.87% never worked in this stage. This stage focuses on Post—the project's construction phases, which include site work, meetings with the contractors, clients, and building officials, reviewing the shop drawings and submittals during construction, and managing the project close-out procedures and documentation. Other results are followed by 45, 34, 36, and 14 students in 31–50%, 51–70%, 71–100%, and 100%, respectively.

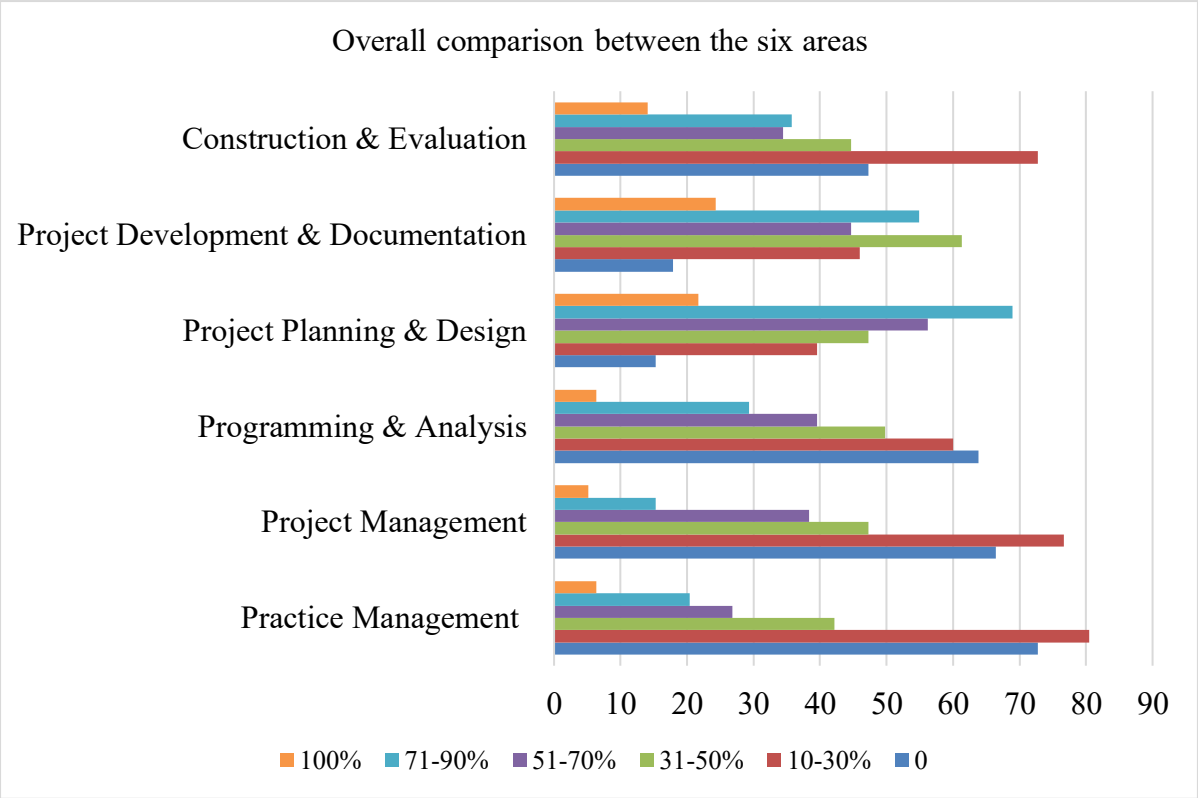


Figure 8. The bar chart shows the overall comparison between the six areas.

Figure 8 shows that the students spent the maximum time working on Project Development & Documentation and Project Planning & Design during their internship.

Typical tasks that students performed throughout their internships

Students were asked about the work that they were doing most often during the internship period in the divisions of model making, drafting, estimation, concept development, site visits, sheet presentation, and 3D works.

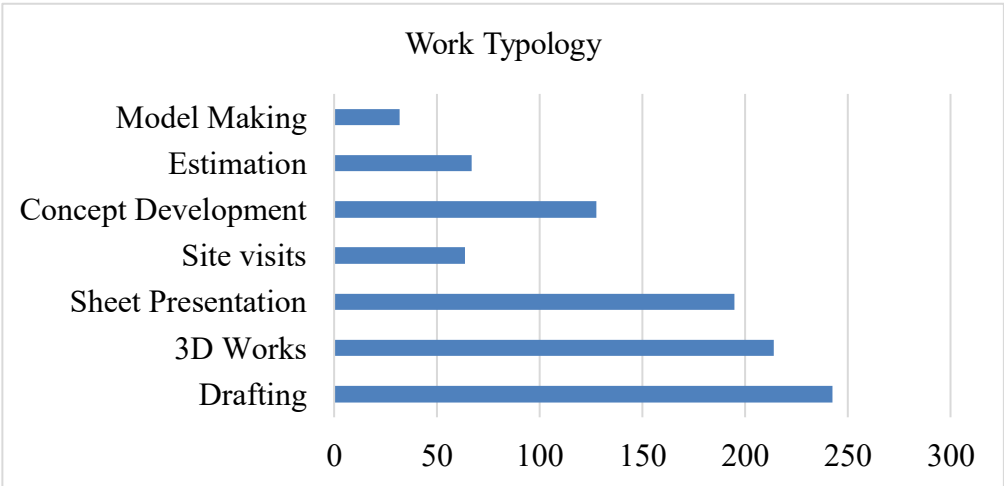


Figure 9. The bar chart shows the types of work exposed by the students in their internship period.

From the result, it is more evident that 97.59% of the students were exposed only to the drafting work, which is followed by 85.64% for 3D works, 78.31% for sheet presentation, 25.70% for site visits, 51.40% for concept development, 26.90% for estimation, and 12.85% for model making. These results show that more interns worked in drafting and 3D work.

Maximum amount of time spent in

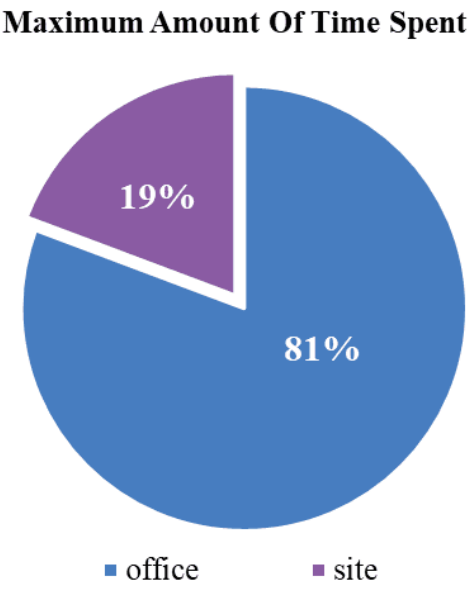


Figure 10. The Pie chart shows the comparison between office and site in terms of duration.

81% of the students said they had spent only the maximum time in the office. Moreover, only 19% of the students have proper site exposure. In the architecture intern journey, it must be taken into consideration that the practical experience needs to be focused on since this is the only place the students can learn practical knowledge before getting into the practise. One of the interns shares his experience, saying there were too few site visits.

> *"Since the major project in my office was a residential project, Hence, I got to learn planning, a small part of building services, e.g., plumbing and electrical drawing. However, I did not get much exposure to construction parts or site visits."*

This practise will help the intern understand the drawings on paper, but they must learn how they work out practically.

Table 1. General experience of internship from 249 students

Survey questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Throughout my architectural office internship, I was fully involved as the drafting person.	30	29	41	101	48
I was motivated to visit the site to understand the execution of work.	126	59	17	36	15
I was mainly assigned with the same type of works.	28	43	66	53	60
During my internship, I have acquired adequate knowledge in structural design.	28	53	74	60	34
I have been involved in the design development process during my internship program.	15	32	55	85	62
I was happy in doing work, beyond my regular working time in my internship office.	36	30	57	53	72
During my internship, I feel I am exploited beyond my structured office working hours.	51	34	49	45	70
Design development has improved after the internship.	15	11	70	70	83
I have been involved in the design development process during my internship program.	15	32	55	85	62
The nature of my work in the internship has improved my Decision-making skills	15	4	51	104	72
Practical knowledge of the design approach has improved after the internship program.	4	6	30	102	106
During my internship, I was motivated to coordinate work with other consultants.	26	45	70	57	51
I was treated as a supportive hand instead of a professional staff.	23	40	74	62	49

Table 1 shows 13 five-point Likert scale survey question, which shows the students' experience in the internship period on a scale of 1-5 from strongly disagree to Strongly agree. From the results, the everyday things that must be considered are the students' work typology, office timing, site visits, nature of work, and office environment.

Duration of the Architectural Internship period

According to survey data from students who have completed internships, they preferred one-year internship terms. They state that depending on the individual, it takes 2-3 months to become accustomed to office norms and tasks; once they begin working, they feel like their internship has ended.

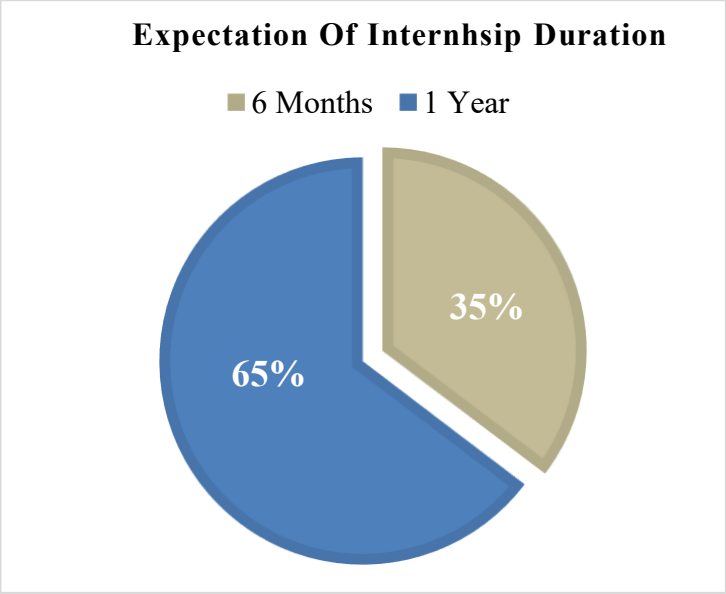


Figure 11. The Pie chart shows the expectation of internship duration by the students.

Discussion

Architectural internships are essential to students' journey with an architecture background. It bridges the gap between theoretical and professional knowledge, which must be structured so that the students get knowledge from all types of work in the office and on the job. It further helps them understand the work environment, work culture, how to deal with projects, clients, documents, approvals, and more. This is where they learn about the practical world and take their first step toward their entire professional life. It must be planned, organized, and monitored correctly to get the actual professionals in the field. The crucial part of India is that it is not as properly structured as in other countries. There is a 6-month internship rule that is followed throughout the state depending on the institution type and semester as 8 or 9th semester. But the outcome from these 6 months differs from person to person in the same class as per their firm selection, work type, and location. The knowledge gained from the internship has a lot of variances, even within the class, which can be high or low. The unstructured internship guidelines and regulations are the cause of this discrepancy. The COA, or Council of Architecture, is the board for architects. Which governs and regulates the architectural field. Before 2021, the rules were only about the total number of days to work. In 2021, they introduced the work that has to be done during an internship, but it is not followed and monitored properly. There must be detailed, structured rules and regulations that must be framed and monitored properly. From the open-ended questions, the students shared their experience and their issues. One intern has mentioned the stipend as,

> *"I think internships should at least have some sort of reward system, such as stipends or bonuses for individual project completion, as it will keep us going with determination."*

Some of the responses to the open-ended questions are given below.

> *"As an experience, I really learned a lot, and I was also given training in two new software programmes as well."*

"*I learned more about working drawings and 3D visualisation during my internship.*"
"Gained knowledge of structural details and estimation."

"Good but could have been better in terms of exposure to approaching project tenders and bidding processes for large-scale projects."

"Since the major project in my office was a residential project, Hence, I got the opportunity to learn planning and a small part of building services, e.g., plumbing and electrical drawing, etc. But I didn't get much exposure from construction parts or site visits."

"I have worked on manual sheets for conceptual sketches, and also, we interns made ammonia sheets in the machine by ourselves and coloured them."

The responses show that most of the students were happy about the work they have been doing in their internships and that they got good exposure to different areas. By analysing the open-ended questions, the five-point Likert scale, and the interval scale question, it is clear that all other responses are positive except for some factors like stipend, site visits, and duration of the internship. But while asking questions by covering all six areas related to their fields, the responses are very low, which shows that the students themselves are unaware of the areas they must cover during their internship and what all must be learned for the profession. Some recommendations are formed by considering the student's future endeavours by addressing these issues.

Recommendations for Guidelines

Duration of the Internship Period

The internship period must be one year; in the fourth year, after completing the internship, they must complete their fifth year. This one-year professional experience will make them understand the actual meaning of all the inputs they are making in the design. Since the students feel that the timeframe of 6 months is significantly less, two to three months are spent getting adapted in the office. When they start to learn, the intern period gets over, which shows that the aim of the internship is not fully satisfied. Therefore, revising the internship period from 6 months to one year is desirable.

Stipend

In the current practice, the stipend varies from firm to firm, and in some firms, the stipend is not paid. The rules must be implemented to get paid; the worksheet must be submitted at the end of each month. The worksheet should include the project name and the duration of the work done on each part of the project. This type of practice will ensure the student's work, the area they have covered, and the area that needs to be covered. Moreover, the working hours can be calculated by following this, and the stipend can be given accordingly. This practice will ensure the interns will get the stipend; this will make the motivation to do work and waste of time during an internship can be avoided, and the type of work they work can be monitored by themselves and by the mentor. Additionally, architectural firms can inform interns about the stipend and work culture on their website, which motivates them.

Area of Exposure

From the responses, the internship provides good exposure to the respected field. However, the lag is created when exposed to different types of work. Of the target group, 72% say they used to perform the same type of work. They are unaware of some work and how to handle or approach it. The areas that are divided by IDP must be implemented and should be monitored accordingly. The hours should be divided as per the recommendations and appropriately implemented.

Hours Division

The six areas were divided, and the work hours should be fixed. As per the division, total working hours can be 1440 in one year, of which practice management can be 40 hours, project management can be 138 hours, programming and analysis can be 100 hours, project planning and design can be 416 hours, project development and documentation can be 585 hours, and construction and evaluation can be 161 hours. By dividing these, all types of areas can be learned.

Table 2. Shows the area of work and hours to be covered in the internship period.

Area of work	Hours to be followed
Practice Management	40
Project Management	138
Programming & Analysis	100
Project Planning & Design	416
Project Development & Documentation	585
Construction & Evaluation	161
Total	1440 hours (Minimum)

Exposure towards site

The internship is planned so the students get exposure to the office and site environments to gain theoretical and practical knowledge. Only 4% of the students were satisfied with the site visits, which shows a significant drawback since the practical experience can be fulfilled only by direct site exposure.

Table 3. Requirements for the internship that must be adhered to.

Before internship	During internship	After internship
Before going to the internship, they must be introduced to all types of work, and the institution has to make sure that they have some general knowledge about the work and are instructed to engage in all types of work they are assigned.	During the internship, a monthly report must be sent to the respective coordinator, showing the type of work.	The portfolio must be submitted according to six area divisions made by the collaboration with IDP rules, along with proof of the work they have done during their internship.

Conclusion

The internship is the essential stage in the architectural student's journey, which must be appropriately structured. As per the implications of the areas from the background study of IDP, the students will understand all the areas and get exposed to different types of work. Rules must be followed strictly as per the recommendations. The monthly report must be submitted to the coordinator of the internship at the college and have to be submitted to the firm to get the stipend and to know which work the students get exposed to; by following this, no intern can waste time, and it will benefit the student and the firm. This stipend calculation method motivates the students to do their work; unknowingly, they will learn about all the areas. Site exposure is another central point that must be considered since the exposure to the site is significantly less, resulting in a lack of practical knowledge for the students even after the office exposure.

Limitations / Further research

The present study focuses on analysing the architectural internship and the issues faced by the students in their internship period, which can be added by focusing on the social and cultural background of the students and how it impacts the students learning part in the internship.

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Promoting Teamwork Skills Among Thai Pre-service Teachers Through Gamification on Cloud Technology

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Abstract
Given that gamification has been applied in the classroom to stimulate students' participation for successful learning, this study investigates the extent to which cloud-based gamification promotes undergraduate students' teamwork skills. Thirty-one first-year pre-service teachers majoring in physical education at Phranakhon Si Ayutthaya Rajabhat University in Thailand worked in groups of three or four to produce instructional media in physical education using cloud-based gamification and graphic design in a semester-long educational innovation course. At the end of the course, teacher-, peer-, and self-assessments of student teamwork skills were conducted using a holistic teamwork skills evaluation covering five evaluation categories, i.e. participation, task achievement, peer interaction, responsibility, and students' use of resources. In addition, teamwork skills were also assessed by the researcher through classroom observation. Results showed that the scores of the participants' teamwork skills were over 75%, showing a high level of student participation while completing the assigned tasks. Further results revealed that learning activities integrating gamification on cloud technology promote not only teamwork skills among students but also student-teacher interaction and student learning achievement. It can be concluded from the present study that gamification is a useful tool for teachers to design innovative learning activities that promote students' innovation, cooperation and problem-solving in the classroom.

Keywords: Teamwork Skills, Gamification, Cloud Technology

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Introduction

Guidelines for education in the 21st century, instructors need to adjust their learning approach which must make learners love lifelong learning. The goals for learning are to develop life skills, thinking skills and IT skills that learners have practiced or experimented on their own (Adkins, 2002). The findings of an appropriate and accepted teaching theory of the expected standard in Thai higher education are the concepts of constructivism or cooperative learning (Inthachot, Sopeerak, & Rapai, 2013). This teaching divides learners into small groups where learners work together, help each other and seek knowledge that is beneficial to themselves and the group, thereby fostering cohesion among members and fostering interaction between learners where the goal is the success of all members (Nuraini, Faaizah, & Naim, 2014).

Using of computers to support collaborative learning is the application of computer network technology to support group work, which helps organize learning environment outside the classroom for students with cloud computing (Siegle, 2010). Users of cloud computing can determine their needs for services over the internet and can access resources simultaneously and at any time (Vockley, 2007; Nevin, 2009; Buyya et al., 2009). Collaboration is an essential for the 21st century learner skills that encourages learners to have teamwork skills (Sullivan et al., 2015). Developing students' teamwork skills requires training everyone to work together towards the same goals and objectives, have a working system and having good interactions with each other according to the desired goals.

Gamification is a marketing tool widely used in every country by using game techniques and mechanics to create motivation and encourage interaction between organizers and participants (Inchamnan, 2018). Gamification has been used in education to help stimulate learning and engage learners in fun learning by using game mechanics as simple operators (Huang & Soman, 2013; Swacha, 2021). The basic principles of game mechanics design such as points, levels, rewards, leaderboards, competition are applied to learning by simulating a gaming environment.

In this study, the researcher focused on gamification learning with cloud tools to enhance teamwork skills of undergraduate teacher students in Innovation and Information Technology for Educational Communication. and learning. Learning management uses game mechanics as a learning environment in which students work together to create works according to specified problems. with cloud technology tools. works created as graphic media in the form of still images and animations that contain knowledge of physical education. The production of work is created as graphic media in the form of images and animations that contain knowledge of physical education. Then, the instructors observed individual students' participation behavior in group work and promoted a positive attitude towards learning that aimed to learn by thinking and doing in order to overcome obstacles and achieve goals including having a concrete work that can be used for real which will develop young learners in the new era continually and sustainably.

The objective of this study was to investigate the extent to which cloud-based gamification promotes undergraduate students' teamwork skills. It specifically answers the following:

1. What is the learning with gamification with cloud tools that foster teamwork skills in students?
2. What is the student's attitude towards gamification learning level?

Methodology

This research is experimental research using the one-group posttest-only design with details as follows.

1. Participants

The sample group used in this research was selected as undergraduate students who enrolled in the Innovation and Information Technology for Education Communication and Learning course in the first semester of the academic year 2022, Phranakhon Sri Ayutthaya Rajabhat University, Thailand, which has five majors/classrooms. After that, it was simply randomized using the classroom as the random unit, which received 31 students from the major of Physical Education, Faculty of Education, Phranakhon Sri Ayutthaya Rajabhat University, Thailand. This study has adjusted the assessment criteria to be a holistic rubric, 5 levels per item, worth 25 points.

2. Measuring Tool

This study used a teamwork skills assessment form based on the work of Saenoonsong (2018) who studied the effects of project-based learning on cloud computing to enhance collaboration skills for 30 undergraduate students in the course Innovation and Technology for Science Teachers. The collaborative skills assessment form used consisted of 5components, 15 questions, with a confidence value of .83, with a high level of confidence. The components are as follows: 1) The willingness and commitment to work, 2) The goals of the work, 3) The interaction within the group, 4) Responsibilities, and 5) Shared resources. This study has adjusted the assessment criteria into a 5-level holistic assessment, totaling 25 points.

3. Learning process

This study was conducted with physical education undergraduate teachers in the Innovation and Information Technology for Education Communication and Learning course in a normal classroom format by using gamification and cloud technology as follows:

3.1 Gamification Learning

Gamification learning is a teaching activity without playing a game. It is an application of techniques of playing games to motivate them to achieve objectives in learning activities (Kirillov et al., 2016). Gamification environment can enhance motivation, satisfaction, participation in activities, teaching efficiency and learning achievement. Game mechanics such as scores, levels, challenges, badges, virtual goods, leaderboards are related to human needs which can change human behavior work (Poonsawad et al., 2022). The main incentive strategy is to reward players for completing missions. Students are required to complete assignments by gathering information from previous experiences or new knowledge to solve problems creatively (Dreimane, 2019). This is a practice to understand problems and focus on solving problems, resulting in effective solutions. The gamification components used in this research are as follows:

1) Points It is the accumulation of points for trying to answer questions set by the teacher both individually and in groups, which students will receive different points.

2) Level It is the score range of students specified by the instructor. In this research, there are 6 levels, consisting of Bronze, Silver, Gold, Platinum, Diamond, and Conqueror, which are used to motivate students to answer questions to earn points and increase their level.
3) Badge It is a symbol of behavior and success that students can achieve according to the goals, including responsibility. Involvement, punctuality, cooperation with the team, honor and assistance.
4) Leaderboard It is a summarizes the order of points, levels, and badges earned through learning that encourage students to collect their own scores to be at the top of the board.
5) Mission It is an assignment that a teacher gives students to create a team or individual project.

3.2 Cloud Technology Tools

Nowadays, teachers need to integrate existing technologies to facilitate teachers and benefit students' learning by considering the appropriateness of application for maximum benefit. Cloud technology is not only a modern trend of effective use of information and communication technologies in professional activity, but also a proven tool for educational activities (Fedorenko, 2020). Cloud computing has great potential for application in education, research and application development, as well as distance learning (Elmurzaevich, 2022). This research is based on Cloud Technology Tools, which are Internet-based technology tools that serve users to share their resources and can be accessed whenever and wherever they want. There are many tools for cloud technology but for this research we have used Gamiplus tool which is an add-on application from google classroom that has structured gamification environment. Teachers can create their own gamification environment and easily use the information available in google classroom. The researchers also recommended other cloud technology tools for students to use to create their team's work: CANVA website for creating graphics, Powtoon website for creating media presentations with animated cartoons, Google Sites for creating web pages like easy Google Workspace for Education; Classroom, Drive, Gmail, Calendar, Docs, Sheet, Slides and Meet, and YouTube video presentations.

Data Collection and Analysis

In the study of 8 periods, students were assigned to form groups to create works in the form of teaching materials. cartoons, animations, websites, and information presentation media in the amount of 4 works using cloud technology tools to apply and create works according to the specified problems. Then, the instructor observed the participation behavior in the group work of the students individually. In addition, students were asked to assess themselves and their groupmates.

Results

The result divided into 2 parts as: 1) Teamwork Skills, and 2) Satisfaction of Students.

Table 1: Scores of the students' teamwork skills

	n	Scores	$\bar{x}$	S.D.	% of Mean	t	Sig(1-tailed)
Teamwork Skills	31	25	20.95	1.13	83.78	10.82*	0.0000

*t(.05, df 30) = 1.68

Table 1, comparing the teamwork skills of the students with the criteria of 75%, the results showed that the students had an average score of 20.95 out of 25, representing 83.78 percent. In addition, the comparison between the criteria and the mean scores of the students was presented, showing that the teamwork skill score of the students was significantly higher than the criteria at the .05 level. This finding implied that the Gamification on Cloud Technology provided a positive influence over successful in teamwork skills of students.

Table 2: The Satisfaction of Students

Factors	$\bar{x}$	S.D.	Level of meanings
1. The personality and dress of the instructor	4.64	0.56	High
2. Punctuality	4.51	0.60	Highest
3. Teaching preparation	4.57	0.59	Highest
4. Willingness and enthusiasm to teach	4.55	0.61	Highest
5. Intention and enthusiasm for teaching	4.56	0.62	Highest
6. Provide a variety of teaching and learning	4.47	0.68	High
7. Moral, ethical and social responsibility insertion	4.45	0.76	High
8. Encourage learners to think reasoned analysis	4.49	0.69	High
9. Provide information, advice, research sources for additional knowledge	4.52	0.63	Highest
10. Contents and activities are in line with the interests and aptitudes of the learners	4.52	0.67	Highest
11. Use teaching materials that promote appropriate learning	4.52	0.62	Highest
12. Multi-evaluation, learners know how to assess and participate in determining the percentage of points	4.48	0.65	High
13. The atmosphere in the classroom is warm, emphasizing cooperation and the learners are happy in learning	4.52	0.63	Highest
Overall	**4.52**	**0.64**	**Highest**

According to the table 2, the satisfaction of learners after learning with the Gamification on Cloud Technology found that the learners satisfied with the designed instruction at the highest level ($\bar{x}$ = 4.56, S.D. = 0.64), the most satisfied topic was "Provide a variety of teaching and learning" which was 4.57 of mean and 0.68 of standard deviation.

Conclusion

The results can be concluded that the use of gamification on cloud technology has a positive influence on student success because gamification motivates students to work together and solve problems by proposing different problem-solving ideas within the group. After that, the

assigned student work is reviewed at the place of work (Musa et al., 2012). Students who learn using gamification and cloud technology have good learning outcomes (Ardhyani & Khoiri, 2017). In addition, appropriate use of modern technology facilitates students to better access information. The use of cloud technology in education allows educational institutions the opportunity to use computer resources and application software services over the internet, which it can enable a more intensive and better process of development and practice whereby students and teachers can quickly and economically access various platforms, applications and resources through their preferred websites (Emelyanov & Klygin, 2016; Ercan, 2010). It can reduce the cost of the organization but increase productivity by providing teachers and students with a good learning environment. Thus, these findings suggest that practice-based student learning using gamification techniques in a cloud computing learning environment affects collaboration skills as a skill development learning is consistent with education in the 21st century.

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Undergraduate Research and Grant Applications: Access and Barriers at a Transnational University

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Abstract
Undergraduate research is an important opportunity that students should take advantage of. The benefits of undergraduate research have been proven many times, showing benefits to both the students and faculty who participate. Research grants have been an important part of increasing participation in research by overcoming the cost barrier, however, other barriers still exist. In this study we examined obstacles preventing students from taking part in undergraduate research at a transnational university. An online survey was sent to undergraduate students at the University of Utah Asia Campus (UAC) to assess their awareness of and interest in undergraduate research. The anonymous survey was advertised to all undergraduate students at the beginning of the semester and 8% of the population responded. The data collected was analyzed by looking for key themes and organizing responses into categories. The results of the survey showed a large increase in willingness to consider research projects at the end of the survey compared to the beginning. Six perceived barriers were also identified by the participants: lack of ability, lack of knowledge, time, money, lack of interest, and difficulty. Lack of time and ability were the most common response to why participants did not participate in research. Presenting information about how to plan and complete research projects along with information about research and grant opportunities could improve undergraduate participation. UAC departments should also consider revising curriculum to integrate research discussions and projects.

Keywords: Undergraduate Research, Access, Barriers, Transnational Universities

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Introduction

The benefits of undergraduate research have been thoroughly researched, but many barriers still exist. Multiple studies have shown that students' knowledge, skills, and understanding increase when they are involved in research (Awong-Taylor et al., 2016; Kolokithas & Calderón, 2018; Peachey & Baller, 2014; Wayment & Dickson, 2008). They also learn how to collect and analyze data, as well as better understand source material. Thorough research is required in any research project. With the student being more personally involved they are more inclined to look deeply at the issue and seek out the knowledge they need (Peachey & Baller, 2014; Wayment & Dickson, 2008). They also develop a stronger sense of independence, involvement, and persistence (Awong-Taylor et al., 2016; Kolokithas & Calderón, 2018; Rosas Alquicira et al., 2022). The individual growth and learning process benefits the students while in their undergraduate programs and after they graduate. Student engagement increases with participation in research and once they graduate, their experiences improve their opportunities both in applying to graduate schools as well as in their careers (Awong-Taylor et al., 2016; Brew & Mantai, 2017; Wayment & Dickson, 2008). However, even with all these benefits, not all students have equal access to, or participation in, undergraduate research opportunities. This study investigates undergraduate students' understanding of, and perceived barriers to, undergraduate research at the University of Utah Asia Campus, a transnational university.

Historically, undergraduate research has only been available to select students mainly in Science, Engineering, Technology, and Math (STEM) majors (Brew & Mantai, 2017; Peachey & Baller, 2014). Many types of studies and programs have been implemented to try and resolve this issue. One such study focused on psychology programs and determined five barriers to students becoming involved in undergraduate research, such as lack of knowledge, lack of publicity, and unequal access. By targeting these barriers, they were able to see almost triple the amount of student involvement in two years, and 94% faculty involvement (Wayment & Dickson, 2008). Another study surveyed academics at an Australian university to determine what they perceived as barriers (Brew & Mantai, 2017). They found that structural barriers, differing attitudes, and resources were all impeding access. While some barriers remain the same between universities, unique universities need to conduct research to determine the specific struggles their students and faculty face. For the purpose of this study unique will be defined as a university or college that has a non-traditional population in terms of race, age, socioeconomic status, cultural background, or primary language spoken. Under this definition the University of Utah Asia Campus (UAC) is a unique university and needs research in order to tailor programs to its unique student population.

Research has been done at UAC before. Jordan (2022) looked at the specific situation of UAC and how the unique mix of cultures and backgrounds affects both learning and teaching at a transnational university. For the purposes of this study transnational university will be using the same definition as Jordan (2022), describing a university that combines multiple cultural identities into a new "transnational" environment that often differs from the surrounding area. The initial struggles of starting courses and departments in UAC's early years are described, as well as changes that were noticed throughout the early years. Comparisons between the more typical main campus located in Salt Lake City and the unique campus in Incheon, South Korea were analyzed, and specific needs were identified that differed between the campuses. The unique population at the Asia campus faced different barriers and required different assistance than the population at the main campus. However, the different understanding and potential barriers to undergraduate research were not

considered in Jordan's research. Therefore, this survey sent to a sample of undergraduate UAC students will fill an important gap in the current literature and increase our understanding of the challenges facing students at transnational universities.

Methods

An online questionnaire was developed using Qualtrics to assess an undergraduate's understanding of undergraduate research opportunities and the perceived barriers to participating in undergraduate research. The survey consisted of 17 questions which were accessed remotely through a QR code. Students could receive different questions depending on previous answers. The survey was made up of four sections: demographics, interest in research, personal eligibility, and opportunity awareness. A consent cover letter was shown as the first page of the survey. Participants could end the survey at any time and were not required to answer any questions. The survey was advertised to all undergraduate students at UAC through professor participation, school sponsored events, and flyers placed in the hallways. The QR code on the poster linked to the online survey. It was open for four weeks and participants could respond at any time and in any location with internet access.

Qualitative data was exported from Qualtrics and analyzed after the survey had closed. Eleven questions were multiple choice and six were free response. Answers to the free response questions were categorized by matching similar and duplicate answers. For questions asking about nationality and undergraduate major answers were only grouped together if they indicated the same country or major. For questions asking about perceived barriers the answers were grouped into seven categories. Answers to the question "Why did you not apply for a grant?" were grouped into eight categories. The questions about perception of eligibility and difficulty aspects of the grant application process did not receive sufficient answers to be included in the analysis.

Results

UAC had 530 undergraduate students enrolled for the Spring 2023 semester, of which 45 participated in the study (8%). The participants were mostly South Korean nationals (81%) between the ages of 18-25. Over half the participants were female (60%) and over half were in their first year of school (63%). Eight of the nine undergraduate majors at UAC and four countries were represented. These demographics are similar to the overall demographics at UAC. Roughly 80% of UAC undergraduates are ethnically Korean with Korean passports. The remaining 20% of UAC undergraduates are considered international students with the majority of these students holding US passports. Approximately 85% of incoming students are aged 18-21.

		#	%
Age	<18	0	0
	18-19	15	38
	19-20	14	35
	21-22	9	23
	23-24	1	3
	24-25	1	3
	25+	0	0
Gender	Male	13	33
	Female	24	60
	Non-Binary/3rd	3	8
Nationality	South Korea	30	81
	USA	5	14
	Canada	1	3
	Venezuela	1	3
Year in School	Freshman	25	63
	Sophomore	10	25
	Junior	3	8
	Senior	2	5

Table 1: Demographic information of all participants in the study.

The survey included two questions about intention to participate in. One was placed at the beginning of the survey and addressed previous consideration of participating in a research project. Participant responses to this question showed that 58% had previously considered completing a research project. At the end of the survey participants were asked about their intention to participate in research in the future. For this question 96% responded that they would consider doing research in the future. Responses of "Yes" and "Maybe" were counted as being willing to consider participating in research.

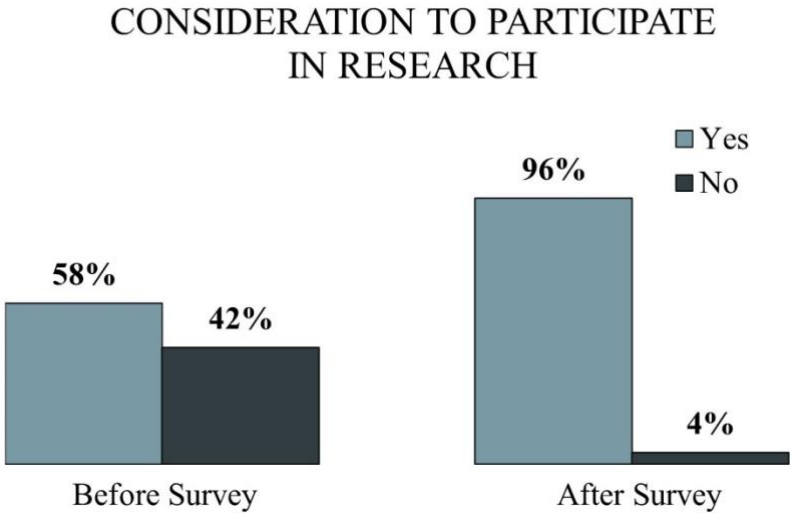


Figure 1: The difference between participants' willingness to consider participating in research at the beginning of the survey and at the end.

Six common barriers were identified by the participants; time (26%), lack of ability (22%), lack of knowledge (13%), money (9%), difficulty (4%), and lack of interest (4%). Of these, time and lack of ability were the most commonly cited reasons for not completing a research project with a difference of only 4% between the two categories. Five responses were put in the category 'Other' as they did not have a commonality with the rest of the responses. The Other category included responses such as a language barrier, too focused on academics, and issues working with others.

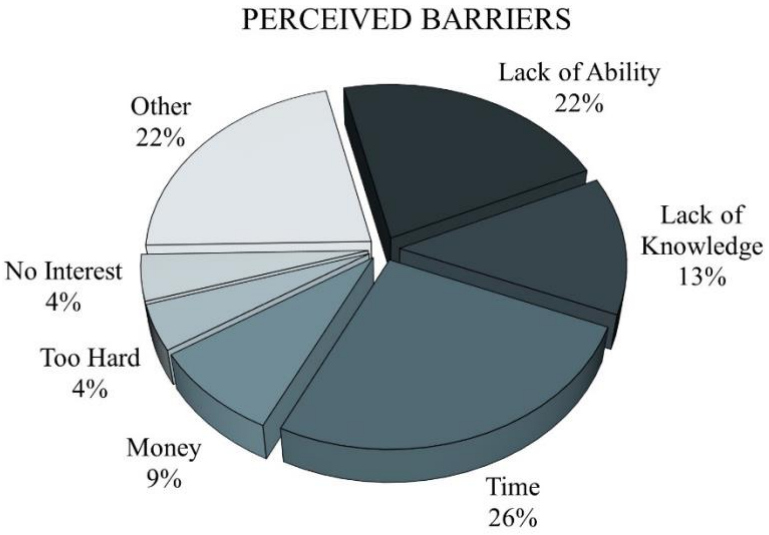


Figure 2: Breakdown of the responses identifying perceived barriers in each category.

UAC has an office for undergraduate research grants called UROG. When asked about grants and grant opportunities 45% of participants responded that they had heard of UROG. Eleven (11%) selected maybe, with 45% saying that had not heard of UROG. A few more participants were aware that UAC offers undergraduate research grants with 53% saying yes. However, 24% of participants selected that they did not think they are eligible to apply for research grants. Only three participants had ever applied for a research grant at UAC, with two receiving the grant. Answers to the question "Why did you not apply for a grant?" were grouped into five categories; lack of knowledge (25%), unprepared (35%), lack of interest (15%), missed the deadline (10%), and other (15%). The most common reason, with 35% of participant responses falling this category, was that the participant felt unprepared to apply.

Discussion

The results of this study show that simply being introduced to the idea of undergraduate research can improve the desire to participate in research. At the beginning of the survey only 58% of students selected that they had ever considered participating in a research project. Most of these students who had not considered research were freshman (81%). This accounts for approximately half (52%) of the total freshman participants and suggests that freshman were the most likely to have not considered a research project. However, at the end of the survey 96% of participants responded that they would consider doing a research project in the future. This suggests that discussing research even generally with students can inspire consideration of participating in research. Therefore, research discussions should be implemented at the very beginning of the college experience.

Increasing consideration of new students is important as the low desire of freshmen to participate in research could be detrimental to the students. Research projects require time and effort to plan and execute. If undergraduate students are not thinking about research from the beginning, they may not be able to complete a research project, denying them the opportunity to develop skills and build their resumes. Undergraduate research has been shown to help students develop better technical and personal skills, analytical, logical, and independent learning skills, and increase persistence and problem-solving skills (Kolokithas & Calderón, 2018; Wayment & Dickson, 2008). Research also builds a student's professional qualifications and increases student retention and engagement (Brew & Mantai, 2017; Peachey & Baller, 2014).

A correlation between awareness of university specific opportunities and willingness to consider participating in research was also shown. Among the participants who selected they had considered a research project at the beginning of the survey 68% responded that they had heard of the undergraduate research opportunity grant (UROG) program. Seven participants (32%) who had previously considered a research project had not heard of UROG. This indicates that unless undergraduate students being made aware of opportunities for undergraduate research and the benefits to them, can increase their likelihood to participate in research. Conversely, undergraduate students who are not introduced to research opportunities and their benefits may not have the desire to do research thus creating a barrier. However, more research with a larger sample size is needed to solidify the significance of these findings. Specifically, future research needs to explore a large sample size in transnational universities.

In the meantime, undergraduate institutions can begin to use these findings for implementations. Electronic communication, social media, presence at events, and information sessions are all ways that a university can promote research. Department involvement can augment these efforts by sharing the information to students in classes and other required meetings. This will reach students that do not have time or desire to attend extracurricular events.

Many studies have been done on the effectiveness of integrating research into existing curriculum and adding additional courses and workshops (Awong-Taylor et al., 2016; Kolokithas & Calderón, 2018; Peachey & Baller, 2014; Wayment & Dickson, 2008). These studies found that integration of undergraduate research into existing curriculum increases student involvement, reduces structural barriers, and increases students' confidence in their ability to do research. These benefits relate to the perceived barriers of time and lack of ability. Increased involvement and increased confidence can help overcome these barriers. However, these studies were done at traditional universities and focused on STEM fields. To account for the differences that can be found at a transnational university as well as include non-STEM fields, the incorporation of courses, presentations, and workshops may need to be adjusted.

Lack of awareness, time, money, and lack of ability were identified as perceived or actual barriers to undergraduate research in previous studies (Brew & Mantai, 2017; Wayment & Dickson, 2008). However, the high percentage of students who identified time as a perceived barrier is less commonly found in the previous studies. For example, this study found that time was the number one barrier, whereas Brew & Mantai (2017) found it to be third on the list. In their study it was also linked together with the financial barrier and was not assessed separately. It is unclear as to why time is considered a more significant barrier in this study.

Further investigation should be done to identify whether the time correlates with transnational universities, small universities, or other possible variables.

Other barriers that have been found in previous studies such as unequal access, uneven incentives, and lack of resources were not identified in this study. This could have been due to the small sample size or the nature of a transnational university and the difference in challenges and needs compared to more traditional universities. More research is needed to discover why certain barriers were so commonly cited in this study and other barriers were not identified.

Almost half (48%) of responses addressing perceived barriers fell into the categories of time and lack of ability with 26% and 22% respectively. The students expressed that they did not feel confident in their ability to manage their time or successfully complete a research project. Whether the students actually lack the skills or only lack confidence needs more investigation. However, this concern for time management and skills can be addressed at the curricular level by offering and/or requiring course(s) where the learning objective is to conduct research, such as a Research Methods course. These courses designed to educate students about research help introduce research skills as well as force learners to manage their time to include research projects.

Additionally, research workshops, Q&A sessions, presentations, and clubs would help students learn about research skills and time management outside of the classroom. Incorporating targeted research training in these areas could help build both competency and confidence in undergraduate students. Faculty involvement is also essential in these efforts to give the students the support they need. When research is taught and promoted, there will be an increase in awareness of opportunities and participation in research. And as faculty are actively encouraging and mentoring research, then students can build the confidence to do research (Brew & Mantai, 2017; Wayment & Dickson, 2008). The students will also have the knowledge of who they can turn to for questions and assistance when embarking on research.

As these findings have shown, when students are introduced to the idea of research they can be inspired to participate in a research project. Awareness of university specific opportunities is important in cultivating that desire. Integrating research into existing courses and offering workshops, presentations, and other opportunities outside of classes also fill the role of discussing research and can encourage students to complete their own research projects. At the same time they are being introduced to the idea of research they are also being taught the research skills and confidence needed to participate in research.

Limitations

This study was completed at a small transnational American university in Asia with an 80% ethnic minority undergraduate student population. While many of the perceived barriers identified (lack of awareness, money, lack of ability, and time) were the same as previous studies (Brew & Mantai, 2017; Wayment & Dickson 2008), some barriers such as unequal access and limited faculty availability were not seen that are normally present at other universities (Wayment & Dickson, 2008). The variability in barriers identified could be due to the small size and transnational nature of the campus, however more research is needed to confirm the causation.

The prevalence of certain barriers, specifically time, was also different from previous studies (Brew & Mantai, 2017). This could have been due to cultural differences, perceived support, or sample size. Additional research is needed to identify why time was more prevalent in this study than previous studies.

While it is important to acknowledge that this is one of the first studies on research barriers to examine a transnational higher education environment, the number of participants was limited. Due to the small sample size, a duplicate survey of this study at the same small transnational university or the same survey at a larger transnational university would be beneficial in confirming these findings.

Conclusion

In conclusion, undergraduate students are not completing research projects simply because of low desire. There are diverse barriers undergraduate students face, and it is important to identify which barriers exist. Participants of this survey identified barriers such as a lack of time, lack of ability, lack of knowledge, money, difficulty, and a lack of interest. There are several possible methods of addressing these barriers. Barriers such as a lack of knowledge and lack of interest can be overcome by general discussions about research. Many students have not been introduced to the idea of doing a research project or are unaware of the opportunities available. They have not had the chance to learn about the benefits of undergraduate research or considered how they could participate themselves. This study showed that a general discussion on research and the opportunities available increased desire to do research.

Once they have learned about research, they still face perceived barriers such as a lack of time and a lack of ability. Universities and faculty can work together to bring the information to the students and teach them how to successfully complete a research project. Integrating research into existing courses and holding presentations, workshops, and Q&A sessions outside of classes all contribute to overcoming these barriers.

Overcoming these barriers and encouraging students to participate in research will bring many benefits to undergraduate students. They will learn valuable skills such as technical and personal skills, analytical, logical, and independent learning skills, and increase persistence and problem-solving skills (Kolokithas & Calderón, 2018; Wayment & Dickson, 2008). They will also be better prepared for attending graduate school and for employment (Rosas Alquicira et al., 2022). Student engagement and retention will also increase (Brew & Mantai, 2017). There are many benefits to undergraduate research, however barriers exist that need to be overcome for undergraduate students to be able to receive these benefits.

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Learning Motivation of Adult Learners During the Transition to Fully Online Learning Due to COVID-19

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Abstract
This paper investigates the learning motivation amongst adult learners in Singapore, during Singapore's transition to fully online learning due to COVID-19. A mixed methods study consisting of two phases was conducted from 2020-2021: (i) Phase One is an online survey which consists of a series of Likert-scaled items that ask respondents to reflect on their most recent online learning experience, which includes their motivation and learning strategies, as well as their perspectives on online learning; (ii) Phase Two is a combination of interviews and focus group discussions to gather information on the respondents' experiences and their collective suggestions. The relationship between their learning motivation and learning strategies with their intention to participate in further online learning was examined using the Technology Acceptance Model (TAM) framework. The findings were supported by the qualitative research conducted in Phase Two of the study. Other key findings indicate that adult learners in Singapore are embracing the fact that online learning is becoming a norm, but some challenges remain. Firstly, there is a need to ensure that both the learners and Adult Educators (AEs) possess the relevant digital skills. Findings also imply that AEs and training providers should pay attention to the following when designing an online learning programme: (i) to allow learners to enjoy the element of social interaction; and (ii) to provide learners with prior support to familiarise with the functions and use of learning platforms.

Keywords: Lifelong Learning, Online Learning, Learning Motivation, COVID-19

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Introduction

Singaporeans had been no strangers to online learning long before COVID-19 hit Singapore in 2020. Back in 1997, the Singapore government had launched a 'Master Plan for IT in Education' to enhance teaching and learning through IT and online learning at both the K-12 and tertiary levels (Hung et al., 2003). The adoption of online tools was widespread but slow, and varied in extent. This changed after the SARS outbreak in 2003, during which schools and campuses nationwide were shut down for a week. The education sector in Singapore moved to adapt its business continuity plans after SARS was brought under control, with the installation of learning and content management systems as well as the implementation of 'e-learning weeks', so as to prepare staff and students in the event that such closures were to happen again (Chandran, 2011).

Online learning came with its own challenges, regardless of the length of the online courses. An exploratory study conducted by Guan, Ding and Ho (2015) on the adult learners studying in Institutes of Higher Learning (IHLs) in Singapore found that several factors impact the effectiveness of online learning methods, which helped to informed and improve institutional online learning strategies. These include "technical training for the learners, improved infrastructure by the institution, and the use of localised examples and cases" (cited in Tan & Sheng, 2022). When asked to rank-order critical factors for online learning effectiveness, factors highlighted by the participants include self-discipline, study materials, instructor, network access and stability, their own technical competence, technical support from a helpdesk, as well as their classmates. These experiences are echoed by other studies focused on the challenges that adult learners face in online learning (e.g. Kara et al., 2019). All these imply a need for an improvement of the curriculum and the development of the instructors' capability, especially in areas related to content development and the use of appropriate pedagogical activities for online learning environments.

Besides the challenges, other aspects of online learning such as motivation, self-directed learning capabilities, and support networks were also studied. For example, Regmi and Jones (2020) found that the motivation to learn online was influenced by contextual factors such as time and flexibility in course design, while other studies considered the need to develop self-directed learning (e.g. Manganello, et. al., 2019; Rostaminezhad, et. al., 2013). The relevance of course design and content were also considered when studying the learners' levels of satisfaction with the course, which will also impact motivation and completion rates (Park & Choi, 2009). These factors point to the importance of online learning design. Lastly, interaction and collaboration were also found to be essential for learner success in several other studies (e.g. Kara et al., 2019; Manganello et al., 2019; Regmi & Jones, 2020).

However, these studies were conducted pre-COVID-19 when classroom learning was still the default mode and online learning was an alternative to gradually ease into, which is usually at a minimal level. With the rapid spread of COVID-19 and the ensuing closure of schools globally, learning institutions were pressured to quickly transition all in-person learning activities to fully online learning.

Singapore entered the Circuit Breaker period on 7 April 2020, which lasted for almost two months and was defined by a stay-at-home order to prevent escalating COVID-19 infections. During this period, the Higher Education and the Training and Adult Education sectors were pressured to accelerate their digital transformation as they only had one to two weeks to transit to fully online learning, due to the physical closure of their teaching and training

premises. Much needed to be learnt about the experiences of the learners during this transition.

Aims and Objectives

A variety of rapid snapshot polls and surveys had provided some early insights into the impact of COVID-19 on the education sector, but many have taken the institutional or faculty view (e.g. Grajek, 2020; Chan, 2020). As the unit of analyses was limited to institutes of higher learning and was primarily concerned with students in degree-granting programs, it is uncertain if the findings from these studies are generalizable to the general adult learner. This study filled the gap by looking at adult learners in non-degree online learning activities, such as those in corporate environments. In addition, as online learning proliferates and most professions become increasingly dependent on technological work tools, it is crucial to understand how to improve the use of such technologies for the best outcomes, particularly outcomes pertaining to learning.

In this paper, the following research questions will be addressed:

RQ1: How has the transition to fully online learning due to COVID-19 impacted the adult learners?
RQ2: What are the challenges adult learners experience in their transition to fully online learning due to COVID-19?
RQ3: What motivated learners to continue to participate in online learning?
RQ4: What are the implications of the challenges (or the absence of) from transitioning to fully online learning?

Methodology

A mixed-method research study consisting of two phases was conducted from September 2020 to February 2021 (Figure 1).

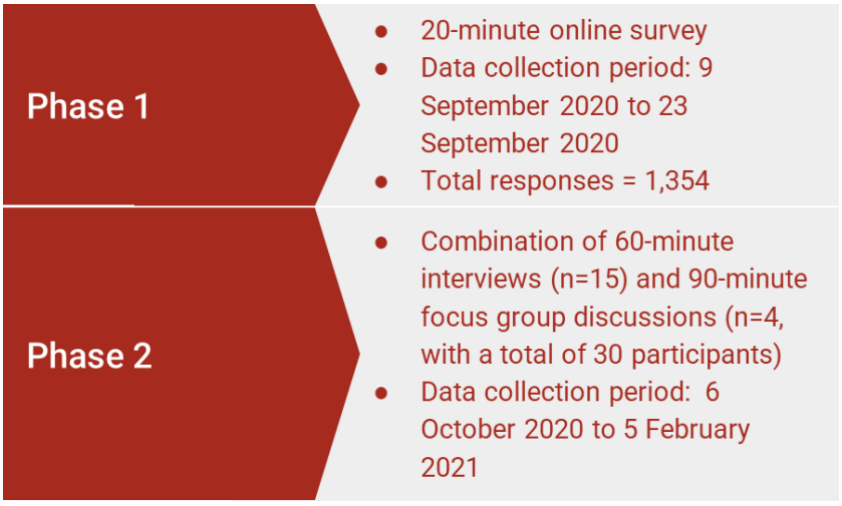


Figure 1: Phases of the study

Phase One comprised a 20-minute online survey (n=1,354) that collected data on adult learners' perceptions of online learning, motivation, experiences, and challenges. The survey included a series of Likert-scaled items that probed participants to reflect on their most recent online learning experience since the implementation of the Circuit Breaker in Singapore on 7

April 2020, their perspectives on online learning, their learning strategies, as well as their learning motivations. Data collection started on 9 September 2020 and ended on 23 September 2020.

Phase Two was a combination of 60-minute interviews (n=15) and 90-minute focus group discussions (n=4, with a total of 30 participants), with a purposive sample drawn from Phase One. Phase Two aimed to gather more in-depth information on adult learners' experiences and their collective suggestions, which included suggestions that could improve potential participation in online learning. Data collection started on 6 October 2020 and ended on 5 February 2021.

The participants were recruited from a combination of sample listings: (i) learners of training programmes conducted by the Institute for Adult Learning (IAL), an institute that provides training for adult educators in Singapore; (ii) past participants of surveys conducted by the research division of IAL; (iii) members of the Adult Education Network (AEN), a community for training and adult education professionals in Singapore to connect, collaborate and learn; and (iv) Continuing Education and Training (CET) students from an autonomous university in Singapore. All individuals aged 21 and above within this sample frame received an invitation via email to participate in the study. A total of 1,354 individuals participated in the study. Table 1 provides a breakdown of the participants.

Sample listing	**Proportion**
Past survey participants	15.1%
IAL Learners	3.2%
Adult Education Network (AEN)	77.8%
SUSS CET students	3.8%
Gender	**Proportion**
Male	57.1%
Female	42.9%
Age	**Proportion**
Below 30	9.8%
30- 39	25.8%
40- 54	45.9%
55 and above	18.6%
Highest Qualification	**Proportion**
Secondary and below	2.9%
Post- secondary	20.5%
Degree and above	76.6%
Employment status	**Proportion**
Employee	65.4%
Self- employed/ Freelancer	21.3%
Unemployed	6.9%
Out of labour force	6.4%

Table 1: Profile of selected interviewees

Key Findings

In this section, we present the keys findings from both phases of the study in response to research questions one to three. The final research question will be addressed in the concluding section of this paper.

Impact of the transition on adult learners: The adult learners in Singapore by and large reported that they accepted that online learning is here to stay. This finding was evident across a range of data and questions, but most clearly indicated in the following survey question illustrated in Figure 2. Over three quarters of the respondents indicated they would continue to learn online.

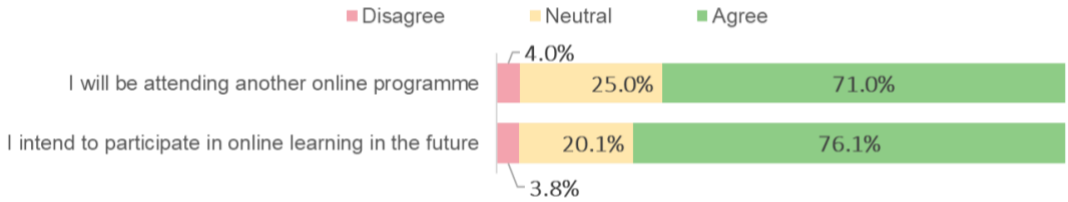


Figure 2: Proportion of adult learners who intend to participate in online learning in the future (%)

There also has been a fourfold increase in the preference for 100% online learning from 5.6% to 26.4% (Figure 3), since the implementation of the Circuit Breaker. At the same time, the preference for blended learning (i.e. programmes combining both classroom and online learning) has risen from 56.9% to 66.6%, while the preference for 100% classroom-based learning has decreased sharply from 37.4% to 7.0%.

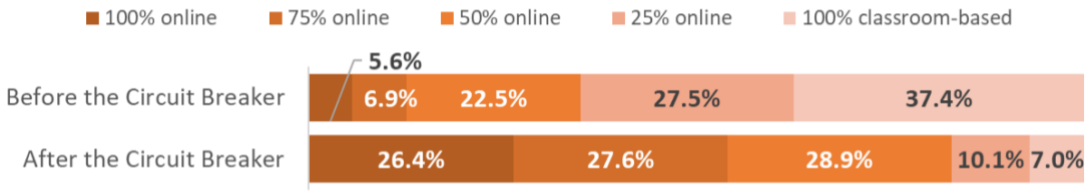


Figure 3: Preferred mode of learning before and after the Circuit Breaker

This finding corroborates another study conducted by the IAL regarding the impact of the move to fully online learning on adult educators (AEs). Among the AEs surveyed in this study, 51% intends to frequently use online platforms for their work even after the pandemic, more than 90% shared that their organisations intend to replace a majority or all of their face-to-face programmes with online offerings in the short-term (i.e. currently to the next year), and 92% felt that the training and adult education sector in Singapore is likely to remain in a predominantly online model in a post COVID-19 world (Tan et. al., 2020).

In terms of the benefits from the transition to online learning, as perceived by the learners, the convenience of online delivery was highlighted in the survey where close to 90% of the respondents liked online learning due to the convenience of not having to travel (Table 2). The convenience was also highlighted by both participants of the focus group discussions (FGD) and the interviewees in phase two of the study. Despite the general preference for face-to-face learning, nearly all the participants in phase two talked about the convenience of doing the courses in the comfort of their own homes. Saving travel time to the training premises meant that they will be able to get more time for self-study:

> …the journey going there and coming back home is three hours, and actually that's my three hours lesson. So, the good thing is I save the time, instead of travelling, I can relook at the lecture and then do my own self-study. (Bryan)

For those engaged in asynchronous learning, the convenience of being able to complete the learning activities at times of their choosing, at their own pace, as well as at a venue of their own convenience meant that they can take breaks whenever they wished. This also ties in with the concept of flexibility, which was brought up by both the survey respondents and interviewees:

> …it's very useful and I miss a certain, like a certain chapter or something I did not understand, I can just go back and re-watch it. (Cherry)

> Flexibility in completing the learning at different times or by breaking the training down into multiple sessions. (survey respondent, 69720)

These benefits imply that including a portion of asynchronous learning within an online learning programme might be a better approach, which is corroborated by data on the effectiveness of the programme as reported by survey respondents (Figure 4). Generally, the majority of the respondents (85.2%) found that the online learning programme that they had attended was effective to some extent, in terms of improving their skills or knowledge. However, it is worth noting that there higher proportion of adult learners who attended programmes with a mixed mode of delivery (i.e. synchronous and asynchronous) reporting that the online learning programme is effective.

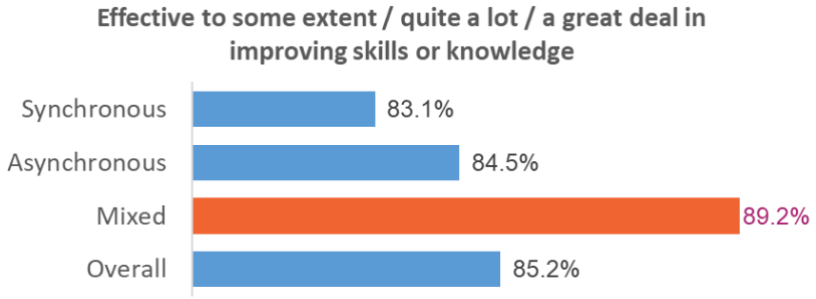


Figure 4: Effectiveness of online learning programme

Lastly, survey respondents also shared that being in a familiar environment made they feel relaxed (Table 2).

It was very convenient because I did not have to travel	87.8%
I felt relaxed because I was in familiar environment	41.5%
I was able to have some face-to-face interactions through video-conferencing	25.6%

Table 2: Top 3 factors that adult learners liked about online learning

While it seems that there is general acceptance among adult learners that online is here to stay, there were considerable challenges for many thus indicating that there is much to be improved.

Challenges: Data from the study illustrates that adult learners experienced considerable technological challenges while learning online. Be it the learners or instructors, discomfort or lack of familiarity with the required technologies or applications used was reported as a technological challenge by more than a quarter of the survey respondents (Figure 5).

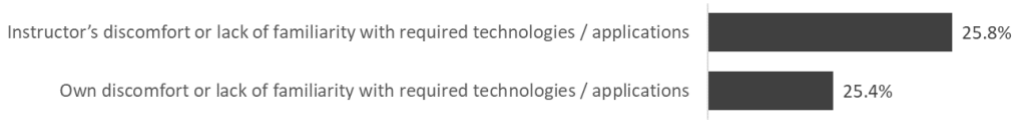


Figure 5: Technological challenges pertaining to technological expertise

In terms of technological infrastructure, more than a quarter of the survey respondents complained that there were inadequate digital replacements for face-to-face collaboration tools (Figure 6), which indicate the lack of such features in currently available learning technologies (and sometimes the lack of instructor's technological expertise to utilise such features). A small but nevertheless worrying proportion of the survey respondents reported limited or no access to a reliable digital device (11.4%) or a required specialised software (16.6%). These are important infrastructure issues that need to be addressed, as they will affect social mobility and widen the gap between the information rich and the information poor.

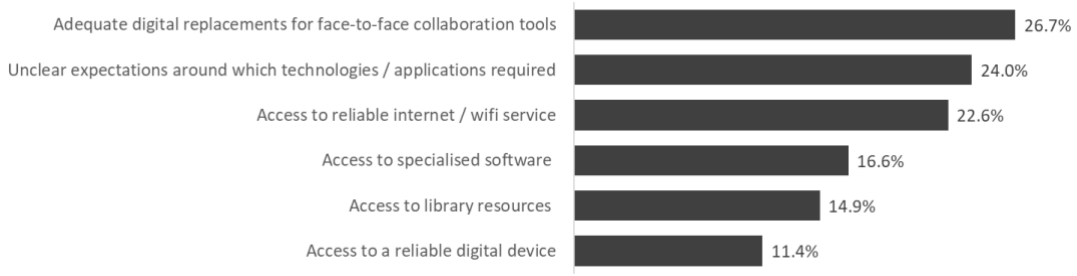


Figure 6: Technological challenges pertaining to technological infrastructure

Design issues pertaining to the lack of interaction and the difficulty to stay focussed or motivated was also high amongst challenges experienced (Table 3). Regardless of the mode of delivery, a concerning number of survey respondents had issues with the lack of interaction between learners (51.0%) and between learner and trainer (43.0%). About 4 in 10 also reported that the course lessons or activities did not translate well with the online environment, mainly for those in synchronous mode.

	Synchronous	Asynchronous	Mixed	Overall
Difficulty focusing on or paying attention to on-screen / online instruction or activities	42.0%	40.5%	40.5%	41.3%
Personal motivation / desire to complete coursework	21.3%	33.1%	23.4%	23.7%
Not being able to see classmates	19.6%	16.9%	18.4%	18.8%
Lack of interaction among classmates	53.7%	44.6%	49.3%	51.0%
Lack of interaction among learners and facilitator / trainer / lecturer	43.3%	45.3%	41.4%	43.0%
Not able to get required attention from the facilitator / trainer / lecturer	17.7%	20.9%	17.1%	18.0%
Course lessons or activities that haven't translated well to a virtual environment	40.1%	35.1%	40.1%	39.4%

Table 3: Challenges pertaining to design issues

Learning Motivation and Strategies: To investigate why learners continue to participate in online learning, this study adapted questions from an oft-researched theoretical model of user acceptance and usage of technology known as the Technology Acceptance Model (TAM) (Davis, Bagozzi, & Warshaw, 1989). TAM in its original form suggests that an individual's motivation to use technology is influenced by the perceived ease of use, perceived usefulness, as well as the attitude toward using the system in question. The model posits that perceived ease of use directly influences both perceived usefulness and also the individual user's attitude towards system use (Figure 7). Questions were adapted from the studies conducted by Venkatesh & Davis (2000) and Masrom (2007), and validated with a pilot study.

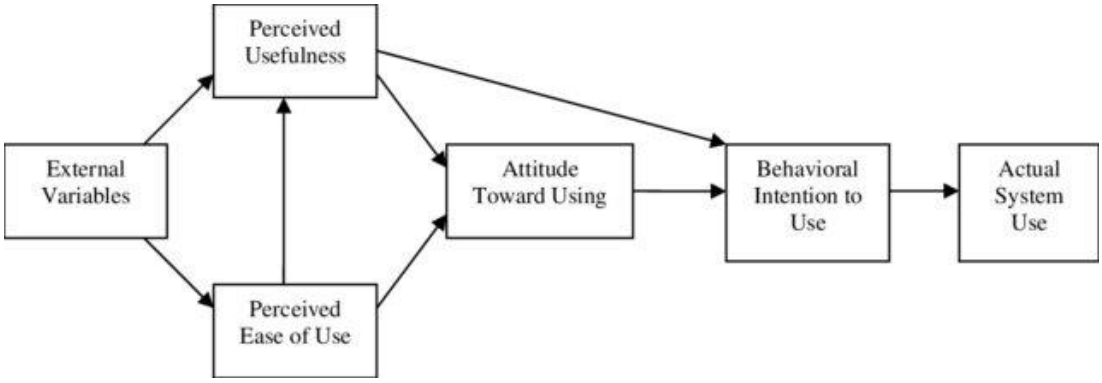


Figure 7: Technology Acceptance Model (Davis, Bagozzi, & Warshaw, 1989)

Generally, respondents gave a good rating for each item of the three TAM dimensions used in this study (Likert-scaled items of 1= "Strongly Disagree" to 5 = "Strongly Agree"), with the mean scores ranging from 3.17 to 4.00 for the individual items. On average, the perceived usefulness of online learning was rated the lowest among the three dimensions.

	Perceived ease of use of online learning system	
Ease1	It was easy for me to use the online learning platform	4.00
Ease3	My experience with online learning was effective	3.78
Ease4	I find it easy to find information through online learning	3.79
Ease5	I find it easy to learn what I want to learn from online learning	3.72
	Perceived usefulness of online learning	
Use2	I learn better through online learning	3.17
Use3	Participating in online learning improved my learning performance	3.34
Use4	Participating in online learning increased my productivity in my learning	3.40
Use5	I found online learning useful	3.76
	Attitude towards online learning	
ATT1	I like the idea of using online learning	3.81
ATT2	I have a generally favourable attitude toward using online learning	3.78
ATT3	I believe it is a good idea to use online learning for my learning	3.81

Figure 8: Mean scores for TAM items

On the other hand, questions on learning motivation and learning strategies were adapted from the study conducted by Lee et. al. (2019). Respondents generally rated lower in terms of collaboration with their classmates (Likert-scaled items of 1= "Never" to 5 = "Always"), as compared to the other two dimensions (Likert-scaled items of 1= "Strongly Disagree" to 5 = "Strongly Agree").

	Learning motivation	
Mot1	Online classes enhance my interest in learning	3.51
Mot2	I am motivated to study when I take an online class	3.40
Mot3	Online classes are very useful to me	3.71
Mot4	It is very interesting to take online classes	3.59
Mot5	After taking an online lesson, I look forward to the next one	3.48
	Self-directed learning	
PS1	I was able to derive new interpretations and ideas from the knowledge I have learned	3.69
PS2	I was able to approach the subject of the class with a new perspective	3.71
PS3	I was able to deeply analyse thoughts, experiences, and theories about the knowledge I have learned	3.61
PS4	I was able to judge the value of the information related to the knowledge learned	3.70
PS5	I tend to apply the knowledge I have learned to real problems or new situations	3.79
	Collaboration with classmates	
Collab1	I tried to answer the questions that other students asked	3.19
Collab2	I tried to solve difficult problems with other students when I encountered them	3.20
Collab3	I worked with other students on online projects or assignments	3.16
Collab4	I studied the lesson contents with other students	2.75
Collab5	I asked other students for help when I couldn't understand a concept taught in my online class	2.94
Collab6	I made use of online chat groups like Whatsapp, Telegram to communicate with other students	3.48

Figure 9: Mean scores for learning motivation and strategies

Two logistic regression models were employed, one to investigate the relationship between learning motivation and learning strategies with the intention to participate in online learning in the future, the other to examine the impact of these factors on the effectiveness of online learning i.e. an improvement in skills and knowledge; TAM dimensions were included in both models. The outcome variables were recoded into a dichotomous variable – for intention to participate in online learning in the future, a reported intention to participate in future online learning (at least 4 on a Likert scale of 1 = "Strongly disagree" to 5 = "Strongly agree") is recoded as "1" and no intention was recoded as "0"; for effectives of online learning, a reported improvement in skills and knowledge at least to some extent (at least 3 on a Likert scale of 1 = "Not at all" to 5 = "A great deal") is recoded as "1" and no improvement was recoded as "0".

Figure 10 shows the odds ratios of the logistic regression models that were run. Adult learners employing learning strategies such as self-directed learning or collaboration with classmates in their learning, are more likely to report that their participation in the online learning programme helped them in improving their skills and knowledge. However, those with better attitudes towards online learning are less likely to report that the online learning programme was effective in improving their skills and knowledge.

On the other hand, those with better attitudes towards online learning and higher learning motivation are more likely to pursue online learning in the future. Although insignificant, collaboration with classmates had a negative impact on the intention to pursue future online learning, which may imply that current experiences of online learning might be lacking in terms of interaction with classmates, as supported by the challenge shared by more than half of the survey respondents regarding the lack of interaction among classmates (Table 3).

Perceived ease of use of the online learning system and the perceived usefulness of online learning have significant impact on both the effectiveness of online learning and intention to pursue further online learning in the future.

	Effectiveness[a]			Intention to pursue further online learning[a]		
	OR	95% CI		OR	95% CI	
Scale						
Learning motivation	0.94	0.61	1.46	1.88*	1.16	3.03
Collaboration with classmates [Learning Strategy]	1.47**	1.16	1.86	0.85	0.66	1.10
Self-directed learning [Learning Strategy]	2.03**	1.31	3.13	1.23	0.77	1.97
Perceived ease of use [Technology Acceptance Model]	2.17**	1.52	3.10	2.02**	1.35	3.02
Perceived usefulness [Technology Acceptance Model]	2.00**	1.28	3.15	1.93**	1.20	3.11
Attitude towards online learning [Technology Acceptance Model]	0.58**	0.39	0.87	5.89**	3.83	9.04
N	939			1,047		
Pseudo R^2	0.18			0.45		

[a]The analyses controls for age, gender, ethnicity, highest qualification attained, and employment status.
*p < .05 **p < .01

Figure 10: Logistic regression results

Conclusions and Recommendations

Due to the sudden transition to fully online learning during the Circuit Breaker, many training providers in Singapore were insufficiently prepared to provide for a smooth experience for both learners and trainers. As shared in the previous section, about 4 in 10 reported that the training activities were not translated well to a virtual environment – many were transited from classroom to online wholesale using available applications such as Zoom and Microsoft Teams, which do not fully meet the needs of conducting online courses. Additionally, many AEs lack the experience in online teaching and therefore use inappropriate learning design. This resulted in the following issues when they face learners with varying levels of technological capability: (i) lack of engagement; (ii) lengthy lessons; and (iii) lack of support for learners with technical difficulties.

There also seems to be an expanded role for AEs. Firstly, they must now also play the role of a fluent user of the technologies that are required for online learning, and exploit the various functions available within the systems to conduct their courses and engage their learners. They also now need to be curators of asynchronous learning, in order to shorten the synchronous lessons and provide the learners with the flexibility in the time and pace at they learn (Tan et. al., 2021). Next, they need to become 24/7 facilitators for learners, by providing technical support or pre- and post- lesson tutorials on the use of the required technologies for learners who less tech-savvy. Lastly, they need to be innovators of facilitation and delivery, so as to devise strategies to maintain the attention and engage their learners, as it becomes more challenging in a virtual environment due to the various challenges highlighted in the previous section.

The findings from this study have provided useful insights on how to sustain the transition to online learning after the COVID-19 pandemic, by addressing the challenges that have been identified. The fact that both the perceived ease of use (of the online learning system) as well as the perceived usefulness of online learning have significant impact on both the effectiveness of online learning and one's intention to pursue further online learning, also highlights the importance of improving the learner's experience and design of the learning system and the course, in order to sustain online learning post-pandemic.

Moving forward into the future where online learning will be the norm, there is a need for the following main areas to be improved: (i) the online learning system, (ii) the learners'

experience; and (iii) the trainers capability and learning design (Tan et. al. 2021). To tackle these, we have made the following recommendations:

1) There is a need for providers to adopt an intuitive Learning Management System that covers all training needs. While the urgency to switch to fully online learning during the Circuit Breaker may have robbed training providers of the time to make proper adjustments to their courses (especially for organisations that do not already offer online learning programmes), it is important that necessary time, talent, and infrastructure should now be allocated to digital transformation in preparation for the expected permanent shift to online learning. One key step for them to take in order to stay sustainable in the sector and the future economy will be to make long-term investments in innovative teaching and learning technologies and methods, so as to improve their courses and the delivery of these courses for better learner experiences and learning outcomes (Tan et. al., 2020). A good solution would be a one-stop learning platform for learners, which minimises the need for learners to locate information from different sources (Tan et. al., 2021). In addition, extra support should be provided for learners with low technological capability during the use of the system, and the AEs' technological capability should be strengthened via continuing professional development.

2) There is a need to help learners to adapt to online learning. Firstly, ensuring that the learners possess the relevant digital skills should be a key focus. There should be more effort and initiatives by the government to help adults (especially the seniors) in Singapore take the digital leap and gain basic digital skills (Tan & Sheng, 2021). Other support that can be provided to the learners include the creation of online learning communities for learners to make connections with fellow online learners, providing opportunities for active social interaction, providing guidelines on how to develop a time-management strategy, and providing physical classroom and resources for individuals who lack access to technological equipment or internet access (Tan et. al, 2021).

3) The quality of design and facilitation of online learning should be improved. Some ways to improve this include striking a balance between synchronous and asynchronous mode of learning so as to provide learners with the flexibility that they enjoy about asynchronous learning, planning for hybrid mode of delivery as there is increasing preference for this, sharing of resources and best practices among the AEs, and lastly setting clear expectations on learner participation, the use of the online platform, and timeline (Tan et. al., 2021).

Delay in the release of the initially planned sample frame (owing in part to data protection policies) caused the pool of participants to be heavily skewed with a high proportion of AEN members (61.9% of the 1,702 respondents) who tended to be highly educated professionals. This caused a high proportion of the respondents with a highest qualification of degree and above (61.1%), as opposed to the national proportion (among Singapore residents aged 25 years and over) of 33.0% in 2020 (Department of Statistics Singapore, 2021). Given the sample in this study (online learners who are for the most part well educated professionals), some of the findings from this study are perhaps not surprising. Findings may be skewed due to the lack of representativeness of the sample, and the generalisability of the findings to the general adult learner in Singapore may be limited. Any follow-up studies must therefore ensure more representation from other learner profiles and backgrounds, in order to address the current limitation of this study and provide a more rounded picture.

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"People Are Poison" – A Case Study of Chinese Young Adults' Printed Clothes as Linguistic Landscape From Wearers' Perspective

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Abstract
Printed clothes have been treated as a special type of mobile linguistic landscape and wearing these clothes can be regarded as a conscious communication act. Previous studies have paid their attention on producers and printed clothes themselves, but wearer is also an essential step which should not be ignored in forming printed clothes as linguistic landscapes. In this study, wearers, as the "second" decision in printed clothes that they choose from existing printed texts to express themselves were explored, to see how different social and linguistic factors influence the final presentations of printed clothes. Applying an ethnographic approach, twenty three private items were collected from six Chinese young adults who are now locating in three global cities: Shanghai, Hong Kong, and London, and interviews were conducted for exploring the agency of buying and wearing texts on their bodies. This paper gives a glance of young Chinese adults choosing or not choosing to wear clothes with texts to express their own identities, and how sociocultural factors lead to the results that Chinese, as their first language, is absent in this communication act. Finally, I suggest that the final presentations of these printed clothes do not only reflect wearers' own language and cultural ideologies but also globalization of English from economic and cultural perspectives.

Keywords: Printed Clothes, Linguistic Landscape, Globalization of English

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1. Introduction

Printed clothes have become media of conveying information about culture and identity. Jaworski and Lou (2021) claimed that language elements displaying on people's body have formed a special type of mobile linguistic landscape in the urban areas, including clothes, tattoos, bags, and so on. Being carried by their wearers, these moving languages build a connection between public and private, and they could be seen as an essential part for individual's identity formation and public presentation.

Previous studies related to T-shirts have looked at language policy related issues, especially for local varieties printed on T-shirts (Coupland 2010; Järlehed 2019). This type of communicating actions can be regarded as local identity formation, and a challenge to the standard variety in these areas. Recently, studies have also seen these printed language elements on T-shirts as a special kind of moving linguistic landscape. Not only the designers or producers' thoughts but also wearers' agency play an important role in the representation of them in urban space (Jaworski and Lou 2021). Caldwell (2017) built up a comprehensive framework for language elements presented on body as a mode. Wearing these clothes can be potential speech acts. However, most linguistic related studies about language printed on T-shirt started from the clothes themselves, to some extent, from the designers' perspective. They paid much of their attention on how language elements were designed to present on T-shirts as the platforms. Although wearers' agency also determines the representation in public space, abundant ethnography work is required to explore the role of wearers' agency in wearing printed T-shirts as a communication act, which makes studies from wearers' perspective are limited.

This study looked at agency behind purchasing and wearing printed clothes. It aimed to explore these language elements on clothes, mainly T-shirts from a wearers' perspective, to see how situational factors and wearers' own ideologies shape the final presentations of words carried by individuals, as a bottom-up language practice. An ethnographic approach was applied that firstly, three to five items with language elements were collected from six participants from 20 to 25 years old, following with semi-structured interviews related to their opinions on purchasing and wearing these items. This study will provide a different perspective for treating printed clothes as linguistic landscape, and how younger Chinese treating printed clothes as an expression of themselves.

2. Wearing T-shirts as self-expressions of identities for younger generations

Studies related to printed clothes mainly focused on T-shirts. T-shirts have become communicative media and index of language ideology and wearers' identities (Jaworski and Lou, 2021). According to Armani (quoted in Harris, 1996, cited in Caldwell, 2017), one of the most famous fashion designers, T-shirt is an anti-status symbol that the rich and the poor can be put on the same level with the white cotton surface. This feature young generations tend to pay more attention on fashion and have more aspiration in expressing themselves. T-shirts are not just pieces of clothes but mobile, multimodal, and highly accessible communicative media (Järlehed 2019). They provide semiotic affordance for scripts (Caldwell 2017). Different from other types of mobile texts on human bodies, such as tattoos, printed T-shirts do not afford such long permanence and they could be largely determined by their wearers. For wearers, they are self-conscious linguistic signs which tie wearers and these texts, texts and the surrounding environment, wearers and the surrounding environment together (Goffman 2017; Caldwell 2016).

Before treating printed clothes as a type of mobile linguistic landscape, most studies explore from language policy aspect and paid their attention on local varieties printed on T-shirts as a local identity formation, and a hybrid form of standard variety and local varieties printed on T-shirts to some extent forms a challenge to official languages of the society. Coupland (2010) looked at T-shirts produced and sold by a small local company in Wales. Local variety printed on T-shirts can be regarded as a bottom-up language practice which revealed local cultural values. The creations related local Wales variety are mostly ironic and these textual representations show the local identity and antagonism of the top-down official language policies. Järlehed's (2019) study focused on T-shirts produced in Galician and Basque. Code-mixing of standard variety and local varieties revealed a mix identity for local people. These texts dealt with issues related to local language policies and traditional understanding of local culture in a rather humorous way ("rurban", which refers to rural + urban). It provides a critical stance for local people and fosters them to rethink the value of local culture and urban "coolness" rooted in modern western Anglo-Saxon pop culture brought by globalization. Using the hybrid of standard variety and local varieties, together with urban youth register on printed T-shirts exhibit the complicated situation in language policy and this type of "imperfect" language displaying challenges standard language ideology and elaborates with local language, culture, as well as identity.

Globalization of English is one factor which reflect the social and political trend within the culture on T-shirts (Seargeant 2009). As a result of British colonial empire and economic, military, and political dominance of the United States, English has set its status as a global language (Ferguson 2012). In this case, English has composed a picture as a seemingly ubiquitous language in the world. It further influences the English dominate language policy in international business entities. However, it also brings various problems, such as cultural homogenization. Globalization of English represents cultural influence as a unidirectional flow, and it shows a vector of cultural "Americanization" (Pennycook 2003). Currently, English is no longer a singular clearly bounded entity that indexes a specific, determinant identity. It portrays the recipiences of western cultural goods and consumers become passive and unreflecting in this process (Ferguson 2012). New hybrid cultural forms and hybrid identities and cosmopolitan sensibilities have been put forward. They are usually mixed with English which is no longer bounded with certain identities. With the spread of Neoliberalism, market mechanism also organizes individuals' activities, including its governing and self-governing capabilities (Rojo 2018). Although it seems that individual have opportunities to choose the language they use, market mechanism as an underneath factor has transformed individuals' language choice imperceptibly.

This kind of values conveyed by English scripts is discussed in Curtin's (2008) study of linguistic landscape in Taipei. Those English scripts in public spaces were designed to be seen as visual presentations mainly perform symbolic functions. As mentioned in interviews with local residents, they may not be able to comprehend the content of English but the visual form of English indexes the certain quality and identity of the products. Using these product will index the identity of users as "educated, youthful, fashion, and worldly". As language elements appearing in a language environment other than English, those English scripts act as "ethnic" roles, and "reterritorialize" image of English-speaking culture which indexes values of English as modernity, wealth, fashion, and freedom (Iwabuchi 2002).

Different from these studies which looked at these T-shirts from a producer and designer's perspective, Jaworski and Lou focused on mobile texts themselves. They collected data from pedestrians wearing printed clothes with texts in the streets in Shanghai, Hong Kong, and

London. The term “wordswewear” was put forward to summarize this category of mobile semiotic landscape. Texts on clothes and being carried to different public spaces by wearers reveal the interface of private and public space. Also, as mentioned before, wearing printed T-shirts with texts can be seen as a conscious language practice, so these printed T-shirts emphases human agency in this semiotic practice. These words worn on individuals’ bodies may target or diffuse certain audience, even if they are looking at themselves in the mirror. Studying these texts can help us understand the power of self-expression. They index the awareness of others, and visible or potential with any possible groupings in the urban public space.

3. Printed T-shirts as a Mode

In Caldwell’s (2017) study, corpus of printed T-shirts were built with visual data from online catalogue. They were treated as interactions between wearers and the T-shirts as a type of conscious speech act. Different from hanging in the wardrobe or windows on the sides of streets, wearing on ones’ body make the wearer as affordance of text and wearers visually articulate the meaning of elements on the T-shirts. The representation of texts and images on T-shirt can be seen as a specific communicative mode. Based on Systemic Functional Linguistics (Halliday and Matthiessen 2004) and Multimodality (Kress and Van Leeuwen 2020), a taxonomy of printed T-shits was built for different elements appearing on a printed T-shirt. These texts with different linguistic features on T-shirts are oriented with certain functions according to human agents. Projections, labels, and icons are three main features which construct the lower level of the taxonomy.

Projection is usually realized by a single clause (Caldwell 2017, 136). These short clause projecting on t-shirts function as Mental or Verbal process, so the role of wearers here is Senser or Sayer of the texts. The result of the projection is the wearer says/thinks the content of the text. For example, wearer wears a jacket (figure 1) with “never mind” and a sad teddy bear to show his or her depressed situation. The feature of label is realized through adjective, a single noun or noun group (except proper noun or noun group). Texts can also function as the value of the wearer. These texts displaying on clothes “label” the wearer, and the attitudes or description could be either positive or negative (139). They are potential to be read as the wearer is xxx (printed texts) and these communicative acts are more like self judgements to wearers. Proper noun or noun groups printed on T-shirts care categorized as icons. These texts denote to specific objects or persons (139-140). One of the most frequently appear types of items with icons is souvenir, which creates physical connections between wearers and these proper names. This type of texts usually creates an emotive Mental Processes, such as “I love Fall Out Boy (band)”. The icon feature is not just valuable for printed T-shirts, but also important for broader themes, including globalization, mobility, mass production of clothes, as well as youth culture and fashion culture. This taxonomy provides a systematic framework for analysing T-shirts worn on individuals. It links specific linguistic features to functions and brings consciousness to the agents of these printed T-shirts.



Figure 1. example of projection (Never Mind)

4. Research questions

The current study decided to focus on individuals' agency and presentation of language elements from wearers' perspective, and how environmental factors shape the representation of language elements on clothes. There are two main research questions:

1. What are the preferred features of printed clothes for young adults (20-25 years old)?
2. What are the individual and environmental factors influence individuals' presentation of the language elements in public spaces?

5. Methodology

5.1 Participants

There are six participants aged from 20 to 25 in this study, including three females and three males. Chinese is their shared first language. They located in different cities with different language environments when participating in this study. Three of them were in Shanghai, two in Hong Kong, and one in London.

Age group has been considered in this study. As mentioned in Jaworski and Lou (2021), young generations tend to pay more attention on fashion and have more aspiration in expressing themselves. Identity formation and presentation play a more important role compared with other age groups. Another consideration for choosing this age group is English proficiency. All participants are either university students or new graduates, which guarantees a capacity for them to interpret most of the English elements, which provides a higher possibility for them to wear these items as expressing themselves.

The three cities they located, also give three different language environments for this study. Shanghai, as one of the major cities and the economic center in China, is a Chinese dominant environment. With the colonial history and biliterate and trilingual language policy nowadays, Hong Kong can be seen as a bilingual society. For London, the capital of the UK, English is the most frequently used language. These different language situations would help this study explore the influence of different language environment on language choice and presentation on clothes.

5.2 Data collection

Qualitative data collection was conducted in this study in two rounds. The first round was questionnaires with open questions related to participants' individual items, such as clothes, bag, phone case, with language elements on them. Photos of the items themselves which can clearly show the language parts on the clothes, and photos of participants wearing the items in the public (if possible) were asked to be provided in the questionnaire. Then, the following questions focused on why they purchased the items and how they wear the items, including participants' own interpretations of the language elements, reasons for purchasing them and detailed situations that participants would like to wear them. Participants were asked to choose three to five their private items to fill the questionnaire. At the beginning of data collection, participants were asked to use three to five their "favorite" items, because it may indicate that they have possibly interpreted with the language parts when they decided to buy and wear them. However, during the collecting process, it was found that there were much fewer items with language elements from participants than I thoughts. Some participants can only find two items and some participants provided five items with the same brand logo in the front. Data from these participants were eliminated from this study because limited number or types of clothes may not reveal their authentic situations and opinions about language on clothes. In this case, the instructions of questionnaires were modified as three to five items with language elements. With this requirement, twenty-three items were collected in total and six participants who were able to provide more than three items were selected for the further interviews for the second-round.

In the second round, based on the information provided by interviewees, some further questions related to the general situation of one participant were asked. For example, participant A provided three items with English only, questions like "have you noticed that most printed T-shirts using English on them?", "why do you think it happens?", "will you buy clothes with Chinese on them and why?" were asked during the interview. Each interview took about fifteen to twenty minutes. Questions for the interviews were mainly from three perspectives, whether they would pay attention on language elements when purchasing, whether they care about others read the language elements, proportions of different languages they prefer to buy and why. Since all participants have comparatively high English proficiency, interviews were conducted in English. Sometime participants may feel hard to express their opinions, Chinese was allowed to support their expression, and English translations of Chinese part has been double checked with participants.

5.3 Data analysis

Qualitative data for photos of clothes and questionnaire answers and interviews were analyzed separately. Photos of clothes will be analyzed based on the framework put forward by Caldwell (2017). Texts on T-shirts were categorized into three main types of text features and discussed how different types of text interact with wearers and function variously. Different codes printed on clothes were also paid attention to when categorizing the collected data. Different features of texts on clothes were labeled to see the general preferences for all participants as Chinese young adults and participants' individual preferences. The table shows the general information of collected items has been shown in Table 1. Participants are labelled as surname initial + given name initial (for example Nancy Wang is shown as WN) and items has been labelled by numbers.

Thematic analysis was applied for responses in questionnaires and follow-up interviews. Themes related to language practices and ideologies were identified in questionnaire responses and transcripts of interviews. Then the identified themes were refined and interconnections among all participants were build. Themes were analyzed based on Huebner's (2008) framework for language analysis of linguistic landscapes. Huebner elaborated this comprehensive framework from settings, participants, to presentation of linguistic landscapes for analyzing linguistic landscape from different angles. The analysis of responses and interviews provided evidence for how different factors influence the display of these language elements on clothes, and they helped to reveal the trend of preference related to text on clothes in Chinese younger generations, as well as the factors of individuals and environment that influence their choices.

6. Results: Wearing Printed clothes as a conscious communication act

6.1 Avoid self-expressions on clothes

For younger generations, printed T-shirts have become an important media for self-expression and culture conveying (Jaworski and Lou, 2021). These written texts are silent but literate as the same time. As Caldwell (2017) clamed, the interaction between text and audience can be seen as conscious speech act (p.127), and wearers may probably use these clothes as media to release the messages to other. From participants responses, all participants confirmed that they will check the content of the text parts before they determined to buy them, and they will consider the occasions for wearing these printed clothes. In this case, purchasing and wearing clothes with texts on them are conscious actions for wearers. LS mentioned in the interviews that she would like to buy these items with language elements because of two features, their overall designs and printed texts as cultural symbols and self-expression. They did care about different codes and contents displaying on their bodies, because when they wear these clothes to the public space, audience may be able to receive the messages on clothes. These messages will be conveyed by the wearers, and they become part of wearers' own identities. Different participants mentioned different checking points. Some would check whether the overall content of the texts fit their own value while one participant said he just checked whether there are some "strange" words on the clothes, such as language taboos, which may be not polite to wear in the public. From this consciousness of picking language elements, it could be found that when some is wearing the texts, a connection has been built between the texts and wearers' own identity presentation. For audience who have received the messages on the clothes, these texts will probably be regarded as externalization of wearers own personalities.

However, because wearing clothes with texts can be seen as releasing some messages to the public, and for audience, these massages would be thought as reflections of the wearers themselves, during data collecting process, it was found that some participants avoided buying and wearing clothes with languages elements. One participant said usually he will only buy clothes with language elements as logos (LB), and three participants showed their attitudes that they prefer not to purchase clothes with language elements, even without elements as brand logos (LS, LE, WE). Design could be a reason for their rejection for clothes with texts. One participant said that she prefers simple designs without any decorations because "These designs look more mature, and they can show the high quality of the fabrics" (LE).

Reasons provided by the other three participants were related to "expression" itself, either about the contents that they were able to choose or the behavior of expression itself. LB and YS claimed that they don't like the contents of language elements usually displayed on clothes. "Most texts printed on clothes are either very negative or very positive, such as 'life sucks' and some prep talk (figure 2). These texts do not fit my own personal values", as YS said. He also mentioned about the designs related to text elements themselves. "I can't accept clothes with texts only. Texts and some images together is ok, but only several lines is not. You can't see the designs for these clothes. They're too straightforward." From this statement, it can be found that wearers, or consumers, have the freedom to choose the texts they would like to display on their bodies, but their choices are limited within the corpus provided by producers and designers. Another participant gave a clear attitude about the rejecting of the act of wearing printed clothes as expression, "I don't think I need to use wearing clothes with texts as a way for releasing any messages" (WE). Some other evidence was also found during the data collection process that when asking participants to provide items at the beginning, some participants can only find no more than two items with language elements, including all their personal items, such as clothes, bags, shoes, and cases of phone, tablet, and laptop. Common explanations from these participants were "I don't like items with texts" (about design) and "I don't want to be 'read' by others in the public". Since these texts build connections with the wearers, they become parts of their identity formation in the public. Those people who reject to wear texts may because those texts may cause misunderstanding of their own personalities, or they just do not want themselves to be stared by strangers who are able to interpret the texts in the public.



Figure 2. example of prep talk (optimistic thinking)

6.2 Absence of Chinese

For all six participants, Chinese is their shared mother tongue, and for both Shanghai and Hong Kong, Chinese is official language. However, from collected items, only five of them have Chinese elements, including two with both English and Chinese on them. As one of the most common used languages among these participants, it was quite strange to find the absence of Chinese on clothes in collected data.

Among these five items, three of them are Chinese band related merch. For the other two, one with the Chinese character "中国" (China) and the other with the Chinese character "囍". During interviews, LS, who is now in London, said that "because I am now in an English-speaking environment, English is the most commonly used language here". She also made

the inference that in Chinese Speaking areas there should be more items with Chinese based on her own situation. However, this statement could not explain the large proportion of English in other five participants' collected items, that they are in either Chinese-dominant environment or bilingual environment. Also, all participants said they had more clothes with English texts than other languages, including two participants who only have clothes with English. It was also interesting to find that when being reminded that most of their printed clothes are English, several participants mentioned that "there should be more people in the street wearing clothes with Chinese". In other words, they thought other people prefer to wear Chinese printed clothes more than they do. They were more like uniform, such as T-shirts with Chinese association names printed on them for members of student associations, or vests for certain marathon campaigns. For these uniforms, or uniform-like clothes, these Chinese names and titles printed on clothes represent more of a collective identity rather than individual identity. For reasons behind this type of absence, from both the collected items and interviews, it could be found that there are neither many shops selling items with Chinese nor many participants would like to buy items with Chinese. When asking about participants' opinions about why they do not have many items with Chinese, two participants responded as they did not see many items with Chinese texts in the shop ("Just simple didn't see this type of items that much", LS; "in my own impression, there are not many shops selling clothes with Chinese", LB). Also, two of the participants mentioned about the designs of items they have seen with Chinese, and they did not think these items have very high-quality design. "Last time I saw some T-shirts with Chinese in a Chinese fashion brand shop, but I didn't feel like I want to buy them. They are about *Three Kingdoms*. They just…do not fit my own taste of clothes" (LB). YS also talked about his ideas related to design, that he thought that t-shirts with only texts on them could not be counted as "design". This situation may be cause by globalization of business and mass production of clothes. These larger size international business entities are more able to invest more in design which could be more attractive for consumers. Also, as international companies, English as a global language is probably the most suitable choice for international market, which to some extent, may explain the higher proportion of English texts in collected data. From another perspective, it could be seen as a socio-economic inequality and cultural homogenization as well (Ferguson 2012). With larger proportion in the market, those international entities, to some level, "force" consumers to buy clothes with English texts on them, which leave limited space for local business and texts in local varieties to survive.

Another factor influences wearers' decision is audience. As discussed in previous session about self-expression, being interpreted together with the texts will make wearers feel embarrassed and the texts may bring negative effects to themselves. When being in Chinese speaking environment, Shanghai and Hong Kong, it raises the possibility for Chinese texts being processed by strangers in public space. "It is quite embarrassed because everyone understands Chinese. And most of the texts printed on clothes are related to, that kind of subculture, very depressed ones. I am not a fan of them, and I don't want others to think me in this way" (YS). A conflict between ideology and practice was also found in some participants, that they did not reject about purchasing items with Chinese, but when asking whether they have bought any items with Chinese texts, they said no. Reasons behind the rejection are similar to these mentioned in self-expression session, that they do not want to catch strangers' attention because of the printed texts, together with the limited choice for Chinese texts printed on clothes.

For those who have items with Chinese, they were quite careful about the situation wearing these items with Chinese. There two reasons for this situation which need to be more careful.

One situation is related to the T-shirt with “中国”(China) (figure 3) which is regarded as too straightforward for wearer to wear it in public. YS mentioned in the interview that he would only wear it for sporting and with elder generations. This item was a present from his aunt, who used to be a basketball player of Chinese national team. In this case, from both the source and the texts on this item, it enhances the national identity formation. Wearing it in situations except doing sports with his aunts and other family members gave him a sense of flaunting, which does not make him so comfortable.



Figure 3. 中国

The second one is the contents of items collected in this study are quite offensive in Chinese culture community. In addition to the fact in both Shang Hai and Hong Kong, these Chinese elements can be interpreted by most of the people in public space, they are not quite acceptable by Chinese speakers. For example, it is inappropriate to talk about death openly in the public in Chinese speaking society because death is ominous in Chinese culture. One item provided by participant is a T-shirt (figure 4) with the name of the band “暗狱戮尸” (The Dark Prison Massacre), which is a Chinese death metal band. The texts are written in yellow, very close to skin color, with red filled inside, which makes them looks like wounds. Below is a picture with a person holding a knife surrounded by pieces of corpse. When I tried to search this item on Taobao, one the biggest online shopping website in China, the picture of this item had mosaic on it because of the bloody and violent elements. “I will only wear it when I go to music festival, because that is where I would like to express myself. Only people there can understand what is on the T-shirt” (WE).

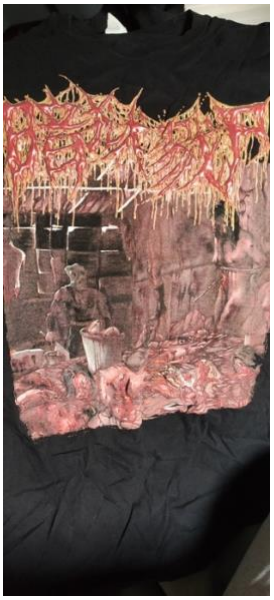


Figure 4. 暗狱戮尸

Another example is not about the content of the Chinese text but a Chinese character which is functioned more as a symbol. The character “囍” (double happiness) is usually used in wedding ceremony in Chinese cultural society, and the color code should be red, or the character written in gold with a red background. For this item (picture 5), the character “囍” is written in black, which referred to an obsolete tradition of wedding for death. For Chinese cultural society, red usually indexes happiness, which is usually used in wedding and Spring Festival, and black and white is the color code index death, which is usually used in funeral. Because of this, wearing “囍” written in black or white is ominous for people belong to Chinese speaking society. The participant was attracted by the design when purchasing it, and the brand of this item is mainly about gothic style, about death and horror. Using an unacceptable color code for this character to some extent, shows a sense of rebellion which is the main attracting point for the participant. However, when she brought the jacket back home, her parents could not accept the design and asked her to remove the part with the black “囍” (figure 5).



Figure 5. removal of "囍"

7. Conclusion

This study explores printed clothes with texts as linguistic landscape from wearers/agents' perspective. Both printed clothes and owners, as wearers' opinions related to their opinions on different languages printed on clothes were collected. Some texts perform informational function, and they can be seen as an important part for wearers' identity formation and self-expression, which leads to the result that some people avoid wearing printed clothes. The practice of language on printed clothes is determined not only by the wearers themselves but also shaped by the globalized environment. These representation of texts on human's body, to some extent, is a reflection of globalization of English, as well as the capital behind the language itself.

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Research on the Learning Effect of Statics Course by the Problem-Based Learning Method Integrated With Design Thinking

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Abstract
Statics is a mandatory course in the departments of mechanical engineering, aerospace, and shipbuilding, and it can be challenging due to its combination of mathematical and physical concepts that students have previously studied. Typically, traditional teaching methods for statics focus on formula calculations and abstract concepts, which involve a significant number of mathematical equations. This study utilizes the problem-based learning method integrated with design thinking (DTPBL) to explore the teaching of the "Statics" course. The results of this study show that incorporating DTPBL into the statics course enhanced students' motivation to learn, enabled them to actively seek practical situational issues related to statics, improved their problem-solving and innovation abilities, and fostered better interaction between teachers and students.

Keywords: Statics, DTPBL, Learning Motivation, Engineering Education

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Introduction

Learning motivation is an important key factor affecting students' learning outcomes. Students with low learning motivation are less likely to concentrate during class and are less willing to participate in classroom discussions. After analyzing the reasons for low learning motivation among students, it was found that the traditional one-way teaching method is a key factor. Therefore, in order to improve the effectiveness of teaching, teachers should understand how to motivate students' learning motivation and adopt effective teaching methods to positively influence students' learning motivation, enabling students to be more engaged in learning activities (Hofer, 2006). Therefore, it is very important to change the traditional teaching methods and develop new teaching models to enhance students' learning motivation.

Previous literature has proposed various solutions to address this issue, such as the impact of teaching variations on students' achievement motivation (Huang and Duan, 2002) and cooperative learning (Wang, 2012). Problem-solving ability is an important indicator of engineering students' learning outcomes. When students cannot link the course content with practical problems, their interest in learning naturally decreases, and their learning motivation cannot be enhanced. The traditional teaching method has long emphasized the teaching of theoretical knowledge while neglecting the cultivation of understanding and problem-solving ability in practical issues, let alone inspiring students' creative thinking. Therefore, this study employs a problem-based learning approach with design thinking incorporated into the teaching curriculum to cultivate and enhance students' learning motivation and problem-solving ability with creative thinking.

Problem-Based Learning (PBL) is mainly a student-centered learning model that focuses on practical problems and situations for discussion. In addition to triggering students' learning motivation, it can also connect classroom knowledge with life experiences, enhance students' learning interest, and promote self-learning (Norman, Schmidt, 1992). Design Thinking starts with human needs and seeks innovative solutions to various problems. Relevant research results show that Design Thinking courses can promote adults' career development and improve their ability to make self-changes (Burnett, Evans, 2016; Reilly, 2013; Lindsay, 2012).

Statics is a difficult course that includes mathematical and physical concepts that students have learned before. The traditional teaching method is theoretical lecture using chalkboards, without practical problem analysis and exploration of physical models. Problem-based learning has been studied since 2005 by introducing practical engineering problems into engineering courses. The related research results show that compared with traditional teaching methods, students are more motivated to learn (Al-Sarawi, 2005). In addition, a study on the effect of design thinking on college students' learning motivation and learning effectiveness showed that after incorporating design thinking into an electrical engineering project course, students' motivation was significantly increased, and their interest in the course made it more practical-oriented, achieving an effective integration effect (Chang Chia-Ming, Tamkang University, 2020). Therefore, problem-based learning with design thinking can be used as a new innovative teaching model to enhance students' learning motivation and creativity thinking in the field of engineering science.

Research Methodology

The teaching method of this project's curriculum is mainly classroom lectures, supplemented by problem-based learning group discussions. During the course, two practical problems will be selected based on the course content: 1. "PBL Problem 1" for the design of a labor-saving device system, and 2. "PBL Problem 2" for the design of a frictional force system. Through problem-based learning discussions, students will be trained in the ability to apply principles of statics to solve and integrate engineering practical problems. This study will collect information and data on students' learning motivation and attitudes towards the course through a "Learning Motivation Scale." The learning motivation scale used in the project includes three main motivation components: value, expectation, and emotional value.

The scope of data collection required for this teaching practice research is one semester (2021-1 semester), with a teaching time of 18 weeks, including student background information and their level of prerequisite knowledge. The related learning outcome data includes test scores, participation in discussions, practical work scores, DTPBL report scores, as well as student feedback data. Statics is a basic theoretical course, and the course is conducted by the teacher organizing PPT based on the content of the textbook for classroom teaching. In addition to explaining the background of the course, the teacher must also explain the derivation of formulas. After students have a certain level of statics foundation, the DTPBL learning is conducted in the following course content, which is divided into two stages in the plan.

The first stage is conducted after teaching the principles of equilibrium of particle forces, and the topic is "design of labor-saving device systems". This problem is an open practical engineering problem in the field of particle force equilibrium, which is quite challenging for sophomore students. During the DTPBL process, the teacher guides the students to explore the problem-solving direction and clarify the concept content and formula application in practical engineering problems within the scope of this learning. Through this, students' abilities to apply their knowledge of dynamic fundamentals to practical engineering problem-solving and integration are cultivated. In addition, suggestions are provided on the group division method, and students conduct three weeks of group DTPBL discussions. In the learning sheet, students are required to collect data, discuss, propose solutions, and share their thoughts and feelings in groups according to the problem discussion framework. Each group of students can discuss and analyze the problem they choose, propose initial solutions, and leave many reflections and impressions after completion. The second stage of PBL learning takes place after teaching the principle of friction. The topic is "Design of Friction Systems". After three weeks of group discussions, students fill out DTPBL reports. At the end of the semester, each group is arranged to present their results, including design steps, how to choose the best design, how the selected design operates, design content, and conclusions. Students are also asked to conduct peer evaluations in their reports to understand the design strengths and weaknesses of each group.

Results and Discussion

1. DTPBL Feedback Form

In the first stage of problem-based learning exercises, only preliminary discussions and solutions were conducted. Students' views on problem-based learning were generally positive, with 22.06% considering it ordinary and 77.94% considering it helpful or very helpful. This

was reflected in the qualitative data from the reflections and feedback in the DTPBL learning materials. After the midterm exam, when the course entered the topics of friction and rigid body mechanics, the second stage of DTPBL practical engineering problems was practiced. In addition to group discussions, each group was required to write a complete report and present it with a PPT at the end of the term, sharing their design results and accepting challenges and evaluations from their classmates. According to the questionnaire statistics, in the second stage of problem-based learning exercises, 7.34% of students considered it ordinary, while 92.66% considered it helpful or very helpful. The results showed that at this stage, due to a deeper understanding of problem-based learning, students' recognition and appreciation of its usefulness in their learning had significantly increased.

2. Learning motivation scale (pre-test, post-test)

To evaluate the effectiveness of the DTPBL project, a survey was conducted using the Learning Motivation Scale tool on the students. 64 pre-tests and 62 post-tests were collected. The following bar chart is a comprehensive result of a survey on the Learning Motivation Scale. The average scores for each question are shown in Figure 1. The average scores for the pre-test ranged from 2.90 to 4.15. The analysis is shown in Table 1. Figure 2 shows the average scores for the post-test, which ranged from 2.65 to 4.24. The analysis is shown in Table 2.

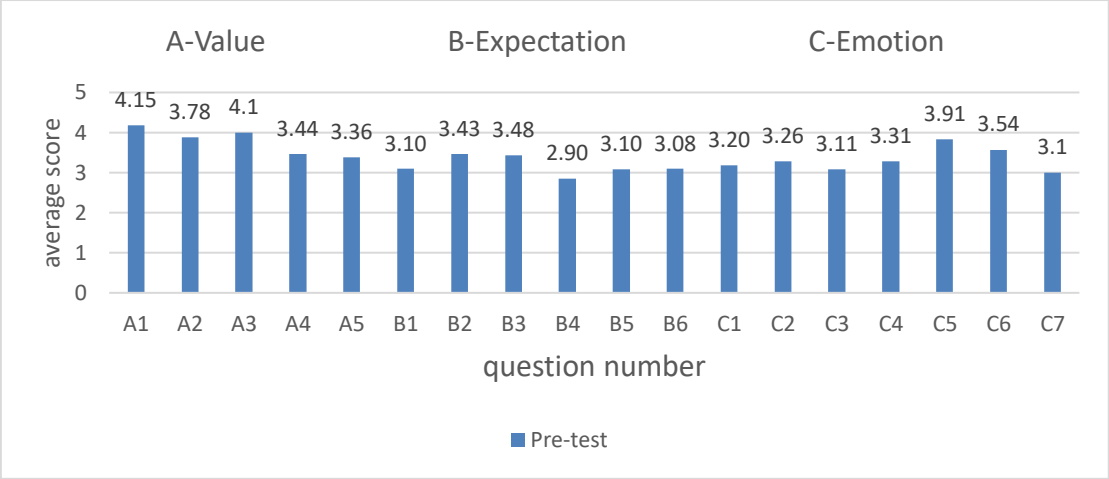


Figure 1. Average scores for each question in the pre-test questionnaire

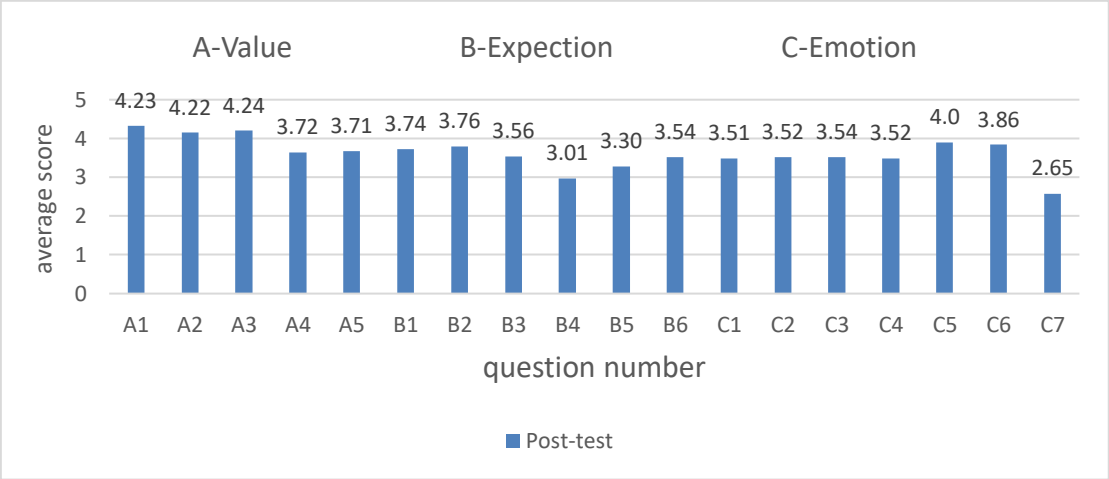


Figure 2. Average scores for each question in the post-test questionnaire

Table 1. Analysis of average scores for the pre-test questionnaire

Dimension	Average
Value(question A1~A5)	3.77
Expect(question B1~B6)	3.18
Emotion (question C1~C6)	3.39
Reverse questionC7	3.10
analysis of high and low scoring questions	
high scoring questions： Question A1: "I think that learning 'statics' is quite important for the subsequent study of mechanical engineering courses." Score: 4.15 Question B3: "I was able to solve the exercises on "Statics" textbook for problem on my own" Score: 3.48 Question C5: "In the 'statics' course, I care about whether or not I understand the content taught by the teacher." Score: 3.91	
low scoring questions： Question A5: "I am very interested in the equilibrium of objects, and actively learn related knowledge in 'statics'." Score: 3.36 Question B4: "I am confident that I can understand the most difficult part of the 'statics' course." Score: 2.90 Question C3: "I am confident that I can achieve good grades in the 'statics' exam." Score: 3.11	
reverse-scored：	
Question C7: "I always feel anxious when I am taking the 'statics' course." Score: 3.10	

Table 2. Analysis of average scores for the post-test questionnaire

Dimension	Average
Value(question A1~A5)	4.02
Expect(question B1~B6)	3.49
Emotion (question C1~C6)	3.66
Reverse questionC7	2.65
analysis of high and low scoring questions	
high scoring questions： Question A3: " I believe that the "Statics" course is important and quite useful for my future work. " Score:：4.24 Question B2: "I am confident that I can learn the basic theory taught in 'statics'." Score:3.76 Question C5: "In the 'statics' course, I care about whether or not I understand the content taught by the teacher." Score: 4.00	
low scoring questions： Question A5: " I am interested in the phenomenon of object equilibrium and actively learning related knowledge on "statics". " Score:3.71 Question B4: "I am confident that I can understand the most difficult part of the 'statics" Score:3.01 Question C1: "I always feel happy when I am taking the 'statics' course." Score: 3.51	
reverse-scored：	
Question C7: "I always feel anxious when I am taking the 'statics' course." Score:2.65	

Then compare the changes in satisfaction with the pre-test and post-test, as shown in the radar chart in Figure 3. Overall, the post-test score has improved compared to the pre-test.

Evaluation of value: the average of questions A1~A5 is 3.77 to 4.02, slightly improved; evaluation of expectations: the average of questions B1~B6 is 3.18 to 3.49, slightly improved; evaluation of emotion: question The average of C1~C6 is 3.39 to 3.66, a slight increase; on the reverse question: question C7 dropped from 3.10 to 2.65. Finally, according to the pre-test and post-test learning motivation scale survey, after the introduction of DTPBL, the impact on students' learning can be obtained as follows:

1. Students agree that statics is an interesting course significantly improved.
2. Significant improvement in students' acceptance of statics as a useful and practical course.
3. Students' confidence in studying the statics course has improved significantly.
4. Students are more confident in learning the difficult content of statics.
5. Students can experience the fun of learning more in the course of statics.
6. Students are more focused on their studies in statics courses.
7. Students feel less anxious in the statics course.

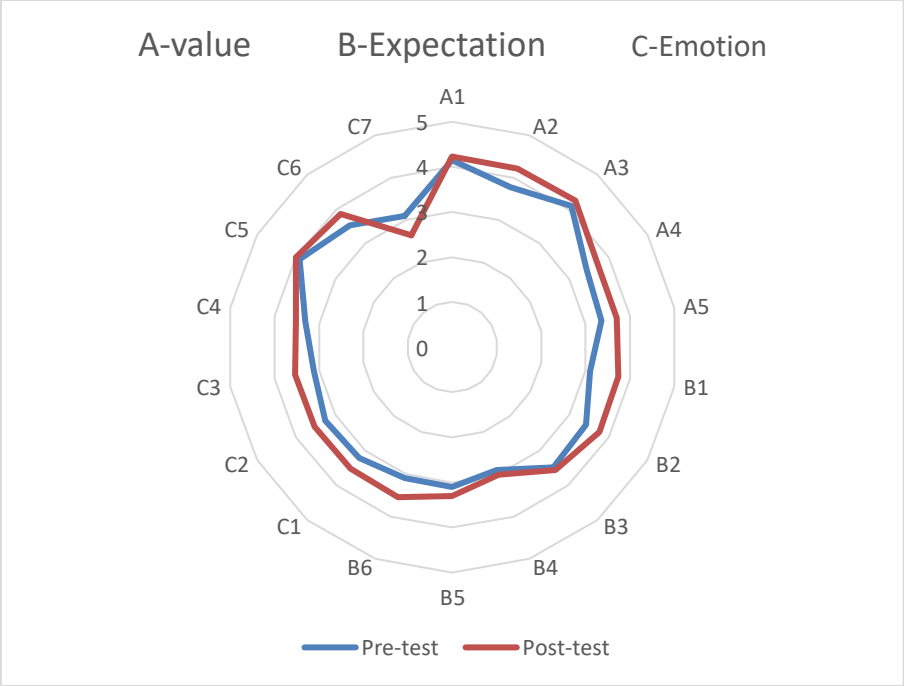


Figure 3. Radar chart comparing pre-test and post-test

In terms of learning outcomes, the average grade for the 2021-2 semester (the semester in which the project was implemented) was 73.95. The highest score was 93, the lowest was 50, and there were 2 failures. The average grade for the 2022-2 semester was 73.39. The highest score was 95, the lowest was 50, and there were 5 failures. The average grade during the semester of project implementation increased by 0.76% (Figure 4), and the number of failures decreased to 3. The grade distribution for the two semesters is shown in Figure 5. There are many factors that affect the average grades of a semester, and due to the implementation of innovative teaching methods, the calculation of grades is different, making it difficult to compare directly. However, from the qualitative feedback, it is clear that there has been a change in students' learning attitudes. This can also be seen from the survey on the motivation scale for learning, where significant results are evident in terms of values, expectations, and emotions.

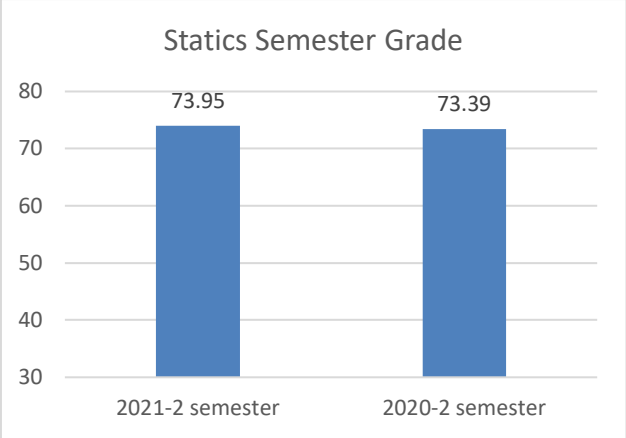


Figure 4. Statics Semester Grade

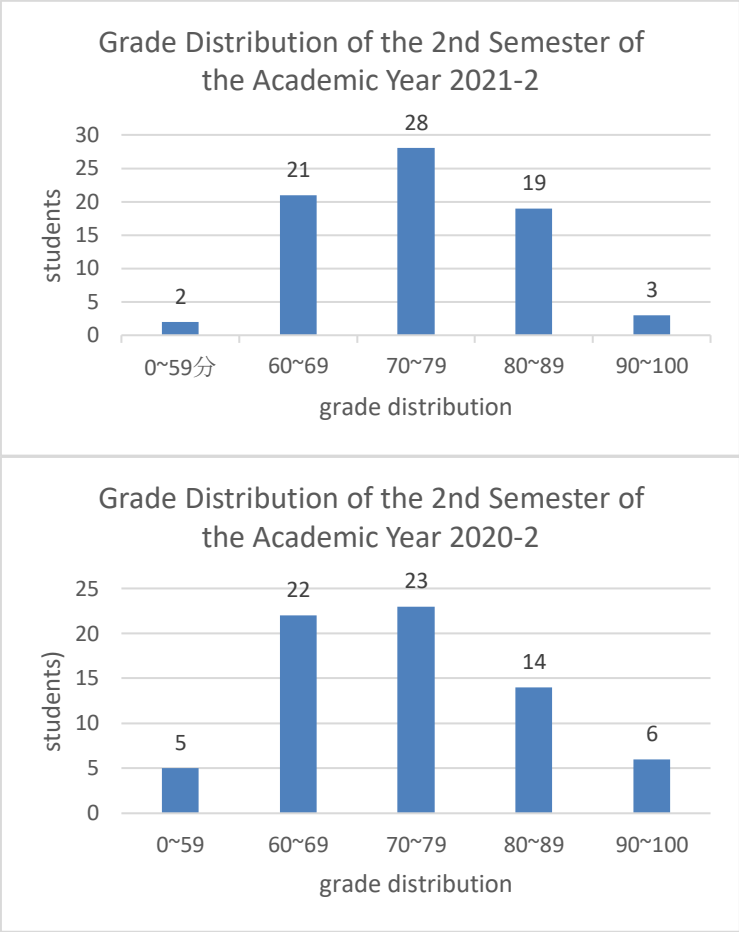


Figure 5. Histogram of Statics Semester Grade Distribution (The Academic Year 2020, 2021)

Conclusions

The results of this study indicate that the introduction of DTPBL in the statics course has led to enhanced student motivation for active learning. Students were able to actively seek out practical issues related to statics and improve their problem-solving skills, while also increasing interaction between students and teachers. The use of DTPBL also had a positive impact on student motivation in terms of value, expectation, and emotion. However, some

students still found it difficult to participate in group discussions, possibly due to their long-standing habit of passive learning. Overall, students' efforts to adapt to the new teaching method under the guidance of the teacher were apparent from their qualitative feedback. Due to time, budget, and equipment constraints, PBL project design could only be presented in written form and simulation. It may be possible to improve this in the future through the use of materials such as paper clay models or 3D printing. The results of this study demonstrate that the appropriate introduction of DTPBL in traditional courses can be an effective way to improve teaching and should be promoted and applied to related engineering courses.

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A Study on the Differences in Perspectives of Cyber-Bullying Between Korea and Japan

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Abstract
South Korea and Japan are the top IT powerhouses in East Asia. Teenagers are taking lessons and forming social relationships such as peer relations through the Internet. Accordingly, cyberbullying by teenagers is increasing and this is a serious social problem. In this study, we focused on cyberbullying by teenagers, which commonly experience of Japan and South Korea, and we analyzed the differences in perspectives of definitions, causes, and others. We searched studies written since 2010(69 in South Korea and 33 in Japan), used keywords 'cyberbullying' and 'net Ijime'. In results, Studies of Japan defined cyberbullying as verbal violence (smearing and slandering) using computers and mobile phones, leaking of false and personal information, and excluding someone from the group. South Korea added insulting activities, intentionality and repeating to Japan's definition. Looking at the causes of the cyberbullying, Japan and South Korea acknowledging that there are personal, relational, and social factors, but there were some differences in specific contents. Studies of Japan are focusing on the role of parents, the bystanders in the classroom, the 'Ijime' culture, and climate of accepting ostracism as main causes. Meanwhile, Studies of South Korea are discussing the impact of social networks such as parents' negative parenting attitudes and peer groups strongly. By increasing opportunities for South Korean and Japanese researchers to exchange cyberbullying research results and communicate about methods, it is expected that the damage of cyberbullying of teenagers in both countries can be reduced and healthy culture and growth of Internet can be promoted.

Keywords: Teenagers, Cyberbullying, South Korea and Japan

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Introduction

South Korea and Japan are the top IT powerhouses in East Asia, and the Internet and smartphones are used as daily tools and essential resources for many members of society. In particular, teenagers in both countries conduct most of their daily lives through the Internet and smartphones. According to the 2022 National Youth Policy Institute (NYPI) report in Korea, The 2020 Ministry of Internal Affairs and Communications (MIC) paper in Japan, and the results of the Meiko Network Japan 2019 survey, 98% of Korean teenagers and 90% of Japanese teenagers own a smartphone. Also, 98% of Korean teenagers and 98.4% of Japanese teenagers use the Internet, and 80.5% of Japanese teenagers answered that they use SNS. Teenagers complete school education curriculum and obtain information through the Internet and smartphones, and use them as an important means of peer and interpersonal relationships. However, it was found that teenagers in both countries are in trouble due to the problem of cyberbullying(Nam & Kweon, 2013; Cho, 2013b; Hara et al., 2021; Nishino, 2015).

The term cyberbullying was first used in 2000 by the Crimes Against Children Research Center at the University of New Hampshire in the United States. In Korea, cyberbullying is also referred to by various terms such as “Online Bullying” or “Cyber-Violence.” In Korea, the “Act on the Prevention of And Countermeasures Agaionst Violence in Schools” (abbreviated as “the Act on the Prevention of Violence in Schools”) amended on November 19, 2014 defines cyberbullying as “Behavior in which students continuously and repeatedly inflict psychological attacks on specific students using information and communication devices such as the Internet and mobile phones, or spread personal or false information related to specific students to make the other person feel pain”. In Japan, cyberbullying is defined as “Actions such as uploading gossip, slander, or slander of a specific person on a bulletin board of a website on the Internet through a mobile phone or computer, or by sending e-mails, etc.” in “Investigation into the collapse of the support system for the Ijime problem” announced by the Ministry of Education, Culture, Sports, Science and Technology in 2006 (Kim & Jeong, 2016; Adachi & Morimoto, 2011).

South Korea and Japan are currently accepting the ever-increasing problem of cyberbullying and bullying of teenagers as a serious social problem, and are seeking ways to minimize the damage caused by youth cyber bullying, which is becoming more sophisticated and sophisticated day by day(Kim & Han, 2020; Shin, 2017; Joo & Lim, 2017; Choi, 2014; Utsumi, 2010; Takeuchi, 2012; Fuji & Yoshida, 2012). According to a survey by the Korea Communications Commission and the Korea Internet & Security Agency, 29.2% of South Korean teenagers responded that they had experienced cyberbullying, and 30.3% said that they had experienced being victimized. 8.7% of Japanese teenagers said they had also been victims of cyberbullying(Hara et al., 2021).

Previously, the main behavior of cyberbullying was the act of spreading rumors using simple messages or e-mails, or the act of harassing the opponent with slanderous words. However, in recent years, the malice and intentionality of the purpose of the act have reached a serious level, and the method of bullying has become so sophisticated and complex that it is difficult to respond immediately from the outside and normalize and recover the victim(Nakamura & Teraguchi, 2016; Aoyama et al., 2018; Horiuchi et al., 2020; Nonaka & Morinaga, 2021). In other words, the virtual world of the Internet and the characteristics of SNS, such as anonymity, rapid spread, and instant feedback are used as a means for harassment(Nishiguchi & Toriumi, 2020). In addition, it tends to appear in the form of convergence with other types of crimes such as sex crimes, stalking, abuse and violence, gambling and drugs(cho, 2017). It

was found that cyberbullying victim experience in adolescence brings physical, emotional, and mental difficulties. Trauma can impact adulthood. As adolescence is an important stage of development, cyberbullying is a problem that requires social interventions(Horiuchi et al., 2020; Yang & Hong, 2016; Oh, 2013; Cho & Baik, 2021).

In this study, the reasons for choosing Korea and Japan particularly and looking at the differences in the direction and perception of cyberbullying in academia are as follows. This is because these two countries are liberal democracies located in Far East Asia and have a common point of having capitalist economic ideology and economic structure. In addition, there are many similarities between the youths of the two countries (e.g., high school dependence, entrance exam-oriented education, extreme stress due to academic work, anomie experience between Confucian family structure and open social structure, etc.). Lastly, it is because the society accepts the cyber bullying problem of teenagers as a serious social problem. In addition, as mentioned above, both countries are experiencing social difficulties due to the recent increase in cyber bullying among teenagers, and they are highly willing to find solutions. In this study, we focused on cyberbullying by teenagers, which commonly experience of Japan and South Korea, and we analyzed the differences in perspectives of definitions, causes, and others. Through the results, it is expected to find differences and similarities in the perspectives on cyberbullying in the academia of the two countries. It will provide the academic world of both countries with an opportunity to interpret the cyber bullying problem from a broad perspective, and provide a positive opportunity to find an effective way to rescue teenagers suffering from cyberbullying and grow into healthy members of society.

The research question is:
1. How do South Korea and Japan define cyberbullying?
2. What are the causes of cyberbullying in South Korea and Japan?

Method

In Japan, the term 'Netijime' is mainly used. Therefore, we searched for papers with the keyword ‘Net Ijime’ in the title on the J-STAGE site of ”Scientific and Technical Electronic Journal Platform System of Japan”, and among them, 33 studies that analyzed the definition and cause of occurrence were selected and analyzed. In RISS, a Korean academic search site, all papers with the keyword ‘cyberbullying’ in the title were found since 2010, and 69 papers that explored the cause of cyberbullying were selected and analyzed. Meta-analysis of preceding research trends, scale development, program development and evaluation, and papers discussing legal/ethical countermeasures in other countries were excluded from the analysis.

In this study, we focused on teenagers cyberbullying, which Japan and Korea are experiencing in common, and conducted study to analyze the research trend. The analysis method is descriptive analysis and thematic analysis. Descriptive analysis is an analysis that examines the quantitative trend of research by period(year), that is, the trend such as the number of papers and the percentage increase or decrease. Thematic analysis is a method mainly used in literature research, and it is a method of identifying topics preferred by researchers by arranging the results according to the subject to be analyzed.

Results

1) Descriptive analysis

(1) Analysis of Research Trends by Period

The frequency of research reflects the importance of the subject. The first study of cyber bullying in Korea was conducted in 2010 by Eun Jung Oh. The purpose of this study is to investigate the actual situation of cyberbullying as a new form of bullying at the time.

In South Korea, research on cyberbullying began after 2010, but it can be said that the study began in earnest after 2013. Research on cyber bullying has been continuously conducted, but recently, a slight decrease trend is seen. In Japan, research on cyber bullying began actively after 2010, and it was found that research on it was conducted in various fields until 2015. From 2016, interest in cyber bullying showed a slight decline, but it can be seen that related studies have increased since 2019.

	Before 2010	2010-2012	2013-2015	2016-2018	2019-2021	2022	Total
South Korea	-	1	16	27	21	4	69
Japan	-	12	13	3	5	-	33

Table 1: Number of studies by year

(2) Analysis of Research Methodology

Quantitative research method is a method that can reveal the relationship between variables through a large amount of objective data, and qualitative research method is a method of approaching and analyzing from the point of view of 'as is' as much as possible. Through these two research methods, it is expected that cyberbullying can be looked at from various angles. As shown in the table below, 88.4% of a total of 69 Korean studies analyzed cyber bullying through quantitative research methods. There were 7 studies using qualitative research methods, and only 1 study using mixed research. In Japan, 24 studies, 72.7% of the total 33 studies, analyzed cyberbullying through quantitative research methods, and 6 studies used qualitative research methods.

In South Korea and Japan, cyberbullying research was mainly conducted through quantitative rather than qualitative research. The ratio of qualitative & mixed research was higher in Japan than in South Korea. It can be seen that South Korea is relatively less interested in understanding what cyber bullying means to both victims and perpetrators than Japan, and the nature and inherent characteristics of cyber bullying experienced by each person. On the other hand, it is considered that Japan needs more objective approach and analysis of cyberbullying than Korea, and the process of finding objective variables that can explain the social phenomenon of cyberbullying needs to be further strengthened.

	nation	List of studies
Quantitative research	South Korea (61/88.4%)	Lee, I. T. (2012), Kim, J. K. (2013), Nam, S. I. (2013), Sim, H. I. (2013), Cho, Y. O. (2013)a, Kim, H. Y. (2014), Lee, A. R. (2014), Hong, K. S. (2014), Noh, S. H. (2015), Mun, C. B. (2015), Shin, S. R. (2015), Jun, D. S. (2015), Choi, J. O. (2015), Choi, H. (2015), Kim, S. J. (2016), Kim, E. J. (2016), Park, Y. S. (2016), Baek, J. E. (2016), Shin, S. R. (2016)a, Shin, S. R. (2016)b, Yang, Y. S. (2016), Lee, S. W. (2016), Lee, J. M. (2016), Cho, Y. K. (2016), Choi, J. O. (2016), Na, H. Y. (2017), You, S. M. (2017) a, You, S. M. (2017) b, Yun, I. H. (2017), Joo, M. H. (2017), Ko, S. Y. (2018), Park, J. H. (2018), Song, Y. R. (2018), Woo, J. J. (2018), Lee, S. S. (2018)a, Lee, S. S. (2018) b, Lee, S. B. (2018), Choi, Y. (2018), Hwang, H. W. (2018), Kang, S. K. (2019), Seong, G. J. (2019), Lee, S. S. (2019), Kang, S. J. (2020), Seong, G. J. (2020), Yun, J. H. (2020), Lee, S. Y. (2020), Lee, H. W. (2020), Cho, C. B. (2020), Goh, H. B. (2021), Kim, N. H. (2021), Kim, D. H. (2021), Kim, J. Y. (2021)a, Kim, J. Y. (2021)b, Kim, J. Y. (2021)c, Park, H. J. (2021), Lee, S. C. (2021), Jun, J. H. (2021), Kim, Y. J. (2022), Park, S. U. (2022), Woo, I. K. (2022), Yu, J. H. (2022)
	Japan (24/72.7%)	Nishiguchi, M. (2020), Fuji, K. (2014), Mishima, K. (2015), Utsumi, S. (2010)a, Nonaka, R. (2021), Aoyama, I. (2017), Hara, K. (2014), Hara, K. (2020), Horiuchi, Y. (2020), Harada, E. (2013)a, Kanetsuna, T. (2014), Hara, K. (2021), Nakazato, S. (2011), Hara, K. (2010), Hara, K. (2012), Nagaura, H. (2011), Aoyama, I. (2015), Harada, E. (2013)b, Aoyama, I. (2012), Nishino, Y. (2015), Utsumi, S. (2010)b, Aoyama, I. (2014), Kanetsuna, T. (2015), Fuji, K. (2012)
Qualitative research	South Korea (7/10.1%)	Oh, S. Y. (2013), Song, J. Y. (2014), kang, C. K. (2017), Cho, Y. O. (2017), Lee, J. W. (2019), Lee, S. R. (2021), Lee, J. E. (2021)
	Japan (6/18.2%)	Tagawa, T. (2012), Kurokawa, M. (2017), Adachi, S. (2011), Kagawa, N. (2014), Nakamura, K. (2016), Takeuchi, K. (2012)
Mixed methods research	South Korea (1/1.5%)	Park, S. H. (2015)
	Japan (3/9.1%)	Kato, Y. (2012), Kurokawa, M. (2015), Kanoh, H. (2014)

* In the list of papers, two or more authors is marked as one representative.

Table 2: Analysis of research methodology

2) Thematic analysis

(1) What is cyber bullying? : Definition of Cyberbullying

Both Korea and Japan have an official definition of cyber bullying in terms of both law and policy, and it was found that they have a great commonality about the concept of cyber bullying even within the academic world. However, there are also some differences in the definition of cyberbullying from the academic world of the two countries. These three meanings of ‘Electronic media use, Personal information leakage, Peer Bullying’ were commonly included in important definitions in both countries.

South Korea emphasizes the content of ‘Intentional and repeated bullying, Verbal violence, Shame' in the definition, and Japan emphasizes ‘Slander and mudslinging, Production and spread of rumors' as an important cyberbullying behaviors.

	List of studies
Intentional and repeated bullying	Park, S. H. (2015), Jun, D. S. (2015), Goh, H. B. (2021), Kim, E. J. (2016), Ko, S. Y. (2018), Lee, S. C. (2021), Park, S. U. (2022), Lee, S. B. (2018), Kim, D. H. (2021), You, S. M. (2017) b, Lee, S. R. (2021), Noh, S. H. (2015), Choi, H. (2015), Lee, A. R. (2014), Oh, S. Y. (2013), Nam, S. I. (2013)
Electronic media use	Park, S. H. (2015), Jun, D. S. (2015), Goh, H. B. (2021), Kim, E. J. (2016), Ko, S. Y. (2018), Lee, S. C. (2021), Mun, C. B. (2015), Yun, J. H. (2020), kang, C. K. (2017), Joo, M. H. (2017), Woo, J. J. (2018), Park, H. J. (2021), Kim, H. Y. (2014), Yu, J. H. (2022), Park, S. U. (2022), Lee, S. S. (2019), Seong, G. J. (2020), Lee, S. B. (2018), Lee, J. E. (2021), Song, Y. R. (2018), Kim, J. Y. (2021)a, Cho(2013)a, Kim, D. H. (2021), Choi, Y. (2018), Kim, J. K. (2013), Lee, J. M. (2016), Lee, H. W. (2020), Seong, G. J. (2019), Cho, Y. K. (2016), Cho, C. B. (2020), Kim, J. Y. (2021)b, Shin, S. R. (2016) a, Shin, S. R. (2015), Lee, S. W. (2016), You, S. M. (2017) a, Choi, J. O. (2016), Cho(2017), Lee, S. R. (2021), Park, J. H. (2018), Park, Y. S. (2016), Jun, J. H. (2021), Kim, N. H. (2021), Kang, S. J. (2020), Lee, I. T. (2012), Yang, Y. S. (2016), Lee, J. W. (2019), Choi, H. (2015), Lee, A. R. (2014), Lee, S. S. (2018) a, Choi, J. O. (2015), Oh, S. Y. (2013), Yun, I. H. (2017), Lee, S. S. (2018)b, Kim, S. J. (2016), Song, J. Y. (2014), Woo, I. K. (2022), Kang, S. K. (2019), Shin, S. R. (2015), Kim, J. Y. (2021)c, Kim, Y. J. (2022), Baek, J. E. (2016), You, S. M. (2017) b, Lee, S. Y. (2020), Hwang, H. W. (2018), Sim, H. I. (2013)
Verbal violence	Kim, E. J. (2016), Yu, J. H. (2022), Lee, S. R. (2021), Park, Y. S. (2016), Lee, I. T. (2012), Na, H. Y. (2017), Choi, H. (2015), Lee, A. R. (2014), Oh, S. Y. (2013), Sim, H. I. (2013), Nam, S. I. (2013)
Personal information leakage	Kim, E. J. (2016), Shin, S. R. (2016) a, Lee, I. T. (2012), Na, H. Y. (2017), Choi, H. (2015), Oh, S. Y. (2013), Shin, S. R. (2015), Nam, S. I. (2013)
Shame	Kim, E. J. (2016), Yu, J. H. (2022), Lee, S. B. (2018), Shin, S. R. (2016) b, Lee, S. R. (2021), Lee, I. T. (2012), Nam, S. I. (2013)
Peer Bullying	Goh, H. B. (2021), Yu, J. H. (2022), Lee, J. E. (2021), Noh, S. H. (2015), Lee, I. T. (2012), Na, H. Y. (2017), Choi, H. (2015), Lee, A. R. (2014), Oh, S. Y. (2013), Sim, H. I. (2013), Nam, S. I. (2013)

Table 3: Definition of Cyberbullying (South Korea)

	List of studies
Electronic media use	Nishiguchi, M. (2020), Fuji, K. (2014), Mishima, K. (2015), Tagawa, T. (2012), Utsumi, S. (2010), Kurokawa, M. (2017), Aoyama, I. (2017), Hara, K. (2014), Adachi, S. (2011), Hara, K. (2020), Horiuchi, Y. (2020), Hara, K. (2021), Hara, K. (2010), Kato, Y. (2012), Kagawa, N. (2014), Harada, E. (2013)a, Hara, K. (2010), Nagaura, H. (2011), Aoyama, I. (2015), Harada, E. (2013)b, Utsumi, S. (2010)a, Aoyama, I. (2012), Nishino, Y. (2015), Tekeuchi, K. (2012), Fuji, K. (2012)
Slander and mudslinging	Nishiguchi, M. (2020), Fuji, K. (2014), Tagawa, T. (2012), Utsumi, S. (2010)b, Nonaka, R. (2021), Kurokawa, M. (2017), Hara, K. (2014), Adachi, S. (2011), Harada, E. (2013)a, Kanetsuna, T. (2014), Kagawa, N. (2014), Hara, K. (2012), Nagaura, H. (2011), Kurokawa, M. (2015), Nishino, Y. (2015), Harada, E. (2013)b, Kanetsuna, T. (2015), Takeuchi, K. (2012), Fuji, K. (2012), Kanoh, H. (2014)
Production and spread of rumors	Fuji, K. (2014), Utsumi, S. (2010)b, Hara, K. (2014), Kanetsuna, T. (2014), Kanoh, H. (2014), Fuji, K. (2012)
Personal information leakage	Fuji, K. (2014), Hara, K. (2014), Kanetsuna, T. (2014), Kagawa, N. (2014), Hara, K. (2012), Nagaura, H. (2011), Kanetsuna, T. (2015),
Peer Bullying	Aoyama, I. (2017), Kato, Y. (2012), Kagawa, N. (2014), Nakamura, K. (2016), Nishino, Y. (2015), Kanoh, H. (2014), Takeuchi, K. (2012)

Table 4: Definition of Cyberbullying (Japan)

(2) What is the cause of cyberbullying? : Causes of Cyberbullying

Both Korea and Japan are trying to find the cause of cyberbullying by approaching it from various aspects, and commonly classify it into personal, relational, and socio-environmental factors. South Korea argues that cyber bullying is caused by a combination of socio-

environmental factors; Individual factors such as 'Individual negative temperament and lack of competence, Exposure to violence, Internet/smartphone addiction, Psychological difficulties, and relationships with parents, Dependent relationships with peers, Limited social relationships, Online anonymity, Lack of environmental support, Lack of education and perception, etc'. The process of deriving the core themes of the causes of cyber bullying revealed by Korean studies is summarized in <Table 5> below.

On the other hand, Japan, like Korea, tried to find the cause by classifying it into personal, relational, and socio-environmental factors. However, there was a difference in the details of the specific cause. Japan's approach to personal factors was very similar to Korea's (Individual negative temperament and lack of competence, Exposure to violence, Internet/smartphone addiction, Psychological difficulties, etc.), and education was considered important. In addition, it was analyzed that there are relational factors such as 'Apathy in the classroom, Maladjustment, Absence of parental roles'. It was different from Korea, which analyzed the lack of parental roles and negative parenting attitudes as important factors triggering cyberbullying. In addition, Japan differed from Korea in that it pointed out the problems inherent in the social climate, the atmosphere throughout society, and the culture itself, and strongly emphasized the need for improvement. The causes of cyber bullying revealed by Japanese studies are summarized in <Table 6> below.

	main subject	causes	detailed causes	List of studies
Personal factors	Individual negative temperament and lack of competence	Lack of morals and ethics	Low ethical awareness in SNS	Park, S. H. (2015), Mun, C. B. (2015)
			moral departure	Joo, M. H. (2017)
			lack of moral guilt	Nam, S. I. (2013)
			antisocial tendency	Park, H. J. (2021)
			Recognition as a play culture	Oh, S. Y. (2013)
		Lack of empathy	low emotional intelligence	Yu, J. H. (2022)
			Low cognitive and emotional empathy	Goh, H. B. (2021)
			Sensation Seeking Tendency	Lee, S. B. (2018)
		strong aggression	aggression	Woo, J. J. (2018), Seong, G. J. (2020), Kim, J. Y. (2021)a, Kim, J. Y. (2021)b, Kim, N. H. (2021), Yang, Y. S. (2016), Choi, H. (2015), Lee, A. R. (2014), Woo, I. K. (2022)
			decreased ability to control anger	You, S. M. (2017) b
			Impulsivity	Nam, S. I. (2013)
		negative self-image	low self-control	Park, S. H. (2015), Kim, H. Y. (2014), Lee, S. S. (2019), Shin, S. R. (2016) b, Park, Y. S. (2016), Noh, S. H. (2015), Choi, H. (2015), Lee, S. S. (2018) a, Kim, S. J. (2016),

				Baek, J. E. (2016)
			low self-esteem	Hwang, H. W. (2018), Lee, S. C. (2021)
			low self-resilience	Lee, S. S. (2018) b
	Exposure to violence	direct violence victimization experience	Cyberbullying experience	Park, S. H. (2015), Yu, J. H. (2022), You, S. M. (2017)a, Kim, J. Y. (2021)c, You, S. M. (2017)b, Sim, H. I. (2013)
			experience of verbal abuse	Jun, D. S. (2015)
			Bullying experience in off-line	Kim, H. Y. (2014), Seong, G. J. (2020), Kim, D. H. (2021)
			experience of physical violence	Kim, J. K. (2013)
			experience of violence in school	Cho(2013)a, Seong, G. J. (2019), Kim, J. Y. (2021)b, Lee, S. R. (2021), Park, Y. S. (2016), Yang, Y. S. (2016)
			discrimination experience	Seong, G. J. (2019)
			Experience with disclosure of personal information	Park, S. U. (2022)
		Indirect Violence Witness Experience	Cyberbullying Witness Experience	Lee, A. R. (2014)
			violence Witness Experience	Shin, S. R. (2016) a
			indirect witness experience(Internet, games, electronic media, etc.)	Shin, S. R. (2016) a
	Internet/smartphone addiction	Internet/smartphone overuse	Smartphone overuse	Woo, J. J. (2018), Kim, J. Y. (2021)a, Lee, A. R. (2014), Park, H. J. (2021),
			Internet overuse	Park, J. H. (2018), Park, Y. S. (2016), Sim, H. I. (2013)
			SNS overuse	Park, S. U. (2022), Lee, A. R. (2014)
		Dependency	smartphone overdependence	Kang, S. K. (2019)
			internet overdependence	Shin, S. R. (2015)
			SNS overdependence	Jun, J. H. (2021)
	Psychological difficulties	depression and anxiety	Anxiety	You, S. M. (2017) a, Choi, J. O. (2016)
			Depression	You, S. M. (2017) a, Kim, N. H. (2021)
		Unresolved emotions	Difficulty relieving stress	Park, S. H. (2015)
			Unresolved underlying anger	Lee, S. W. (2016), You, S. M. (2017) b
		stress accumulation	academic stress	Kim, J. K. (2013),

				Choi, J. O. (2016)
			Lack of stress relief ability	Choi, J. O. (2015)
Relational factors	Negative relationships with parents	Parenting Attitude	Parent's Neglecting Attitude	Ko, S. Y. (2018), Kim, N. H. (2021)
			parent's abuse	Lee, S. C. (2021)
			Negative Parenting Attitudes	Yun, J. H. (2020)
			overprotection	Song, Y. R. (2018), Kim, Y. J. (2022)
			Weak control of the Internet	Cho(2013)a
			psychological control	Baek, J. E. (2016)
			verbal abuse of parents	Nam, S. I. (2013)
			Lack of interest in child's school life	Kim, D. H. (2021)
		stress in the family	stress from parents	Yun, J. H. (2020), Kang, S. J. (2020), Kang, S. K. (2019)
			low relationship satisfaction with children	Park, H. J. (2021)
		Psychological Isolation	constant conflict with parents	Kim, D. H. (2021), Shin, S. R. (2015), Kim, S. J. (2016)
			Lack of activity with parents	Shin, S. R. (2015)
			tension with parents	Lee, S. S. (2018) a, Kim, S. J. (2016)
	Dependent relationships with peers	satisfying the need to belong	Peer group pressure	Joo, M. H. (2017)
			Norms within the peer group	Park, S. H. (2015), Cho, Y. K. (2016)
			strong peer relationship	Lee, S. B. (2018)
			negative relationships with friend	Choi, H. (2015)
			Maintaining negative relationships with friend	Nam, S. I. (2013), Lee, J. M. (2016)
			relational aggression	Kim, Y. J. (2022)
		lack of healthy relationship with peers	contact with limited persons	Lee, S. S. (2019)
			Lack of support from friends	Kim, S. J. (2016)
			Lack of communication opportunities with peers	Shin, S. R. (2015), Jun, J. H. (2021)
			lack of face-to-face activities	Lee, H. W. (2020)
		stress in school life	stress in school life	Kang, S. J. (2020)
			dissatisfaction in school life	Kim, E. J. (2016)
			School Maladjustment	Ko, S. Y. (2018)
	Limited social relationships	Negative relationship with teachers	Lack of attention from teachers	Kim, D. H. (2021)
			Lack of activity with teachers	Shin, S. R. (2015),
		social isolation	interpersonal	Park, S. U. (2022)

			relationships online	
			Lack of social connections	Lee, S. W. (2016)
			low social support	You, S. M. (2017) b
Socio-environmental factors	Online anonymity	anonymous environments		kang, C. K. (2017), Lee, S. B. (2018)
	environmental support	Low social participation		Jun, D. S. (2015)
		vulnerable living conditions		Yun, I. H. (2017)
	Lack of education and perception	a neglectful environment		kang, C. K. (2017)
		lack of prevention education		Lee, S. W. (2016)
		lack of understanding of self-competence		Hwang, H. W. (2018)
		understanding and perception		Hong, K. S. (2014)
		lack of cyberbullying research and observation		Hong, K. S. (2014)

Table 5: Analysis of the trigger cause of cyberbullying (South Korea)

	main subject	causes	detailed causes	List of studies
Personal factors	Individual negative temperament and lack of competence	Lack of morals and ethics	lack of guilt	Nishiguchi, M. (2020), Hara, K. (2014), Nakamura, K. (2016), Kanetsuna, T. (2015)
			pleasure-seeking tendency	Horiuchi, Y. (2020)
			power-seeking tendency	Horiuchi, Y. (2020)
			Achieving a sense of superiority through trampling on others	Horiuchi, Y. (2020)
		lack of empathy		Harada, E. (2013)b
		strong aggression	Bipolar aggression	Hara, K. (2020)
			aggression in relationships	Utsumi, S. (2010)b
		negative self-image	lack of control	Utsumi, S. (2010)a
			Lack of self-control	Utsumi, S. (2010)a
			virtual competence	Aoyama, I. (2014)
	Exposure to violence	relational bullying		Utsumi, S. (2010)b
		cyberbullying victimization		Aoyama, I. (2012)
	Internet/smartphone addiction	Overuse	Internet overuse	Kurokawa, M. (2017), Kato, Y. (2012), Hara, K. (2012), Utsumi, S. (2010)a, Fuji, K. (2012)
			Smartphone overuse	Kurokawa, M. (2017), Kato, Y. (2012), Hara, K. (2012), Utsumi, S. (2010)a, Fuji, K. (2012)
		Increase in smartphone usage		Kato, Y. (2012), Kurokawa, M. (2017)
	Psychological difficulties	depression and anxiety	Anxiety	Nagaura, H. (2011)
			Depression	Fuji, K. (2014)
			Learned helplessness	Fuji, K. (2014)
			unfair feelings	Nagaura, H. (2011)
	Academic background	Differences in educational level		Hara, K. (2020), Hara, K. (2012)
		damage caused by educational improvement		Hara, K. (2010)
Relational factors	Apathy in the classroom	A bystander atmosphere in the classroom		Aoyama, I. (2017), Kurokawa, M. (2015)
		lack of awareness among		Aoyama, I. (2017),

		bystanders to school violence	Kurokawa, M. (2015)
		lack of solidarity	Nakamura, K. (2016)
		fear of revenge	Hara, K. (2014)
	School Maladjustment	Negative friendships	Aoyama, I. (2015)
		poor adaptability in school	Fuji, K. (2014)
	Absence of parental roles	Separation from healthy adults	Kagawa, N. (2014)
		lack of objective awareness of teenagers	Utsumi, S. (2010)b
		lack of control within the home	Utsumi, S. (2010)b
Socio-environmental factors	Online anonymity	anonymous environments	Fuji, K. (2014), Kanetsuna, M. (2014), Hara, K. (2012)
		Difficult to identify perpetrator	Fuji, K. (2014)
	overall social moods and culture	Lack of internet etiquette and manners	Hara, K. (2021)
		belief in a fair world	Nonaka, R. (2021)
		permissive atmosphere for Secondary offense	Nonaka, R. (2021)
		permissive atmosphere for slander	Fuji, K. (2012)
		bullying culture	Adachi, S. (2011)
		school climate	Nishino, Y. (2015)
		stalking culture	Adachi, S. (2011)
		weakening control over students	Takeuchi, K. (2012)
		a sense of division due to polarization	Hara, K. (2020)
	Lack of education and perception	Lack of cyberbullying prevention education	Aoyama, I. (2017), Harada, E. (2013)b
		lack of Internet Manners and Etiquette education	Adachi, S. (2011), Nakazato, S. (2011), Kanetsuna, M. (2015), Kanoh, H. (2014)
		lack of parental awareness of cyberbullying	Hara, K. (2010)
		poor counseling for victims	Harada, E. (2013)b
		lack of ability to respond to a crime	Takeuchi, K. (2012)
		lack of research on the psychological process of cyberbullying behavior	Fuji, K. (2012)

Table 6: Analysis of the trigger cause of cyberbullying (Japan)

Conclusion

1) Summary of research results

Through this study, it was possible to find out how cyber bullying is defined in the academic world in Korea and Japan, and what causes cyber bullying is viewed as being triggered. The results of a detailed analysis of cyberbullying research on 69 Korean and 33 Japanese films were as follows.

First, looking at research trends, cyberbullying research started in 2010 in Korea and in 2008 in Japan, and research has been actively conducted continuously. As a result of analyzing 69 Korean studies and 33 Japanese studies, quantitative research was the most attempted research method with 61 Korean studies (88.4%) and 24 Japanese studies (72.7%). There

were 7 qualitative studies in Korea (10.1%) and 6 studies in Japan (18.2%), and 1 study in Korea (1.5%) and 3 studies in Japan (9.1%) were mixed studies. Through this, it was found that Korea attaches more importance to quantitative research methods than Japan, and that Japan uses qualitative research methods relatively widely.

Second, in defining cyber bullying, the difference in meaning between the two countries was examined. These three meanings of ‘Electronic media use, Personal information leakage, and Peer Bullying’ were commonly included in important definitions in both countries. In addition to this, Korea included 'Intentional and repeated bullying, verbal violence, and shame' in the definition, and Japan emphasized 'Slander and mudslinging, Production and spread of rumors' as important contents of cyber bullying.

Third, looking at the causes of cyber bullying, both Korea and Japan have a common point in approaching cyber bullying from three directions: personal, relational, and socio-environmental factors. However, there are some differences in specific content. Looking at individual causes, Korea discussed the causes of cyberbullying, focusing on 'Individual negative temperament and lack of competence, Exposure to violence, Internet/smartphone addiction, Psychological difficulties. On the other hand, Japan, in addition to the above four factors, included individual academic background as a factor contributing to cyber bullying, just like Korea. Except for academic background, there was no significant difference in personal factors seen in Korea and Japan. Next, looking at relational causes, Korea analyzes negative relationships with parents, dependent relationships with peers, and limited social relationships as causes of cyber bullying, while Japan analyzes Apathy in the classroom, school maladjustment, and Absence of parental roles. In other words, while Korea is looking for the cause of the problem in 'relationships' with people around them, Japan seems to focus more on the 'role' of people around them. Finally, looking at socio-environmental causes, Korea analyzes online anonymity, lack of education and awareness of people around them, and unhealthy surroundings as causes, but Japan analyzes the social climate & atmosphere throughout society, Problems inherent in culture itself in addition to these three factors.

2) Implications of the study

The results of this study suggest the following implications.

As these two countries have a lot in common in various aspects, the process of comparing and analyzing each other's research will be a way to find solutions to the cyberbullying problem that are both quantitatively and qualitatively effective. As these two countries have a lot in common in various aspects, the process of comparing and analyzing each other's research will be a way to find solutions to the cyberbullying problem that are both quantitatively and qualitatively effective.

Second, in defining cyber bullying, Korea emphasizes that it occurs 'intentionally and repeatedly' and includes the emotional content of 'stimulation of shame', including the intention to cause cyber bullying and the resulting results in the definition. In Japan, 'slander and slander, production and spread of rumors' are included in the definition, showing a tendency to specify the phenomenon and behavior of cyberbullying more. As the types of cyber bullying are diversifying, it seems necessary to define cyber bullying in more specific and subdivided ways.

Third, among the perspectives of looking at the causes of cyber bullying, personal causes are similar in both countries, but differences in relational and socio-environmental causes were found. Compared to Japan, Korea has more studies that emphasize that relational factors are deeply related to cyber bullying. Korea is making efforts to analyze relational factors in detail, categorize them in detail, and suggest suitable alternatives. In addition, it emphasizes the healthy growth process, and emphasizes the improvement to a positive relationship and the transition to a healthy relationship. On the other hand, Japan tends to emphasize socio-environmental factors as an important trigger for cyber bullying compared to Korea. It is believed that cyberbullying can be resolved by emphasizing the healthy role performance of individuals and social organizations, changing the social atmosphere, and improving social awareness. This is thought to be related to the socio-cultural values and social priorities of Korea and Japan. Korea, which focuses more on 'relationships' between people, tries to find the cause in 'interpersonal relationships' with parents, peer groups, and others in society, while Japan focuses on environmental factors surrounding adolescents. In particular, it seems to be interested in the 'role' of the people around them, the characteristics of the surrounding environment, and the culture and social climate. Combining the studies of both countries, it is judged that cyber bullying is comprehensively influenced by the 'interpersonal relationship' of adolescents, the 'role' of those around them, the school atmosphere and cultural influences. It will be necessary to continue efforts to explore various causes.

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Research on the Relationship Between Reflective Practice and Academic Performance in Experiential Learning

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Abstract
This research is based on the manipulation of experiential learning, combined with feedback surveys of reflective practice. The implementation project is three learning activities of creative thinking, advertising script and video shooting in the advertising design course. Based on the learning effect of the project design, the participants go through the four processes of analysis, thinking, execution, and reflection, conduct phased investigations based on individual and team performance, and then proceed to the next project design, and so on. The research results show that there are differences between student team self-assessment, individual self-assessment, and academic performance. There is a moderate correlation between the two variables. There is a positive relationship between self-assessment and academic performance. Students with high team and high individual self-assessment scores will have higher academic performance. Individual self-assessment results can have an impact on academic performance and can also be used as a basis for inferring students' academic performance. The research shows that the learning mode of developing cognition and skills can observe problems, innovate thinking, solve problems through the focus of thinking in the process of project execution, and then provide feedback and improvement through reflection practice, so that the participants' ability and experience can be improved. More importantly, Reflective practice enhances learning outcomes for all learners.

Keywords: Design Education, Reflective Practice, Academic Performance, Experiential Learning

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Introduction

This research focuses on the effectiveness of combining experiential learning with reflective practice, emphasizing the exploration of experiential learning and the benefits of self-reflection. Through the execution of a curriculum design project, the participants in this research were able to move from abstract thinking to concrete execution, challenging themselves, critiquing, evaluating, and making revisions. In addition to challenging conceptualization and improving execution, reflective practice can also help individuals better understand the significance of their knowledge and expertise in terms of the effectiveness of their actions (Finlay, 2008). The research used self-assessment during three consecutive reflective processes as a criterion for effectiveness. Peer review formed a cyclical process of reflection, enabling the participants to identify errors, evaluate and explore better task approaches, and improve their problem-solving skills by addressing the lack of practical experience combined with poor critical thinking. This process enhanced the participants' reflective habits, building their abilities to think proactively and engage in self-directed learning.

Research Purpose

Traditional students' experiential learning often involves sharing learning experiences rather than practical experiences. Without reflection, the learning process lacks the ability to reflect on the meaning behind learning actions, resulting in a lack of experiential exchange. The depth of reflective practice requires practice, especially in the learning stage. If one can internalize reflection as a learning habit and be more open to criticism, challenges, and suggestions, the process will be more effective. Therefore, this research conducted a curriculum operation and effectiveness survey on "experiential learning and reflective practice." The research was conducted by forming task teams with learners and implementing the spiral cycle model of returning to experience, reflecting on observation, focusing on feelings, and reviewing experiences through classroom experiential learning. In each stage, learners conducted self-assessment to trigger discussion, reflection on mistakes, and design modifications to establish new team experiences and cohesion.

Literature Review

Reflective Practice is a core skill and an active, dynamic process. Through the practice of learning experiences, reflective practice becomes a habit, leading to more informed and confident decision-making. The concept of reflective practice was first introduced by Schön (1983), who defined the relationship between reflection and action as a means to improve professional capabilities. Schön proposed two types of reflection, "reflection-in-action" and "reflection-on-action." Reflection-in-action refers to reflective behavior during action, continuously examining one's performance and adjusting behavior in real-time to achieve goals and solve problems. Reflection-on-action, on the other hand, involves reflecting on past experiences, considering one's performance, and improving plans to enhance learning outcomes.

Boud et al. (1985) proposed incorporating "individual emotions and feelings" into a three-step reflective model, consisting of "returning to the experience," "attending to feelings," and "evaluating the experience." Gibbs (1988) introduced the famous Reflection Cycle, also known as Reflective Practices, which is a continuous improvement cycle consisting of six stages: description, feelings, evaluation, analysis, conclusion, and action

plan (see figure 1). Gibbs believed that the importance of reflective practice is to enhance awareness when performing professional tasks, induce reflective behavior, and enable learners to perform better during the practice process (Gibb, 1988), supporting the model of experiential learning.

Reflective practice as a support and development tool in education and social science fields is recognized. In action research and reflective practice, reflection has subjectivity and individuality, and its depth of application requires practice. The creativity of new experiences enhances the universality and effectiveness of action and reflection (McIntosh, 2006). Therefore, reflective students are more capable of engaging in external dialogue and self-communication effectively (Tennyson, 2008). Students can attempt to understand the impact of learning, how to improve learning quality, or new application experiences, connecting the two experiences to ensure that they can achieve better performance in the next stage. In addition to understanding professional knowledge and behavioral issues, the reflection process can also encourage collaboration, ensuring that students learn more effectively. Reflection is critical, and how students face mistakes and listen to others' opinions is the most difficult part for students. Guides can help students recognize learning issues, accept challenges, and cultivate self-confidence, while teachers can improve their teaching methods by asking questions. In addition to open-ended questionnaire reflections, this research evaluated learning outcomes and used the self-assessment scores from the three reflective cycles as the analysis data for this reflective practice survey.



Figure 1: Gibbs' Reflective Circle Theory

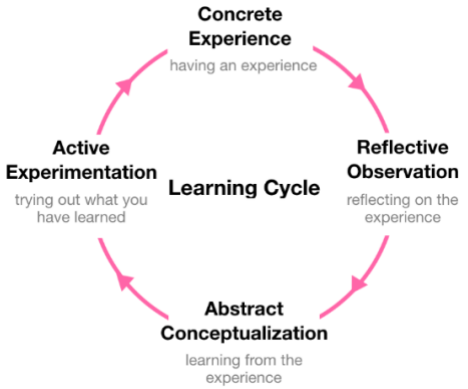


Figure 2: Kolb's Theory of Experiential Learning

To sum up, reflective practice can be said to be a conscious and active process of thinking about the process in order to better prepare for similar events in the future. It is characterized by "learning from mistakes" through strategic, systemic and positive meaning. The advantages of reflective practice are as follows: Reflective practice encourages innovation: Reflective practice can be used as a basis for curriculum adjustment. Adjust, create and experiment with new ideas while learning. Students have a richer learning experience and are more creative, imaginative and ready to adapt to new ways of thinking. Reflective practice encourages participation: Reflection helps to justify decisions and encourages different perspectives and understanding. Focus on student strengths, preferences, development, or the perspectives of others. Reflective practice helps develop confident students: Encouraging students to take on new challenges in their learning builds a safe and confident learning journey.

How Reflective Practice Incorporates Experiential Learning

In 1984, Kolb proposed the cycle theory of experiential learning (Learning Cycle), which includes concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb & Wolfe, 1981). It emphasizes that individuals can learn through the process of experience and practice, forming a continuous cycle of learning. Learning is a continuous process of experience transformation and knowledge creation. This dynamic process of knowledge creation is the result of the interaction, conflict, and problem-solving between individuals and the environment. In other words, the process of knowledge creation starts with concrete experience, followed by reflection and observation, formation of concepts and inferences, and testing concepts in new situations (as shown in Figure 2).

Reflection in practice is "learning from experience to gain new insights into self and practice" (Finlay, 2008). The exploration process is prioritized to understand the actions and experiences that may have been overlooked during execution. Reflection challenges the critical practice process of the execution experience, enabling students to understand their professional knowledge and action meanings more deeply. Therefore, reflection in practice is closely related to experience. The level of reflection ranges from self-perspective, action, values, to team communication and relationships, and answers are found from experiences. Students interact with people from different backgrounds and perspectives in collaborative relationships to promote understanding, influence, and guide complex dynamic relationships. Sometimes, experiences may be confusing and unpredictable, and there may not always be a logical or straightforward solution. When faced with situations that do not have correct or wrong answers, students must make professional judgments. However, judgments may be incorrect, and these experiences of failure may cause students to feel frustrated and retreat. If they can re-evaluate how to perceive and handle events, turning negative experiences into positive ones, reflection can become a valuable ability. Figure 3 shows how this study embedded the reflective observation aspect of the experiential learning cycle into the operational mode of the reflection cycle in practice.

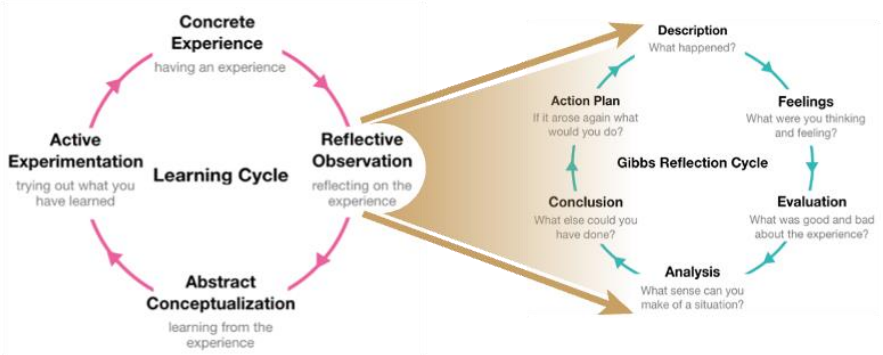


Figure 3: Concept map of experiential learning combined with reflective practice

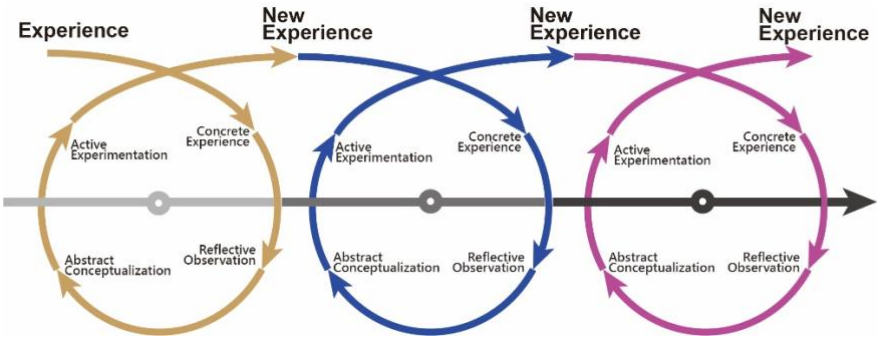


Figure 4: Schematic diagram of the cycle of experiential learning

How experiential learning and reflective practice apply to curriculum and teaching

The student's experiential learning process will be integrated into reflective practice teaching, incorporating flipped teaching, experiential learning, and workplace experiences through social service. Through individual and team reflection training, a review mechanism is formed using the small and large cycle loops (as shown in Figure 4). New experiences are formed by overlaying each other's experiences, and reflective habits are repeatedly accumulated. Students lead the learning process of problem-solving and can observe and reflect on their own learning gaps in each learning stage through concrete workplace experiences. Through teacher support or dialogue with industry experts, students can develop an understanding of the social workplace, which is further applied and verified in the next stage of design work.

However, through the reflection practice training of team and curriculum design, students and teachers can reflect on their project design performance and exchange ideas to see the diversity and individuality of students. Students can choose their preferred way to communicate their learning and decide on reflection expressions or tools to support the team's reflective practice process, in line with the tendency of modern young students to think independently. The teacher's role becomes a supporter of learning, guiding students to seek answers. Such experiential learning, which was previously led by teachers, has been transformed into a domain where students can independently seek answers and verification, addressing the current issues of students' low autonomy, enthusiasm, learning-application gaps, and curriculum focus.

Table 1: Comparison of experiential learning theory and reflective observation activities

Steps	Theoretical basis	Reflective Practice Observation Activities
Concrete Experience	Arouse students' interest by actually participating in activities and specific experiences in the workplace.	Observe or experience the implementation needs in the field of design, examine individual learning problems and obstacles, propose problem descriptions, and trigger learning discussions.
Reflective Observation	Observing industry-university issues and seeking the value of practical experience	Through the experience of practical tasks, students propose situation assessment and practical experience induction, and record emotions and feelings.
Abstract Conceptualization	Analyze the feasibility of practice by thinking and internalizing knowledge and experience	Integrate practical experience and professional skills, propose coping strategies and learning conclusions, establish improvement methods and design revisions.

Active Experimentation	Learning activities that put functional experience and skills into practice	Propose action plans in new design activities and implement specific design strategies and action guidelines to verify the specific effectiveness and value of experiential learning theory and reflective practice on design functions.

This research focuses on the integration of "reflective practice" and "experiential learning", where students are encouraged to reflect and revise their thinking at each stage of collaborative learning. High-achieving students are organized into experiential learning teams, where they engage in cyclical learning and reflective practices based on individual strengths, to assist their peers with lower levels of engagement and learning outcomes. Students are given greater autonomy and openness in terms of their self-perceived role, learning planning, and team teaming. The reflective practice process is the most important operational procedure, where stage-specific experiences are aimed at problem recognition, marketing planning, design decision-making, and proposal execution, among other processes. Each learning stage and reflective outcome is used as a basis for the next stage, while also reflecting on better execution methods.

Research Design

The research will be based on the individual and team self-assessment results of students' reflection on practice, corresponding to their actual academic performance. Measure whether student team and individual performance improves as a result of reflective loop manipulation. Using the experiential learning model as the foundation, this research aims to reinforce the independence and learning effectiveness of each participating student in the learning team, while also interacting with the execution of design practices in the work team. Traditional experiential learning can achieve short-term team learning pressure and goals for students, and low-achievers and those with inadequate abilities can indeed achieve learning objectives due to peer and time pressure. By incorporating a structured learning exchange system and the support of instructors and TAs as mentors, the lack of autonomous motivation and learning enthusiasm can be avoided, allowing the collaborative learning mode of "learning by doing" to be internalized as a student's independent learning process and method.

Findings

According to the single-sample T test results in Table 2, participants' team self-assessment ($t=49.612$, $P=.000$), individual self-assessment ($t=42.488$, $P=.000$) and academic performance ($t=176.005$, $P=.000$) all three items reached a significant level. It means that there are significant differences in the team self-assessment, individual self-assessment and academic performance of the participants.

According to the results of Pearson correlation analysis (Table 3), the participants' team performance and individual performance ($r=.670$, $p=.000$); team performance and academic performance ($r=.353$, $p=.014<.05$); individual performance and academic performance are ($r=.418$, $p=.003<.01$), and the r values of the three items all exceed 0.3, indicating that there is a moderate correlation between the two ($0.3<r<0.7$).

Table 2: Variable single sample test

Variance	M	SD	T	df	sig	MD	95% confidence	
							lower	upper
Team	7.9475	1.10984	49.612	47	.000	7.94750	7.6252	8.2698
Individua	7.8069	1.27301	42.488	47	.000	7.80687	7.4372	8.1765
AP.	87.6252	3.44924	176.005	47	.000	87.62521	86.6237	88.6268

Table 3: Pearson correlation analysis

Variance		Team	Individual	Academic
Team	Pearson	1		
	Sig			
Individual	Pearson	.670**	1	
	Sig	.000		
Academic Performance	Pearson	.353*	.418**	1
	Sig	.014	.003	

As shown in Table 4 and 4-1, most students belong to high self-assessment and academic performance. The F statistics of team and individual self-assessment results are .251 and .657 respectively, and the significant values are .619 and .422, both of which are greater than the significant level of .05. Indicates that there is no significant difference between the two independent variables. The independent T test of team self-assessment was T=-1.781, P=.082>.05; the independent test of individual self-assessment was T=-2.222, P=.031<.05, reaching a significant level. There is no significant difference in academic performance among students who express different team self-assessment performances; however, students with different individual self-assessment performances have obvious differences in academic performance.

Table 4: Statistical data of students' self-assessment and academic performance

High / low academic		N	M	MD	MSE
team	Low team	20	86.5995	3.32872	.74433
	High team	28	88.3579	3.40246	.64300
individual	Low	22	86.4700	3.53124	.75286
	High	26	88.6027	3.11838	.61156

Table 4-1: Independent sample T-test of student self-assessment and academic performance

Academic Performance	Levene		t-test for equality for means						
	F	P	T	df	Sig	MD	SE	95% confidence	
								lower	upper
team	.251	.619	**-1.781**	**46**	**.082**	-1.75836	.98728	-3.74565	.22893
			-1.788	41.62	.081	-1.75836	.98360	-3.74388	.22716
Individual	.657	.422	**-2.222**	**46**	**.031**	-2.13269	.95979	-4.06465	-.20073
			-2.199	42.36	.033	-2.13269	.96996	-4.08964	-.17574

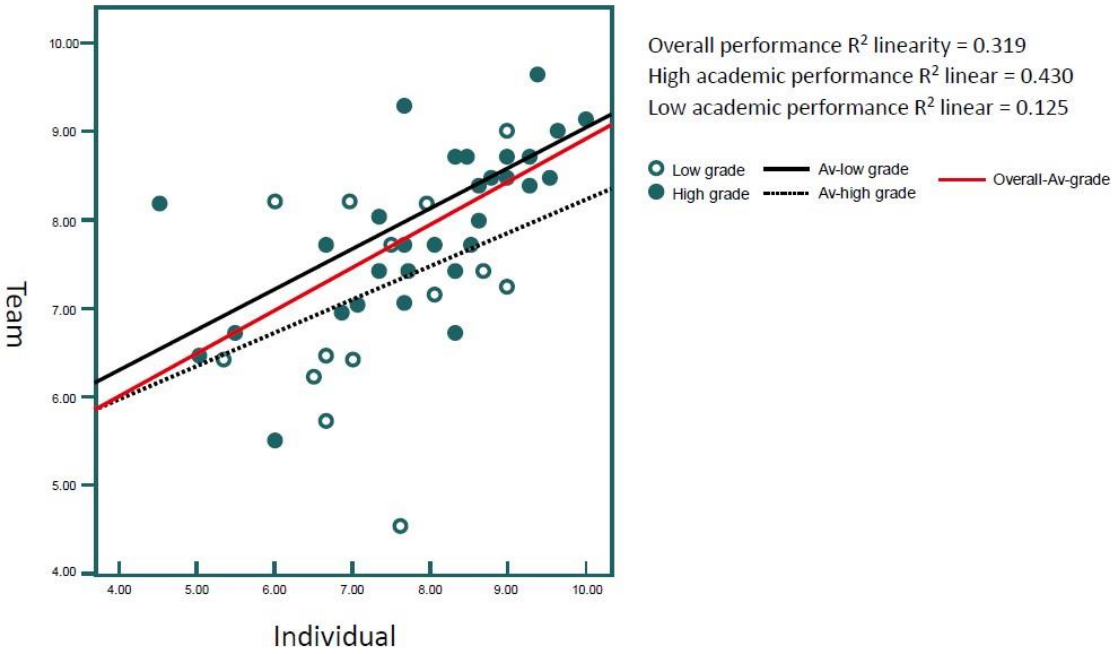


Figure 5: The linear structure relationship between self-assessment grades and academic grades

Table 5: Regression analysis results of team self-assessment and individual self-assessment

model summary

mode	R	R-squared	Adjusted R-squared	Standard Skew Error
1	.391[a]	.153	.135	3.20843

a. Predicted value: (constant), individual self-assessment

Analysis of Variance[a]

Mode		sum of	df	mean	F	Sig
1	Regressio	85.646	1	85.646	8.320	.006b
	Residual	473.525	46	10.294		
	Total	559.171	47			

a. Dependent number: academic performance
b. Predicted value: (constant), individual self-assessment

coefficient [a]

Mode		unstandardized coefficient		standardized	T	P
		B	standard	Beta		
1	(constant)	79.347	2.907		27.29	.000
	Individua	1.060	.368	.391	2.884	.006

a. Dependent number: academic performance

According to the linear structure diagram (Figure 5), the best fit line shows that the regression line of the overall academic performance can explain 31.9% of the variance; high academic performance can explain 43.0% of the variance and low academic performance can explain 12.5% of the variance. Individual performance is directly proportional to team performance. The better the individual self-assessment performance, the better the team self-assessment performance, and the higher the academic performance. Those with high self-assessment performance will also have higher academic performance.

Discussions and Conclusions

The research results can echo the four learning processes that students experience: analysis, thinking, execution, and reflection. Students can reflect and improve through the feedback of reflective practice. In addition to gaining professional ability and progressive experience, more importantly, reflective practice can improve the learning of all learners. grades and achievements. The research results show that the operation of experiential learning combined with reflective practice can increase the learning mode of designing professional ability and developing cognition and skills. Feedback for reflection and improvement. Participants' abilities and experiences are progressive, and more importantly, reflective practice enhances the achievement and effectiveness of all learners.

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Relegating School Principal Leadership From Teacher Professional Learning: Social Network Analysis Approach

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Abstract
Researchers have been trying to identify through which 'path' the principal's leadership practice is most impactful to the quality of teaching and learning as a preferred outcome. On the other hand, there is some evidence that its influence on student learning is indirect. This study seeks to contribute to the knowledge regarding influence of school leadership on teacher professional learning by investigating their relationship using a social network analysis (SNA) approach in Indonesian context. SNA is applied to examine the level of leadership influence in the observed schools. Social network analysis measurement is going to be used to analyse the relations among variables. This research wants to offer insights to Indonesian policymakers and practitioners on how they could support teachers professional learning in a society where the influence of leadership on teaching and learning is still poorly explored in network perspective. Preliminary result of this research in progress shows that although the principal still has significant influence on teacher professional learning, there are influential individuals outside formal leadership hierarchy. It is one of evidence of a shared/distributed leadership in practice with which further exploration could identify the attributes and practice lead to higher organisational effectiveness and agility.

Keywords: School Leadership, Professional Learning, Social Network Analysis

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Introduction

Effective school leadership is essential for improving the school performance. School principals play a central part in ensuring a positive environment for teaching and learning in schools. The role of school principal demands the bearer to give direction and provide guidance for all school improvement programme. The responsibility also includes ensuring teaching quality and resources allocation for professional development programme (Yeigh et al., 2018), and school success (Raihani, 2008). The change in educational policy, evaluation systems, and increased external pressure on accountability, have raised expectations for principals to improve school climate, instructional practice, and student outcomes. Thus, the successful education reform implementation depends on the school leadership's execution of the reform (Lumban Gaol, 2021). There is evidence that principals are significant elements in student learning outcomes, whereas not much knowledge about how principals could best achieve the aims (Liebowitz & Porter, 2019).

The influence of principal leadership and school capacity on teacher professional learning were modelled (Hallinger & Lu, 2014) and examined (Li et al., 2016) in Hong Kong. These studies were further explored to verify the mediating effects of trust on principal leadership and teacher professional learning in Hong Kong (Li et al., 2016) and Turkey (Karacabey et al., 2020). Collectively, the results indicated that shared vision within school leadership team is positively related to teacher's perception of school alignment, teachers' commitment, and teacher support to students (Hallinger and Lu, 2014). They also demonstrated that multiple dimensions of principal leadership in the presence of trust makes significant contributions to teacher professional learning (Li et al., 2016; Piyaman et al., 2017; Karacabey et al., 2022). The quantitative studies confirm the significant positive however indirect influence of principal leadership on teacher professional learning.

Indonesia currently undergoes massive educational transformation highlighting the need to support teachers in professional learning, which is similar to what has been experienced in Turkey (Karacabey et al., 2022) in terms of school principals' increased responsibility for improving teaching and learning in their schools. The education bureaucracies in Indonesia also reflects similarly with China, and Thailand in a hierarchical fashion, in additional to close relations in culture in terms of respect for age, experience, and rank as elements of social values (Hallinger et al., 2019).

The study's results and comparability spark our interest in examining the relationship between principal leadership and the teacher professional learning in Indonesian context. Despite the similarity in education bureaucracies and cultural hierarchies, there is not one model fits all in the face of change initiatives. But there is a need to explain a leader's role within a complex system to initiate organisational change and manage dynamic social network (Dinh et al., 2014). Social network analysis (SNA) approach provides theories and methods to investigate, with higher precision and rigor, the relational perspectives suggested by leadership theories (Carter et al., 2015). Hence, it would be beneficial to introduce social network approach to investigate school leadership.

This study is designed to address the following research question:

RQ: How does school leadership effectively influence teacher professional learning?

This research extends insights to school leaders and management, Indonesian policymakers, scholars, and practitioners on how they could support teacher professional learning where the influence of leadership on professional learning is still poorly explored within Indonesian and SNA approach context. This study would also contribute to the expanding literature on school leadership and teacher learning in Asia (Hallinger & Kulophas, 2019; Harris & Jones, 2018; Karacabey et al., 2020; Liu et al., 2016; Piyaman et al., 2017).

Findings of the systematic literature reviews

Effective leadership is an essential aspect to improve the quality of education. School leaders are expected to be able to appropriately manage the school's own or access to resources, lest the institution would struggle to develop. A systematic literature review on leadership for professional learning done by Poekert et al. (2020) investigated leadership approaches which forms professional development. The criteria used provide reasonable basis for conceptual framework which identifies the characteristics of effective professional learning (Desimone et al., 2002, in Poekert et al., 2020). The outcomes of professional learning, however, are influenced by how the teachers engage professional learning which further influence their experience (Castanheira, 2016) whereas Hallinger (2018) referred to the learning experience as a 'person-specific context.'

In addition to the practical needs for references, the literature on school leadership is also lacking non-Western context, while Evans (2022) observed that belief systems exist within specific cultures and psyches and within scholarly communities. It was around two decades ago that studies in educational leadership field began in non-Western contexts (Gümüş et al. (2022) in Lumban Gaol, 2021) and articles from Asian countries are still scarce due to lack of studies conducted in Asian schools (Raihani, 2008). The number of school leadership studies in Asian countries has increased in the last decade, nevertheless there are still a few Asian countries that lack contributions to this field and Indonesia is one of them (Walker & Hallinger, 2015).

The educational leadership and school reform issues in Indonesia have been relatively neglected in publications regardless of its significance being acknowledged (Sofo et al., 2012). Thus, Indonesian policymakers have shown the tendency to depend on the results and practices of educational system from Western context rather than relying on Indonesian research results. A systematic literature review on school leadership in the context of Indonesian education by Lumban Gaol (2021) helps constructing the relevant reference basis for this study although there is still no publication to date with SNA approach.

School leadership

Principal leadership has a significant effect on school organisation features, which positively affects the quality of teaching and student learning, and vital to the success of improvement attempts (Leithwood et al., 2019). Principal's transformational leadership is suggested to influence teacher professional learning through mediation of teacher trust and teacher agency, which can change teaching practices and lead to recuperated student's learning outcome. This conceptual model of the research frames the principal as the representation of school leadership and teacher professional learning, which we adapt from Karacabey et al. (2020), Damanik and Aldridge (2017), and Hallinger et al. (2017).

The last decade has been an important period for education in Indonesia regarding policies and regulations for education system improvement and school reform which takes place as school-based management. The policy changes lead to new roles and responsibilities of school principals which generate various demands. The core competencies for school leadership comprise of personal, managerial, supervisory, entrepreneurial, and social competencies (Wiyono, 2017). The implementation of school-based management brings new roles and responsibilities to school principals in which teachers should be empowered to have a voice in educational planning (Bandur, 2012) which in turn requires an improvement in school principals' competencies.

Principals have critical role in improving the quality of educational service, hence they must manage various aspects while carrying out the improvements. School improvement is proven by empirical studies as context-specific and cultural (Jawas, 2017), which applies to critical area of learning level, capacity development, and evaluation of improvement (Teddlie & Reynolds, 2000). Jawas (2017) reaffirmed that leadership practices are context-specific and context-influenced, and that instructional improvement are affected by the condition of the school, social practices, and economic considerations.

However, Lee and Hallinger (2012) found that the emphasis of Indonesian principals were on management and administration rather than leadership. Another study by Bandur (2018) reported the lack of success of school-based management which gave rise to poor students' academic achievement. The studies demonstrated the significance of school principal's leadership impact on learning outcome in Indonesia.

Referring to Jawas (2017) that school improvement and leadership practice are context-specific and context-influenced, this study deploys SNA to approach school leadership and teacher professional learning. SNA allows an inductive approach as it is descriptive in nature (Locke, 2007) and useful to describe the status of the research focus (Hiller et al., 2011). In consideration of school condition and culture, albeit similarity in hierarchical educational systems between Indonesia and the countries in the studies, this study seeks to examine the relationship and explore the mediating factors between the principal leadership influence and teacher professional learning.

Teacher professional learning

Teachers need to engage in professional learning to be conversant with knowledge and skills necessary to accommodate changes in educational environment (Jansen in de Wal et al., 2014). Professional learning now has been an ongoing developmental process rather than discrete activities (Kwakman, 2003; Timperley, 2011) in various forms through formal and informal structures or settings, individually or collectively (Hallinger et al., 2019).

Teacher professional learning, regardless of the format, calls for adult learning practices promoting collective and collaborative behaviours which have been a medium for establishing sustainable school improvement. Teacher professional learning has been a centre of school reform practices correlated with behaviours and practice responsible for student learning as well as teacher's learning (Hallinger & Kulophas, 2019). Teacher growth and development is included in Indonesian Education National Standard (Standar Nasional Pendidikan) as one of the key measurements for school performance which is under the responsibility of the school's leader who also has competencies standard. Thus, school principals bear the responsibility to arrange the teachers' professional development.

Social network analysis

Ogawa and Bossert (1995) in Lin et al. (2018) observed that leadership is not constricted to specific roles or formal titles, rather it flows through the networks of roles that form organisations. They stated that leadership is based on deployment of distributed resources throughout the network, therefore school organisation is considered as the unit of network analysis.

Spillane et al. (2001) professed that school leadership is best understood as a distributed practice influenced by social and contextual factors. Hence, the interdependence and interactions between individuals and the environment in a network is a suitable unit of analysis for examining leadership practice within the network. In this context, SNA could identify the types of existing distributed leadership. This knowledge provides insight on more effective energy and resources allocation for the success of school leadership rather than narrowly focused on the principal's leadership.

Social network analysis (SNA) is a set of theories, tools, and processes to understand the relations and structures of a network represented by nodes and links (Hoppe & Reinelt, 2010). Social network will connect social actors contained in a network, including individuals, organizations, and families. The analysis takes interest in how an individual is nested within a structure or networks of relations with others and how the structure surfaces from the said relations (Hanneman & Riddle, 2005). The purpose of using this social network analysis method is as a basis for studying activities related to organizations, interpersonal relationships, and others (McAndrew & Everett, 2014). The social map generated by SNA computer programs displays the patterns of connections between nodes of the network while networks are measured with mathematical techniques.

Method

This study employs a social network analysis approach with cross-sectional quantitative case study design. Data were compiled from a respondent school comprises of leadership and teaching staff of 41 people across levels (from preschool to high school) in a full network method where information about each individual and the relations with all other individuals is collected. The major limitation of this method is the difficulty of collecting full network data.

To measure the information about relations between individuals, ordinal measure similar to a Likert scale is applied to determine the strength of ties (Liebowitz, 2005). The resulting response would then be converted to zero-one binary scale which brings the strength of influence to extreme of present (one) or absent (zero).

Demographical data such as gender, age, years of teaching experience, years of leadership experience, and highest completed degree are collected to provide context for analysis. And relational data is collected as rating of peer influence on respondent's professional learning as a response to the SNA question, "To what degree does this individual influence your professional learning?" The response provided represents peer influence on respondent's professional learning in the range of options from "To a great extent" to "None at all". The response data would then be coded into square binary matrix in the size of number of individuals. Shown in the graph below is the sociogram generated from 41 x 41 matrix.

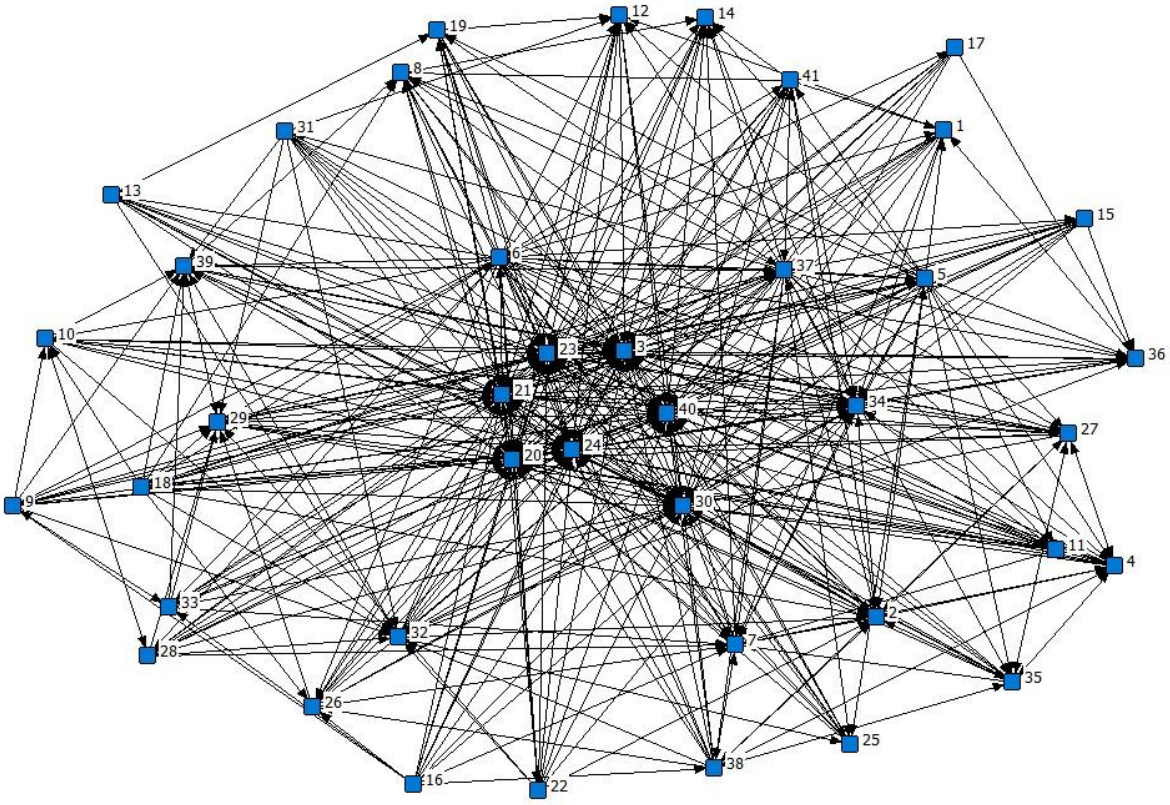


Figure 1: Social network map of individuals within a school (using UCINet)

Initial analysis on result of this research-in-progress shows the dominance of school principal's influence (node 6) that is closely followed by the school management (node 37 and node 5) and an emerging influential individual (node 20). It describes that although the principal has significant influence on teacher professional learning, there are influential individuals outside formal leadership hierarchy. It is one of evidence of a shared/distributed leadership in practice with which further analysis using SNA measurements could identify the more detailed relations and leadership dynamic within the school network.

Conclusion

There is evidence of a shared/distributed leadership in practice in the respondent school with which further exploration could identify the leadership attributes and practice lead to effective intended impact on outcomes. Further detailed analysis on SNA measurements result is vital for discussions to happen and to arrive at the objectives of this study.

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Relations Between Visual Perception and Working Memory Through Urban Sketches at Phumin-Ta Li Community, Nan Province

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Abstract
The study explores the relationship between visual perception and working memory through the medium of urban sketching at Phumin - Ta Li community in Nan province, Thailand. The research involved participants sketching various buildings and landmarks in the community while completing working memory tasks. The sketches and working memory task results were analysed to investigate the connection between visual perception and working memory. The findings suggest that the act of sketching can enhance an individual's visual perception and working memory. Furthermore, this study adds to the understanding of how urban sketching can be used as a tool to improve cognitive processes and a medium to record and remember the urban environment. The results of the study suggest that the act of sketching can serve as a means of enhancing one's memories about sense of place and working memory in visualisation research. The findings also indicate that Phumin-Ta Li community is characterised by a sense of place and a rich cultural heritage that is not closely connected to the residents but also recognized by the visitors. The study provides insights into the potential of urban sketching as a tool for understanding the relationship between visual perception, working memory, and sense of place. The research concludes with some recommendations for future research, including the use of various methods of data collection in order to validate the findings and to expand the understanding of visual perception and working memory in different contexts.

Keywords: Visual Perception, Working Memory, Place Memory

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Introduction

Visual perception and working memory are both important cognitive processes that play a crucial role in our ability to navigate and interact with the environment around us. Visual perception refers to the process by which individuals interpret and organize sensory information from the environment to create a meaningful representation of the world, while working memory involves the temporary storage and manipulation of information that is necessary for ongoing cognitive tasks.Studies have shown that visual perception and working memory are closely related, with working memory playing a critical role in the ability to maintain and manipulate visual information (Luck & Vogel, 2013). However, the nature of this relationship is complex and may be influenced by a variety of factors, including the nature of the visual stimuli and the task demands placed on the individual. In the present study, we aim to explore the relationship between visual perception and working memory through the analysis of urban sketches created by residents of the Phumin-Ta Li community in Nan province. Urban sketches are an ideal medium for investigating this relationship, as they require the integration of visual perception and working memory to capture the unique features and characteristics of the urban environment. By examining the characteristics of the urban sketches created by community residents, we hope to gain a deeper understanding of the relationship between visual perception and working memory in the context of urban environments.

Visual Perception

Visual perception and working memory are both important cognitive processes that play a crucial role in our ability to navigate and interact with the environment around us. Visual perception refers to the process by which individuals interpret and organize sensory information from the environment to create a meaningful representation of the world, while working memory involves the temporary storage and manipulation of information that is necessary for ongoing cognitive tasks. Studies have shown that visual perception and working memory are closely related, with working memory playing a critical role in the ability to maintain and manipulate visual information (Luck & Vogel, 2013). However, the nature of this relationship is complex and may be influenced by a variety of factors, including the nature of the visual stimuli and the task demands placed on the individual.

Working Memory

Working memory is a cognitive system responsible for temporarily holding and manipulating information that is needed for ongoing mental tasks (Baddeley, 2012). Drawing is a complex visual and spatial task that involves multiple working memory processes, such as visual perception, spatial planning, and mental manipulation of visual information (Kozbelt & Seidel, 2006). Working memory is critical for drawing because it allows artists to remember the features and details of their subject and mentally manipulate the image as they create it (Kozbelt & Seidel, 2006).

Place Memory

Place memory refers to the way in which individuals associate memories with specific locations or places. This connection between memories and a sense of place has been widely studied and documented in various fields, including psychology, geography, and urban studies. For example, Lewicka's study (2011) examined the relationship between place

attachment and memories, finding that individuals who were more attached to a particular place tended to have stronger memories associated with it. Additionally, the study found that memories associated with a place could influence an individual's emotional attachment to that place. Similarly, a study by Bolliger and colleagues (2020) explored the relationship between spatial cognition and autobiographical memory, and found that individuals with stronger spatial cognition tended to have more detailed and vivid memories associated with specific locations.

Urban Sketches and Illustrate Showcase

As part of the study, the researcher created urban sketch images to assist in presenting questions to participants about the research findings. These sketches were identified as figures 2 and 3. Within the collection of images representing the Phumin-Ta Li community in Nan province, Figure 1 featured a photograph taken by the researcher, highlighting Wat Phumin, Nan province.



Figure 1: *Wat Phumin*



Figure 2: *Urban Sketch of Wat Phumin No.1*



Figure 3: *Urban Sketch of Wat Phumin No.2*

Methodology

The sketcher used interviewing to obtain information on his artworks and to observe expressions from the participant to understand the relationship between visual perception, working memory, and place memory. Meanwhile, Solos Punakabutra, a lecturer from King Mongkut's Institute of Technology Ladkrabang, Thailand, has imparted music aesthetics to the sketcher as figure 4. In addition, the sketcher used the picture interview method, which refers to a type of interview technique that uses images to ask questions to the participant as figure 2 and 3. This technique is designed to encourage the participant to provide more information and comprehensive responses than he or she has done before. According to Braun and Clarke (2019), picture interview methods are particularly useful in qualitative research as he or she can help the researcher to understand how he or she interprets and makes sense of the drawing of Wat Phumin into some valuable information. To illustrate her point, the researcher showed a drawing of Wat Phumin online to the participant as figure 5. The researcher used picture interview methods to ask a participant, this exhibit shows two drawings of Wat Phumin and asking them to discuss what he or she saw, how he or she felt about the drawing and what thoughts or memories he or she evokes. A selected participant to the research is a female who comes from Nan province. She is 36 years old. She works for a government sector in Bangkok. The following conversation is shown.

> *Researcher*: Can you tell us about your recent experience with two drawings of Wat Phumin and Phumin-Ta Li community in Nan province?
> *Participan*t: Yes, of course. I recently had the opportunity to view two beautiful drawings of Wat Phumin and Phumin-Ta Li community in Nan province. The drawings were incredibly detailed and captured the essence of the area's unique architecture and culture.
>
> *Researcher*: Can you tell us more about this relationship?
> *Participant*: Yes, certainly. I have a deep connection with the historical area of Nan, and in particular, the people who lived in Phumin-Ta Li community. Although I do not live there, I have a passion for exploring and learning about different cultures and histories, and this has led me to develop a strong affinity for this community.
>
> *Researcher*: Can you tell us more about your connection to this historical area?
> *Participant*: Of course. I have visited the area numerous times and have studied the history of the region extensively. One of the things that have captivated me about Phumin-Ta Li community is the unique relationship between the community and the Wat Phumin temple. This temple is a central part of the community, and it has played an important role in the lives of the people who live there for centuries.
>
> *Researcher*: How would you describe this relationship between the community and the temple?
> *Participant*: The relationship between Phumin-Ta Li community and Wat Phumin is a special one. The temple is not just a place of worship; it is also a hub of social activity and a symbol of the community's identity. The people of Phumin-Ta Li have a deep connection to the temple, and they have worked hard to maintain its historical and cultural significance. For me, this relationship between the community and the temple is a testament to the resilience and strength of the people who live there.

Researcher: It sounds like you have a lot of admiration for the people of Phumin-Ta Li community.
Participant: Yes. The people of this community have a rich history and a unique cultural identity. Despite facing numerous challenges over the years, they have managed to preserve their traditions and way of life.

Researcher: Can you describe one of the drawings and the feeling it conveys?
Participant: Yes, the drawings show the intricate details of the temple's architecture. It conveys a sense of dazzle and speculate. It reminded me of my visit to Wat Phumin when I was in primary school in Nan province, where I studied at Strisrinan School. Visiting important architectural buildings in Nan was a requirement at my school.

Researcher: Can you tell us about the memories these drawings brought back for you?
Participant: Yes, seeing these drawings brought back memories of the time I spent in Phumin-Ta Li community. The community is known for its rich cultural heritage, and visiting Wat Phumin was a highlight of my trip. The drawings captured the essence of the temple and the community beautifully as I remember it.

Researcher: Can you tell us more about the community?
Participant: Evidently, Phumin-Ta Li community is located in the city of Nan, an important area with a lot of government buildings and a thriving business community. It is known for its traditional way of life and cultural practices. Additionally, the community is steeped in history and has been actively preserving its cultural heritage for many years, particularly in relation to Wat Phumin. Therefore, Wat Phumin is an important place to Phumin-Ta Li community, which is an important landmark and a testament to the community's cultural significance.



Figure 4: *Solos Punakabutra gave a lecture at College of Communication Arts Suan Sunandha Rajabhat University Nakhon Pathom Campus*

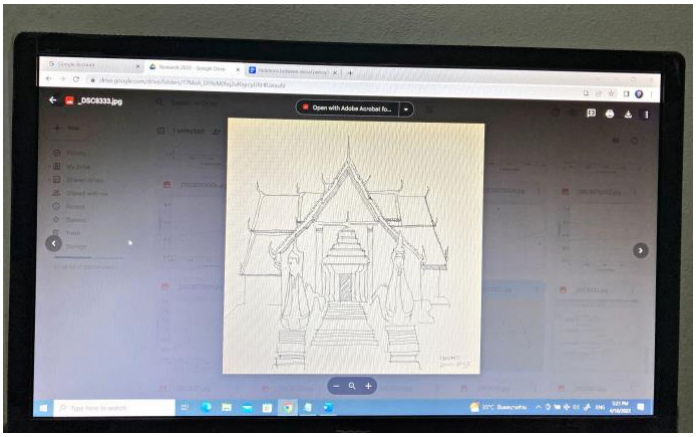


Figure 5: *A drawing of Wat Phumin on the participant's computer screen*

Finding and Discussion

Based on the research conducted on the relationship between visual perception and working memory through urban sketches in the Phumin-Ta Li community of Nan province, the researcher found that urban sketching can have a positive influence on both visual perception and working memory, as revealed through picture interview methodology. The study used images of urban sketching, particularly those of Wat Phumin, to pose questions to the participants and gather data on their visual perception and working memory. Therefore, the researcher used a model of working memory adopted from Daniel Willingham (2009) as figure 6 to describe this event which are drawing of Wat Phumin represent Environment, and the visual perception represents Long-term memory As a result, In this particular model, the working memory is being used to hold and manipulate a mental image of Wat Phumin, which represents the environment being perceived. The visual perception of the environment is stored in long-term memory, which is a more permanent storage system for our memories. The study found that urban sketching (drawings of Wat Phumin) helped the participant to better understand the visual elements of the environment, such as the shape, texture, and colors of buildings, trees, and other objects. This improved their visual perception and helped them to better retain visual information in their working memory. As a matter of fact, the study found that urban sketching helped participants to retain more information in their working memory, as they were required to remember and draw various details of the urban environment. This exercise helped them to improve their working memory and their ability to manipulate visual information in their minds. Overall, the findings of the study suggest that urban sketching can be a useful tool for improving both visual perception and working memory. The use of images of urban sketching, particularly those of Wat Phumin, was an effective way to gather data on the effects of this practice. The study highlights the potential benefits of incorporating urban sketching into educational in different areas.

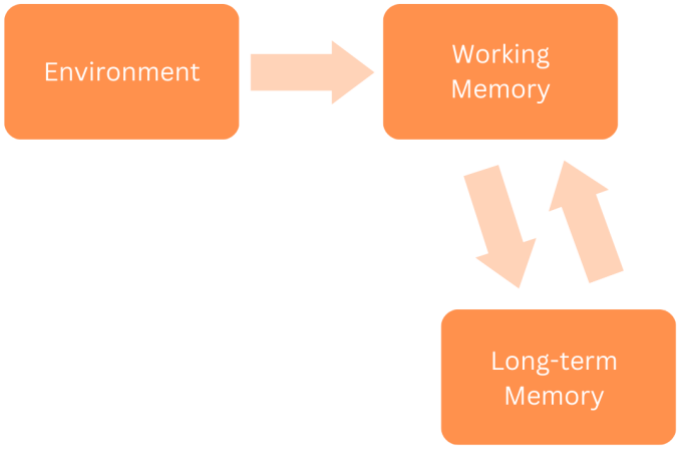


Figure 6: *Model of Working Memory adopted from Daniel Willingham (2009)*

Conclusion

Based on the study conducted on the relations between visual perception and working memory through urban sketches at the Phumin-Ta Li community, Nan Province, it can be concluded that there is a significant relationship between visual perception and working memory. The results indicate that individuals with higher working memory capacity are more likely to have better visual perception skills, which allow them to retain and recall details of urban sketches more accurately. Moreover, the study highlights the importance of the environment in which an individual is placed. The participants who were familiar with the

community had better visual perception skills and were able to recall details with greater accuracy, indicating the influence of familiarity and context on visual perception and working memory. Overall, this study contributes to the understanding of the relationship between visual perception and working memory and the importance of the environment in shaping these cognitive processes. Further research in this area can help in designing effective interventions to enhance cognitive abilities and improve visual perception and working memory.

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STEAM Implementation Analysis on Creative Thinking Skills of Middle School Students in East Java

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Abstract
The Covid-19 pandemic impacts each sector of life around the world, including the education sector namely, changes in the implementation of education. This impact is related to the implementation of learning that switches from online to offline. Students feel passive when learning offline. Science learning emphasizes that students should be active in STEAM project assignments. However, there is no research description of the application of STEAM learning in East Java after the pandemic. This study aims to describe East Java's STEAM implementation of creative thinking skills. STEAM is an integrated approach that combines science, technology, engineering, art, and mathematics as a means of developing student inquiry, teamwork, creative thinking skills, critical thinking, and other skills during learning. This research methodology uses qualitative descriptive research. Research instruments are in the form of interviews, literature studies, and field observations. Data analysis techniques include data reduction, data display, and drawing conclusions on verification. The subjects of this study were 30 middle school teachers from East Java. The results of the study show that the application of STEAM education to creative thinking skills has a positive impact on education in East Java, Indonesia. The results of this study are expected to add insight to the teachers in learning science innovation with STEAM education.

Keywords: STEAM, Creative Thinking Skills, Middle School, East Java

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Introduction

The Covid-19 pandemic has had a major influence on global change, one of which is in the field of education. During the pandemic, Indonesia conducted learning online. The teacher provides learning materials using online learning application features. Students get material taught by the teacher online by using the application suggested by the teacher. Students do learning in their homes. When the covid-19 pandemic is over, learning returns to normal as before. Face-to-face learning at schools is permitted while adhering to health protocols. Face-to-face learning that is carried out again becomes a challenge for teachers to deal with students who are used to the virtual world. Learners tend to be less active in interacting both with friends and with teachers. The transition from online to offline learning is a challenge for teachers.

The rapid development of science and technology had a major impact on the industrial revolution. Education is a very important aspect as a basis for sustainable development (Alenezi, 2020). One of the important elements that can grow the economy and national competence in the current era is preparing several learning system innovations and improving the quality of competence of graduates who have learning and innovation skills in the 21st century. 4C is an attitude that needs to be developed in the 21st century. 4C is the development of an attitude which consists of critical thinking, creative thinking, collaborative, and communication. 4C can be implemented when teaching and learning takesplace (Supena et al., 2021). The application of 4C abilities can make students think coherently. This research focuses on the ability to think creatively. One of the subjects studied by students is natural science education.

Natural science education is a science with the topic of discussing natural phenomena which are arranged systematically based on the results of experiments and observations (Hamza et al., 2022). Science learning includes knowledge in the form of facts, concepts and principles obtained from experience, as well as the result of a series of processes through investigation, preparation, and presentation of ideas (Jannah & Atmojo, 2022; Nurmala et al., 2021; Pratiwi et al., 2022). Science learning is closely related to the natural potential that is in the environment around students. In addition to studying natural forms theoretically, students also learn the blessings of gratitude for the creation of the almighty.

Based on the characteristics of science learning can be applied using the STEAM approach. STEAM is a disciplinary approach with a combination of the fields of science, technology, engineering, art, and mathematics. STEAM is able to develop students' abilities as a means of investigation, communication, leadership, teamwork, creativity, critical thinking and other skills in learning (Rodríguez-Nieto & Alsina, 2022; Starzinski, 2017; Zubaidah, 2019). The STEAM approach is needed to nurture convergent creative talents in students to lead the future with the development of science and technology (P. W. Kim, 2016). The STEAM approach is an effective educational strategy for solving problems faced by students (Park et al., 2016).

The STEAM approach is based on basic concepts that make students understand the material content in depth (Jho et al., 2016). STEAM implementation in schools needs to be improved in order to achieve learning objectives. Based on data in the field, it shows that the implementation of STEAM in several schools in Indonesia has resulted in specific improvements in 21st century learning, namely communication skills, critical thinking, creativity, and collaborative skills (Asti & Andriyani, 2022; Mu'minah & Suryaningsih,

2020). Learning outcomes with the STEAM approach can increase student creativity through project learning (Nurinayah et al., 2021). Identification of the application of STEAM learning in Indonesia, especially in East Java, has not been specifically explained. Therefore it is necessary to have a detailed and complex descriptive analysis to find out the results of the implementation of STEAM learning in East Java, Indonesia.

Method

This study uses a qualitative descriptive model. The data were obtained based on the results of interviews with 46 middle school science teachers in East Java, field observations, and literature studies. Interviews were conducted with science teachers in junior high schools in East Java by discussing the implementation of STEAM in science lessons that have been implemented. Field observations were carried out by researchers by making direct observations of students' work when developing creative thinking skills in STEAM learning. Literature study is used as a support for research data that has been developed. Data analysis techniques use the Miles and Huberman model. Activities in data analysis are data reduction, data display, and drawing conclusions (Creswell, 2012). Data analysis was carried out to find out the implementation of STEAM in the East Java region.

Results

Based on data analysis, the results of the correlation between STEAM learning and creative thinking abilities were obtained are found in Table 1.

Table 1. Correlation between STEAM Learning and Creative Thinking Skills

Syntax STEAM Approach	Fluency	Flexibility	Originality	Elaboration
Formulation of the problem	√	√		
Design problem solving		√		√
Creating and developing models			√	
Using models	√	√		
Evaluation				√
Communication and reflection				√

Discussion

Implementation of Science Learning using the STEAM Approach

STEAM is an integrated approach that combines several aspects, namely science, technology, engineering, art, and mathematics (Rodríguez-Nieto & Alsina, 2022). Science learning with the STEAM approach can train students' independence in acquiring knowledge with discovery-based learning based on their knowledge. The STEAM approach is an effective educational strategy for solving problems faced by students (Park et al., 2016). The STEAM approach is based on basic concepts that make students understand the material content in depth (Jho et al., 2016).

Based on the research data, it shows that the implementation of the STEAM approach in East Java has been well implemented. Teachers have an organization, namely the science subject teacher deliberations in each region. The applicable curriculum in Indonesia emphasizes active students in learning. The application of STEAM learning to science material is emphasized on project performance that has been planned by the curriculum. The

implementation of STEAM learning has been applied magnetism, electricity, biotechnology, inheritance, temperature, environmental pollution, gas pressure, simple machines, acids and bases, motion and force, heat, wave and sound vibrations, genetics, the solar system, changes in matter, systems circulation, newton's laws, photosynthesis, and the respiratory system. The teacher acts as a facilitator if there are students who experience difficulties both theoretically and practically.

Definition of STEAM according to the teachers is an approach that emphasizez student competence by combining the five disciplines of science, technology, engineering, art, and mathematics to solve a problem. Students produce project learning that is associated with STEAM learning on science material. The results of students' project performance on science learning which is linked to the STEAM approach produce an assessment of aspects of creative thinking skills.

The implementation of STEAM learning based on the data obtained emphasizes student project performance. In the project students are trained in integrating several aspects of STEAM. Project activities take place with the integration of science material with other aspects such as technology, engineering, art, and mathematics. The teacher conceptualizes students by explaining important things that students need to understand. STEAM learning is implemented with learning models such as project based learning, discovery learning, and others.

Based on the research results also show that there are several schools that have not implemented STEAM learning. This is due to constraints from inadequate school facilities and teachers who have not received intense training on STEAM learning. The teacher has implemented practicum activities, but has not been integrated with the existing concepts in STEAM learning. The implementation of STEAM learning in schools can be used as an innovation in science learning for middle school students.

The Work of the Science Learning Project with the STEAM Approach to Students' Creative Thinking Skills

The STEAM approach is a modification of the STEM (Science, Technology, Engineering, and Mathematic) approach implemented by the National Science Foundation (NSF) in the United States (B. H. Kim & Kim, 2016; P. W. Kim, 2016). Departing from the teachings of neuroscience which tries to balance between the working of the left brain and the right brain in learning science. In the STEAM aspect there is an additional "art" component which is learning arts and humanities. Art knowledge is proposed as an interesting and realistic learning based on experience resulting from integration with scientific disciplines and can encourage creativity and problem solving (Herro et al., 2017). In the artistic aspect, you can learn about design, where creative thinking processes can be trained to explore aesthetic elements and the use of goods in everyday life. Arts can help students make connections between concepts and ideas by supporting the assimilation and accommodation of new ideas into the scheme of learning materials. The ability of the right brain, left brain, and body to work together produces higher cognition than is produced from just one process (Hughes et al., 2022).

The ability to think creatively is a process that enables students to find connections, face new challenges, and seek unusual, original, and new resolutions (Gafour, 2021). Students can do learning by discovering new things based on individual perspectives that have been packaged

at the time of discovery both theoretically and practically. Indicators of creative thinking ability used as a benchmark in this study are fluency, flexibility, originality, and elaboration (Alghafri & Ismail, 2014; Gafour, 2021; Sola et al., 2017). Each indicator of the ability to think creatively produces data that is analyzed in the study. The research data shows that students are very enthusiastic in participating in learning by implementing the STEAM approach.

Schools that apply the STEAM approach relate to project outcomes linked to indicators in creative thinking skills. The first indicator is fluency, students are able to relate/connect existing problems in learning with real life experienced in the surrounding environment based on literature studies. The second indicator is flexibility, students have started to be responsive and active with the existing problem conditions in the surrounding environment. The third indicator is originality, students have been able to find new discoveries at the time of project discovery. It was evident from during the process, they held discussions with their group mates to find the best solutions and results. The fourth indicator is elaboration, Students have made different works based on project assignments.

Students with the application of STEAM learning produce project works that can be assessed aesthetically, neatly, and beautifully. Based on the observation data, it was found that the results of students' work with various innovative levels of creative thinking with an assessment of aspects of beauty, neatness, and aesthetics. STEAM works can be used as teaching materials to achieve meaningful learning. The work of students is also produced from the utilization of used goods. Students are taught to apply STEAM learning that cares about the environment by utilizing used materials as material for project assignments. STEAM learning takes place by training students to learn actively and teachers as science learning facilitators.

Correlation Between STEAM Learning and Creative Thinking Skills

STEAM-based learning uses EDP (Engineering Design Process) terminology. STEAM learning can be correlated with indicators of the ability to think creatively. The EDP flow is a formulation of the problem, designing problem-solving, creating and developing models, using models, evaluation, communication, and reflection. At the problem formulation stage, students are able to summarize answers and generate ideas that are included in indicators of fluency in creative thinking skills. At the problem formulation stage, there is also a relationship with the flexibility indicator because it trains students in connecting with situations, manage situations, and plan different answers. At the design stage of solving problems related to flexibility indicators, namely, students can find solutions to problems by providing perspectives on situations, organizing situations around them into STEAM learning, and finding several solutions to problems around the students' environment. At the problem-solving design stage, there is also a relationship with the elaboration indicator. This is because students when designing problem-solving require collaboration with group mates to exchange opinions based on the theory they have obtained.

The next syntax, namely creating and developing models related to indicators of the ability to think creatively on the aspect of originality. Creating and developing models trains students' ability to produce new work. At this stage, students are also able to modify a work according to the abilities and knowledge they understand. In the using model stage, it relates to indicators of the ability to think creatively, aspects of fluency, and flexibility. The fluency aspect trains students' ability to summarize answers and generate ideas. This can make

students fluent in generating ideas when modifying or creating a project model that will be produced. The flexibility aspect is able to train students' abilities when connecting with situations, managing situations, and planning different answers in making the work of project models that will be designed based on the performance of each group. The syntax for evaluation, communication, and reflection is closely related to the aspect of creative thinking skills, namely elaboration. The elaboration aspect trains students in differentiating ideas, planning to solve problems in a procedural way, and producing something new. The elaboration aspect is able to make learning more meaningful because students are active in discussing and exchanging ideas with group mates, classmates, and teachers.

The correlation between the STEAM approach and the ability to think creatively can be analyzed in Table 1. The correlation between sections shows that there is a relationship between the STEAM approach and the ability to think creatively. It can be concluded that learning that implements STEAM learning will be able to train students' creative thinking skills.

Teacher Obstacles in Implementing Science Learning with the STEAM Approach

Based on the data obtained, it shows that the teacher has implemented the STEAM approach in learning science. There are several schools that experience problems in implementing STEAM in science learning. First, constraints due to limited time available. STEAM learning requires a relatively longer time, so the teacher allocates optimal time for its application. Second, constraints related to facilities and infrastructure. Third, conditions students when learning about high order thinking skills. There are several schools that have limited equipment, so learning project assignments is not possible.

Conclusion

Based on data obtained from interviews with middle school teachers, field observations, and literature reviews, the results of an analysis of the implementation of STEAM learning for students were obtained. The data results show that middle school teachers in East Java have implemented STEAM learning. The teacher assesses STEAM learning with a disciplinary focus on students' creative thinking skills. STEAM learning is able to train students to think creatively. In line with this research, there are also obstacles in implementing STEAM learning, namely several schools are still constrained by limited facilities and infrastructure, as well as the distribution of limited study hours when implementing STEAM learning.

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Development of a Tool to Analyze Source Code Submitted by Novice Programmers and Provide Learning Support Feedback With Comments

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Abstract
Novice students make various mistakes in the process of learning computer programming. In courses with more than 100 students, it is difficult to provide accurate and detailed feedback regarding errors in the source code submitted for their assignments. Therefore, we created a source code analyzer and developed a tool to provide detailed feedback to each student. It performs unit tests with misspelled classes and method names. From the results, the tool generates comments, such as "Let us check the method name" or "Let us check the execution result." The tool can generate an average of more than 8,000 Japanese characters per assignment in an actual programming lecture with more than 100 students. In this study, we report on the developed tool, its adaptation to an existing learning management system, and its evaluation.

Keywords: Programming Education, Source Code Analyze, Learning Support Tools

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Introduction

Information and Communication Technology (ICT) is playing an increasingly important role in everyday society. Therefore, software development is an important element in constructing information systems, and the training of programming engineers necessary for software development is key.

According to the IPA (Information-technology Promotion Agency of Japan. 2020), the demand for IT personnel remains high, and the Ministry of Education, Culture, Sports, Science, and Technology is promoting education that incorporates programming in elementary, junior high, and high schools (Ministry of Education, Culture, Sports, Science, and Technology. 2021).

Beginner programmers make various mistakes during the learning process. Understanding programming requires practice, which includes making mistakes (Martin, R.C. 2008). It is difficult for educators to identify errors properly when there are many learners.

Therefore, we developed a tool that can generate comments from student-submitted programs, even if the program's method name is misspelled, and can even perform unit testing. This tool is based on the core functionality of our previous system for real-time evaluation of student programs during lectures (Shin Hasegawa, et al., 2011), which is designed to be output in the form of an evaluation input to Manaba, the learning management system (LMS) currently used for lectures at Kanto Gakuin University. The output of the evaluation was designed to match the format of the evaluation input in Manaba. In this study, we report the results of using the tool in a lecture attended by more than 100 students who are beginner programmers and the results of feedback through comments to the students.

Development Tool Overview

The tools were developed in Java and Groovy, a dynamically typed scripting language that runs on Java VM.

The tool uses student submissions, a configuration file of the source code evaluation method, and the source code of the correct answers. The tool has a defined folder structure, and when the tool is executed, the evaluation results are output as CSV, HTML, and XML files; the CSV and XML files are used to read the evaluation result values, and the HTML file is used by the instructor to view the evaluation results. The main evaluation parameters were compilation, indentation, class definition, and unit testing.

Manaba allows student evaluations to be entered into an EXCEL file, which contains columns for each student to enter evaluations and comments, and the tool generates a CSV file from the CSV file of the evaluation results that can be pasted into the columns for each student.

Folder and file organization

When a zip file is unzipped, there are three folders and three files:

- answer folder ・・・ File that will be the correct answer to the execution result
- check folder ・・・ File to set check items
- Test folder: Folder with the teacher's name where student submissions are stored.

- prettify.css prettify.js style.css ・・・ File for html, which is a view of scoring results

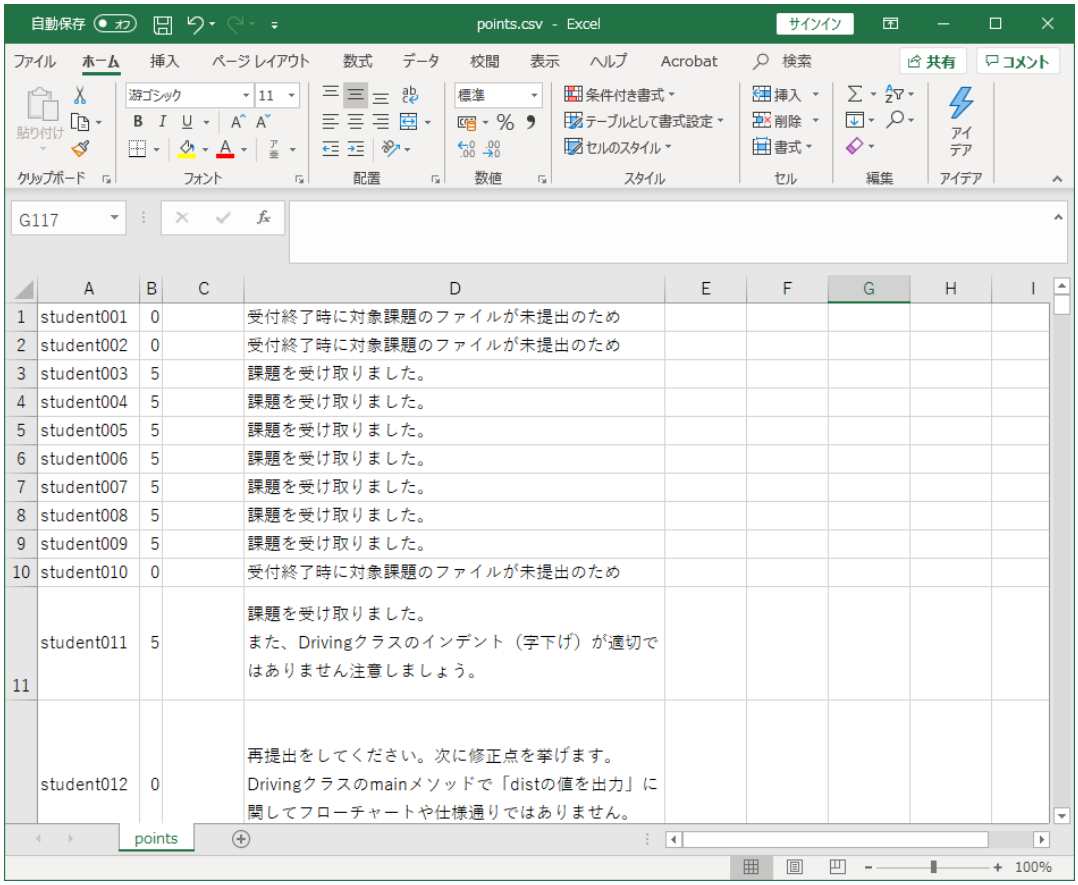
The following folders exist in the tests folder:

- mihon folder ・・・ Correct answer file (same file as "answer")
- mini folder ・・・ Files of specific students extracted when creating the checklist
- teacher folder ・・・ A folder that contains the student's submitted files

The mihon and mini folders were used only for setting up and adjusting the tools. The teacher folder contained each student's folder and the files necessary for grading. The roles of each folder are as follows:

- reportlist.xls ・・・ Registration file to LMS
- points.csv ・・・ Evaluation result file to be pasted into the registration file
- teacher.html ・・・ File for viewing the results of scoring items
- teacher_compile.txt ・・・ Dump file of compilation errors (option)
- CreateMessage.groovy ・・・ Script to output points.csv (option)

Folder and file organization

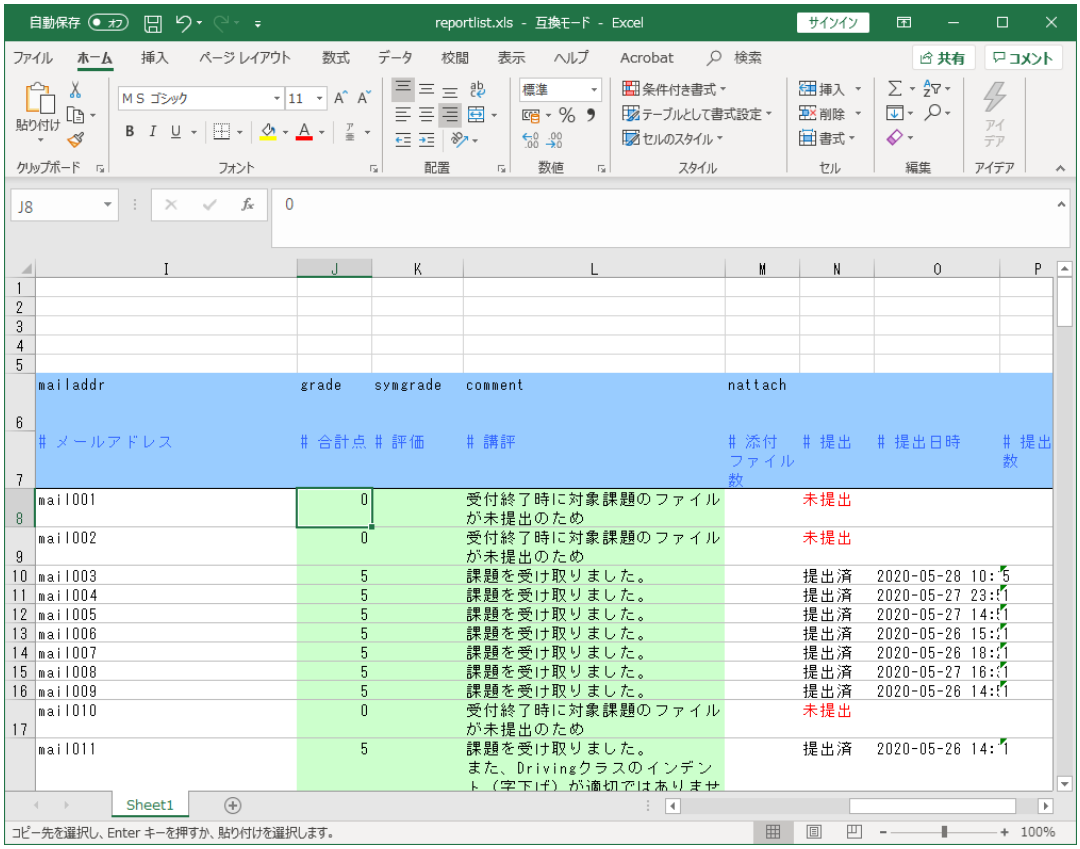


	A	B	C	D
1	student001	0		受付終了時に対象課題のファイルが未提出のため
2	student002	0		受付終了時に対象課題のファイルが未提出のため
3	student003	5		課題を受け取りました。
4	student004	5		課題を受け取りました。
5	student005	5		課題を受け取りました。
6	student006	5		課題を受け取りました。
7	student007	5		課題を受け取りました。
8	student008	5		課題を受け取りました。
9	student009	5		課題を受け取りました。
10	student010	0		受付終了時に対象課題のファイルが未提出のため
11	student011	5		課題を受け取りました。 また、Drivingクラスのインデント（字下げ）が適切ではありません注意しましょう。
	student012	0		再提出をしてください。次に修正点を挙げます。 Drivingクラスのmainメソッドで「distの値を出力」に関してフローチャートや仕様通りではありません。

Figure 1: Example of evaluation result file (points.csv).

To grade the scores, first open points.csv (Figure 1) and reportlist.xls (Figure 2) were used in Microsoft Excel. points.csv opens as follows: Column A contains the student ID number, and columns B–D are the three columns for pasting. Copy these three columns and paste them into columns J to L of reportlist.xls, and paste the total score, evaluation, and critique

according to the "Value" option. (In Manaba, if there is no total score, the evaluation is displayed in the Grades column).



	I	J	K	L	M	N	O	P
6	mailaddr	grade	symgrade	comment	nattach			
7	# メールアドレス	# 合計点	# 評価	# 講評	# 添付ファイル数	# 提出	# 提出日時	# 提出数
8	mail001	0		受付終了時に対象課題のファイルが未提出のため		未提出		
9	mail002	0		受付終了時に対象課題のファイルが未提出のため		未提出		
10	mail003	5		課題を受け取りました。		提出済	2020-05-28 10:5	
11	mail004	5		課題を受け取りました。		提出済	2020-05-27 23:1	
12	mail005	5		課題を受け取りました。		提出済	2020-05-27 14:1	
13	mail006	5		課題を受け取りました。		提出済	2020-05-26 15:1	
14	mail007	5		課題を受け取りました。		提出済	2020-05-26 18:1	
15	mail008	5		課題を受け取りました。		提出済	2020-05-27 16:1	
16	mail009	5		課題を受け取りました。		提出済	2020-05-26 14:1	
17	mail010	0		受付終了時に対象課題のファイルが未提出のため		未提出		
	mail011	5		課題を受け取りました。また、Drivingクラスのインデント（字下げ）が適切ではありませ		提出済	2020-05-26 14:1	

Figure 2: Example of copying and pasting an evaluation into a registration file (reportlist.xls).

The faculty member checks if the rows with the "Not submitted" column are evaluated as "Not submitted." This is a simple method for verifying whether the number of lines output by the tool is correct. After completing the check for "Not Submitted," the teacher should refer to the teacher.html file and adjust the evaluation and critique. This was done to allow the graders to adjust for unexpected patterns in the tool's submission and grading criteria.

Viewing evaluation results via HTML file

The results of the submissions, execution results, and graded items can be viewed by opening a teacher.html file in a browser. The results for each student are arranged according to the number of students in the single-page structure.

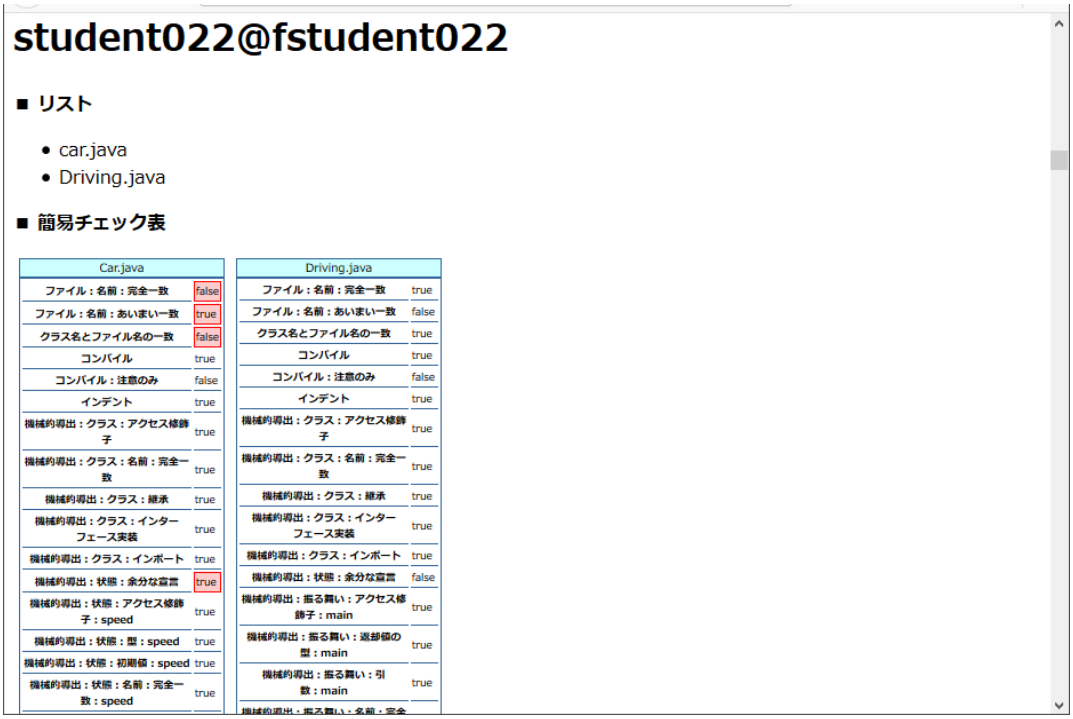


Figure 3: Example of viewing an evaluation in HTML.

Using Figure 3 as an example, "student022@fstudent022" is the name of a student folder. The files under "list" are the files used by the grading tool. Files that do not contain a ". java" or ". txt" extensions are not displayed. The "Simple Check List" shows the true/false status of the check items for each file as true and false. The files with poor results are shown in red. Critical text was generated based on these judgment results, but some items were not used. Some items were displayed in red, and there were cases in which the evaluation was acceptable, even if the background was not entirely white.

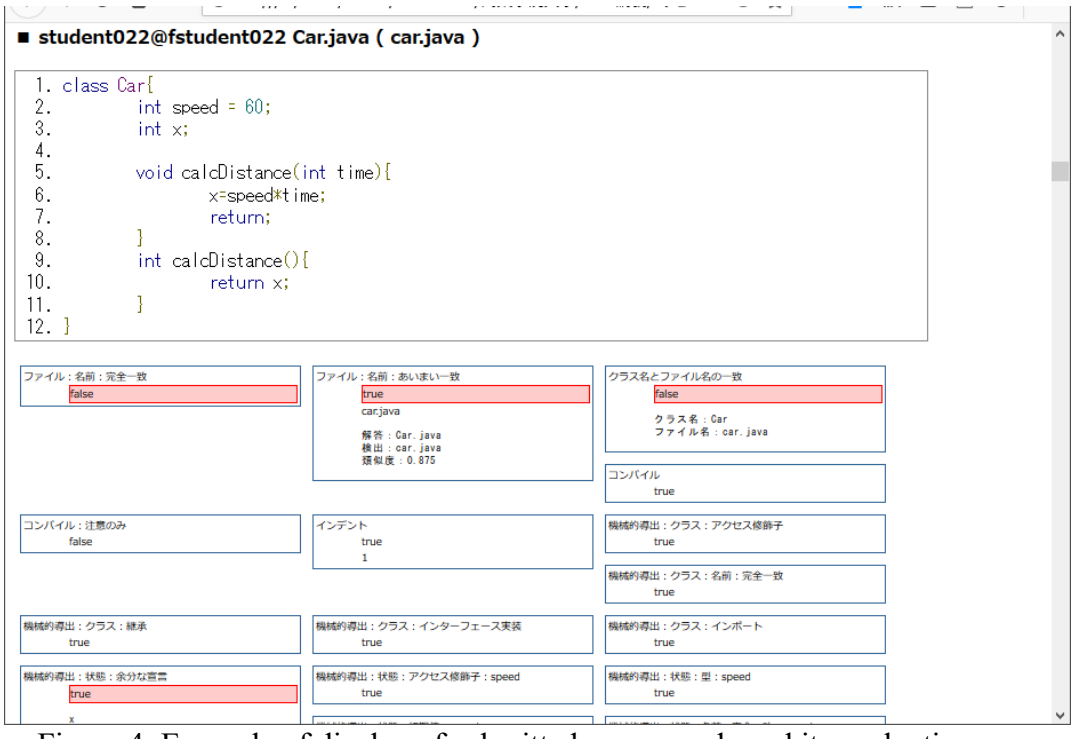


Figure 4: Example of display of submitted source code and its evaluation.

Next, in the source code section of the submission, "Folder name Issue file name (name of the submitted file)" is displayed (Figure 4), and the contents of the submission are displayed below it with line numbers. The file name inside the parentheses is the file of the submission; therefore, in this case, we know that the submission was made with the lower-case name car.java. The filename difference was true for the file "file:name:fuzzy match" indicating that the tool detected a misspelling of the filename. In this case, the generated comment is "There is a misspelling in the filename of the Car class."

Figure 5 shows an example display for each item. The items are roughly classified into "File," "Compile," "Indent," "Class Definition," "Grammar," and "Unit Test." The value for "Indent" indicates the indentation width using one-byte spaces. In the case of tabs, the value is 1.

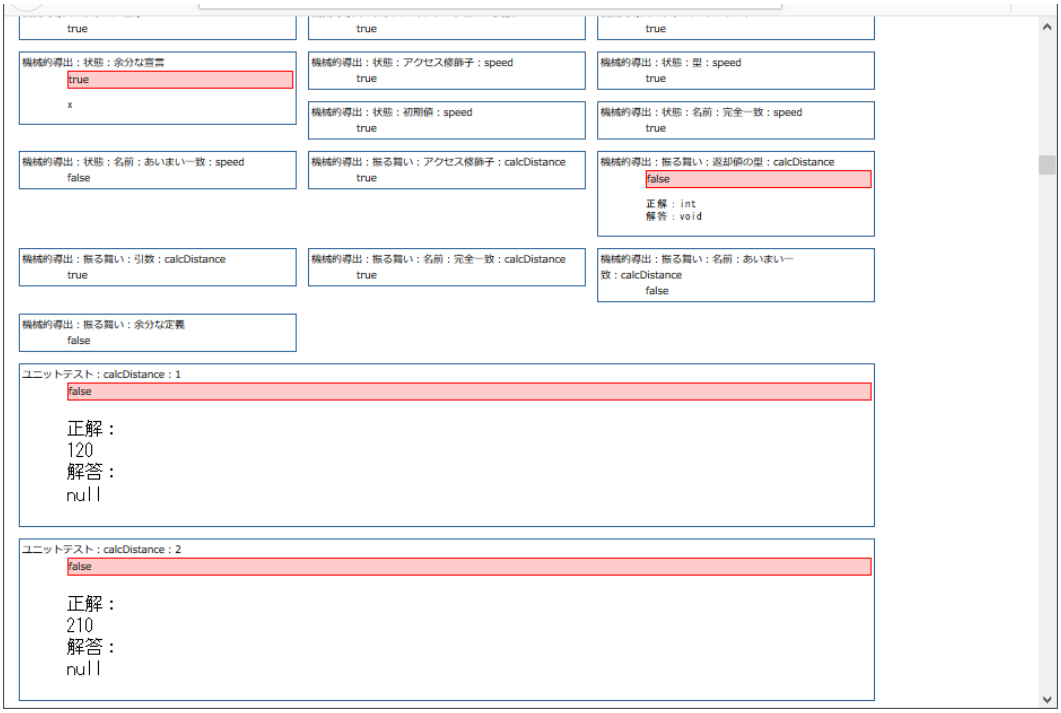


Figure 5: Example of display of each evaluation item.

Class Definition" is a check item for the specifications that form the class framework. The state refers to the field in the class, and behavior refers to the methods and concepts in the class. The results of comparing the type, variable name, etc., with the correct file are displayed.

The unit test compared the execution results with the correct answers. For methods that returned a value, the value for the test was entered as an argument, and the results were displayed to determine whether the results matched. Below "Correct:" is the result of the correct file, and below "Answer:" is the unit test result of the submitted file.



Figure 6: Example of unit test evaluation results.

Classes with a main method have a "Grammar" item, and "Unit Tests" also have a "Similarity" indicator. The "Grammar" item uses regular expressions to check whether the program is written according to the declaration method and flowchart of the variables in the main method described in the assignment.

As shown in Figure 6, the "unit test" of a method in the standard output displays the "similarity" below the correct answer and solution. The similarity is used to allow for ambiguity in judging the presence or absence of white space or double-byte and single-byte characters when questions are submitted on paper. A judgment of 1.0 was regarded as 100% agreement, and the other values are displayed in red. However, because a separate threshold is set for the results at point csv, even a false judgment may result in a pass. The corresponding full-width characters are changed to half-width characters, and the similarity is calculated by the "edit distance of strings (Levenshtein distance)" for strings that exclude all but the necessary white space.

The "unit test" in the main method isolates a specific line for each role of the output (Figure 7) and reflects the judgment in the critique.



Figure 7: Example of multiple unit test results.

The unit test uses three times the width of the other items and a larger font size to make it easier to identify differences in the text.

Use in lectures by its tools

The tool was used in a lecture for beginner programmers at Kanto Gakuin University's Faculty of Science and Technology to evaluate assignments and provide feedback through generated comments. The lecture was given to 140 students, most of whom were first-year university students. The content of the lecture was based on the fundamentals of structural programming in Java and did not include object-oriented programming.

Next, we discuss the comments received while evaluating the submitted source code.

```
import java.util.*;

class Kadai1201 {
^.public static void main(String[] args){
^.^.int num[] = new int[5];
^.^.int k;
^.^.
^.^.Scanner scan = new Scanner(System.in);
^.^.
^.^.for(k = 0; k < num.length; k++){
^.^.^.System.out.print((k+1)+"番目の数値：");
^.^.^.num[k] = scan.nextInt();
^.^.}
^.^.
^.^.int min = num[0];
^.^.for(k = 1; k < num.length; k++){
^.^.^.if(num[k] < min){
^.^.^.^.min = num[k];
^.^.^.}
^.^.}
^.^.
^.^.System.out.println("最小値："+min);
^.}
}
```

Figure 8: Example of Correct Source Code.

```
import java.util.Scanner;

public class Sample {
public static void main(String aregs[]) {
Scanner scanner = new Scanner(System.in);
int min = 0;
for (int i = 0; i < 5; i++) {
System.out.print(i + 1 + "5 = ");
int n = scanner.nextInt();
if (i == 0) {
min = n;
} else if (min< n) {
min = n;
}
}
System.out.println("-34 = " + min);
}
}

```

Figure 9: Example of submitted incorrect source code.

For example, if there is a submitted source code (Figure 8) for this correct answer (Figure 9), feedback with comments such as the following will be generated by the tool.

> *We have received your assignment.*
> *The following points will be noticed here, please refer to them for future study.*
> *Check the class name of the Kadai1201 class.*

Check the main method of the Kadai1201 class for "displaying input from the keyboard.
Let us check the "Display of the minimum value" in the main method of Kadai1201 class.
Note that the indentation of Kadai1201 class is not proper.
The argument of the main method of Kadai1201 class does not seem to be String[] args.

Table 1 shows the number of characters in Japanese used for comments on each assignment and the number of submissions.

Table 1: Number of both words and submissions of comments in each assignment.

Assignment Number	Number of characters (in Japanese) for comments to the entire submitter	Number of submitters
02-1	5392	116
02-2	6966	113
03-1	6534	115
03-2	13750	112
04-1	8958	113
05-1	11663	108
05-2	13649	102
05-3	6437	97
06-1	6441	114
07-1	7697	117
10-1	8091	109
10-2	8137	105
11-1	6670	108
12-1	8144	111
12-2	7454	97
13-1	10961	105
Sum	136944	1742
Ave.	8559	108.875

The feedback from the evaluations and comments was checked by the lecturer in charge of each lecture, and the evaluations were returned to the students via the LMS. There were only a few cases in which the comments made by the tool were incorrect or corrected.

Evaluation by questionnaire to students when using the tool

A questionnaire was sent to the students at the end of the lecture period to evaluate their assessment of assignments using the tool and provide feedback through comments. Eighty-three responses were received.

The results of each question and answer were as follows.

Q1. How accurate are your remarks?
- Very accurate 36% (30)
- Generally accurate 41% (34)
- Fairly accurate 20% (17)
- Generally inaccurate 2% (2)
- Inaccurate 0% (0)

Q2. How detailed were the comments?
- More detailed 18% (15)
- A little finer 24% (20)
- Normal 55% (46)
- A little rougher 1% (1)
- More rough 1% (1)

Q3. How is the readability of the points you made?
- Very easy to read 37% (31)
- Somewhat easy to read 23% (19)
- Normal 28% (23)
- Slightly difficult to read 11% (9)
- Difficult to read 1% (1)

Q4. Is the evaluation criteria consistent and stable throughout each assignment?
- Very stable 39% (32)
- Somewhat stable 33% (27)
- Cannot say either 25% (21)
- Slightly unstable 4% (3)
- Unstable 0% (0)

Q5. Are the points you have made useful for this study?
- Very useful 37% (31)
- Somewhat useful 39% (32)
- Cannot say either way 18% (15)
- Somewhat unhelpful 6% (5)
- Not useful 0% (0)

Q6. Would you like to use a programming learning site with this type of evaluation system in the future?
- I would like to use it by all means 30% (25)
- Somewhat would like to use it 46% (38)
- Cannot say either way 22% (18)
- Somewhat unwilling to use 2% (2)
- I do not want to use it 0% (0)

The results of student evaluations using the questionnaire were positive. The questionnaire also indicated many requests for a learning site separate from the feedback method through the LMS.

Future Outlook

The results of the survey showed that there was a high demand for a learning site, and a system was being developed to make the developed tools available via a web browser. Generally, a Java program requires an execution environment to be installed on a PC or another device to run and evaluate it. However, Doppio (Vilk, John. et el. 2014), which runs on a web browser, enables program execution and evaluation using only a web browser without installing an execution environment on a PC. Currently, we are developing a prototype tool for the simple evaluation of submitted source code using only a web browser.

Conclusions

In this study, we developed a tool to evaluate the source code submitted by students for assignments, using the core functionality of a previous program evaluation system. The tool tests the submitted source code for spelling errors and automatically generates comments for students based on the evaluation results.

The tool has been used in actual assignments for beginner programmers' lectures and has provided feedback with comments of more than 8,000 characters in Japanese for an average of more than 100 submissions each time. The tool was also evaluated using a questionnaire administered to students after the lecture period, and no major problems were found in the comments generated by the tool.

In the future, we will develop an environment in which the tool can be run using only a web browser such that the results of the tool can be used more easily.

Acknowledgements

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The Creation Strategies, Participants' Satisfaction and Learning Experiences of 'Sure and Share's Fact Check Detective Club'

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Abstract
'Sure and Share's Fact Check Detective Club' is a project initiated by the Sure and Share Center, Thailand's well-established fact-checking center under Thai News Agency. Due to the COVID-19 pandemic alarming situation during 2021-2022, the project with the main goal to enhance fact-checking knowledge and skills for 651 participants nationwide, aged 12-87 years old, had to be conducted in hybrid fashion under the concept of 'Innoactive Learning' virtual camp in November 2021. The objectives of this study are 1) to examine the creation strategies of the project and 2) to scrutinize participants' satisfaction and learning experiences. The study is mixed method research; it consists of semi-structured in-depth interview of six key informants who involved in the project creation and online questionnaires of 312 project participants with mixed demographic factors, from primary school students to retired civil servants, at the end of November 2021.Qualitative study showed that the project was designed to be adaptive with limitations during the pandemic under the concept of Innoactive Learning with the hybridization between a virtual camp and on-site activities. All activities were designed to give new learning experiences to the participants to ensure that they could gain fact-checking knowledge and skills with ease and fun. Quantitative study found that most of 312 informants were 'highly satisfied' with the activity's design and the learning experiences. Most of them would like to attend activities of the Sure and Share Center in the future. However, there are some problems of digital divide among the group of elderly participants.

Keywords: Innoactive Learning, Fact Check, Media Literacy and Virtual Camp

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1. Introduction

Thailand has been continually launching various dynamic initiatives to prevent and combat the fake news and information disorder. Still, when people want to get more information, such as during the COVID-19 pandemic or political protests, frequently the information shared between people is inaccurate. As the result, the society has to face with the 'Infodemic': a situation with a massive of information hardly to distinguish which is accurate or inaccurate same as the spread of COVID-19 pandemic. Due to this, it emphasizes the necessity to continue building an 'immunity' or 'media literacy' for people urgently and widely, in particular the youth and elderly. Those are the vulnerable groups who can be affected by an unawareness. To increase the media literacy by further developing from the successful previous project, the Sure and Share Center under Thai News Agency, a state-owned public broadcaster, therefore, launched the 'Sure and Share's Fact Check Detective Club' project: a comprehensive workshop to build a fundamental for sustainable media literacy to people with a support of the Thai Media Fund.

The 'Sure and Share's Fact Check Detective Club' project consists of five sub-elements as follows:

1. A workshop 'Train-the Trainer'
2. Research on the workshop and evaluation after the workshop to study participants' attitudes and user experience
3. Audio media produced by the participants to promote and provide knowledge on the media literacy for people
4. A design of the project for improving the training course to combat fake news and information disorder with the fact-checking skills for versions of youth or elderly
5. A group established for promoting the media literacy in communities and building the sub-network of student, teacher, elderly, media and local leader

In 2015, Thai News Agency launched the series of 'Sure and Share' and later established the 'Fact-Checking Center under Thai News Agency' in 2016 with aims of investigating the truth of information shared via online and reporting information through various channels. As the result, it surprisingly found that most of information was suspicious and inaccurate. Some caused negative impacts to both individual or social levels.

Producing a content in corresponding to people's questions could only help solving the facing problems. However, if considering to the root of problem and individual, 'media literacy' is a vital factor needed to be established. Although it is difficult to increase people's media literacy within a short period, the 'Sure and Share's Fact Check Detective Club for Youth' project was launched with the objectives to build an awareness for high school students in 2021. The project was developed from the previous 2020 program but expanded to various groups: teachers and elderly. Unfortunately, due to the COVID-19 preventive and control measures, the project was adjusted to a hybrid form of virtual camp and Innoactive Learning conducted through online.

Under the abovementioned circumstances, the study thus focuses on the creation strategies of the project and participants' satisfaction as well as learning experiences on the virtual camp and Innoactive Learning for further improvement of online activities in providing knowledge and skills as well as new experiences to participants in future.



Figure1. The closing ceremony of 'Sure and Share's Fact Check Detective Club'

2. Objectives of the study

2.1 To examine the creation strategies of the project
2.2 To scrutinize participants' satisfaction and learning experiences

3. Scope of the study

3.1 Persons involving in the project creation: a head of the project and speakers
3.2 Project participants: students, teachers and persons over the age of 50 who participated in the whole project

4. Definitions

4.1 Satisfaction in a context of teaching means the satisfaction on arrangement of learning and teaching elements. For this study, it refers to the satisfaction on organizing elements for learning, teaching and activities on the 'Sure and Share's Fact Check Detective Club' project. The satisfaction on learning environment reflects the satisfaction on arrangement of teaching elements.

4.2 User Experience means an experience of user occurring when the user interacts with the system (Burmistrov, 2017). For this study, it implies to experiences of participants on activities in the 'Sure and Share's Fact Check Detective Club' project.

4.3 Innoactive Learning is a term initiated by the organizers of 'Sure and Share's Fact Check Detective Club'**.** It's a combination between Innovative + Interactive. This project was designed to be the hybridization between a virtual camp and on-site activities to ensure that the participants will gain new knowledge and skills through integrated and innovative learning experience.

5. Literature review

5.1 Digital and media Literacy

Digital and media literacy is a vital skill for the 21st century. Definitions, however, evolve over time. It encompasses the full range of cognitive, emotional and social competencies that includes the use of texts, tools and technologies; the skills of critical thinking and analysis; the practice of message composition and creativity; the ability to engage in reflection and ethical thinking; as well as active participation through teamwork and collaboration (Hobbs, Renee, 2010). It includes these competencies:

Essential Competencies of Digital and Media Literacy
1. **ACCESS** Finding and using media and technology tools skillfully and sharing appropriate and relevant information with others
2. **ANALYZE & EVALUATE** Comprehending messages and using critical thinking to analyze message quality, veracity, credibility, and point of view, while considering potential effects or consequences of messages
3. **CREATE** Composing or generating content using creativity and confidence in self-expression, with awareness of purpose, audience, and composition techniques
4. **REFLECT** Applying social responsibility and ethical principles to one's own identity and lived experience, communication behavior and conduct
5. **ACT** Working individually and collaboratively to share knowledge and solve problems in the family, the workplace and the community, and participating as a member of a community at local, regional, national and international levels

Figure 2. Digital and Media Literacy Competencies (Hobbs, Renee, 2010)

In conclusion, it provides a framework to access, analyze, evaluate and create messages in a variety of forms.

5.2 Fake news

The European Commission (2017) defines the fake news as information created with an intention to distort and attack an individual, group of people or organization. The fake news also means the negative news, political propaganda or propaganda which makes people to misunderstand from their perception. Further, it includes a news report in a sarcastic form or giving misinformation for a cyber-attack.

To sum up, the fake news means information providing a fact without correctly researching or made-up information for propaganda, attacking the individual, the group of people or organization, creating the situation leading people to misunderstand. The fake news occurs either with and without an intention. It then circulates through broadcasting and social media.

However, there is a concern on using the term 'fake news' or 'misinformation' as it can be used as a discourse to distort or discredit those who think differently. Consequently, it must be careful or some media avoid to use this term.

Beside the fake news, there is a similar perception called 'information disorder.' Clair Wardle, a founder of First Draft', distinguished the information disorder into three groups by considering two parts: false information and cause harm (cited Anutarasoat and Salathong, 2019).

1. **MIS**information means false information spreading from a sender who believes it is true without any harmful intention.
2. **DIS**information means false information spreading from a sender who knows it is false and intent to cause harm: intent to lie.
   (As a result, the status of MIS and DIS can be changeable depending on the sender.)
3. **MAL**information means genuine information shared with an intention to cause harm. This information is likely to be a privacy but it is shown in the public. For examples, leaked clips, privacy violation clips or contents causing harm such as hatred quotes.

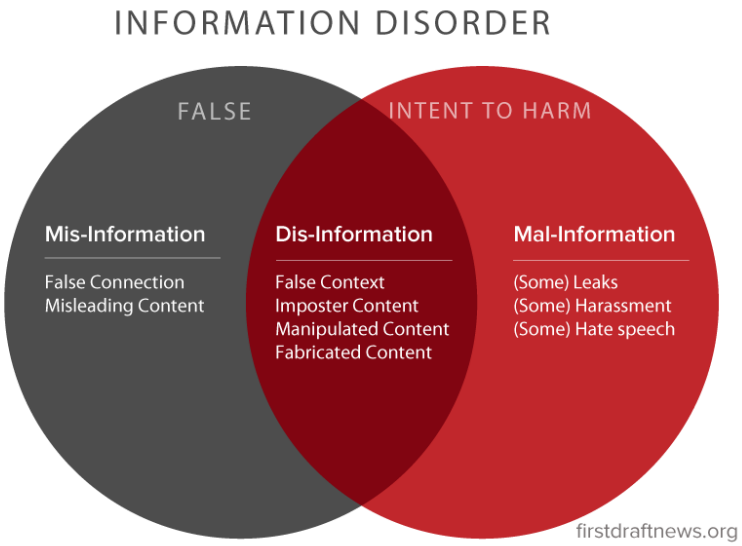


Figure 3. Information disorder (Wardle, Claire and Hossein Derakhshan, 2017)

5.3 Prospection on media creation

UGC: User Generated content

UGC is content contributed. It's includes personal contents produced by end-users in multiple social media platforms, such as Facebook, YouTube, MySpace, Twitter, blogs, and online forums. This content is unrelated to ones' professional work. UGC on the internet is not merely used for entertainment or passing time, but may also lead to citizen journalism (Gillmor, 2004) and social movements (Birdsall, 2007).

In this project, however, audio media was used as a tool to reflect participant's enhanced knowledge and skills on the basis of UGC as well as digital and media literacy. The audio is significant for circulating on the online platform when the users create their own User-Generated Content.

Prospection on User Experience

User Experience means an experience occurs from having an interaction with a system (Burmistrov, 2017).

The study on user experience is a study on experiences in terms of behavior, emotion and impression of user toward a product to understand and explore in improving approach and tool for further development of the product and new designs for the utmost benefit of the user. Each person has different need, capacity and potential. Therefore, those have

experiences in using the product differently. The user experience research (UX research), in this regard, refers to the study aiming to examine an understanding on user's behavior, need and intention for using the product and impact toward the design by collecting data from a process of research (Wongwanich, 2017).

However, to interpret user experience is required both abstract and quality resulting in the user experience questionnaire (UEQ) designed to be a quick use under prospections on subjectivity and quantity. The UEQ consists of six main elements as follows (S. Martin, Andreas, & Jörg, 2017):

1. Attractiveness is an emotional response resulting from evaluating user's satisfaction whether he/she likes it after use it.
2. Perspicuity refers to a system whether is easy for a user to quick use and learn.
3. Efficiency refers to a user can use a system successfully without putting more efforts and how quick the system can respond to user's needs.
4. Dependability is whether the user can control an interactive situation and be confident on using.
5. Stimulation is related to how exciting and enjoyable for using the system.
6. Novelty is whether the system has an attractiveness to the user.

For the attractiveness, this element is quite wide. Hassenzahl (2003), therefore, divided into two prospectives: first, pragmatic quality focuses on achievement of utilization consisting of perspicuity, efficiency and dependability. Second, hedonic quality focuses on the action to entertainment and enjoyment consisting of stimulation and novelty. Both are equally vital as the attractiveness of user (Hassenzahl, 2001). This can be described as the following chart.

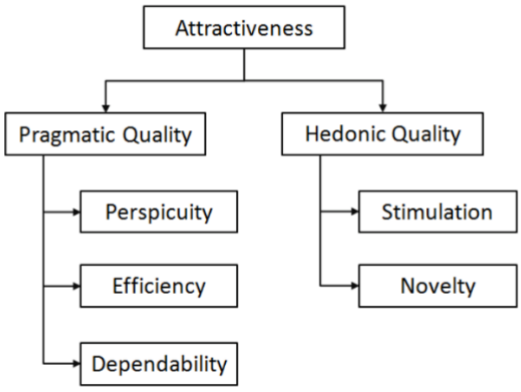


Figure 4. Attractiveness (Hassenzahl, 2001)

5.4 Concepts on development of virtual camp and Innoactive Learning

The main reason for changing the on-site to the virtual camp came from a concern on a widespread of COVID-19. The pandemic not only affected people's livelihood, but it also stimulated the fake news directly causing impacts to people. In this regard, although the COVID-19 situation had not yet ended, the project should not be postponed. As the problem on the fake news became increasingly severe, the project was thus designed by using a creation, innovation as well as technology to handle with the said problem.

The virtual camp aimed to create an experience on an online camping with designing the innovation to encourage the participant to gain the same experience with the on-site camp, such as meeting new friends, creating a group, arranging specific time to learn and participate on the activities for fun and enhancing relationship, and having a competition, such as base activities or rallies.

Meanwhile, Innoactive Learning was a new form of learning experience through the virtual learning materials. It combined the study clips and interactive online platform. The learner could learn by selecting the end-result and continue learning via a "content" or a "storyline" which would make the learner to enjoy during the study and lead to the new experience.

6. Methodology of the study

The mixed method research is applied for this study. An in-depth interview determines the process of project creation while a qualitative study by online questionnaire is utilized for evaluating participants' satisfaction and learning experiences.

6.1 Qualitative research

Key informants

Key informants of this study consist of a head of the project and speakers in total of six persons. The semi-structured in-depth interview was applied as it helped the interview to have a clear direction. Still, it allowed the researcher to find out new issues while interviewing. (Jamshed, 2014). The study selected a purposive sample involving the project: the head of project and speakers. The interview was carried out through an online via Zoom from 14 May 2021 to 5 November 2021.

6.2 Quantitative research

Research samples

The population was a group 312 participants (out of the total participants of 650) to answer the questionnaires composing students, teachers and persons over the age of 50 who participated in the whole project. Informants would evaluate themselves through open-ended questions for all parts: general information (personal data of informants), satisfaction, and attitude after the workshop. The questionnaires were under a supervision of three experts to ensure clearly comprehensive contexts in accordance with the objectives and evaluated for Index of Item Objective Congruence (IOC).

7. Result of the study and discussion

7.1 Objective 1: Result of quality research by interviewing

7.1.1 Background of Sure and Share's Fact Check Detective Club

Background on the virtual camp

Due to the severe widespread of COVID-19 in Thailand, the difficulty with unpredictable pandemic situation caused impacts not only to people's livelihood but also numerous the fake

news causing the situation became worse. In this regard, the 'Sure and Share's Fact Check Detective Club' project must continue by changing from the on-site to virtual camp to strengthen knowledge and awareness to the youths and elderly in handling with the fake news with using a creation, innovation and technology in supporting the project implementation.

The virtual camp is an activity aiming to organize the virtual camp in providing a camping experience via online system. It was designed for utilizing an innovation to support a creation of experience for the participants resulting in the participants could gain a similar experience with the on-site camp. They could be able to meet new friends, have a group, arrange specific time for learning to have fun and interaction as well as have a competition through base activities or rally.

> *We try to maintain the learning experience for not to be unchanged. Considering all parts of our works, this (learning experience) is the most interesting.*
> (Peerapon Anutarasoat, head of 'Sure and Share's Fact Check Detective Club' project, interview 18 September 2021)

Background of Innoactive Learning

As all activities and learning were switched from on-site to virtual one with the aims of ensuring the participants would still get the same experience of on-site camp resulting in the learning materials were produced in a form of video. The audience could learn by selecting the final result of the study and continuing their learning through 'contents' or 'storylines' which allowed them to enjoy with the learnings. The contents would be pre-recorded; it could reply answers in correspondent to questions.

7.1.2 Structure and process of the virtual camp

7.1.2.1 Before starting the virtual camp

The process included to call for participants, registration, system testing for learning and submission and introduction of participants inside their group.

Concept on creation before starting the virtual camp

The project was switched from the on-site to the virtual camp. Still, the organizer wished to providing similar experiences of the on-site to those participants. Therefore, many activities such as the interaction among the participants, introduction and preparedness on the system, were conducted.

Objectives of the creation before starting the virtual camp

1. To set up a preparedness and understanding of participants to avoid having a difficulty on using the system once staring the camp (such as system on submission of works or setting up the picture background on Zoom)
2. To create an excitement to participants before joining the camp
3. To encourage the participants to have a close acquaintance to each other

7.1.2.2 During the virtual camp

Concept on creation during the virtual camp

Since the project had been adjusted from on-site to virtual camp, the issue on building experience toward the participants was considerably designed and inclusive. For the on-site camp, the speaker could see the interaction of participants by their faces. If they were bored, then the speaker could add more games or give a break. In contrast, there was no interaction between the speaker and participants for the virtual camp. The project, therefore, had to carefully consider, design and prepare the activities to make sure that, from a total of eight-hour on-site camp divided into small online classes, the participants would still enjoy the learning and have the same experiences with the on-site.

Objectives of the creation during the virtual camp

1. To provide the on-site-alike experiences learned from the virtual camp
2. To create participants' excitement and enthusiasm for the whole project learning

7.1.2.3 'Clinic' Activity

Concept on 'Clinic' activity

It was an activity which the speakers and participants meet each other. The interaction between them occurred via live; system. The activity was conducted by collecting ideas inside the groups of participants. It allowed not only the participants to discuss among their groups but also could bring the issues to the speakers who went live online.

Objectives 'Clinic'

1. To have an interaction between the participants and speakers
2. To build relationship among the participants

Subjects learned during the virtual camp

1. FACT-CHECK Detective
2. Cyber security by the ETDA
3. Case study with the cyber police and Thailand Internet Crimes Against Children (TICAC)
4. Audio Production

7.1.2.4 'Virtual Campfire' Activity

Concept of creation of the 'Virtual Campfire'

It was a live online focusing to creating an atmosphere and relationship through an entertainment and building inspiration. It also helped to enhance relationship, unity and inspiration to support each other. It is aimed to replace all on-site activities by ensuring that the participants would gain experience as much as the on-site and exciting to study with other participants.

Objectives of 'Virtual Campfire'

To create a good atmosphere for participants to endeavor to accomplish the project
To build relationship and inspiration among the participants.

7.1.2.5 After the virtual camp

It consisted of 1. handover of kits to the participants 2. closing ceremony 3. expansion of network.

Concept on creation after the virtual camp

It was a period to handover kits to the participants so they could wear the same cloths on the ceremonial closing day to show the unity and expand knowledge and activities to other network at the school and community levels.

Objectives

To pass and share the knowledge and experience from participating in the project to neighbors, schools, friends or communities in strengthening knowledge and understanding at the society level.

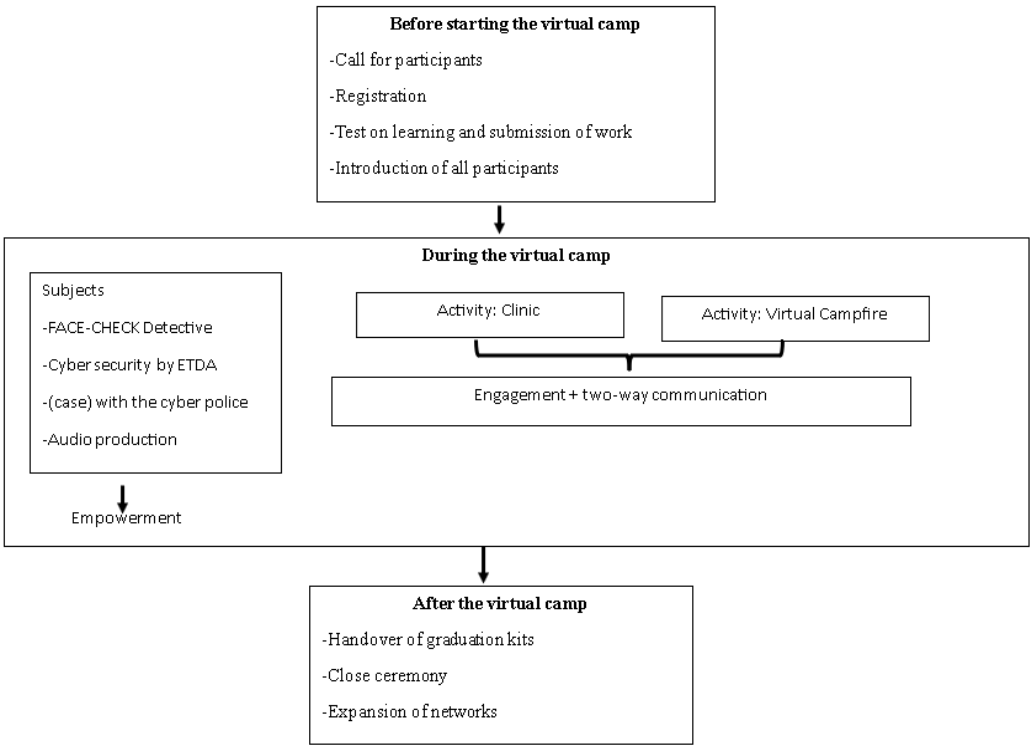


Figure 5. Overall project

7.2 Objectives 2: Result of quantitative research

The quantitative research aims to scrutinize a satisfaction on learning experiences of participants: teachers, students and people in general from various regions in Thailand during

14-30 November 2021 via online. The criteria of informants were initially set as a person was required to attend the opening ceremony, take every course, participant activities as attend the closing ceremony. The survey was conducted through an online questionnaire and opened for the participants to voluntarily answer. The researcher collected the data and evaluated as well as analyzed by using the computer.

There were 312 persons as a sample group from 41 provinces. Most of the informants were from Bangkok: 99 persons or 27.05 percent.

Meanwhile, students were considered as the most informants, 205 persons or 56.01 percent, following by people in general 93 persons or 25.41 percent and teachers 68 persons or 18.58 respectively.

Table 1. shows number, percent, average, standard deviation of participants' experiences andsatisfaction on the overall project.

Question	Level					$\bar{X}$	S.D.	level
	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree			
1.You tend to share knowledge and experience to others.	205 (65.71)	95 (30.45)	11 (3.53)	1 (0.32)	-	1.38	0.572	Strongly agree
2.You satisfied with a learning form of 'Virtual Camp'.	206 (66.03)	89 (28.53)	17 (5.45)	-	-	1.39	0.591	Strongly agree
3.You satisfied with a learning form of Innoactive Learning (Learning Video which a learner can select the final result	221 (70.83)	81 (25.96)	9 (2.88)	1 (0.32)	-	1.33	0.546	Strongly agree

and a learning video with the storylines.								
4.Overall, you satisfied with participating the 'Sure and Share's Fact Check Detective Club' project	223 (71.47)	80 (25.64)	9 (2.88)	-	-	1.31	0.523	Strongly agree
Total Experiences and satisfaction with the overall project						1.35	0.48	Strongly agree

n = 312

From **Table 1**, it illustrates that the sample group was highly satisfied on the overall project. There were 312 persons for a sample group from 41 provinces nationwide. Top six of provinces having the most informant included Bangkok (86 persons or 27.56 percent), followed by Samut Sakhon (36 persons or 11.54 percent), Nonthaburi (35 persons or 11.22 percent), Nakhon Phanom (25 persons or 8.01 percent), Chiang Rai (23 persons or 7.37 persons) and Pathum Thani (12 persons or 3.85 percent) respectively.

The most informants answering questionnaires was students (162 persons or 51.92 percent), followed by people in general (89 persons or 28.53 percent) and teachers (61 persons or 19.55 percent respectively. The average age of the sample considered as people in general was 58 (mean = 58.07). While the youngest age of informants in general was 19, the eldest was 85. A number of females answering the questionnaire than males as 173 persons or 55.45 percent comparing with 135 persons or 43.27 percent. Meanwhile, four persons or 1.28 percent did not identify the gender.

The sample group gained experiences and had the most satisfaction with an overall process of calling the participation the most. The highest level of satisfaction also shown for the Starter kit which consisted of project's organizational charge and manual. Likewise, those informants had the most experiences and satisfaction with activity on 'Online Clinic with speakers.' They also gave the most satisfaction toward the Campfire and audio production as well as overall project.

8. Expectation on transfer and adaptation of the participants

For a group of students, it was expected that the students could have wider ideas in producing contents and utilizing in various dimensions. Also, they could know how to adapt a use of the application which is more convenience in media production. This knowledge could be passed

via a month-to-month communication among the students. (Yet, it could have less impacts comparing with the teaching by a group of teachers).

For a group of teachers, it was expected to use for their teaching in compliance with the online class amid a spread of COVID-19. The audio could become a tool or an option helping the students to access retrospective lessons (such as podcast).

For a group of elderly, it was expected that the elderly could have an experience in using tools for audio production and learning how to use their own tools in creating works rather than only communication use.

9. Discussion and Conclusion

According to the abovementioned study, the creation of the project was designed by considering contexts and conditions of unanticipated situation caused by COVID-19 as well as learners' participation and experiences. The project, therefore, proceeded into the virtual camp focusing on Innoactive Learning concept and participation. The most effective result under the prospection of media literacy and UGC is an ability to produce a creative media in compliance with prospection of experiences and media literacy. The content complies with providing knowledge, investing truths, cybercrime and media creation. The participants not only highly satisfied with new learning experiences but also could produce the creative media. This outcome illustrates in accordance with the result of the quantitative research. The sample group expressed their highest satisfaction and could provide the utmost experience to the participants. Most of them showed their intention to share the knowledge and experience from the project to other and have a willingness to attend the project organized by the partner network of this project again in the future.

As the result reflected high "attractiveness" from the participants, the 'virtual camp' focusing on Innoactive Learning could become a model for adapting to other workshops in providing knowledge and empowerment in various issues However, it is required a determination of limitation for contents and activities which may not allow the project to conduct in a form of online. Besides, the capabilities of participants in technology and accessing to the technology may also become a limitation and lead to a digital gab which can affect the quality and atmosphere of learning class and activities. Therefore, the nature of demography and readiness of learners needs to be considered in order to proceed the project successfully.

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Factors Influencing Thai University Students' Decision in Participating in Study Abroad

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Abstract
Educators have long recognized that education abroad can be a path to job opportunities and personal growth. Pre-COVID, the number of students studying abroad had increased steadily year by year; this development was disrupted by the pandemic. As student mobility resumes post-COVID, there is a renewed interest in understanding the factors that motivate students to participate in studying abroad. This presentation shares the results of preliminary research conducted at a Thai university. The researchers surveyed 250 students to determine the factors that motivate them to study abroad as well as the obstacles that they perceive as preventing them from studying abroad. The top three factors were personal development, career development, and academic factors. International experience makes an impact on the CV as it does not improve only the students' language skills but seems to shape their global citizenship mind which is essential in the industry. The top three obstacles were expenses, curriculum factors, and language barriers. The majority of Thai students are self-funded for their education abroad so the expenses are one of the main factors in their decision as well as the relevant course should not expand the study time. Additionally, students expressed interest in a wide variety of experiences beyond the traditional semester abroad, including work and study, short courses, internships, and research opportunities. The findings of this study will be of interest to educators who are interested in understanding students' perceptions regarding studying abroad in order to increase student mobility and student satisfaction with the study abroad experience.

Keywords: International Education, Study Abroad, Exchange Mobility, Outbound Mobility, Student Exchange

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Introduction

Higher education institutions around the world have put internationalization and global citizenship as one of the main objectives. Many universities enhance their international mobility by seeking collaboration with partners, as well as promoting their image to attract international students (De Wit, 2002). The collaboration between partners allows students to go on an exchange program and get credits as a part of their study (Doyle et al., 2010) and exchange programs have promoted internationalization and student mobility. Moreover, the exchange between the partner universities creates the international atmosphere which has a positive effect on the students to be able to raise cross-cultural awareness, develop global citizenship and learning experience as well as to develop their personal growth (Mpinganjira, 2009). Nowadays, global competencies are highly expected in the industry so students have been encouraged to participate in study abroad. (Hunter, White & Godbey, 2006; Terrant, 2010) An outbound program has been among the strategies of many universities to develop students' global competencies (Asoaka & Yano, 2009).

However, the number of Thai students studying abroad is not large compared to the number from other countries in Asia. During 2012–2019, the number of students participating in study abroad slightly increased 32,916 from 28,339 students (16%). The destination choices are Australia, USA, UK and Japan respectively (Statista, 2021). Several indicated problems and obstacle factors preventing the student from studying abroad. The most common factor is the financial factors as well as the language barrier and the difference between cultures (Brustein, 2007). Moreover, studying abroad is considered an extracurricular activity that extends the time of the study. Support from the home university is one of the obstacles, consequently; the spotlight is on the inbound program due to the income (Doyle et al., 2010).

The Student Exchange Program at the International College has been very successful, especially in terms of inbound students, which include students who come to study for a semester as well as those who come for short periods of less than 12 weeks. According to the data from the activities organized in the academic year 2019, there were 380 inbound students for the semester program and 284 inbound students for the short-term program, for a total of 664 students. However, the number of outbound students was only 143, even though the college has tools to increase the number of outbound students, such as organizing study abroad programs, providing scholarships, and developing a global partner search system to facilitate the selection of schools and transfer credits. Nevertheless, the number of outbound students is still relatively low compared to the number of inbound students. The present study was designed to examine the factors influencing students' decision to participate in study abroad in order to have a proposed plan to develop outbound mobility.

Research Objective

1. To investigate the factors influencing MUIC students to participate in study abroad
2. To investigate obstacles factors preventing MUIC students from participating in study abroad
3. To propose an effective plan for an outbound program for MUIC students

Literature review

Several studies have identified the factors influencing students' decision to participate in study abroad as both motive factors and obstacle factors. A number of studies have discussed that students consider studying abroad as a tool for the future career opportunity. Daly. (2011) and Bourke (2000) mentioned that participating in an exchange program helps to increase the chance of employment after graduation. Moreover, it would develop the necessary skills for future jobs like problem-solving skills and systematic thinking skills.

Personal factors are one of the major considerations. Studying abroad is considered a great opportunity to live in another culture and see the world. (Van Hoof & Verbeeten, 2005) The participant can make a relationship with people from different cultures. (Clyne and Rizvi, 1998) Some students participate in study abroad for the reason of personal growth. Studying abroad helps to increase cross-cultural awareness as well as language ability. Winnicki and Marciniak, 2019 reported that exchange students tend to be more confident and be able to understand different cultures. Students also participate in study abroad to seek an adventure and step out of their comfort zone. (Bourke, 2000; Krzaklewska & Krupnik, 2005; Goldstein &Kim, 2006; Doyle et al. 2010; Winnicki&Marciniak, 2019) It also boosts up social status (Mpinganjira, 2009).

Parents' attitude toward study abroad also had an influence on the decision to study abroad. Word of mouth helps exchange programs mobility grow. The students who get a recommendation from friends and family tend to participate in study abroad (Wiers-Jenssen, 2003). Another significant factor that most affects students' decision is the financial factor. Despite the family's affordability, the information of estimated expenses is something to consider. Students also look for the availability of the scholarship and the possibility to have a part time job (Gust, Livett and Stone, 2006; Doyle et al., 2010).

The relevant courses drive the exchange mobility. Some students decided to not participate in study abroad with the reason that there is no course matched with their interest and their degree program (The Sussex Centres', 2004). Moreover, the time match is also one of the vital factors. Students would not like to spend the extra time on their study (Van der Meld, 2003). Consequently, the new type of exchange program has occurred, for instant short term exchange program, work and study program which are the extra curriculum program requiring a short period of time (Doyle et al., 2010). Support from home university as well as networking and collaborating with partner universities plays an important role in the decision factor (Doyle et al., 2010). Furthermore, the enthusiasm of the staff to promote the program affects the decision because students need the information of the program (Sussex Centre, 2004).

Obstacle factors of participating in study abroad

Several studies have reported the obstacle factors that affect the decision of participating in study abroad. One of the main barriers is the financial factor. Sussex Centre, 2004; Otero S &McCoshan, 2006; Doyle et al., 2010 have identified Finance as a barrier to study abroad as the exchange program is an add-on to the curriculum which requires extra expenses. Moreover, other expenses like cost of living will occur. (Van der Meld, 2003) The psychological factors have also been identified as the barrier of study abroad. The participants were worried about leaving their friends and family as well as living in an unfamiliar circumstance. (Doyle et al., 2010; Wiers-Jenssen, 2003) Mazzarol and Soutar,

2002 reported the limits of foreign language ability as the obstacles of student mobility. Most students tend to choose the destination country where English is the language of instruction. Students have the concerns of the interaction during the class if lack of language skill.

Lack of access to reliable information is significantly important. (Doyle et al2010) According to the study of Van der Meld, 2003, found that students decided not to participate in exchange programs due to lack of information about the opportunity. The limitation of the relevant course is also a big concern because students are afraid that study abroad would affect their degree program. Some universities have a tight schedule, so participating in study abroad will extend their study time (Doyle et al., 2010).

Methodology

The questionnaire with a set of questions based on the literature review was designed to collect data on factors influencing students' decisions. The questionnaire was divided into four parts; the first part was the general information consisting of four items asking participants' gender, nationality, academic year, and major. The second part (two items) was designed to investigate the participants 'intention to participate in Study Abroad. While the third past was developed to examine factors influencing the decision of participating in study abroad both the motive factors and obstacle factors and the last past (one item) asked the respondents for suggestions on exchange programs. This questionnaire was reviewed by three outside organization inspectors and approved by Mahidol University Central Institutional Review Board (MU-CIRB) before being used.

The QR code of the questionnaire was distributed to the participants at the Student Exchange Unit office and Co-working Space. The participants were 250 students selected by accidental sampling from 4,325 MUIC students, year 1-4 the academic year 2021. From all of the respondents, 76 % of them were female and 19.6 % were male. 4 % of the respondents prefer not to mention their gender while 0.4% specified themselves as bisexual.

Data were analyzed by SPSS. Descriptive statistics were used to investigate the items in part 1- 3 of the questionnaire.

Finding

The survey reported 92.8 % of the respondents had a plan to study abroad while only 7.2% of them did not plan to study abroad.

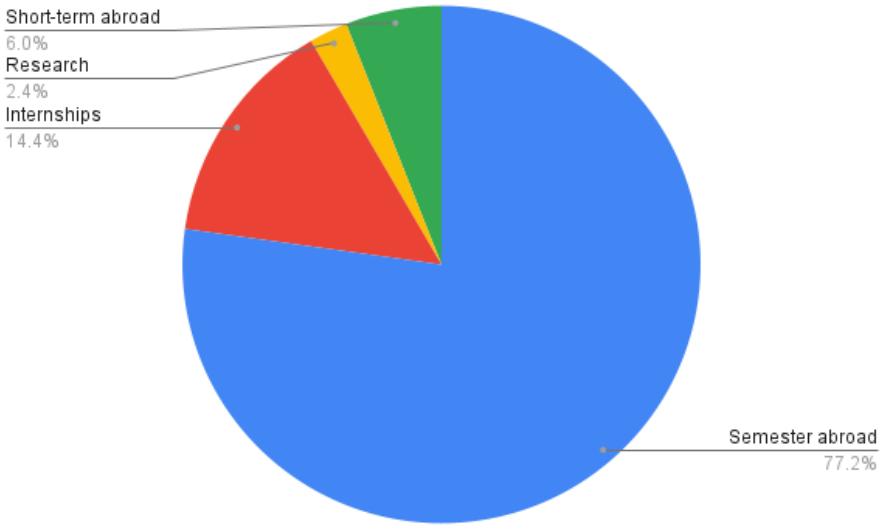


Figure 1: Intention to participate in study abroad

From figure 1 showing that the majority of the students (77.2%) were intended for the traditional semester exchange. Many respondents (14.4%) were into the internship program while some (6%) were interested in short-term abroad. Only a few students (2.4%) expected the research exchange program.

Motive factors to study abroad

Respondents were asked to rate how much each factor influenced their decision to study abroad. The factors were divided into six categories; career development, personal development, recommendation, financial aids, academic and support from the home institute.

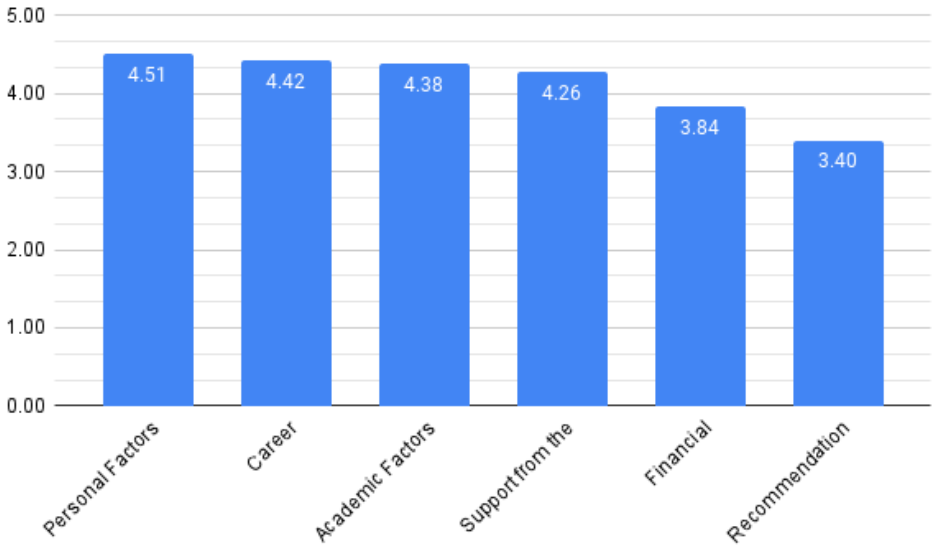


Figure 2: Factors influencing the decision to participate in study abroad

ITEMS	Very important (%)	Important (%)	Neutral (%)	Slightly important (%)	Not important (%)
Personal Factors					
It would be a good opportunity to travel.	66.8	21.6	10	1.2	0.4
It would be a good opportunity to live in another culture.	70.8	20.8	6.4	1.2	0.8
I would like to have relationship with people from different culture.	59.2	27.6	10.4	2	0.8
It would increase ability to communicate in a foreign language.	68.8	21.2	7.2	1.2	1.6
It would expand my knowledge beyond courses offered at MUIC.	61.6	26.4	10.4	1.6	0
Seeking independence and challenge.	62.4	27.2	7.2	2.4	0.8
Career development					
It would enhance my employability after graduation.	57.6	26	12	39.2	0.8
It would help me improve necessary skills for my future job.	61.2	26.8	10.4	1.2	0.4
Academic factors					
The quality of education in the host country.	56.4	31.6	9.2	1.6	1.2
There are courses that meet my interest.	51.6	33.2	11.6	2.8	0.8
There are relevant courses to my program.	55.6	30.8	11.2	1.6	0.8
Courses are conducted in English.	69.6	21.6	6.4	0.8	1.6
I do not have to spend an extra year or semester attending the program.	53.6	23.6	16	0.8	4

Table 1: The top three motivating factors influencing students' decision to study abroad (According to the survey)

Among the respondents, the most important factor influencing them to study abroad was the personal development factor (mean = 4.51) as the result showed that 70.8% of the participants realized studying abroad would be a good opportunity to live in another culture. More than half of them (68.8%) saw it as an opportunity to increase their language ability. Followed by the career development factor for the second significant factor (mean = 4.42). From Table 1, 61.2% of the respondents thought study abroad would help them to improve the necessary skill for the future job. The third factor was the academic factor (mean = 4.38) of which 69.6 % of respondents seeing the relevant course should be conducted in English. The fourth important factor is support from the home university (mean = 4.26) and the last two important factors are Financial aid factors (mean = 3.84) and recommendation from friends and family (mean=3.40), (See Figure 2).

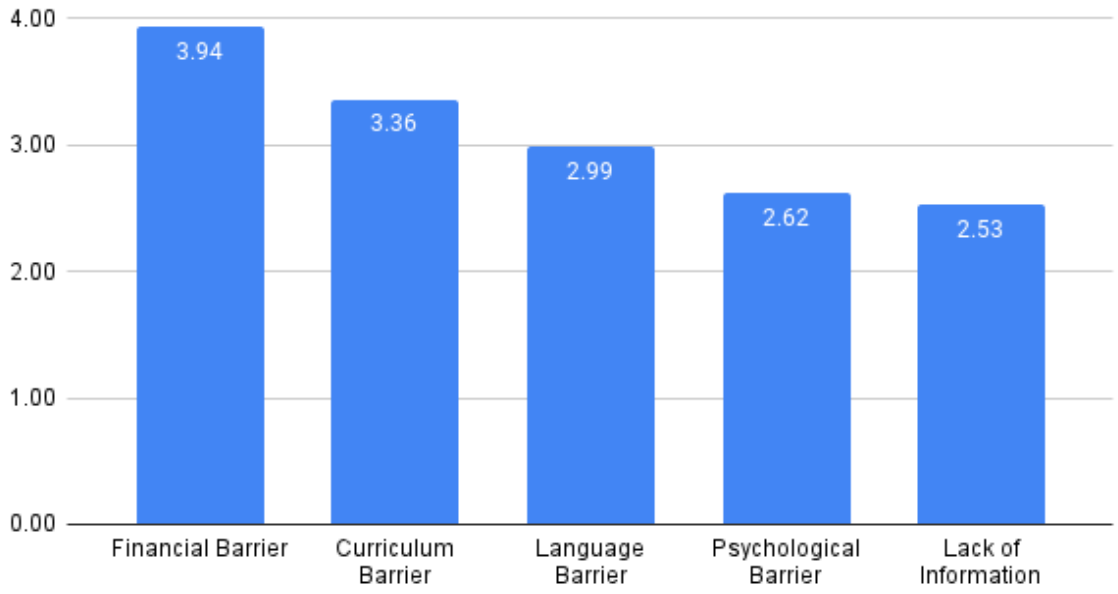


Figure 3: Obstacle factors influencing the decision to participate in study abroad

ITEMS	Very important (%)	Important (%)	Neutral (%)	Slightly important (%)	Not important (%)
Financial Barrier					
It would be too expensive for me to study abroad	27.2	33.2	26.4	7.6	5.6
I would need more information about the cost of the outbound exchange program	50	29.6	12.8	5.2	2.4
Curriculum Barrier					
Participating in the program may make my study longer.	20.8	28.8	27.6	12.8	10
There are no or few relevant courses.	22.4	22.8	30.8	15.2	8.8
Language Barrier					
I don't want to stay in a country where I do not know their language.	13.6	17.2	26.4	17.2	25.6
Language of instruction is not English.	26	17.2	27.6	11.6	17.6

Table 2: The top three obstacle factors influencing students' decision to study abroad (According to the survey)

Obstacles factors preventing students from studying abroad

The financial factors were reported as the most important barrier to study abroad. (mean = 3.94). From Table 2, the survey showed that half of the respondents (50%) would need more information about the cost of the outbound exchange program. Lack of information about the expenses of the program is a very important obstacle. The second significant obstacle was the curriculum (mean = 3.36) in which the respondents thought there are few relevant courses and studying abroad would extend their studies. The third factor was the language barrier (mean =2.99). It is not the language competency but if the language of instruction was not English, it will be one matter of barriers (See Table 2).

Implication

The most significant motivating factor was the personal factor. In order to promote the exchange program related to this factor, universities should broaden the positive perspective of students toward the exchange program. Specifically, the experiences and benefits they would get from studying abroad. In point of career matters, studying abroad has been seen as a way students would improve their global competency which is highly required in the industry. Universities can push this harder by encouraging the students to engage themselves with the local community to actually shape the globalization skill and improve the necessary skill for the future job. Apart from those, universities should strengthen the collaboration with partner universities and seek more relevant courses and programs that would fit most of the students.

Similarly, to most of the previous studies, the result showed that financial factors were the significant obstacles to participate in studying abroad. The survey showed that the respondents would need more information about the cost of the outbound exchange program. At this point, we recommend the university to create a platform where the student can easily access the information including the average cost of living. There should be specific estimated expenses for specific destinations, not only broad general information. The information of the availability of scholarships both internal and external institutions also can be provided on the platform. Another issue with the financial factor was that it would be expensive for students to study abroad. The university should offer various types of exchange programs that would require less financial support for instant short-term exchange programs or work and study programs. The second barrier factor is the curriculum factor. The respondents thought studying abroad would extend their period of study time. In this case, the support for planning to study abroad can be provided so that the students can plan their enrollment ahead. The short-term exchange during their summer break can be one of the options for students to participate in the program during their break time. Language barrier also appears to be one of the important factors to prevent them from participating in study abroad. The limit of language proficiency is one point and another point is the language of instruction.

Limitation

The questionnaire was contributed to the participants at the Student Exchange Unit office where most of the students are interested in studying abroad and the data were collected at the International College. This becomes the limitation in terms of generalization of the results to all Thai universities.

Conclusion

In conclusion, most of the respondents indicated that studying abroad has been beneficial for their personal growth and future career path. Those positive experiences and benefits motivated them to participate in studying abroad. However, there are some obstacle factors pulling them to not participate in studying abroad. It turned out that the most significant obstacle is the financial factor. It is not because they cannot afford the expenses, yet they would like to get more specific information about the expenses that might occur. As most of the Thai students are self-funded for their studies, the information about the estimated expenses is matter for their decision. The condition of academic factors is also one major barrier. In terms of a few relevant courses can be found and the extra time they have to spend. From the findings, the university can increase student mobility by providing information on how to develop their own skill through studying abroad. Moreover, the university can reduce the barrier factors by supporting the required information and strengthening the collaboration with partners in order to have various fields of study. Additionally, students expressed interest in a wide variety of experiences beyond the traditional semester abroad, including work and study, short courses, internships, and research opportunities. The findings can lead to further study on the perception of students toward various types of study abroad.

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An Analysis of Content Marketing on Social Media by Five Top Global Universities

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Abstract
Social media are used increasingly by higher education institutions (HEIs) to promote brands and connect to stakeholders. The authors analyzed post type and post content on Facebook posted by five selective universities of Top 20 QS World Ranking University 2022: Massachusetts Institute of Technology from USA, University of Oxford from UK, ETH Zurich-Swiss Federal Institute of Technology from Switzerland, National University of Singapore from Singapore, and Tsinghua University from China. This study followed the 12 post types: alumni, announcement, campus, curriculum, events, faculty, image and reputation, industry, others, products, research, and students to segment post types, and expressions such as likes and comments are used to evaluate engagement. The study found that from 2,232 posts by the selective institutions, the top five most frequently posted are research, faculty, students, events and announcements. Compared to engagement, beautiful spots on campus, and curriculum gained the most engagement, students' life also gained high engagement as found in previous papers together while research is still in the top five. Interestingly, the "others" post type, which contained content from external outsources, was also found with high engagement in this study. From findings, the authors suggested HEIs may pay attention to updated content or stories that matter from external sources or promote other topics not related to the university but that have an impact at the national or international level as useful content to make users or followers engaged.

Keywords: Higher Education, Marketing, Facebook, Social Media, Content Analysis

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Introduction

Digital marketing changed the world with no exception, and universities will not be able to sustain themselves without enrollment growth. Universities have the challenge of maintaining relevance among students who are more reliant on technology as a communication source (Martin, 2015). Even though traditional strategies and processes to reach out potential applicants via campus visits, letters and viewbooks still exist, but at the same time reaching out to prospective schools using social media have shown a distinct preference by students for more than a decade (Hayes, Ruschman & Walker, 2009). It was confirmed by Barnes and Mattson (2009, 2010, as cited in Peruta & Shields, 2018) that more than 90% of college admission office viewed social media as being of great importance to their recruiting initiatives.

Universities in the United States typically use multiple web and social media platforms in marketing brands to increase applications and engagement to their institutions (Peruta & Shields, 2018). Overall, social media are used increasingly by higher education institutions (HEIs) to promote brands and connect to stakeholders.

Social media platforms have become a popular tool for digital marketing as a medium of communication to reach out to customers and the public. As of January 2023, Statista.com (2023) presents that there were 5.15 billion internet users worldwide or 64.4 percent of the global population, and of this total, 4.76 billion, or 59.4 percent of the world population were social media users. Figure 1 presented popular social media platform and number of active users in January 2023. Impact of digital marketing in all industries and a growing number of social media users creating opportunities for businesses to build their image and branding and connect with present and potential customers.

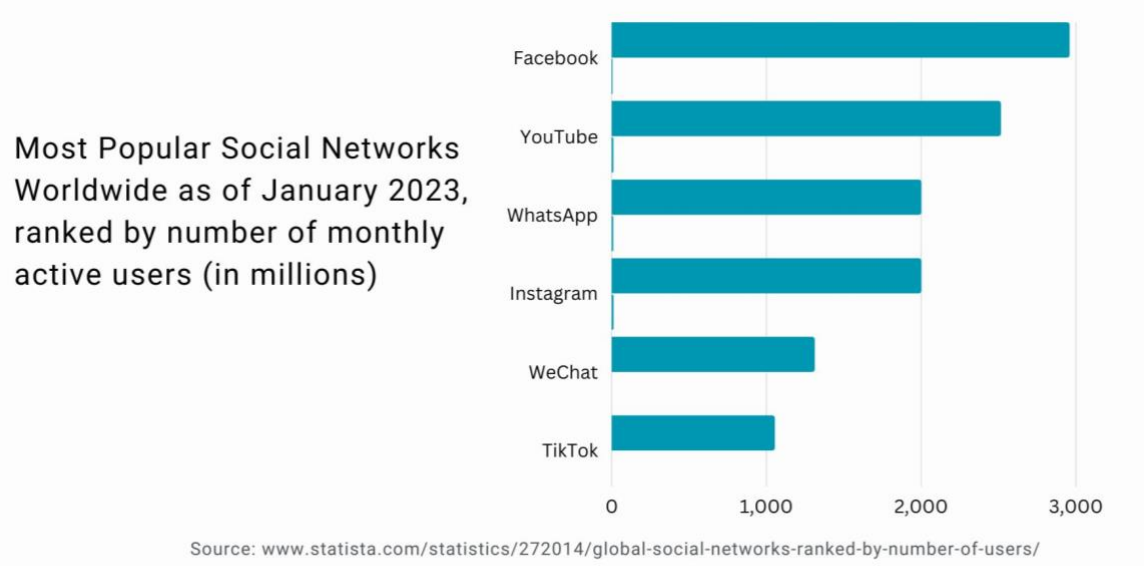


Figure 1 Social Network Worldwide by Statista.com

University students who are social media users typically used social media in searching information about education institutions before choosing university. Kumar and Nanda's research (2019) presented that higher education institutions across the world used social media in reaching out prospective students and interacting with current students and alumni because social media is not only improving communication but also helps in promoting and

developing activities. The UK, as the top destination for international students, University College of London (UCL) has several strategies in international students' recruitment and social media platforms such as Facebook, Twitter, and YouTube are used to create marketing campaigns for each country or region which are listed as top international students' senders to UK such as China, India, Middle East and European Union (Helmi & Puis, 2018). In the case of Indonesia, the number of public and private higher education has increased in the last decade, so it is important for universities to stand out. Thus, universities increasingly adopted digital marketing channels that are generally recognized to market prospective and qualified students compared to traditional marketing (Kusumawati, 2019).

However, there is a lack of studies on how higher institutions use social media for marketing purposes such as strengthening customer relationships, building trust, and broadcasting information. Simultaneously, incorporating social media into recruitment is not simple. (Taecharungroj, 2017; Peruta & Shields, 2018). It is even more difficult recently for social media practitioners and managers to choose the right social media platforms for their institutions as there are more than 10 platforms; Facebook, YouTube, WhatsApp, Instagram, WeChat, TikTok, Facebook Messenger, Telegram, Snapchat, QQ, Pinterest, etc. Even though TikTok keeps growing, Facebook is still the most popular platform by number of active users at 2.96 billion users and has been used by top higher education institutions in the USA such as MIT (Taecharungroj, 2017; Statista, 2023).

This study focuses on 1) how the top universities in the world use Facebook to promote brands and connect to stakeholders, and 2) analyze content marketing on Facebook pages of the top global universities.

Literature review

Current marketing trends in higher education

Higher Education Institutions (HEIs) around the world are struggling with the number of applicants and high competition. In the past, traditional roles of HEIs were to serve the community, research, and teach students, thus marketing and generating profit were not common. With this new challenge, the managers in higher education have to be more market-oriented to be competitive in an international environment (Ramachandran, 2010, cited in Taecharungroj, 2017; Stukalina, 2019). A study by Rafdinal, Mulyawan, and Kusdibyo (2021) found that social media content provided by HEIs has significant impact on students' desire to attend college or university. Social med marketing in HEIs, thus, generate content which encourage students to follow their social media to increase the enrollment in their programs.

Content marketing

Content marketing has been found to be more effective than Traditional marketing which shifts from advertising and selling approach to providing information that creates value for consumer (Forrest, 2019). According to Plessis (2015), the concept of content marketing is being descriptive on sharing brand content through its owned media in an attempt to encourage and create conversation among others for brand awareness both business to consumers (B2C), and business to business (B2B). In short, the definition of content marketing proposed by Du Plessis is as follows: "Content marketing is a strategic brand storytelling technique aimed at changing consumers' inactive behavior through unobtrusive,

engaging brand conversations in earned media". Regularly, brand content comes in forms of brand stories strategy that links company brand to consumer's interest based on relevancy of their own lives. The brand stories are shared via social media, blog posts, videos, podcasts, webinar, interviews, testimonials and so on. These activities are mostly done to encourage electronic word of mouth (e-WOM), engagement on its social media or even convert target audience into customers (Pulizzi, 2010 & 2012, cited by Du Plessi, 2015). The information provides on content marketing are various; helpful, informative, problem solving or even entertaining. Content marketing also provides intangible benefit to business which includes brand awareness, new customers at the same time it increases site traffic, improve Search Engine Optimization (SEO), and consumer conversion (MOZ, 2018 cited in Forrest, 2019).

Content marketing for higher education

Ramadanty, Safitri, and Suhendra (2020) studied social media content strategy for higher education in Indonesia and found that social media changed the process recruitment in higher education, and content strategies are part of social media strategies for HEIs to communicate information to current student, alumni, and prospects. Various contents strategies such as branding, extending reach, and establishing emotion ties (Girard, 2017 as cited in Ramadanty, Safitri, & Suhendra (2020) are needed by HEIs, and should be able to increase on going engagement. Content contains campus life, student activities events, and accommodations is important and helps prospect students get an impression to choose the campus (Zhu, 2019). Peruta and Shields (2017, 2018) presented that volume of social media content is exploded in the recent year, brand and users share more content and compete their share in a social media platform timeline to reach and engage followers. In their researches, post type and content were studied and analyzed engagement. Content analysis was used to examine topics and formats of Facebook posts on top U.S. colleges and universities, the results found that content about athletics increased engagement significantly and format that included users generated also contributed engagement. Taecharungroj (2017) studied higher education social media marketing: 12 content types universities post on Facebook of three universities from the USA; Massachusetts Institute of Technology, Harvard University, and Stanford University, and three universities from Thailand; Mahidol University, Chulalongkorn University, and Thammasat University with 12 post type created. The study found that common post type from universities from USA was research while other three universities from Thailand were events and announcements. Researchers suggested HEIs must be proactive together with strategy on social media.

Methodology

Population

In this study, purposive sampling was used and the top 20 of QS World Rankings University 2022 were targeted (Topuniversities, 2021). From rankings listed, nine universities found from the USA followed by five universities from the UK, and two universities from each country which are Switzerland, Singapore, and China (mainland). Thus, the authors sourced and filtered for universities that gain the highest ranking in its county as representative for this research which are Massachusetts Institute of Technology (MIT), University of Oxford, ETH Zurich-Swiss Federal Institute of Technology (ETH), National University of Singapore, and Tsinghua University. The official Facebook pages for these five universities were used for content post analysis. Population used in this study presented in Table 1.

QS World Ranking 2022	Link to Official Facebook Page	Number of posts	Followers/ Likes (Million)
#1 Massachusetts Institute of Technology (MIT)	facebook.com/MITnews	229	1.4/ 1.3
#2 University of Oxford	facebook.com/the.university.of.oxford	602	4.7/ 4.5
#8 ETH Zurich-Swiss Federal Institute of Technology (ETH)	facebook.com/eth	253	0.085/ 0.08
#11 National University of Singapore (NUS)	facebook.com/nus.singapore	278	0.52/ 0.51
#17 Tsinghua University	facebook.com/Tsinghua	870	4.3/ N/A

Table 1
List of universities in the study and the number of samples from official Facebook Page

Post type content

The authors employed 12 content types and like index from Taecharungroj's study in 2017 to analyze content as it is modernized to covers content post on Facebook which are alumni, announcements, campus, curriculum, events, faculty, image & reputation, industry, products, research, students, and others as shown in Table 2. Expressions such as likes, comments, and shares are used to evaluate engagement using median number of likes to compared the frequency post and post with engagement.

Alumni	Promotes university alumni, alumni achievement, and alumni activities
Announcements	Announces official university statement, university's official program, a message from the page admin team Promote university surveys, external scholarship opportunities, advertises student recruitment
Campus	Shows pictures picture(s) of the campus, the facility, or the physical environment, pictures of physical environment around and near the university
Curriculum	Promotes curriculum, courses, or program offered by the university shows in-class activity, promote MOOCs, promotes university's standardize testing
Events	Promotes events held by or at the university: sports events, art events, commencement events, academic events or conferences, seminars
Faculty	Promotes university faculty members, contains the picture and name of the faculty member, faculty activities, contains faculty's quote
Image & reputation	Promotes the history or reputation of the university, university's mascots, university's role in the society, university's identity, such as a theme song
Industry	Promote employers or companies related to the university, relationships between famous/ influential people and the university
Products	Promotes products made by the university, university's digital download content
Research	Contains novel research and/ or innovations of the university, Promotes studies conducted by the university
Students	Promotes students or their activities, achievements, student life, student affairs activities, students' quotes, charity or philanthropy, students' financial aid
Others	Promotes other matters not related to the university, contains knowledge from external sources

Table 2 Content post type with description (Taecharungroj, 2017)

Reliability

Authors studied 12 post type content type criteria and practiced together on Facebook post type then inter-coder reliability was tested on 15% of the sample (329 Facebook posts) The result using Kripppendorf's alpha and the average pairwise was at 0.872, and 91.0% which is an acceptable level of agreement.

Findings

Facebook posts and statistic description of 12 post types

From selective universities, the total of 2,232 posts; 229 posts by MIT, 602 posts by the University of Oxford, 253 posts by ETH, 278 posts by NUS, and 870 posts by Tsinghua were analyzed as shown in Figure 2.

	Sum	Alumni	Announcements	campus	Curriculum	Events	Faculty	Image & Reputation	Industry	Products	Research	Students	Others
MIT	229	9	13	12	12	12	40	18	2	0	76	34	1
	%	3.9	5.7	5.2	5.2	5.2	17.5	7.9	0.9	0	33.2	14.8	0.4
University of Oxford	602	3	76	74	5	55	128	45	5	1	161	20	29
	%	0.5	12.6	12.3	0.8	9.1	21.3	7.5	0.9	0.2	26.7	3.3	4.8
ETH	253	4	21	2	7	61	73	8	4	1	51	14	7
	%	1.6	8.3	0.8	2.8	24.1	28.9	3.2	1.6	0.4	20.2	5.5	2.8
NUS	278	65	4	0	17	30	37	30	15	2	34	44	0
	%	23.4	1.4	0	6.1	10.8	13.3	10.8	5.4	0.7	12.2	15.8	0
Tsinghua	870	35	41	66	114	163	90	81	18	134	4	114	10
	%	4.0	4.7	7.6	13.1	18.7	10.3	9.3	2.1	15.4	0.5	13.1	1.2
Total	**2232**	**116**	**155**	**154**	**155**	**321**	**368**	**182**	**44**	**8**	**456**	**226**	**47**
	%	**5.2**	**6.9**	**6.9**	**6.9**	**14.4**	**16.5**	**8.2**	**2.0**	**0.4**	**20.4**	**10.1**	**2.1**

Figure 2 Facebook post by each university with descriptive statistic

Common posts on selective universities Facebook page

This study found that from the average score the highest common posts were research (20.4%) followed by faculty (16.5%), events (14.4%), students (10.1%), and image & reputation (8.2%) accordingly. Other post types were often posted such as announcements, campus, curriculum remained on the same amount (6.9%), alumni (5.2%), while content as others (2.1%), industry (2.0%) were rarely found before ended with products (0.4%). Figure 3 shown percentage of 12 content post type in general.

Figure 4 presented like index calculating by dividing the number of likes on the post by the median number of like of the university (Taecharungroj, 2017). Study found that the content post with the highest engagement were others (4.9%) followed by campus (2.8%), alumni (2.4%), curriculum (2.3%), students (2.0%), industry (1.9%), image & reputation (1.8), research (1.7%), Faculty, and products (1.6%), announcements (1.5%), and events (1.4%).

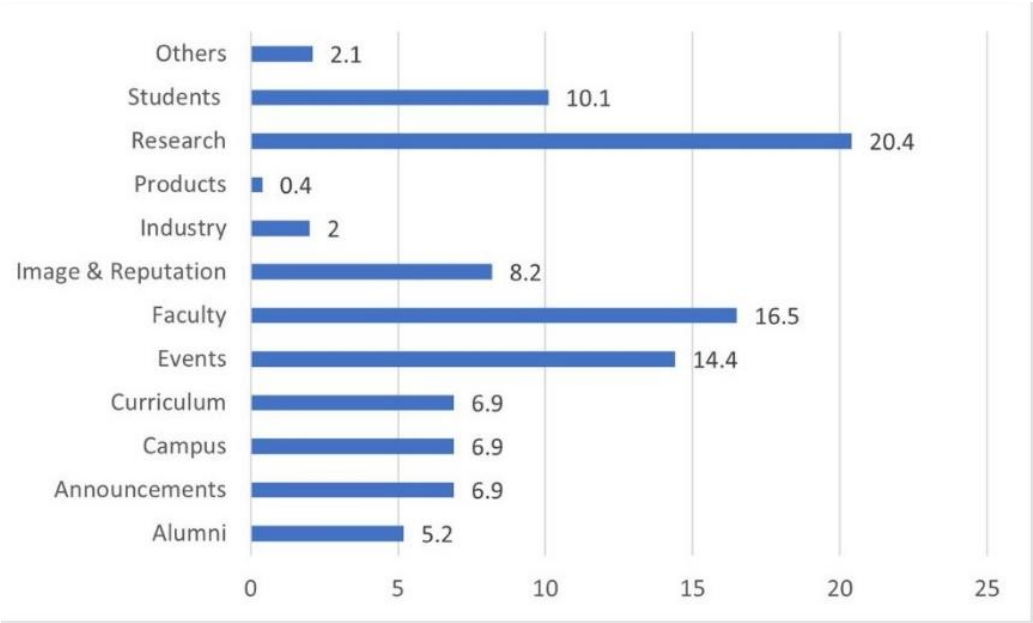


Figure 3 Common post by selective universities

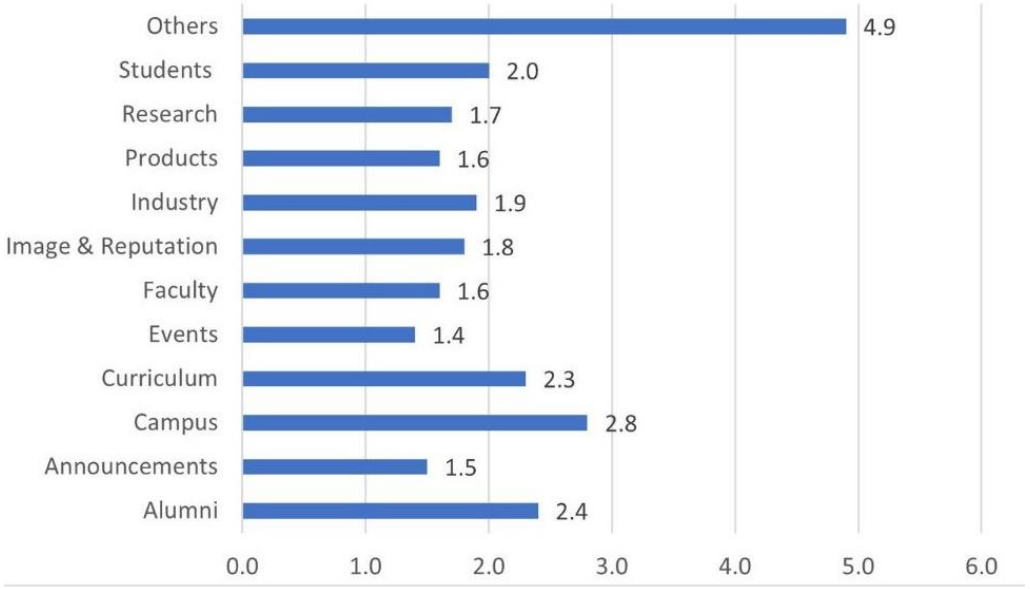


Figure 4 Like index by content post

Comparison between top five posts and top five with engagement post

From the general findings of common content posts and content post with engagement, authors used color coding, rating scale, and percentage to compare the top five post and top five post with engagement. In Figure 5 study found that from the top five posts, research was on the top 1 and gained 76% as it was posted by all five universities, and was also on top 1 of MIT and University of Oxford. The top 2 frequency post was faculty (72%) which also found in all selective institutions while students and events shared top 3 (44%). Announcement found in top 4 (24%) as it was in Top 5 of MIT, University of Oxford and ETH. The last one was alumni on top 5 (20%), and found on NUS.

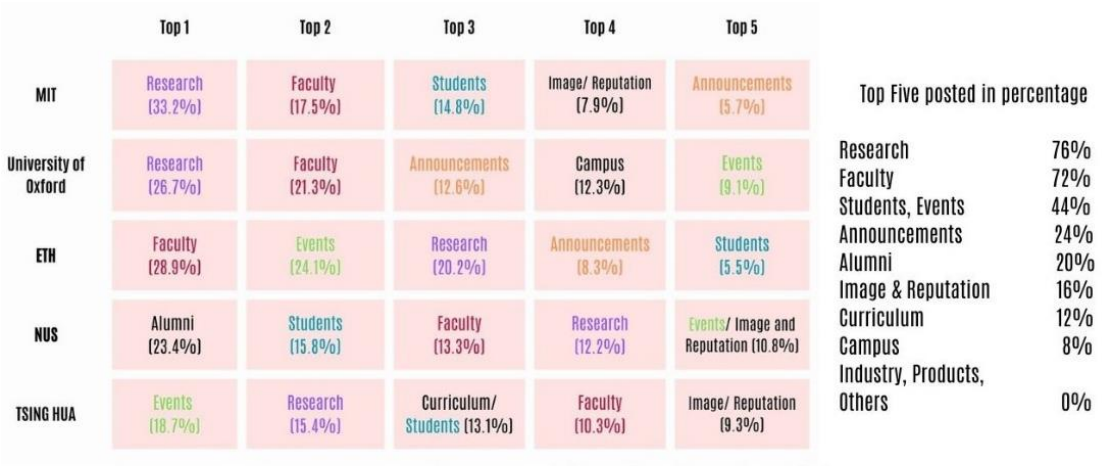


Figure 5 Top Five posted by selective universities

Comparing with top five post with engaged, the most engagement was campus, and curriculum (44%), followed by top 2, students, and others (36%), research, and products (32%), and alumni 28%. Study found that "others" content type which is not related to university gained high engagement at top 2 together with students' content. Post on products which was not founded in top 5 posted by selective universities was in the top 3 as well as research type that was found at all universities' frequently post. Alumni was in the top 4 while "industry found in top 5. Announcement, faculty, image & reputation and events was on the 20% left of all post types. Figure 6 presented top five post with engagement in percentage.



Figure 6 Top Five posted with engagement by selective universities

Discussion

Top five content posted by selective universities

From findings, the top five that selective universities posted are research, faculty, events, students, and announcements. According to previous study by Taecharungroj (2017), content post about research, and faculty found on all universities in this study. Research represented universities' intellectual achievement, advancements, and innovations while faculty post can strengthen the academic status of its university. MIT and ETH created short explanation of

research with captions, photos and link to their news and often with links to research paper. For example, a research post by ETH on December 14, 2021 summarized the topic of research paper from "Iron Deficiency Anemia at Time of Vaccination Predicts Decreased Vaccine Response and Iron Supplementation at Time of Vaccination Increase Humoral Vaccine Response: A Birth Cohort Study and Randomized Trial Follow-up Study in Kenya Infants" into a short sentence "Saving infants' lives with iron" can be a good example of good content that captures readers on Facebook their post. MIT had the way to promote top posts at the end of the year by selecting 21 top posts of the year. The top 2 post from MIT was research post from July 25, 2021 that was reposted again on December 30, 2021 "New face mask prototype can detect Covid-19 infection". These two posts were very well engaged.

According to Peruta and Helm (in press as cited in Peruta & Shields, 2018), social media managers at different schools in higher education implemented a wide range of posting strategies on Facebook. many schools reported timely. Naturally, content reflected current events on campus and in the news were posted thus "events" content type listed in the top 3 (44%) out of 5 in the research accordingly, and may be posted more than one time as a reminder or get more attention.

Post of students also found on top 3 as the most important stakeholder thus post focused on current students, activities, achievements, etc. were usually found on universities' Facebook. Picture of students celebrated Diwati event found on Oxford's Facebook dated November 7, 2021. Tsinghua congratulated student's achievement, "Congratulations! Chinese shooter Yang Qian:" on July 24, 2021. MIT announced MIT's intercollegiate athletics programs are resuming competition for the fall on September 3, 2021. Those posts received high engagement from their followers.

Announcements post was at top 4 or officially top 5 and were used often on getting attention and providing information. ETH announced Trust in science! Get vaccinated to promote awareness to their community as shown on December 10, 2021. It also used as a channel for page admin team to connect with followers by occasions such as "Today is Winter Solstice! Dumplings or Tangyuan: which did you have today?" by Tsinghua on December 21, 2021.

Top five content posted with engagement by selective universities

From findings, the top five with high engagement are campus, and curriculum at top 1, students, and others at top 2, and research and products at top 3 or officially top 5. From previous research, "the information provides on content marketing are various; helpful, informative, problem solving or even entertaining" (MOZ, 2018 cited in Forrest, 2019). These information on campus life, curriculum, and students are very important and help prospect students get impression (Zhu, 2019). Simple photo with short phrase posted by Oxford "Today is #InternationalCatDay!, August 9, 2021", shown cats hiding, sitting at the corner of campus buildings, this post confirming that content marketing are various and the post with entertaining purpose can gained high engagement. A post of "A cloudy day in Oxford" posted on August 26 easily represented atmosphere of the university to prospected students and stakeholder (Peruta & Shields, 2017). In term of promoting curriculum, MIT announced its achievement being no. 1 in 12 subjects for 2021 ranked by QS World University Ranking by reposting the original post in March again on December 24, 2021.

For top 2, students post remained in top 5 both frequency post and post with engagement. Interestingly that content post "others" that contained content from external source and was not related to universities, but touched audience's common interest showed significant impact on engagement at top 2. The sample can be found on ETH's Facebook "celebrates the 130 years of Switzerland "Switzerland National Day, August 1 gained 372 like & love with 18 shares. Posts promote idea that has impact to the community and establish emotion ties can increase engagement (Peruta & Shields, 2018; Ramadanty, Safitri, & Suhendra, 2020). This content type posted by Tsinghua "The Beijing 2022 Winter Olympic Games will represent a breakout phase for the Chinese digital renminbi, also known as the e-CNY on August 7, 2021" also found with high engagement.

Research and research finding or innovation by the university (Taecharungroj, 2017) remained in top 5 of both frequency post and post with engagement as it presents HEIs' achievement, sample found on NUS's FB post "PASPORT: Breakthrough saliva-based COVID-19 rapid test" on December 9, 2021. Another sample found on Oxford's FB "Today saw the first vaccination in a Phase I clinical trial of a novel #HIVvaccine candidate in Lusaka, Zambia" on August 3, 2021.These type of contents increase high engagement as creating emotional ties (Girard, 2017 as cited in Ramadanty, Safitri, & Suhendra (2020). Together with research, products which was not found in top 5 of the frequency post was up to top 3 of engagement. from the definition, products referred to university's digital downloadable content made Albert Einstein's doctoral dissertation thesis from ETH Library more popular with both use as research itself and university's product.

Another finding which was useful is alumni post, even it was not in the top 5 with high engagement but in case of Tsinghua University, post with alumni content was only 4.0% out of the whole posts but was in the top 5 of the its engagement. A post about alumni "Meet Mugisha who turned down job offers abroad to pursue his dream in agriculture" by Tsinghua on September 26, 2021 gained more than 4K liked. It confirmed a strong and a positive relationship with their alumni can benefit the institutes, academically and professionally found in Kumar and Nanda (2019), thus, post about alumni and success of alumni gained engagement.

Conclusion

In conclusion, this study used 12 post type from previous research to analyse content marketing on social media by top five global universities using purposive sampling from Top 20 QS World University Ranking 2022. The study of 2,232 Facebook posts found similar findings that the top five global universities mostly promote research, and faculty which related to universities' intellectual achievements and advancements and strengthen their academic status. Student content type is still in line as student is the most important stakeholder. Events and announcements regular posted naturally by most of universities in this research as found in previous research papers.

However, the significant finding from this research found on Facebook post with engagement part. It presents that content type as others which is not related to university but create emotional ties highly gained engagement from stakeholder as well as products of universities.

Thus, HEIs shall consider these types of content from external sources that benefit all stakeholders' common interest to encourage conversation among others, and to increase own social media followers and engagement rate which are the main purpose of using content

marketing. Finding how the young universities earn reputation and what marketing strategies implemented will be an interesting topic to be explored in the further study.

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Research Skill Level of Grade 12 Students of Penablanca National High School and Their Learning Needs in Practical Research 2: Basis for an Intervention Plan

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Abstract
This study primarily aimed to assess the research skill level of the Grade 12 students of Penablanca National High School. It further identified the respondents' learning needs and formulated an intervention plan for their least mastered competency in Practical Research 2. Descriptive evaluation design was utilized in this study. This study included 200 respondents who are from the Grade 12 Academic tracks of Senior High School –STEM (Science, Technology, Engineering and Mathematics), HUMSS (Humanities and Social Sciences) and GAS (General Academic Strand). Their research outputs were evaluated by teachers teaching English, Statistics and Research subjects. A teacher-made evaluation sheet was constructed in the assessment of the outputs and an equally teacher-made questionnaire was also formulated in the determination of their learning needs. The study showed that respondent's research skill in constructing research titles, problem statement and questionnaires are considerably low. However, their output showed a significantly better result in sampling selection, reviewing related literature and studies and data analysis. As manifested in the findings of the study, the researcher developed an intervention plan to address the respondents' low performance on the cited least mastered competencies.

Keywords: Research Skill, Least Mastered Competency, Intervention Plan, Learning Needs

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Introduction

One of the main academic endeavours covered in the K12 curriculum for Senior High School is research. Students in this new curriculum are introduced to and schooled in the fundamentals of research, including its nature and many types or methodologies. Research is regarded as a crucial talent that every student should have before entering college. Assessing specific competencies in academic endeavours will enable an individual to participate in any institution's initiative or move to develop knowledge and contribute considerably to the nation's advancement.

Research is integral to any learning institution in securing learning goals. An institution's inability to produce and publish high-quality research is a strong indication that higher learning is not supported (Padagas & Hajan, 2020).

Research quality has always been the main concern of every academic institution. In order to promote quality research papers, the research writing process should be considered. As the students' research outputs are crucial, keeping track of their performance is a key ingredient in the quality research papers. As consumers and readers of research, students are valuable sources of information to quality improvements. Students today dread the word research in their academic years. It was reported that students have challenges in writing a full research paper (Tabuena, 2020), and writing issues are due to lack of writing skill and lack of confidence in writing research papers (Wilang et al., 2018).

Senior High School students have 3 research subjects with various competencies required to be performed. Research competencies refer to the skills and performance required by students to conduct research.

Experiences in research conduct also help in improving research competencies and outputs. According to Mallari and Santiago (2013), research competencies comprise of identifying potential sources of research challenges across disciplines. It also includes the formulation of questions, the construction of hypotheses, the assessment of the appropriateness of the scope and boundaries of the research, the use of proper procedures in conducting a review of related literature, and the use of the literature review to improve the research questions and framework. Research competency is an important skill that should be cultivated in all Senior High School students.

This study aims to evaluate and assess the research proficiency levels and least-mastered competencies of grade 12 students of Penablanca National High School. The need for this study was also intended to track and highlight areas of study within the curriculum to provide examples of competencies that teachers and students should concentrate on enhancing.

Statement of the Problem

This study was conducted to assess the research skill level of Grade 12 students in the Academic Track of Peñablanca National High School. It further identifies the least mastered competencies in Practical Research 2.

Specifically it sought to answer the following questions:

1. What is the research skill level of the respondents in terms of the following:
    A. Writing a Title
    B. Formulating a Problem
    C. Reviewing Related Literature and Related Studies
    D. Defining the Sample Size
    E. Designing the Data-Gathering Instruments
    F. Utilizing Appropriate Statistical Tools
    G. Data Presentation
    H. Data Interpretation
    I. Conclusion and Recommendation
    J. Citing Sources

2. What is the least mastered competency of the respondent?

3. What intervention plan can be framed to address the least mastered competencies of Grade 12 students in Academic track?

Scope and Delimitation

This study focused on the evaluation of the research skill level of grade 12 students in the academic track of Peñablanca National High School. It further covered the determination of their least mastered competencies in research and also includes the framing of an intervention plan for the identified learning needs of the respondents so they could improve the conduct of their studies and present a good research output.

This study was delimited to the Grade 12 students enrolled in the academic tracks, STEM (Science, Technology, Engineering and Mathematics), HUMSS (Humanities and Social Sciences), ABM (Accountancy and Business Management), and GAS (General Academic Strand) of Peñablanca National High School. It was conducted during the 1st semester of the School Year 2022-2023.

Research Methodology

Descriptive evaluation design was utilized in this study as it aimed to assess the research skill level of the respondents who are the Grade 12 Academic track students of Peñablanca National. The determination of their learning needs was also done using the same research design by arranging their research skill level from most mastered to least mastered. Least mastered competency was determined by getting the lowest score from the various research skill levels being identified.

The respondents of this study are 200 out of 218 Grade 12 Academic track students of Penablanca National High School who are from ABM, STEM, HUMSS and GAS respectively. They were selected together with their output by using the stratified random sampling selection. 50 research outputs were taken for evaluation with 4 student researchers from each output.

The study was performed by conducting an evaluation on the research papers of the respondents. The researcher crafted an assessment tool used in evaluating the outputs.

The evaluation sheet is composed of 10 research writing skills: writing a title, formulating a problem statement, reviewing related literature and studies, identifying the sample, designing a data-gathering instrument, utilizing appropriate statistical tools, correct presentation of data, precise interpretation of data, making conclusions and recommendations and citing sources and references. A corresponding score was given to each research skill with 10 as the highest and 1 as the lowest.

The statistical procedures utilized in this study were Mean, Frequency Count and Percentage. A 5-point Likert Scale was also employed to determine the respondents' levels on the different research skills performed.

5-Point Likert Scale
8.1% – 10.0% = Excellent
6.1% - 8.0% = Very Satisfactory
4.1% - 6.0% = Satisfactory
2.1% - 4.0% = Average
1.0% - 2.0% = Needs Improvement

Presentation and Interpretation of Data

1. Research Skill Level of Grade 12 Students in Academic Track

Table 1. Research Skill Level of Grade 12 Students in Academic Track

RESEARCH SKILLS	Frequency	Percentage	Mean	Rank	Description
A. Writing a Title	249	83%	8.3	8	Excellent
B. Formulating a Problem Statement	262	82.3%	8.23	9	Excellent
C. Reviewing Related Literature and Studies	275	91.6%	9.16	2	Excellent
D. Selecting the Respondents	280	93.3%	9.3	1	Excellent
E. Designing a Data-gathering Instrument	244	81.3%	8.13	10	Excellent
F. Utilizing Appropriate Statistical Tools	254	84.6%	8.46	7	Excellent
G. Presentation of Data	257	85.6%	8.56	6	Excellent
H. Interpretation of Data	258	86%	8.6	5	Excellent
I. Forming Conclusions and Recommendations	269	89.6%	8.96	4	Excellent
J. Citing Sources	271	90.3	9.03	3	Excellent

The table shows the Research Skill Level of Grade 12 students in the academic track after evaluating their research papers. For the skills that topped the list, 'selecting the respondents/sample' rank first, It implies that the student researchers were able to clearly identify their respondents, that the sampling technique and procedure were addressed, and that the sample size was sufficient and significantly represented the population with 280 frequency and a percentage of 93.3%. 'Reviewing Related Literature and Studies' came in second rank with 275 frequency and a percentage of 91.3 manifesting that reviews conducted are relevant to the current study and are well-arranged and clearly discussed.

In writing a research paper, literature review is an essential part of research writing. As opposed to the findings of this study, Ciocon (2018) suggested that students need further

training or enhancement in order to develop their ability to judge multiple tasks, from finding and evaluating relevant materials to synthesizing information from various sources.

In the third rank was 'citing sources' with a percentage of 90.3. This clearly means that the student researchers were able to document their sources but with a 9.7 difference, there were few who did not fully reference or acknowledge their contributors.

As asserted in the study, Teaching Research Skills in Today's Digital Environment (Purcel et. Al, 2012), it was suggested that the student researchers need to know how to find information and how to judge how appropriate and accurate the material is. They need to be able to assess the biases in their sources. They need to be able to find the material that will help them.

Fourth rank was 'forming conclusions and recommendations.' It shows that student researchers provided accurate conclusions based from their findings and correct suggestions patterned after the conclusions. Conclusions and recommendations are considered to be one of the main parts of research paper because it displays the significance of the study as well as it recommends new ways and solutions to resolve issues and challenges.

On the fifth rank was 'precise interpretation of data which implies that the data are rationally examined, comparable studies were merged to support their study's findings. However, Ciocon's (2018) findings revealed that students in her study find it difficult to accomplish analysis and interpretation of data.

The sixth was 'presentation of data' which suggests that the data are quite thoroughly explained, the graphs and figures are somehow arranged in accordance with the study's goals. The skill in seventh rank was 'using appropriate statistical tools' which was noted that student researchers are bit challenged with statistics and probability. Then followed by the skills, 'writing a title,' 'formulating a problem statement' and lastly was 'formulating a data-gathering instrument.' It was found out that the last 3 skills cited were inter-related. The mentioned difficulties correspond to each other as they all relate to the formulation and construction of the title, problem statement and data-gathering instrument.

The table reveals that the overall Research Skill Level of the students are excellent, however, there are still skills that need to improve after garnering the least result. There were still skills that need to be developed and enhanced in order to generate a quality research paper.

2. The Top 3 Least Mastered Competencies of the Respondents

Table 2: The Top 3 Least Mastered Competencies of the Respondents

Rank	Research Skills	Mean
1	Constructing a Data-Gathering Instrument	8.13
2	Formulating a Problem Statement	8.2
3	Writing a Title	8.3

For the skills that were categorized as least mastered. On the tenth rank was, 'formulating a data-gathering instrument with a percentage of 81.3 followed by 'formulating a problem statement' with 82.3% then 'writing a title' with 83%. Those were the top 3 least mastered skills of the student researchers which shows that they need to improve the crafting and framing of the their questionnaires or any tool they use in gathering the needed data for their

studies. It revealed that the student researchers were unable to fully identify and adequately describe the data gathering instrument that used. Some of the instruments were deemed insignificant for gathering the necessary data, and was also found that some of the questions were unclear and lacking in some areas. It was further found out by teacher evaluators that some questions included in their data-gathering instruments were not in congruence to their objectives. Some questions were in no relation to the title as well as to the objectives of the study.

Bocar (2011) revealed in his study that in conducting a research investigation, the administration of questionnaire and retrieval of the same is a means of gathering the data; nevertheless, visibility and availability of the respondents found to be very difficult for the student-researchers.

Under problem statement formulation, it was noted that student researchers had difficulty constructing their problem statements as questions were not arranged sequentially. Their titles as well were good but some were noted with the use of too many words or stated the title in a sentence form.

The findings of the study is supported by Research Skills Scale for Senior High School Students: Development and Validation by Lacson, (2022), as he discussed the research skill scale of grade 12 students and they found that the Research Methods and Data Analysis and Writing and Reporting Result needs to be enhanced.

These difficulties encountered by the students were not a surprise. According to Bocar (2011), most of the time research work is found to be a tedious and very tiring work to do; however, students cannot get away from this work because most often this is an academic requirement.

3. Intervention Plan for the Least Mastered Competencies

According to the findings of Gilmore and Feldon (2010) and Meerah, et al. (2012), one of the main causes of students' difficulties conducting full research is the lack of preparation in research knowledge and abilities. Hence, the framing of an intervention plan.

Table 3: Intervention Plan for the Least Mastered Competencies

Objective	Program/Activity	Time frame	Persons Involved	Means of Verification	Budget/ Source of Fund
1. Improve students' skills in formulating a good data-gathering instrument	- Present good samples of data-gathering tools like questionnaires and let them analyze its contents and components with the research teacher as facilitator --Research teacher will provide a sample study that he/she can use to demonstrate how to actually make or construct	1 to 2 weeks	Research teacher Students in Practical Research 2	Students' output Activity sheets/ Answer sheets Assessment results	None

	a good data-gathering instrument.				
2. Enhance students' skills in formulating problem statements	- Present good samples of statements of the problem from previous researches and let them analyze its contents and components with the research teacher as the facilitator --Research teacher will provide a sample study that he/she can use to demonstrate how to actually make or construct good problem statements.	1 to 2 weeks	Research teacher Students in Practical Research 2	Students' output Activity sheets/ Answer sheets Assessment results	None
3. Harness students' skills in writing a good research title	- Present samples of research titles and let them analyze if such are good research titles or not. - Explain the components of a good research title by providing research title samples. - Allow them to list down various problems encountered by students in schools that need urgent solutions and ask them to think of a n action research title - Let them think of a program, project or policy in school and ask them about their effectiveness. From there, they will be asked to come up with an evaluation research title. - Allow them to think of some debatable issues in the community and in the country and ask them to come up with a survey title	1 to 2 weeks	Research teacher Students in Practical Research 2	Students' output Activity sheets/ Answer sheets Assessment results	None

Conclusion

In conjunction to the results presented, it is concluded that the overall performance of the respondents in writing a research paper is 'Excellent.' However there are still competencies that need to be improved. It is therefore important for students to focus on the construction of a data-gathering instrument, formulation of problem statements and writing a good research title.

One of the major implications of this research is that the assessment of students' research skill level plays a big role in improving their output and be capable of creating a good research paper.

Recommendations

Since the study showed that the respondents are excellent with their overall research skills, some competencies still need improvement. The researcher prompted to recommend the following:

1. Teachers of research should really focus on teaching the important skills in research so that students become more competent of executing this activity, such as how to construct a valid and reliable data-gathering tool, formulate a statement of the problem patterned after the topic or title and to write a good research title. Teachers must modify their teaching strategies and attitudes when dealing with students in order to maintain a positive approach and allow students to listen and comprehend without difficulty.

2. Furthermore, the school must express its support for student researchers performing a study. Learning materials must provide students with new techniques and learning opportunities that will help them improve their knowledge and overcome constraints and limitations.

3. The recommendations in this study should be used as a guide by the researcher in future educational research.

APPENDIX

EVALUATION TOOL

RESEARCH OUTPUT SCORING RUBRICS

EVALUATOR:	
DATE:	
PRESENTER's GROUP	

Research Writing Skills	**Scoring Criteria**		
Title	It is simple, brief and striking	**10**	
Problem Statement	The general statement capsulized the main problem stated in the title The specific problems are logical and in sequential order The specific problems jibe with the contents of the research instrument	**10**	
Review of Related Literature and Studies	Reviews are based on the original materials and not on the research abstracts Reviews are relevant to the current study Reviews are well-arranged and clearly discussed	**10**	
Respondents	They are clearly identified The sampling technique and procedure are discussed Sample size is adequate and significantly represents the population	**10**	
Data-gathering Instrument	It is identified and properly described The instrument is significantly enough to get the essential data The questions are clear and complete	**10**	
Statistical Tools	The tools are appropriate for the analysis of data The tool used was clearly identified and explained	**10**	
Presentation of Data	The data are discussed in detail The order of the graphs and figures follow the objectives of the study The data answer the questions posted in the problem statement	**10**	
Interpretation of Data	The data are analyzed logically Related studies are integrated to support the findings and the interpretation	**10**	
Conclusions and Recommendations	They are based from the findings of the study They flow from the conclusions They are relevant and doable	**10**	
References	Sources are properly cited	**10**	
	TOTAL SCORE	**100**	
CRITIQUING SECTION	COMMENTS/FEEDBACKS	SIGNATURE:	

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The Development of a Local Curriculum on Bamboo Wicker for Primary Students

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Abstract
The purpose of this study was to develop a local curriculum on bamboo wicker for grade 6 students at Klumnakkhawying 2 school (Ban Bowee). The sample consisted of 20 grade 6 students at Klumnakkhawying 2 school (Ban Bowee). The research instruments consisted of 1) curriculum conformity assessment form, 2) knowledge test about bamboo and bamboo wicker for students, 3) bamboo wicker making skill form for students, 4) opinion questionnaire for the curriculum, and 5) attitude measurement form for bamboo wicker for students. The statistics used for data analysis were mean ($\bar{x}$), standard deviation (S.D.), t-test, and content analysis. The findings found that curriculum consists of importance/background, objective, principle, content, structure and learning time, learning activity, learning material/ learning resource, measurement and evaluation, the expected benefit, and lesson plan. The quality of the curriculum found that the consistency index was 0.81. The results of the curriculum trial showed that the scores on bamboo knowledge, bamboo wicker, bamboo wicker skills, and attitude towards bamboo wicker after using the curriculum were significantly higher than before using that at level 0.05. In addition, opinions towards local courses on bamboo wicker of students, the average was at a high level.

Keywords: Curriculum Development, Local Curriculum, Bamboo Wicker

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Introduction

From the characteristics of Thai society, the occupation of the majority of the Thai population is still agriculture. This profession is a traditional occupation of Thai people and is also a profession that can generate a lot of income for the country. Agriculture is a career that generates income within the country and income from exports. Farmer's occupation shows the importance of agriculture in Thai society, the characteristics of Thai society is an agricultural society that lives in a way that depends on each other and depends on the environment. These things have forged the minds of people in society to love freedom, love locality, have a gentle heart, generous, support each other, and live by relying on local resources to generate income.

Educational curriculum development and local curriculum development are extremely important because the curriculum is like the rudder of a ship that is an important part that will lead the ship to its destination safely. This is the same approach as using the curriculum as a guideline for learning management in order to achieve the educational objectives of the country. Therefore, curriculum is very important to be a framework or guideline for teaching education management to develop people with knowledge, skills, abilities and behaviors. That will benefit the development of society as a whole (Chaiwat Suthirat, 2013). Instructors, as the curriculum guides into the classroom, should study and understand their school curriculum in order to apply it properly. In line with Carl's concept (Carl, 2009), teachers should not only have expert knowledge of the subject they teach, but should also have knowledge of the nature and direction of the curriculum. The nature or direction of the curriculum will also indicate the nature or direction of the content that the instructor must teach as well.

A local curriculum is a curriculum developed from the study of the environment, community, society, culture, resource, demographics, and local interests. A local curriculum is a learning experience for learners in a particular locality. Consideration must be given to compatibility with the local environment and context. This is to meet the needs of the students, able to solve problems that arise with students and localities as well. The curriculum development process must be consistent with the intent of the National Education Act B.E. 2542, and its amendment (2nd edition) B.E. 2545 that focuses on the decentralization of education to localities. In addition, educational institutions will play a role and participate in curriculum development in accordance with local conditions and needs. It is considered decentralized and allows all local sectors to participate in curriculum development. However, today's social conditions are changing rapidly in every aspect that directly affect the views and lives of Thai people in both urban and rural areas (Prawet Wasi, 2018).

Klumnakkhawying 2 school (Ban Bowee) is under the Office of Ratchaburi Primary Educational Service Area, Region 1, located in Suan Phueng District, Ratchaburi Province. The area is mountainous, arid, hot, and waterless. Thus it is very restrictive in cultivation. People in the community are less educated, therefore lacking the opportunity to earn income. Therefore, there should be various developments to improve the quality of life of the people in this community. Bamboo is an important plant and resource of this locality. It grows well in such areas. Mature bamboos have large trunks, thick wood and are used for construction due to their durability and strength. For example, it is used to build a residence, fence line, bridge construction and make scaffolding. Other parts are used to make wicker, musical instruments, handicrafts and food etc. Bamboo species that are suitable for being used as raw materials for creating products for sale is Pai Tong. It is commonly used as a structure that

requires strength, such as a carriage (Sukanya Chaiyaphong, 2020). Local children and young people are familiar with and have seen the use of bamboo for wicker in household and as a community product. Therefore, it should instill in local children and youth to use their local resources and wisdom. Wicker is one of the handicrafts that human beings create to use as tools and utensils in daily life. In addition, it is local wisdom, skills and expertise handed down from the ancestors. Locally available natural materials can create job, generate income, and add value to natural materials as well. It also allows people in the community to use their free time to benefit and can create an economy for the community to have better lives (Tawatchai Tienprateep, 2018). It is not just only Thai people use bamboo wicker, Sun and Liu (Sun & Liu, 2022) also mention bamboo wicker that Chinese, Japanese and many other countries in East Asia use it. In the south, it is popular to use wicker from bamboo. Therefore, it is very appropriate that children and young people should study to create wicker from their own local resources. Klumnakkhawying 2 school (Ban Bowee) has created a curriculum for educational institution in the occupational subject group with the objective of providing learners with knowledge, understanding, and basic skill, necessary for living by being aware of the changes in society. This course was created to allow students to apply knowledge about life and career to work creatively, to be a guideline for a career, to love work, to have a good attitude towards work, and can live in society with self-sufficiency and happiness. Although, there are vocational courses, there is still a lack of local curriculum on bamboo wicker that is concrete and can be used in everyday life. This can lead to children and young people not appreciating their local resources, and a lack of ways to pursue a career that does not require high investments.

For such an important reason and necessity, the researcher developed a local curriculum on bamboo wicker for grade 6 students, Klumnakkhawying 2 school (Ban Bowee) to develop knowledge, skills and occupational attitudes of local children and youth as well as guide teachers in organizing learning activities for students by using available resources to the greatest benefit. Moreover, the purpose is to show the importance and value of their local resources and wisdom that should be preserved and passed down to the next generation. These young people can transfer their knowledge and skills to other people or locality with similar local resource.

Method

Research design

This research is the kind of research and development. The steps are as follow.
Step 1 Research: Study basic information
Step 2 Development: Develop curriculum
Step 3 Research: Trial curriculum
Step 4 Development: Evaluate and improve curriculum

Participants

Study basic information: Study basic problem and need of 20 students, opinion of 10 community members, opinion of 7 educational supervisors, and learning management conditions of 12 school personnel.
Develop curriculum: Assess curriculum consistency by 5 experts
Trial curriculum: Trial curriculum with 20 students
Evaluate and improve curriculum

Data collection tools

Curriculum conformity assessment form
Knowledge test about bamboo and bamboo wicker for students
Bamboo wicker making skill form for students
Opinion questionnaire for the curriculum
Attitude measurement form for bamboo wicker for students

Data analysis

The statistics used for data analysis were mean ($\bar{x}$), standard deviation (S.D.), t-test, and content analysis.

Research process

Study basic information; curriculum development theory, local curriculum framework, basic problem and need of students, opinion from community members, opinion from educational supervisors, and learning management conditions of school personnel.
Develop a curriculum by presenting a draft curriculum to five experts to assess curriculum consistency. Then create and find out the quality of research tools.
Test about bamboo wicker and test attitude towards bamboo wicker before class. After that, record the score.

Trial course by managing the learning for students until completing 6 units.
Unit 1 General knowledge about bamboo and bamboo wicker, 2 hours
Unit 2 Chalom (round basket) weaving from bamboo, 3 hours
Unit 3 Fan weaving from bamboo, 3 hours
Unit 4 Kradong (bamboo tray) weaving from bamboo for fish drying, 4 hours
Unit 5 Kheng (basket with 2 handles) weaving from bamboo, 4 hours
Unit 6 Cradle weaving from bamboo, 4 hours
Then test the students' bamboo wicker skills.

Test about bamboo wicker and attitude towards bamboo wicker after class and ask for opinions on the course. Then record the score.
Improve the course.

Teaching environment

Organize learning activities with local participation by bringing a local sage who specializes in bamboo wicker work for more than 40 years as a speaker. Use bamboo as the main raw material that is easily available and common locally. Organize learning activities based on group processes and safety in the use of tools.

Research Results

The findings found that curriculum consists of importance/background, objective, principle, content, structure and learning time, learning activities, learning materials / learning resources, measurement and evaluation, the expected benefit, include lesson plan. The quality of the curriculum found that the consistency index was 0.81.

The result of the assessment of students' knowledge about bamboo and bamboo wicker by using the bamboo and bamboo wicker knowledge test for 20 students, there are 12 items, 12 points, it was found that the pre-course scores has the mean ($\bar{x}$) was 5.85, the standard

deviation (S.D.) was 2.02. After using the course, the mean ($\bar{x}$) was 9.50, the standard deviation (S.D.) was 3.00. The evaluation result after using the curriculum was higher than before using the curriculum at statistical significance at the level .05, which was consistent with the research hypothesis.

The evaluation result of bamboo wicker making skills using the bamboo wicker making skill test of 20 students, 10 items, 50 points, it found that the pre-course scores, mean ($\bar{x}$) was 10.66, standard deviation (S.D.) was 4.77. After using the curriculum, the mean ($\bar{x}$) was 40.53, and the standard deviation (S.D.) was 3.50. The assessment results after using the curriculum were significantly higher than before using the curriculum at the .05 level, which was consistent with the research hypothesis.

The results of the assessment of students' attitude towards bamboo wicker by using the measure of attitude toward bamboo wicker of 20 students, a total of 10 items, which is a 5-point scale, found that the mean ($\bar{x}$) score before using the curriculum was 3.91 points with a standard deviation (S.D.) 0.23. After using the curriculum, the mean ($\bar{x}$) was 4.51, deviation (S.D) was 0.20. The assessment results after using the curriculum were higher than before using the curriculum at a statistically significant level of .05 which is consistent with the research hypothesis.

The results of the evaluation of students' opinions toward the local curriculum about bamboo wicker using questionnaire for opinion towards the local curriculum of 20 students, which is a scale of 5 levels, divided into 3 measurements; the subject of learning, the management of learning activities, and benefits received, total of 15 items, it found that the student's mean ($\bar{x}$) score was 4.22. It was in the high level. The deviation (S.D.) was 0.58 which was consistent with the research hypothesis.

The local curriculum improvement on the bamboo wicker for primary students, it found that the process of finding the quality of the curriculum has improved the curriculum based on expert advice such as writing objective, measurement and evaluation, and publishing. Then revised the curriculum again. When the curriculum was used with the experimental group, the learning management plan 1 was improved by adjusting the content to be shorter, concise and adjusting the learning management materials to be more interesting. When implementing the curriculum and evaluating improvements to the curriculum, some curriculum deficiencies were found. For example, bamboo sticks prepared for students were too short. Therefore, the course has been adjusted by adjusting the size of the bamboo sticks in the course. In making fan-type wicker, it takes quite a lot of time to weave due to the variety of patterns. Therefore, they may consider adjusting and changing to other types of wicker or may use a method to adjust the order of the learning plan by bringing bamboo fan weaving as the final plan.

Result

The result of developing a quality curriculum consists of importance/background, objective, principle, content, structure and learning time, learning activities, learning materials / learning resources, measurement and evaluation, and the expected benefit and lesson plan.

The results of the students' knowledge assessment on bamboo and bamboo wicker after learning were higher than before.

The assessment results of bamboo wicker making skills after learning were higher than before.

The results of the assessment of the student's attitude toward bamboo wicker after learning were higher than before.

The result of a questionnaire on students' opinions towards the local curriculum on bamboo wicker.

The curriculum improvement results showed that in the process of finding the quality of the curriculum, the curriculum was improved according to the advice of experts such as writing objectives, measuring and evaluating, and publishing. After that, the curriculum was revised and applied to the experimental group by improving the learning management plan 1, improving the content to be short, concise and adjusting the learning management materials to be more interesting. After implementing the course and re-evaluating it, the course was adjusted by adjusting the size of the material in the course, and switched Unit 3 - Bamboo Fan Weaving to Unit 6.

Discussion

The result of local curriculum development of bamboo wicker for Prathomsuksa 6 students at Klumnakkhawying 2 school (Ban Bowee) found that curriculum consists of importance/background, objective, principle, content, structure and learning time, learning activities, learning materials / learning resources, measurement and evaluation, and the expected benefit. The processes of curriculum development were 1) basic information study, 2) curriculum development, 3) implementation of the curriculum, and 4) curriculum evaluation and improvement. This process is consistent with the concept of Chavalit Chukampang (2016) that the components of the curriculum were derived from both documented background analysis and stakeholder interviews. Therefore, it gives a complete curriculum composition. This consistent with Ornstain & Hunkins, (2013), that the curriculum development involves a number of processes that help educational personnel and school understand the real purpose and involve everyone in the curriculum development.

The results of the knowledge assessment of bamboo and bamboo wicker, bamboo wicker skills and attitude towards bamboo wicker of the students after school were higher than before, because the researcher has studied the data by interviewing the learners about their needs. Therefore, the content and method of learning are appropriate, including the use of learning management media that is a picture of each type of bamboo which is a picture taken from the students' own locality, making the students more interested in learning. This consistent with Nirada Wechyalak (2018) stated that educational institutions should bring local wisdom to develop as a source of learning for learners. They must analyze and group local wisdom to apply in teaching. This consistent with the context of learners and educational institutions by setting objectives and arranging learning styles that include a variety of local wisdom according to interests and aptitudes of each age group. In addition, an appropriate learning evaluation form must be created. A local curriculum must be developed from the needs and interests of students who want to learn about their own local wisdom by using their own local resources as the main raw materials for wicker making. In the learning activity, learners learn in a practical way. This is in line with the concept of Mayuree Charoensiri (2020), which stated that teaching and learning must be adjusted to focus on learning through practice or doing (Active Leaning), which is a learning process that allows

learners to learn meaningfully by collaboration between students together. This consistent with the idea of Saavedra & Opfer (2012) that the ability to work with others is an important skill in 21st century skills, whether or not students develop learning, is not related to that. It's not about the outcome alone, but the condition for success is mutual learning. Helping each other is the best way to learn. This consistent with Ariya Kuha et al. (2019) stated that, in the learning process in the 21st century, teachers must overcome "Mass subjects" towards integrated learning for development "21st Century Skills" (21st Century Skills), which teachers do not teach, but learners learn on their own. It is an arrangement that emphasizes learners to practice and act. The role of the learner has been changed from a recipient to a participant learner. This enables peers to understand objectives and achieve course goals by focusing on inquiry, data gathering, analysis and problem solving to develop higher thinking skills include with shift from Passive Learning to Active Learning. In addition, the speaker who manages the learning for the students is a person in the community of the students themselves, thus causing the students to have a good attitude towards the wicker. This is in line with Paitoon Ngew Thang (2017) who stated that the leader who teaches weaving is usually a local philosopher. Old people in weaving communities have valuable wisdom that has been passed down from generation to generation. This is a manufacturing process that has been passed down from family members for weaving for use in daily life and households. This is also consistent with the idea of Pesurnay, (2018), which states that Local wisdom is a phenomenon that shapes the ability of members of natural resource-dependent community cultures to manage and control natural resources in the environment in which they live.

Conclusion

This research aims to develop a quality local curriculum that can be applied to other educational institutions in similar contexts. It also aims to develop students' professional skills by using resources that exist in their locality as the main raw materials for creating products. In addition, teachers who are local sages are brought in to teach the students, strengthening the school-community relationship. The benefits of wicker products can be used in household and can be sold. These can generate income for students, and they can apply this course to people in the community to increase their professional skills to earn extra income. In addition, the process and concept of this research provide a guideline for teachers to develop local curriculum for use in their schools.

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Speak Better: A Meta-Analysis of Language Learning Modalities for Improving Speaking Proficiency

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Abstract
Whether it is to improve one's job opportunities or understand the lyrics of your favorite KPOP band's latest single, the importance of knowing a second or third language is becoming more vital. Despite foreign languages being a compulsory subject in many countries' K-12 education, many language learners are unable to exceed low intermediate speaking proficiency. So, individuals are seeking to find ways to improve their speaking proficiency. Nevertheless, there are many different modalities for language learning, such as asynchronous courses, traditional synchronous university courses, foreign language housing, studying/living abroad, intensive language courses, social media platforms, and mobile applications for language learning (MALL). A meta-analysis was conducted to help learners and educators discover the most effective modalities for improving speaking proficiency. In total, 21 empirical studies involving 1,919 second and foreign-language undergraduate learners have been reviewed. These studies are selected from Education Resources Information Center (ERIC) and Google Scholar. The findings of the meta-analysis indicated that the variable which influences gains in speaking proficiency the most was not the instructional modality. Instead, the amount of time spent utilizing the language directly correlated to the learner's speaking proficiency. Therefore, more research needs to be performed focusing on the influence of the time variable in language learning.

Keywords: EFL, ESL, Foreign Language Learning, Speaking Proficiency, Higher Education, Instructional Modality, MALL

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Introduction

Learning a second or third language enhances job prospects and makes international media and culture more accessible. This accessibility makes language fluency especially speaking, more and more significant in daily life. Despite this necessity, many language learners need help to exceed low intermediate speaking proficiency (Yoshida, 2016). This inability to reach fluency is even more surprising because, in most countries, K-12 education requires foreign languages as a compulsory subject. This inability to break through to the advanced level of speaking proficiency has led learners and educators to search for effective ways to improve speaking proficiency. However, with numerous instructional modalities available, including traditional university language courses, foreign language housing, studying/living abroad, intensive language courses, and mobile applications for language learning (MALL), determining the most effective approach can take time and effort.

A comprehensive meta-analysis was conducted to understand better the instructional modalities available and their effectiveness on speaking proficiency, examining 21 empirical studies comprising 1,919 second and foreign-language undergraduate learners. The studies were identified from Education Resources Information Center and Google Scholar. Additionally, the 21 studies were selected based on their investigation of varied instructional modalities for improving speaking proficiency. By analyzing these studies, this paper aims to provide learners and educators with a better understanding of the effectiveness of different instructional modalities and how they can be utilized to improve speaking proficiency.

What is Proficiency?

For the purpose of this paper, fluency will be defined as the level of mastery an individual has over a language. Therefore, speaking fluency refers to the level of mastery an individual has when speaking in a language. Naturally, speaking fluency can be influenced by many variables, such as self-efficacy, language learning anxiety, and willingness to communicate.

Self-efficacy refers to a person's belief in one's self and abilities (Bandura,1977). Self-efficacy in education can be applied to both educators and learners (Knoblauch & Hoy, 2008). Learners' self-efficacy involves learners' perceptions of their knowledge and skills and how they learn (Schunk, 2016). Thus, research has found a correlation between higher learners' self-efficacy and speaking proficiency (Liu, 2012; Yoshida, 2016).

Language anxiety is categorized as the product of adverse emotions and thoughts toward language usage and learning. Tuncer and Dogan (2015) found that in English Language Learning courses, individuals who experienced language anxiety predicted lower student achievement. However, many causes and contexts create or influence language anxiety, such as being unprepared for class (Liu, 2012).

Another variable that influences speaking proficiency is Willingness to Communicate. The inclination or readiness of a learner to participate, maintain, and initiate communication in a second or foreign language is called Willingness to Communicate (Fouz-Gonzalez, 2017). Naturally, this included a learner's motivation and confidence, linking this variable to self-efficacy and language anxiety.

Due to the varied multitude of variables that can influence speaking proficiency, self-efficacy, willingness to communicate, and language anxiety, this meta-analysis focused on examining studies that focused on improving speaking proficiency in a second or foreign language.

Instructional Modalities

Instructional Modalities, in this paper, refers to the method in which students interact with instructional. In language learning, this can be anything from university language courses to study abroad programs. This paper examines explicitly: university language courses, university online language courses, immersion, study abroad, foreign language housing, and MALL.

Immersion was stated by Rifkin (2005) as the vehicle for many language learners to break through the difficult intermediate level of speaking proficiency. In the context of this study, immersion refers to all language instructional or experience, including speaking and other related curricula, that occur in a reduced time period (Swain & Lapkin, 2002).

Study Abroad is one of the popular instructional modalities used to increase foreign language speaking proficiency increased language proficiency (Serrano et al., 2011). This research defines study abroad as when they leave their native country and attend schooling in a different country. Traditionally, study abroad experiences are six months to one year (Llane & Munoz, 2009). However, two- to four-week intensive study abroad programs have been created to give students an international immersion experience without significant time and financial commitment.

Aharon and Pomson (2018) proposed that programs where participants are housed together, build trust and create unique learning and growing experience. This is precisely the aim of the instructional modality of Foreign Language Housing. Foreign Language Housing is where students live in an environment where all the participants agree only to speak a specific language (Kelling & Bown, 2020). Often, students are assigned a native-speaking roommate to assist with the immersive environment.

Kusmaryani et al. (2019) described MALL as Mobile Assisted Language Learning or incorporating technology into the instructional method. MALL can include but is not limited to Twitter, Instagram, YouTube, Speech to Text programs, Online Dictionaries, Gmail, Weebly, WhatsApp, and Google Chrome. While MALL tends to be incorporated into a traditional instructional modality, the incorporation creates a new and different instructional modality that will require more detailed investigation.

Methods

The 21 studies were found using Google Scholar and ERIC (Education Resources Information Center). Studies were selected based on the following criteria:

1. The participants were undergraduate students.
2. The participants need to be learning a language outside of their native language.
3. The study examined the improvement of speaking proficiency by using a specific instructional modality.
4. The study needs to assess the instructional modality as a dependent variable in measuring the target language learning outcome, speaking proficiency.
5. The study needs to incorporate a (quasi) experimental design.

6. The study needs to establish a pre-treatment equivalency between the instructional modalities/experimental groups with an empirical measurement such as a standardized test or established survey for self-analysis.
7. The language of the study must be English.

Research Questions:

1. To what extent, if any, does the instructional modality influence L2 speaking proficiency in undergraduate students?
2. Does speaking proficiency gains vary based on the instructional modality? If so, how?

Results

Based on the criteria stated above, 21 empirical studies were found. The studies were published from 2010 to 2021 in credible language, education, technology, or interdisciplinary journals in English.

While all participants were undergraduate students learning a language, the number of participants in the surveys ranged from 14 to 229. Additionally, the language being learned varied. Many of the studies (13) researched students learning English. Four of the studies focused on more than one language. Three of the studies focused on students learning Spanish. One study focused on learners studying mandarins. Moreover, one study investigated students acquiring Russian.

Two of the studies only used a survey. The other 20 studies used a Pre-Test and Post-Test. Of the 20 studies that used a Pre-Test and Post-Test, two studies also included a survey. Furthermore, one study included an interview.

These studies focused on the instructional modalities: university language courses, intensive university language courses, study abroad, intensive study abroad, Foreign Language Housing, Online University Language Courses, and MALL, Mobile Assisted Language Learning.

Table 1. *List of Studies analyzed*

Author	Year	Modality	Language Learning	Participants	Measure
Baker et al.	2010	Foreign Language Housing Study Abroad Intensive Study Abroad	Spanish	48	Pre/Post Test
Dewey et al.	2013	Study Abroad	Multiple	118	Pre/Post Test and Survey
Dewey et al.	2015	Foreign Language Housing	Multiple	229	Survey
Fouz-Gonzalez	2017	MALL: Twitter	English	121	Pre/Post Test
Fouz-Gonzalez	2020	MALL: Apps	English	52	Pre/Post Test
García-Amaya	2021	Study Abroad	Spanish	31	Pre/Post Test
Jochum	2014	Study Abroad	Spanish	18	Pre/Post Test

Kelling & Bown	2020	Foreign Language Housing	Multiple	42	Pre/Post Test
Kusnaryani et al.	2019	MALL	English	38	Pre/Post Test and Interview
Martinsen et al.	2011	Foreign Language Housing	Multiple	78	Pre/Post Test
Merrill et al.	2021	Online	Russian	229	Pre/Post Test
Namaziandost et al.	2021	MALL: Online	English	81	Pre/Post Test
Nanjundan et al.	2020	MALL	English	41	Survey
Serrano	2011	Intensive	English	152	Pre/Post-test
Serrano et al.	2011	Intensive Study Abroad	English	131	Pre/Post Test
Serrano et al.	2012	Study Abroad	English	14	Pre/Post Test
Sherine et al.	2019	MALL	English	110	Pre/Post Test
Xu et al.	2014	Intensive	Mandarin	28	Pre/Post Test
Yin	2019	MALL	English	86	Pre/Post Test
Yulian	2022	MALL	English	30	Pre/Post Test and Survey
Zeinali Nejad et al.	2021	Online	English	45	Pre/Post Test

Intensive

Of the 21 studies found, three studies specifically investigated the instructional modality of intensive (Serrano, 2011; Serrano et al., 2011; Xu et al., 2014). The number of participants ranged from 28 to 152 undergraduate learners. All three studies used a pre-test and post-test measure to assess proficiency gains in oral communication with a traditional university language course as the control group (Serrano, 2011; Serrano et al., 2011; Xu et al., 2014). It is important to note that all three studies maintained that the intensive university language course and the traditional university language course contained the same instruction time. The big difference was the duration of the courses.

All three studies' findings showed that both the traditional university language course and the intensive language course improved speaking proficiency (Serrano, 2011; Serrano et al., 2011; Xu et al., 2014). Moreover, all three studies found no statistical difference between the improvement in speaking proficiency between the two instructional modalities. Thus, these findings suggest that the duration of the course does not impact speaking proficiency. However, the number of instruction hours does correlate with language-speaking proficiency. More research needs to be conducted to understand this correlation better.

Study Abroad

During the COVID-19 pandemic, study abroad programs were restricted due to travel bans and the risk of catching the virus, limiting the instructional modality available for students. Despite these limitations, this meta-analysis found four studies that met the research criteria (Dewey et al., 2013; Garcia-Amaya, 2021; Jochum, 2014; Serrano et al., 2012) with undergraduate participants ranging from 14 to 118 in number. All four studies utilized pre-tests and post-tests. Although Serrano et al. (2012) also conducted proficiency testing throughout the program. This testing through the study abroad program allowed Serrano et al.

(2012) to measure the learner's proficiency throughout the entire program, not just at the beginning and the end.

In contrast to the previously mentioned intensive instructional programs, the research results on study abroad are mixed. Three studies (Dewey et al., 2013; Garcia-Amaya, 2021; Serrano et al., 2011) found that speaking proficiency improved with increased time spent using the language, similar to studies on intensive instructional programs (Serrano, 2011; Serrano et al., 2011; Xu et al., 2014). However, Serrano et al. (2012) found that the most significant speaking proficiency gains occurred in the program's first three months, with continued gains at a slower pace after that. These findings of Serrano et al. (2012) indicate that intensive study abroad programs may have more benefits than traditional ones. Nevertheless, further research is necessary to uncover the validity of this indication.

Unlike the other three studies, Jochum (2014) did not find a correlation between time and speaking proficiency gains. However, Jochum's study did conclude that study abroad programs increased speaking proficiency. Further investigation is needed to determine why time did not have statistical significance in this study.

Foreign Language Housing

Like the study abroad research, four studies meet the criteria which explored foreign language housing (Baker et al., 2010; Dewey et al., 2015; Kelling & Bown, 2020; Martinsen et al., 2011;). The studies' participant size ranges from 42 to 229 undergraduate learners. Of the studies, three of the studies implemented a pre-test and post-test measure (Baker et al., 2010; Kelling & Bown, 2020; Martinsen et al., 2011). Dewey et al. (2015) utilized a self-reporting survey. All of the analyzed studies found that participating in foreign language housing was linked to increased speaking proficiency.

Similar to the studies mentioned previously (Dewey et al., 2013; Garcia-Amaya, 2021; Serrano, 2011; Serrano et al., 2011; Xu et al., 2014), Baker et al. (2010) and Martinsen et al. (2011) uncovered that time spent using the language correlates with proficiency gains. However, Dewey et al. (2015) and Kelling & Bown (2020) did not find evidence that time influenced speaking proficiency. This lack of consistency indicates that there needs to be more research.

Online

While COVID-19 may have limited research on the study abroad instructional modality, it gave rise to online instructional modality language research (Merrill et al., 2021; Namaziandos, 2021; Zeinali Nejad et al., 2021). Three studies that met the criteria chose to explore online instruction modalities. These studies' participants range from 45 to 229 undergraduate learners. The studies each showcased that utilizing the online instructional modality enhances speaking proficiency. Additionally, all three studies compared the online instructional modality with another modality. However, the comparison modality varies in each study.

Merrill et al. (2021) presented traditional university language courses compared to online university language courses. The study found that speaking proficiency improved more in the traditional university language classroom. Interestingly, the study also found that writing proficiency improves more in the online university language classroom.

The other two studies (Namaziandos, 2021; Zeinali Nejad et al., 2021) examined different types of online instructional modalities. Further research needs to be done on different types of online instructional modalities so that researchers, learners, and educators can better understand this type of instructional modality and its benefits.

MALL: Mobile Assisted Language Learning

This final instructional modality being examined has the most relevant research that met the study's criteria (Fouz-Gonzalez, 2017; Fouz-Gonzalez, 2020; Kusnaryani et al., 2019; Nanjundan et al., 2020; Sherine et al., 2019; Yin, 2019; Yulian, 2022). Thus, seven studies were found that explored the instructional modality of Mobile Assisted Language Learning. The number of participants varied from 30 to 121 undergraduate language learners.

Six of the seven studies utilized pre-test and post-test measures. One of these studies also incorporated the usage of a survey. While another study instead chose to incorporate an interview. The one study that did not incorporate a pre-test and post-test as the measure instead chose to design a survey. Despite the differing measures, all seven of the studies found that the MALL instructional modality helped increase speaking proficiency.

Although, it is difficult to compare the amount of improvement between the different types of MALL since the studies' experiment designs are so vastly different. More research must investigate utilizing MALL in a learning environment to increase speaking proficiency.

Discussion

When comparing the findings of all 21 studies with regard to their instructional modality and language speaking proficiency, the answer to the first research question is found. All instructional modality used showed speaking proficiency important. However, none of the instructional modalities' speaking proficiency improvements exhibited greater statistical significance. In fact, time showed a greater correlation with speaking proficiency improvement (Baker et al., 2010; Dewey et al., 2013; Garcia-Amaya, 2021; Martinsen et al., 2011; Merrill et al., 2021; Serrano, 2011; Serrano et al., 2011; Xu et al., 2014). This suggests that the instructional modalities, while essential in motivating and engaging students, have less influence on increasing speaking proficiency. Thus, the number of hours immersed in the instructional modality matters. Therefore, it can be assumed that if learners pick an instructional modality they are interested in, they will spend more time on it. This will lead to even more speaking proficiency. However, more research needs to be conducted to confirm this assumption.

The second research question addresses whether the improvement of speaking proficiency varied based on the instructional modalities. Based on the 21 studies analyzed, there was no statistically significant difference between the speaking proficiency gains and the instructional modalities. However, it is essential to note that there are other instructional modalities that were not examined. Another meta-analysis should be conducted to confirm or challenge these findings.

It is important to note that both Foreign Language Housing (Kelling & Bown, 2020; Martinsen et al., 2011) and Study Abroad (Dewey et al., 2013; Garcia-Amaya, 2021; Jochum, 2014) can act as vehicles to produce considerable improvements in speaking proficiency due to the individual student's motivation and time spent in the instructional modality. Both of

these instructional modalities showed an extensive range when comparing the pre-test and post-test. Future research should be conducted to look at the variables of time and motivation.

Limitations

Although this study provides valuable insights for improving speaking proficiency, it is essential to acknowledge that further research is necessary to validate the findings. One limitation is that the selection criteria did not include participants' native language, language learning experience, or level of speaking proficiency, which may have influenced the results. Moreover, the 21 studies analyzed in this meta-analysis employed different measures of speaking proficiency, ranging from self-reporting to interviews to standardized tests like OPIc, and the sample sizes varied greatly. Thus, measure and sample size add potential new variables to explore in the future.

Another factor to consider is the impact of the COVID-19 pandemic on language learning research. Like many other fields, language learning research has been affected, leading to a limited pool of new empirical studies to include in this analysis. Many instructional modalities, such as Study Abroad Programs and Foreign Language Housing, shut down due to the risks of this virus. Most of the limited research published during this period focuses on shifting the instructional modalities to online and perceptions like Cunico's (2021), “Moving the year abroad online: Ready, steady, go!” Therefore, conducting this meta-analysis again in two to three years with a more extensive and recent set of studies could provide a more robust and comprehensive picture of the effects of different instructional modalities on speaking proficiency.

Conclusion

The present study meta-analyzed the effects of varied instructional modalities on undergraduate students’ speaking proficiency. The literature search revealed 21 empirical studies that investigated the effects of an instructional modality or modalities on speaking proficiency in higher education language learners. Most of the studies assessed found that using the specific instructional modality revealed a statistically significant increase in speaking proficiency. However, the time spent using the instructional modality did correlate with large proficiency gains (Baker et al., 2010; Dewey et al., 2013; Garcia-Amaya, 2021; Martinsen et al., 2011; Merrill et al., 2021; Serrano, 2011; Serrano et al., 2011; Xu et al., 2014). Another thing uncovered in this study is that the amount of time immersed in the language also correlates with more significant language learning improvement. Therefore, Study Abroad programs and Foreign Language Housing are most effective when the participants remain immersed in the language. Further research needs to be conducted to give recommendations based on native language, level of proficiency, and language learned. Ultimately, this study confirms what teachers have emphasized for decades: the more you study, the better you perform.

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