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Reading Aloud and Repeated Reading Strategy Based on the ‘Callan Method’ on the Development of the Students’ Reading Skills

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Abstract

This study was conducted to determine the effectiveness of utilizing the reading aloud and repeated reading strategies of the Callan Method in improving the reading skills of the Grade 8 students from the selected high school in Surigao del Norte. The 29 students participating in this study have shown poor reading performance based on the results of the reading inventory of the Phil-IRI in 2020. The quantitative data of the study were the results of the pre-test and post-test of the Cambridge A2 Key for Schools test. Results revealed that there was a significant difference in the reading skills of the Grade 8 students upon the completion of the 120 required hour of Callan- mediated classes with the mean and standard deviation of ($M=15.83$, $SD=4.60$) as compared to the pre-test results ($M=10.62$, $SD=3.51$), $t(29)=-8.39$, $p < 0.05$. Likewise, the teaching interventions have improved the reading proficiency of the students with an effect size of (Cohen’s $d = 1.55$). Furthermore, the qualitative data of the study looked into the affordances and challenges of using the Callan Method in reading. Students identified the affordances of the method to be as follows: guided reading for better understanding of context, repetition practices for mastery, collaborative learning, language translation for unfamiliar vocabulary and familiarity with the new method. The challenges identified during the utilization of the method are the following: the fast-paced instruction, unfamiliar vocabulary in the text and unfamiliarity with the method in the teaching of reading.

Keywords: Callan Method, Reading Aloud, Repeated Reading Strategy, Reading Performance

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Introduction

Reading is a lifelong skill to be used both for academic purposes and everyday life. According to Anderson, Hiebert, Scott, & Wilkinson, (1985) reading is a basic life skill. This includes reading academic or non-academic books, scanning menus, signage, advertisements, checking doses of medicines, learning how to cook by following a recipe and others. Moreover, reading is considered a key element for a child to succeed both in academics and life. Indeed, without the ability to read well, opportunities for professional and personal fulfillment will inevitably be lost. The continuous demand for proficient literacy in the high-technological society makes this issue even more pressing (Snow, Burns, & Griffin, 1998). Despite its importance in students' academic endeavors, reading is one of the most challenging and unattainable successes in the education system.

While reading is considered an important factor in academic success and day to day learning, the Department of Education in the Philippines reported that based on the 2007 data, an alarming 70% of the students are incapable of reading and do not meet their expected level, among the challenges met were poor reading comprehension, word recognition and pronunciation, Estremera & Estremera, (2018). This report was also evaluated by Scholastic Inc., which is known to be the leading publisher and distributor of children's books in the world. Moreover, the Program for International Student Assessment (PISA) is a study under the Economic Co-operation and Development organization that measures student's competence in reading, science and math of its member and non-member countries by conducting assessments among 15years old students' scholastic performances (San Juan, 2019). In the 2018 PISA result, the Philippines reportedly scored lowest out of 79 countries in reading comprehension which was participated by 600,000 students under the age of fifteen. According to the data, over 80% of high school students in the Philippines around the age of fifteen did not reach the average level of proficiency in reading. The ramification of the outcome drew criticisms toward the Department of Education and the implementation of the Republic Act No. 10533 "Enhanced Basic Education of 2012" or much widely known as K to 12 Program.

In order to address the challenges in poor reading, the Department of Education has issued guidelines on the utilization of the 2017 Every Child a Reader Program (ECARP) Funds for the Early Language, Literacy, and Numeracy Program: Professional Development Component which aims to develop every Filipino learner's literacy and numeracy skills which will fundamentally help in the lifelong learning endeavors of learners from Kindergarten to Grade 3 following the K to 12 Basic Education Curriculum by providing a sustainable and cost-effective development system for teachers in their professional teaching endeavors. Among the goals and objectives of ECARP is that 'every child should be a reader' by implementing the Early Language, Literacy, and Numeracy Program in the Philippines.

To shed light into the actual issues in reading, the researcher started to inquire among local schools in the locale of General Luna Surigao del Norte, Siargao Islands. Based on the Phil-IRI in 2020, the Grade 7 students of the participating school exhibited poor reading performance. In the findings, 67% or 6 out of the 11 female population of the Grade 7 students belong to the frustration level in word recognition and reading comprehension.

Meanwhile, 70% or 10 out of the 18 males obtained 60% in word recognition and reading comprehension. Furthermore, 3 out of the 29 Grade 7 students were identified as non-readers.

The Phil-IRI reading inventory tests consist of word recognition and reading comprehension, which assesses the literal, inferential and critical skills of students in reading.

Based on the available figures, students from the participating school do not display proficiency in reading. In context, the purpose of the inventory is to serve as one of the bases in planning, designing/redesigning the reading programs or activities in the school geared towards the development of the reading skills of the students and the improvement of overall school reading performance.

To address the alarming performance of students in reading, finding an aid to the issues and problems is necessary to come up with an alternative method and strategy to improve students' reading competence and provide students the opportunity to rise above the challenges on the students' frustrated reading performance (Lauritzen, 1982, as cited in Homan et al., 1993). In this regard, this present study was undertaken since the researcher believes that students' competence in reading must be developed despite the hindrances for a better education. Moreover, the researcher also believes that success and development is possible when opportunity arises through research and innovation.

In recent years, "commercially exceptionally successful in several countries of the world in the teaching of English as a second language is the Callan Method," (Hrehovcik, 2003). This is a method that eliminates the biggest enemy of boredom and bad memory through its high-speed repetitive oral exercises and revision method of teaching through reading aloud and error correction. The method practices repetitive questioning done by teachers while students learn to respond through reading grammatically structured responses for English language fluency. It has been successful in teaching language faster than any other method around the world. In 2016, The study of Shishido et al. (2016) entitled "Improving Oral Proficiency through the Callan Method" revealed a significant success rate in improving undergraduate Japanese students' English oral fluency and overall competence in English.

Currently, Callan Method is only used in English as Second Language (ESL) schools in the Philippines, hence unfamiliar to the educational institution. Despite the limited information about the method, the researcher's experience working in the ESL industry in Cebu City, Philippines for two years has given her the knowledge on the practices of how Callan Method works and what it does in the development of students in learning the English language. The unfamiliarity of the method in the education industry has posed a limitation on the effectiveness of Callan Method in a different educational setting in the Philippines, thus this limitation drives this study to further investigate the effectiveness of the Callan Method in the aspect of the reading skill as it could also lead to a larger aspect of English language competence among students in the Philippine setting. It is in this context that this research was undertaken since the researcher believes that opportunity arises when they adapt to changes- through research and innovation.

The pursuit of this study was useful in determining whether a new methodology which was found effective for ESL learners as well as helping the Filipino students in a regular school system in honing their reading skills and competency. In determining whether the Callan Method is effective, the researcher facilitated a mixed-method study in finding out whether the Callan Method was a suitable approach in improving students' development. The study sought to determine affordances and challenges encountered in implementing the reading aloud and repeated reading strategy in developing grade 8 students' reading skills. The main objective of this study is to provide data to be used as a basis in planning and designing the

reading activities geared towards the development of the reading skills of the students, particularly among schools located in remote areas where access to educational materials is limited.

Results and Discussion of the Study

This part of the study presents analysis and interpretation of the data of the study from the consolidated results of the pre-test and post-test results of the Grade 8 respondents/participants.

Interpretation and Analysis

This part of the study discusses the results on the use of reading aloud and repetitive reading strategies of the Callan Method in improving the reading skills of the Grade 8 respondents/participants from the participating school.

Table 1 presents a summary of the consolidated results from the pre-test and post-test in determining students' reading levels before and after the Callan-mediated lessons conducted among the Grade 8 students of the participating school. Found in the table from left to right are as follows: the reading level category, raw scores range, CEFR levels, pre-test and post-test respectively along with its data: N= which refers to the number of participants and its equivalent percentage.

Table 1: *Results on the conducted pre-test and post-test with corresponding reading levels*

Reading Levels	Scores	CEFR Level	Pre-Test		Post-Test	
			N	%	N	%
-	0-8	-	9	31.03	1	3.45
Elementary	9-17	A1	19	65.52	18	62.07
Pre-Intermediate	18-26	A2	1	3.45	10	34.28
Intermediate	27-35	B1	0	0.00	0	0.00
Upper Intermediate	36-44	B2	0	0.00	0	0.00
Lower Advanced	45-53	C1	0	0.00	0	0.00
Advanced	54-62	C2	0	0.00	0	0.00

As shown in Table 1, in terms of reading levels for pre-test, nine or (31.03%) of the participants among the group were underperforming in reading. This means that students did not showcase efficient reading abilities prior to participating in the Callan mediated classes; hence, the acquired scores did not meet the standard for elementary level or A1 readers. In the implementation of the Callan Method, the teacher-researcher focused on developing students' competence in vocabulary building, reading comprehension, improving pronunciation and reading accuracy. The teacher-researcher strictly followed and applied the reading aloud and repetitive reading strategies of the Callan method in every reading class to ensure that students have fully engaged in using the Callan Method during the implementation period. After the completion of the 120 required hours of Callan Method, the teacher-researcher determined its effects among the Grade 8 students upon the completion of the required 120 hours.

As a result, post-test scores showed that there was a significant development among the students after participating in the Callan-mediated classes. The number of underperforming participants from the pre-test have relevantly decreased from nine students to one or (3.45%) over the past few months of undergoing the Callan mediated classes. These data can be associated as a success with the promised results of the Callan Organization (1998) as cited by Hrehovcik (2003) on improving students' language skills which requires as little as 80 hours to 120 hours to achieve improvement. For reference, it can be observed that over eight students or (27.58%) of the participants are no longer unclassified or non-readers as post-test results show that participants now belong to elementary for A1 level readers.

Among the twenty-nine participants, nineteen or (65.52%) of the participants scored between 9-17 during the pre-test which indicates that prior to the study the participants exhibited capabilities to identify basic text and recognize familiar words from the phrases as described in the literature. Upon the completion of the 120 Callan-mediated classes, students showed improvement in identifying words in the text. Students are more confident in reading as they have now mastered how to answer comprehension questions based on the context clues from the comprehension questions. Lastly, they are more proactive in reading using the practices and strategies of the Callan Method that provided them a better approach and experiences in learning how to read. In line with these improvements in the reading competency of the students, there were eighteen students or (62.07%) who belonged in the elementary level as shown in the post-test results. Prior to the implementation of the Callan Method, there were nineteen students who were categorized as A1 readers. Posttest data results showed eighteen; hence, it can be inferred that there was only one student or (3.45%) out of the twenty-nine participants who was left as non-reader or uncategorized. For reference, A1 level readers are described by the Callan Organization (1998) as an individual who has basic understanding of everyday expressions and vocabulary for everyday use while A2 learners are capable of comprehending sentences and are able to express frequently used expressions for communicative purposes. Based on these definitions we can fairly make an assumption that students have developed from non-readers to elementary or A1 level readers to pre-intermediate or A2 levels, a clear manifestation of the effectiveness of the Callan method on its objective to improve students' reading abilities.

Pre-test data also recorded one or (3.45%) participants of the study were able to showcase abilities and skill in reading which met the intermediate or A2 level. After the implementation of the Callan method there were huge improvements in the reading performance of the students thus results showed an increased number of students (34.48%) who advanced to A2 level readers or the intermediate readers are characterized by using a higher level of vocabulary and are capable of associating it in their daily language. This significant development among students supports the claims that Callan can be effective in improving student's language skills as discussed and interpreted in Table 2 which presents the results on the significant difference in the reading performance of the Grade 8 students/participants with reference to the pre-test and post-test data. This outcome of the post-test results reflects the study of (Cunningham & Arlington, 2007) who acknowledges reading aloud strategies as an effective practice to developing students' cognitive abilities to grasp the newly introduced vocabulary from the text into meaningful units. Moreover, the guided-reading strategies of the Callan method further reinforces effective teaching in reading, thus increasing the chance of developing students' reading skills.

Table 2: *Paired samples statistics of the Grade 8 students pre- and post-tests*

		Mean	N	SD	Std. Error Mean
Pair 1	Pre-Test	10.62	29	3.51	0.65
	Post-Test	15.83	29	4.60	0.85

Based on data shown in Table 2, there was a significant increase in the Grade 8 students post-test results. This means that after the implementation of the Callan method, students were able to show developments and improvements in their reading. This claim is supported with the mean and standard deviation of (M=15.83, SD=4.60) compared to the pre-test results with the mean and standard deviation (M=10.62, SD=3.51), ($t(29)=-8.39$, $p < 0.05$). In order to measure the magnitude of the mean of the pre-test and the post-test, Cohen's d was used with the formula $d = \text{Mean}/\text{SD}$ and $d = t/\sqrt{N}$. Results obtained an effect size of 1.55 which means that there was a significant difference between the two means of the pre-test and post-test of the Grade 8 students.

Table 3: *Paired T-Test results of the Grade 8 students' pre-test and post-test*

Scores	Paired Differences						t	df	Sig.(2-tailed)
	Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference					
				Lower	Upper				
Pre-Test vs Post- Test	-5.21	3.34	0.62	-6.48	3.94	-8.39	28	0.0000	

Table 3 presents the results on the significant difference in the reading performance of the Grade 8 students before and after implementing the reading aloud and repeated reading strategy in the Callan Method. The effectiveness of the Callan method was evident with a 5.21 mean difference between the pre- and post-test which determined a significant improvement comparing students' performance before and after the use of Callan method. This means that the students were able to adapt the use of the new teaching method in their reading classes and were able to develop the way they learn how to read and comprehend the lessons that they were taught to them. The success of the Callan method reflected in the students' performance during their post-test in which they successfully obtained higher scores compared to their pre-test scores. Prior to taking the pre-test, the students did not receive any interventions or any kind of classes. This means that whatever scores they obtained from their pre-test reflects their reading competence.

The outcome of the study supports language researchers Shishido & et al (2017) claims on the effectiveness of Callan method in improving students' language skills. Researchers like Arayat & et al. (2019) also support the Callan Method has been helpful in improving students' communicative skills through its various practices and its repetitive and guided approach towards the students who are using the method. With the positive results from the data as presented in Table 1, it can be observed that the reading aloud and repetitive reading have been relevant in improving students' reading skills.

Summary on the Interpretation on the Affordances and Challenges of the Grade 8 Students

The qualitative data of the study looked into the affordances and challenges of using the Callan Method in reading. Students identified the affordances of the method to be as follows; guided reading for better understanding of context, repetition practices for mastery, collaborative learning, language translation for unfamiliar vocabulary and familiarity with the new method. The challenges identified during the utilization of the method are the following; the fast-paced instruction, unfamiliar vocabulary in the text and unfamiliarity with the method in the teaching of reading.

Conclusions

This study was conducted to determine the effectiveness of the Callan method in the development of the reading abilities of students in a Philippine classroom setting. Particularly, the study focuses on the effects of the reading aloud and repeated reading strategies of the Callan method in improving the poor reading abilities of the Grade 8 students in a selected high school in Surigao del Norte.

Findings of the study concluded that the use of reading and repetitive reading strategies of the Callan Method were effective. Specifically, use of the new method has contributed a relevant role in improving the reading abilities and skills of the Grade 8 students/participants by advancing from elementary level to pre-intermediate. Upon the completion of the required 120 hours of using the Callan method, students have improved from elementary readers to pre-intermediate. Considering the limited hours of interventions and the effects it has had on the reading skills of students, the Callan method can potentially be a great teaching alternative in the teaching of reading.

This study has proven that students may have different teaching preferences that suit their needs and are more effective than the conventional practices and ways of teaching. As an alternative, the introduction of the Callan Method of teaching was pursued because of its success in improving students' language skills among non-English speakers. Likewise, the teacher/researcher envisions to impart the same success in improving students' reading skills by adapting the same method of teaching. It is in this context that the study was conducted.

The improvements that the students have shown in the study have proven to the teacher/researcher that innovation through research in addressing issues and challenges in education is necessary. The success of determining the effectiveness of the Callan method in teaching reading is equally relevant in successfully providing an aid to the alarming poor reading performances of the students in the participating school. Providing an alternative teaching method in the teaching of reading has provided students an opportunity to have a better education especially those who belong in the displaced schools. The lack of teaching resources must be addressed or given practical solutions so students can compete in the demands of the highly civilized society. It is with this principle that the researcher has introduced the Callan Method.

Additionally, the pursuit of this study has proven that the Callan Method is not just effective in improving oral proficiency among its users but is also effective in developing reading proficiency of students in a Philippine classroom setting. Therefore, the teacher-researcher

believes that change and development can be attainable through educational research and continuous efforts among teachers and school administrators to provide alternative and innovative teaching as a solution to the pressing issues and challenges in the education sector. With the continuous efforts of the stakeholders and innovations in education, one day every student will be given equal rights to quality education that every Filipino student deserves.

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***Relationship of the Val158met COMT Genotype
With the Regulation Disorders of Sensory Processing (RDSP)***

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Abstract

Regulation Disorders of Sensory Processing (RDSP) are disorders of hypersensitivity or hyposensitivity to a specific modality (or modalities) of sensory stimuli. These disorders also affect motor skills as well as executive functions, which is important for the child's neurodevelopment. Patterns of sensory-motor integration may be genetically determined. Particular attention is paid to polymorphisms of the *COMT* gene. The study involved 15 children with neurodevelopmental disorder (aged 7 – 17) divided into two groups in terms of *COMT* genotype. Their RDSPs were examined and then a comparative analysis was made. It was shown that the Val/Val *COMT* genotype may predispose to increased risk of hypersensitivity RDSPs of vestibular system, proprioceptive system and visual system, as well as motor coordination. Met allele (Val/Met and Met/Met genotypes), on the other hand, showed a significant reduced tendency to these RDSPs. The results correlate with numerous studies on the relationship of the *COMT* genotype with sensory-motor integration functions. Thanks to the presented study, we know that this relationship may relate primarily to hypersensitivity disorders and may be associated primarily with the senses and functions related to postural control and motor control. Most likely, a study conducted on a larger sample would yield much more clinically significant findings, however, the presented results may direct further neurogenetic research both in the context of neurorehabilitation as well as developmental psychology and neurology. It may contribute to the better understanding of the neurogenetic conditions of human neurodevelopment.

Keywords: Neurogenetics, Neurorehabilitation, Sensory Integration

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Introduction

Sensory processing is an integral part of the functioning of the nervous system and underlies the development of both motor and cognitive functions. In this context, the senses include: sight, hearing, taste, smell, touch, balance and proprioception. The integration of sensory information from many senses allows for the construction of a complex percept, which is important both for learning about reality and for conscious and purposeful action in it (Bagrowski, 2020). During ontogeny, various endogenous or exogenous conditions may cause disorders in sensory processing, called Regulation Disorders of Sensory Processing (RDSP). These are disorders of hypersensitivity or hyposensitivity to a specific modality (or modalities) of sensory stimuli. Hypersensitivity is characterized by a reduced sensory reaction threshold and, consequently, an excessive reaction to specific stimuli (e.g. a defensive reaction in response to non-painful touch). Hyposensitivity, on the other hand, is characterized by an increased sensory reaction threshold and, consequently, a lack of reaction to a standard stimulus (e.g. he needs to grip the pen harder to feel that he has it in his hand). RDSPs affect motor skills as well as executive functions, and therefore may disturb a child's neurodevelopment and functional development (Hazen et al., 2014; Camarata et al., 2020). Various RDSPs may co-occur with each other (Bagrowski & Olesińska, 2022).

Patterns of sensory-motor integration may be genetically determined. It has been shown, among other things, that sensory-motor integration patterns determined using electrophysiological methods depend, for example, on the *BDNF* genotype (Deveci et al., 2020). However, special attention should also be paid to the Val158Met polymorphism of the *COMT* gene, which encodes the COMT protein (catechol-O-methyltransferase). This protein is involved in the regulation of dopamine concentration in the central nervous system, which plays an important role in cognitive and emotional regulation (Wu et al., 2020). Dopamine also plays an important role in motor control mechanisms (Chakravarthy et al., 2010), therefore the COMT protein may also be important for motor functions. In terms of the Val158Met polymorphism, three genotypes are distinguished: Val/Val homozygotes, Val/Met heterozygotes and Met/Met homozygotes. The Met/Met genotype is characterized by up to four times lower enzymatic activity of the COMT protein than the Val/Val genotype (Williams et al., 2007). Due to the fact that the Val/Val genotype is characterized by higher enzymatic activity of the COMT protein, it is also associated with faster metabolizing of dopamine and, consequently, also with maintaining a lower concentration of dopamine at synapses (Chen et al., 2004; Papaleo et al., 2008). It has been shown that people with different *COMT* genotypes have different levels of cognitive flexibility and motor memory consolidation (Nogueira et al., 2020). People with different *COMT* genotypes also demonstrate different efficiency in performing arithmetic operations and different levels of attentional function (Shashi et al., 2006).

Since sensorimotor integration patterns may be genetically determined, and *COMT* gene variants are characterized by different levels of specific cognitive, executive and motor functions, it seemed reasonable to investigate whether Val158Met polymorphism genotypes may be associated with different sensory profiles or sensorimotor functions.

Method

The study was conducted in a group of children with a neurodevelopmental disorder, specifically cerebral palsy. The study was approved by the Bioethics Committee of the Poznan University of Medical Sciences (Resolution No. 245/20 of March 11, 2020), and

participation in the study was voluntary – parents or legal guardians gave their consent to the child's participation. The inclusion criteria were diagnosed neurodevelopmental disorder and symptoms of sensorimotor disorders. The study group consisted of 15 participants (F = 8; M = 7) aged 7 to 17 years (M = 11.27; SD = 3.24; V = 28.8%). In all participants, the results of sensory profile test were compared with the results of genetic tests in order to examine to relationship between the *COMT* genotype and the Regulations Disorders of Sensory Processing.

Of the participants had a swab taken from the inside of the cheek to examine the *COMT* genotypes. Each samples was given its number and collected using systematic and similar procedures. The samples were stored at about -30 degrees Celsius and in further analysis, DNA isolation was performed using column isolation kits according to the manufacturer's protocol. Isolation was completed using RL lysis solution and proteinase K with Tris buffer (pH 8.5) as an elution solution. All samples were analysed together. The isolated DNA was sequencing using the High Resolution Melting (HRM) and Real-Time Polymerase Chain Reaction (RT-PCR) for the study of *COMT* genotypes regarding the Val158Met polymorphism. The amplification plot is presented in Figure 1 and normalized melting curve produced at the end of RT-PCR is presented in Figure 2. Obtained clusters allowed for the division of participants into three genotypes: Val/Val (n = 10), Val/Met (n = 3) and Met/Met (n = 2).

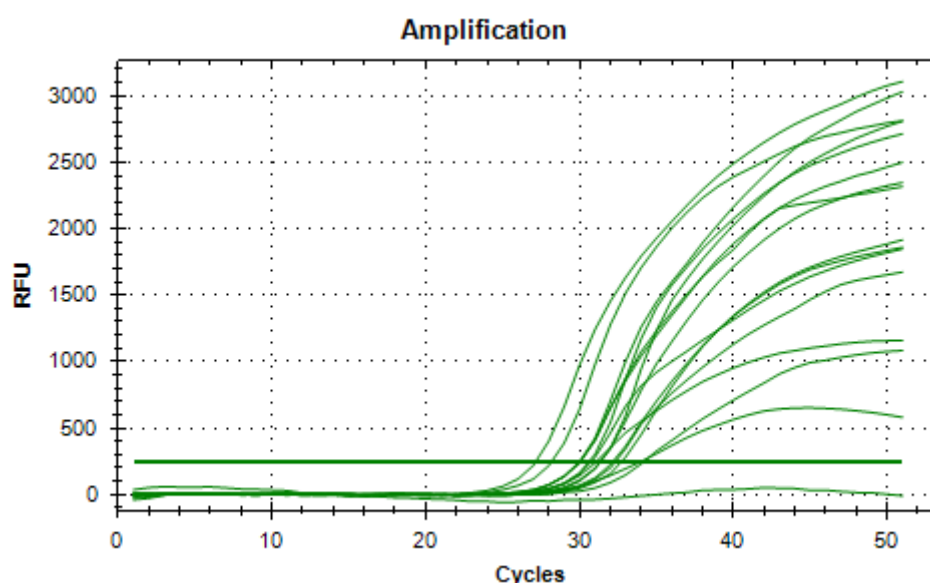


Figure 1: Representative RT-PCR amplification cycle graph of *COMT* gene of participants. X-axis reports the PCR cycle number and Y-axis reports Relative Fluorescence Unit (RFU).

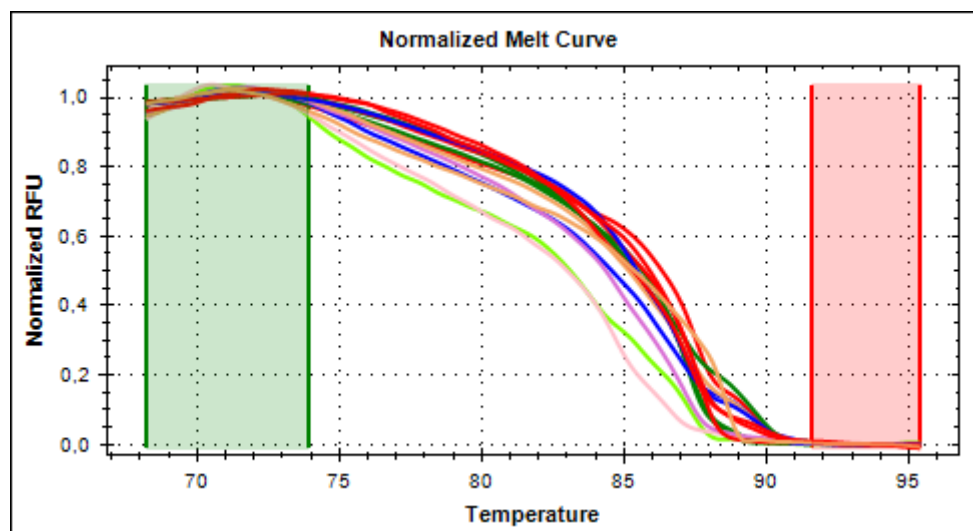


Figure 2: Normalized melt curves of HRM of COMT. The HRM was carried out on independent replicates of each sample and the most representative curve of each sample is reported in the graph.

X-axis reports the temperature expressed in degrees Celsius and Y-axis reports Normalized Relative Fluorescence Unit (Normalized RFU).

After genotype analysis, the participants were divided into two groups: the VAL group consisted of participants with homozygous Val/Val genotype and the MET group consisted of participants with at least one Met allele (Val/Met heterozygotes and Met/Met homozygotes). This methodological procedure was used because it was shown that in the Val158Met polymorphism, just one Met allele is enough to significantly change the degree of dopamine persistence and to significantly affect cognitive functioning (Hernaus et al., 2013; Blanco et al., 2015). For this reason, other studies on the Val158Met polymorphism also include a division into Val/Val homozygotes and carriers of at least one Met allele (Hosák et al., 2006). Therefore, the VAL group consisted of 10 participants (F = 6; M = 4) aged 8 to 16 years (M = 11.4; SD = 2.78; V = 24.8%), while the MET group consisted of 5 participants (F = 2; M = 3) aged 7 to 17 years (M = 11.4; SD = 4.39; V = 38.5%). The distribution of genotypes is presented in Figure 3.

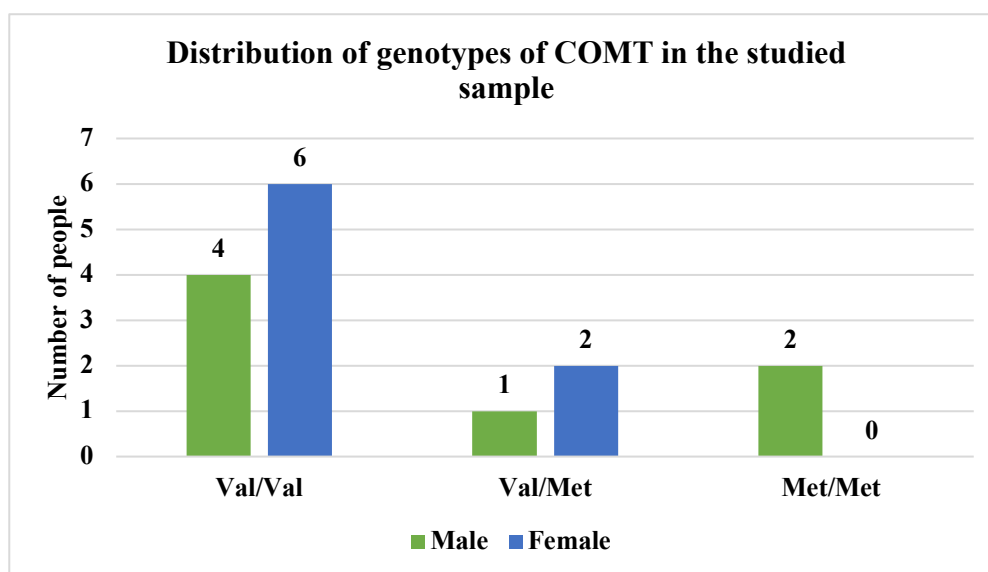


Figure 3: A graph showing the distribution of genotypes in the studied sample and the distribution of sex in individual genotyping groups.

The results of the genetic analysis were compared with the results of the sensorimotor questionnaire in order to investigate the relationship between sensorimotor disorders and the *COMT* genotype. Parents or legal guardians completed a questionnaire assessing the presence of sensorimotor disorders. For this purpose a standardized Sensorimotor Disorders Questionnaire was used. The questionnaire contained questions about the child's sensory profile in terms of the standardized test scale of sensorimotor disorders. The questionnaire was divided into functional domains that corresponded to individual senses and abilities. Based on the results of sensorimotor questionnaire, it was possible to assess the sensory profiles and the level of individual RDSPs in terms of sensory systems (tactile, balance, proprioception, hearing, vision and smell) and dysfunctions related to sensorimotor disorders (motor coordination and concentration of attention and self-regulation of behaviour). In the case of sensory systems, there was an additional division into hyposensitivity and hypersensitivity. The interpretation of the questionnaire is simple – the more “YES” answers in the domain, the higher the score on the scale in the domain, and therefore also more advanced the sensorimotor dysfunction of the domain.

To perform the statistical analysis, the Statistica package (version 13.3) was used. The Shapiro-Wilk test was used to test the normality of the distribution of variables in individual groups. The Mann-Whitney U-test for the comparison of the groups in terms of scores. Due to the inequality of groups, non-parametric test was used, regardless of the type of distribution. The significance was determined based on the verified value p of 0.05.

Results

The results of molecular tests were compared with the results of sensorimotor disorders, both in terms of sensory systems (touch, balance, proprioception, hearing, vision and smell) and functions related to sensorimotor development (motor coordination and attention and behavior). Tables 1 to 6 present the comparison of the VAL and MET groups in terms of RDSP of sensory systems.

Table 1. Summary of data obtained as a result of measurements of the RDSP of tactile system in the VAL and MET groups. The higher the RDSP value, the greater the disorder in a specific functional domain. The table presents the values of the level of RDSP's in a given group and the results of the Mann-Whitney U-test for the purpose of comparing the RDSP's of these functional domains between the groups.

RDSP of Touch (Tactile system)						
Domain	Hypersensitivity		Hyposensitivity		General disorder	
Group	VAL	MET	VAL	MET	VAL	MET
Min	0	1	0	0	0	1
Max	6	1	3	3	3	4
M	2.57	1.00	1.00	1.50	3.57	2.50
SD	1.99	0.00	1.15	1.29	2.23	1.29
Shapiro–Wilk	$p = 0.88$	$p = 0.00$	$p = 0.14$	$p = 0.97$	$p = 0.48$	$p = 0.97$
Mann-Whitney U-test	$p = 0.131$		$p = 0.508$		$p = 0.395$	

Table 2. Summary of data obtained as a result of measurements of the RDSP of vestibular system in the VAL and MET groups. The higher the RDSP value, the greater the disorder in a specific functional domain. The table presents the values of the level of RDSP's in a given group and the results of the Mann-Whitney U-test for the purpose of comparing the RDSP's of these functional domains between the groups.

Statistically significant results are shaded.

RDSP of Balance (Vestibular system)						
Domain	Hypersensitivity		Hyposensitivity		General disorder	
Group	VAL	MET	VAL	MET	VAL	MET
Min	0	0	2	2	3	2
Max	5	1	5	4	9	5
M	2.43	0.25	3.43	3.00	5.86	3.25
SD	1.90	0.50	1.27	1.15	2.48	1.50
Shapiro-Wilk	p = 0.40	p = 0.00	p = 0.22	p = 0.02	p = 0.20	p = 0.22
Mann-Whitney U-test	p = 0.047		p = 0.571		p = 0.108	

Table 3. Summary of data obtained as a result of measurements of the RDSP of proprioceptive system in the VAL and MET groups. The higher the RDSP value, the greater the disorder in a specific functional domain. The table presents the values of the level of RDSP's in a given group and the results of the Mann-Whitney U-test for the purpose of comparing the RDSP's of these functional domains between the groups.

Statistically significant results are shaded.

RDSP of Proprioception and muscle tone (Proprioceptive system)						
Domain	Hypersensitivity		Hyposensitivity		General disorder	
Group	VAL	MET	VAL	MET	VAL	MET
Min	0	0	0	2	2	2
Max	3	1	4	3	7	3
M	1.86	0.25	3.00	2.50	4.86	2.75
SD	1.07	0.50	1.53	0.58	2.04	0.50
Shapiro-Wilk	p = 0.29	p = 0.00	p = 0.01	p = 0.02	p = 0.04	p = 0.00
Mann-Whitney U-test	p = 0.038		p = 0.257		p = 0.186	

Table 4. Summary of data obtained as a result of measurements of the RDSP of auditory system in the VAL and MET groups. The higher the RDSP value, the greater the disorder in a specific functional domain. The table presents the values of the level of RDSP's in a given group and the results of the Mann-Whitney U-test for the purpose of comparing the RDSP's of these functional domains between the groups.

RDSP of Hearing (Auditory system)						
Domain	Hypersensitivity		Hyposensitivity		General disorder	
Group	VAL	MET	VAL	MET	VAL	MET
Min	0	0	1	0	1	0
Max	4	3	4	2	8	4
M	1.86	0.75	2.29	0.75	4.14	1.50
SD	1.77	1.50	1.25	0.96	2.79	1.91
Shapiro–Wilk	p = 0.11	p = 0.00	p = 0.05	p = 0.27	p = 0.25	p = 0.27
Mann-Whitney U-test	p = 0.219		p = 0.073		p = 0.131	

Table 5. Summary of data obtained as a result of measurements of the RDSP of visual system in the VAL and MET groups. The higher the RDSP value, the greater the disorder in a specific functional domain. The table presents the values of the level of RDSP's in a given group and the results of the Mann-Whitney U-test for the purpose of comparing the RDSP's of these functional domains between the groups. Statistically significant results are shaded.

RDSP of Sight (Visual system)						
Domain	Hypersensitivity		Hyposensitivity		General disorder	
Group	VAL	MET	VAL	MET	VAL	MET
Min	0	0	0	0	0	0
Max	3	1	5	1	7	2
M	1.71	0.25	2.43	0.50	4.14	0.75
SD	1.11	0.50	1.81	0.58	2.67	0.96
Shapiro–Wilk	p = 0.48	p = 0.00	p = 0.65	p = 0.02	p = 0.52	p = 0.27
Mann-Whitney U-test	p = 0.047		p = 0.089		p = 0.047	

Table 6. Summary of data obtained as a result of measurements of the RDSP of olfactory system in the VAL and MET groups. The higher the RDSP value, the greater the disorder in a specific functional domain. The table presents the values of the level of RDSP's in a given group and the results of the Mann-Whitney U-test for the purpose of comparing the RDSP's of these functional domains between the groups.

RDSP of Smell (Olfactory system)						
Domain	Hypersensitivity		Hyposensitivity		General disorder	
Group	VAL	MET	VAL	MET	VAL	MET
Min	0	0	0	0	0	0
Max	3	3	3	0	5	3
M	1.14	1.00	1.14	0.00	2.29	1.00
SD	1.07	1.41	1.21	0.00	2.14	1.41
Shapiro–Wilk	p = 0.29	p = 0.16	p = 0.15	p = 0.00	p = 0.23	p = 0.16
Mann-Whitney U-test	p = 0.705		p = 0.131		p = 0.345	

It was shown the VAL group characterized by increased level of hypersensitivity RDSPs of vestibular system, proprioceptive system and visual system. MET group, on the other hand, showed a significant reduced tendency to these RDSPs. It was also shown that the VAL group is characterized by a significantly higher level of General disorder of RDSP of visual system. In other functional domains of sensory systems, no significant differences were found between the VAL and MET groups.

Table 7 presents a comparison of groups in terms of sensorimotor disorders related to motor coordination, while Table 8 presents a comparison of groups in terms of sensorimotor disorders related to concentration of attention and self-control of behavior.

Table 7. Summary of data obtained as a result of measurements of the RDSP of Coordination in the VAL and MET groups. The higher the RDSP value, the greater the disorder in a specific functional domain. The table presents the values of the level of RDSP's in a given group and the results of the Mann-Whitney U-test for the purpose of comparing the RDSP's of these functional domains between the groups. Statistically significant results are shaded.

RDSP of Coordination abilities		
Domain	Motor coordination	
Group	VAL	MET
Min	1	1
Max	9	5
M	6.71	3.00
SD	2.87	1.83
Shapiro-Wilk	p = 0.05	p = 0.71
Mann-Whitney U-test	p = 0.047	

Table 8. Summary of data obtained as a result of measurements of the RDSP of Attention and Behaviour in the VAL and MET groups. The higher the RDSP value, the greater the disorder in a specific functional domain. The table presents the values of the level of RDSP's in a given group and the results of the Mann-Whitney U-test for the purpose of comparing the RDSP's of these functional domains between the groups.

RDSP of Attention and Behaviour		
Domain	Concentration of attention and Self-regulation of behaviour	
Group	VAL	MET
Min	0	0
Max	8	5
M	4.14	2.25
SD	3.02	2.06
Shapiro-Wilk	p = 0.75	p = 0.57
Mann-Whitney U-test	p = 0.299	

It was shown the VAL group characterized by increased level of coordination disorders. MET group, on the other hand, showed a significant reduced tendency to the RDSP of motor coordination. In the domain of concentration of attention and self-control of behavior, no significant differences were found in the level of RDSP between the VAL and MET groups.

Table 9 presents a comparison of the groups in terms of the overall score in the field of sensorimotor disorders, divided into hypersensitivity and hyposensitivity, as well as the overall level of sensorimotor disorders.

Table 9. Summary of data obtained as a result of measurements of the general RDSP, general hypersensitivity and general hyposensitivity in the VAL and MET groups. The higher the RDSP value, the greater the disorder in a specific functional domain. The table presents the values of the level of RDSP's in a given group and the results of the Mann-Whitney U-test for the purpose of comparing the RDSP's of these functional domains between the groups. Statistically significant results are shaded.

Total RDSP						
Domain	Hypersensitivity		Hyposensitivity		General RDSP	
Group	VAL	MET	VAL	MET	VAL	MET
Min	3	2	5	4	14	10
Max	21	8	19	11	56	23
M	11.57	3.50	13.29	8.25	35.71	17.00
SD	6.16	3.00	5.28	3.10	14.72	6.48
Shapiro-Wilk	p = 0.95	p = 0.00	p = 0.33	p = 0.54	p = 0.97	p = 0.27
Mann-Whitney U-test	p = 0.030		p = 0.131		p = 0.047	

It was shown the VAL group characterized by increased level of general hypersensitivity and general sensorimotor disorders. MET group, on the other hand, showed a significant reduced tendency to these disorders. In the hyposensitivity domain, no significant differences were found between the VAL and MET groups.

Discussion

The presented study shows that the Val/Val *COMT* genotype may predispose to increased risk of hypersensitivity, especially the hypersensitivity of vestibular system, proprioceptive system and visual system, while the Met allele (Val/Met and Met/Met genotypes) showed a significant reduced tendency to these RDSPs. Animal studies have shown that the distribution pattern of the COMT protein suggests that this enzyme may modulate sensory neurotransmission (Karhunen et al., 1996). The presented study may therefore confirm that a similar relationship occurs in humans. The association of the *COMT* genotype with the level of functioning of the proprioceptive system is most likely due to the fact that dopamine plays an important role in regulating skeletal muscle tone and other functions of the extrapyramidal system (Yuan et al., 2016). It should be noted, however, that although in the presented study people with the Val/Val genotype were characterized by higher sensory hyperreactivity, and therefore also higher COMT protein activity, studies on pain perception have shown that lower COMT protein activity is associated with greater sensitivity to pain (Kambur & Männistö, 2010). Most likely, the above-mentioned relationship depends not only on the modality, but also on the strength of the stimulus.

The presented study was also shown that the Val/Val *COMT* genotype may predispose to increased risk of general sensorimotor disorder, especially the disorder of visual system. Met allele, on the other hand, showed a significant reduced tendency to them. It has previously been noted that genotypic features in the *COMT* gene may be associated with different patterns of visual analysis in search of information (Nogueira et al., 2020). The presented

study indicates that *COMT* genotypic features may also be associated with visual sensory processing. The association of the *COMT* genotype with General Regulation Disorder of Sensory Processing demonstrated in the presented study may indicate a broad association of this genotype with psychomotor development disorders, because other studies have shown that the occurrence of Developmental Coordination Disorder symptoms also depends on the *COMT* genotype (Shashi et al., 2006).

There is also one difference between VAL and MET group in the presented study – the Val/Val genotype may predispose to increased risk of coordination disorders, while Met allele showed significant reduced tendency to RDSP of motor coordination. This is most likely related to different levels of dopamine at synapses depending on the genotype. Dopamine plays a very important role in motor control mechanisms and shaping motor functions (Gvirtz Probolovski & Dahan, 2021; Speranza et al., 2021), therefore the *COMT* protein, as a dopamine level regulator, may influence motor coordination.

The presented study did not demonstrate the relationship of the *COMT* genotype with other sensory disorders or with concentration and self-control disorders, although studies note a significant relationship between variants of this gene and cognitive functioning (Adele et al., 2004; Bruder et al., 2005; Gold et al., 2014). It is possible, however, that the mentioned relationship did not occur in the presented study due to the too small sample size. Therefore, further research should take into account a larger study group size. However, due to the fact that most neurophysiological functions are multigene-dependent (Park et al., 2021), it would be worth taking into account additional genes related to the dopaminergic system, such as *SLC6A3* or *DRD* genes, in further research. It would also be worth taking into account the occurrence of epigenetic factors that can modulate gene activity (Alvarado-Cruz et al., 2018; Ross et al., 2020; Megala et al., 2021).

However, the presented study constitutes a contribution to the search for neurogenetic correlates of developmental disorders and may have significant importance for programming personalized neurorehabilitation based on the genetic profile (Bagrowski, 2023).

Conclusion

The results correlate with numerous studies on the relationship of the *COMT* genotype and dopaminergic system with sensory-motor integration functions. Thanks to the presented study, we learned that this relationship may relate primarily to hypersensitivity disorders and may be associated primarily with the senses and functions related to postural control and motor control – proprioception, balance, sight and coordination. Most likely, a study conducted on a larger sample would yield much more clinically significant findings, however, the presented results may direct further neurogenetic research both in the context of neurorehabilitation as well as developmental psychology and neurology. A better understanding of the relationship between neurogenetic conditions and the clinical condition may contribute to the development of personalized medicine with individualized therapy protocols and a better understanding of the biological conditions of human neurodevelopment, psychomotor development and sensorimotor development.

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Does Tracking Culture Encourage Fixed Mindsets in Its Students? An Interdisciplinary Analysis Using International Datasets

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Abstract

This study serves as the first of its kind to quantitatively juxtapose students' mindsets from between-school tracking (BST) and comprehensive educational policies. Results indicated that students educated in a BST country were significantly more fixed minded than students educated in a comprehensive policy ($p \leq .0001$). Results also replicated the past finding that being less fixed minded served as a buffer against the negative impact coming from a low socioeconomic status (SES) had on performance in math and reading ($p \leq .0001$). Further results revealed the novel finding that being less fixed minded served as a buffer against the negative impact coming from a low SES had on future job expectation ($p \leq .0001$). A theoretical framework rooted in classical conditioning is used to offer an explanation as to why students educated in a tracking policy are so fixed minded. Results of this research warrant the demand that sociologists, psychologists, and educators better work together on ensuring what scales PISA, TIMMS, and PIRLS measure. An argument for the abolishment of tracking is provided.

Keywords: Mindset, Between-School Tracking, Early-Tracking, Educational Policy, Educational Inequalities

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Introduction

Sociological research has emphasized that the education system is the paramount societal structure in fostering social reproduction: It is the primary agent of socialization for younger students, and it performs the main allocative functions associated with placing older students into a proper societal working role (Parsons, 1959). Because of this, design flaws of the education system and educational inequalities have long since been a focal point of sociological research (Coleman, 1966). The current research was directly inspired by a cornerstone sociological study conducted by Hanushek and Wößmann (2006). Their research separated countries into BST countries and comprehensive countries. As defined in their research, BST countries separate students into university and non-university schools at the young ages of 10-15 based on prior academic performance. Higher achieving students attend a school designed to prepare them for university, whereas lower achieving students attend technical and vocational schools designed to teach them skills so they can enter the workforce after high school. Comprehensive countries were defined as countries that keep students together in the same school for the entirety or at least most of high school. Results of their differences in differences analysis revealed that educational inequalities increased over time in almost all BST countries, whereas educational inequalities decreased over time in almost all comprehensive countries. Researchers have hypothesized four key reasons as to why this finding occurred. The first is peer-group effects (Ryan, 2001; Hanushek et al., 2003). BST consists of placing higher achieving students in a university school and lower achieving students in technical or vocational schools. When highly motivated and high achieving students are placed in a separate school, lower achieving students are unable to benefit from studying with them. Because lower achieving students are no longer working alongside and learning from their higher achieving counterparts, they perform worse over time. On the contrary, lower achieving students from comprehensive countries spend more time with higher achieving students in the classroom, which causes them to improve over time. The second explanation is teacher sorting (Bonesrønning et al., 2005). The most able and motivated teachers prefer to teach higher achieving students. Thus, in BST countries, the students tracked into the university school have access to the best teachers and the technical and vocational schools have less capable teachers. The third explanation is differences in educational standards, curricula, and teachers' expectations (Betts & Grogger, 2003). A key factor of the educational policy of BST is that it sends a message to students that their educational future is likely determined by that young age of x years old (10-15 years old depending on which BST countries is being observed). Betts and Grogger (2003) argued that when students are tracked into non-university schools, students are not only offered a less challenging curricula, but teachers and society also expect less from them. This negative stigma and lack of challenging material causes students' performance to drop. The fourth explanation refers to resources provided to the different types of schools in BST countries: Research has found that non-university schools receive less funding in terms of teacher-per-student ratio than university schools (Brunello & Checchi, 2007).

What is Mindset? A growth mindset is the personal belief that individuals can improve ability through learning and effort; on the contrary, a fixed mindset is the personal belief that ability is an immutable entity that individuals either possess or do not (Dweck, 2000). Research on mindset has shown that environmental stimuli, such as teacher praise (Mueller & Dweck, 1998; Kamins & Dweck, 1999) or reading information on a card (Hong et al., 1999; Schroder, 2014), can affect what type of mindset students go on to display. Because the process of BST consists of the school system telling their students that their educational future is determined by the young ages of 10-15 years old, keeping in mind Bronfenbrenner's

theory of social ecology (Bronfenbrenner, 1979), such a message begs the question of whether the macrosystem of BST countries encourages fixed mindsets within its students. This is the exact question this research is designed to provide insight into: Are students from countries that practice BST significantly more fixed minded than students from comprehensive countries? Although (Hölscher, 2018) conducted a qualitative comparative study using interviews with teachers from the Netherlands and Sweden about the effect of BST on student mindset, no prior study has quantitatively juxtaposed students' mindsets from BST and comprehensive countries. Thus, the current study serves as the first to do so. The current research was also designed to establish whether a decrease in fixed mindset serves as a significant buffer against the negative impact low SES has on student future job expectation, performance in math, and performance in reading.

Participants

There were 104,533 total observations in this study, including students from ten BST countries (Czech Republic, Estonia, France, Germany, Greece, Hungary, Italy, Netherlands, Slovak Republic, and Switzerland - 42,494 observations) and eleven comprehensive countries (Australia, Canada, Denmark, Finland, Iceland, Ireland, Latvia, New Zealand, Sweden, United Kingdom, and United States - 62,039 observations). All variables were obtained from the PISA 2018 dataset. Only countries recognized as developed nations were included in the analysis to help control for what is meant by a low SES student (OCED, 2023).

Study 1

The feature analysis of study 1 was the effect of Educational Policy on Student Mindset. Key independent variables were School Type (dichotomous - students in university school or non-university school), Student SES (continuous – Highest Parental Occupation Status was used to measure this), Educational Policy (dichotomous - students from comprehensive countries ["0"] or BST countries ["1"]), Immigration Status (categorical - natural born citizens, 1st generation immigrants, 2nd generation immigrants), and Sex (dichotomous - male or female). The dependent variable was mindset (continuous – higher levels of mindset indicate an increase in fixed mindset).

Dependent Variable	Coef.
Mindset	(Standard Error)
School Type (Non-Uni School)	0.05* (0.03)
Student SES	-0.003*** (0.0001)
Educational Policy (BST)	0.16*** (0.006)
School Type * HPOS	0.00005 (0.0005)

School Type * Educational Policy	0.04 (0.03)
2 nd gen (Immigration Status)	-0.07*** (0.01)
1 st gen (Immigration Status)	0.01 (0.01)
Sex (Male)	0.03*** (0.005)
Constant	-0.08 (0.005)
Adjusted r Square	1.90%

* $p \leq 0.1$; ** $p \leq 0.001$; *** $p \leq 0.0001$

Table 1. Effect of Educational Policy on Student Mindset

Contrary to prior research (Glerum et al., 2019; Glerum et al., 2020), the current study found that students in non-university schools were significantly more fixed minded than students in the university school. The finding that an increase in HPOS led to a decrease in student fixed mindset is a replication of past research (Claro et al., 2016; Destin et al., 2019). The finding that 2nd-generation born immigrants were significantly less fixed minded than natural born citizens could help explain the “strong determination – weak performance” found in second generation non-European immigrants in past research (Jonsson & Rudolphi, 2011). Prior research on gender difference has shown that boys were significantly more likely to be tracked into non-university schools in BST countries because they mature more slowly than girls (Lehmann & Peek, 1997; Jürges & Schneider, 2011). Other research on gender difference has revealed that boys are significantly more likely to be tracked into non-university schools because school social norms for boys from low SES families tend to align with risky behavior, sports, and opposing authority (Legewie & DiPrete, 2012). This same research went on to state that school social norms for girls across all SES statuses as well as middle and upper-middle class boys tend to align with academic success. Collectively, these findings could help explain why male students were significantly more fixed minded than female students. The feature finding of study 1 was that, as hypothesized, BST students were significantly more fixed minded than students from comprehensive countries. The finding does come with three key limitations. The first is that the proper way to measure the effect of BST on student mindset would be to use the same difference in differences analysis as Hanushek and Wößmann did in 2006. It was not possible to run this analysis because the PIRLS and TIMSS datasets, the main datasets that measure student variables at age 9 (before tracking age in BST countries), do not measure student mindset. Thus, the difference in differences analysis could not be conducted. The next limitation is that the mindset survey that PISA uses is not the complete 6-question survey (Dweck, 2000), it is simply one question from that survey. Results would be more accurate if PISA uploaded the complete 6-question survey to the dataset. The last limitation of the research was that BST countries

submit more information on students from university schools to the dataset than they do for students from the non-university schools. The lack of having a proportional number of students from both university and non-university schools in BST countries, which better reflects their overall student population, confounds the results of accurately measuring the effect of BST on student mindset. This lack of proportional numbers of students from the university school and non-university schools in BST countries could also help explain why the adjusted r square is relatively low.

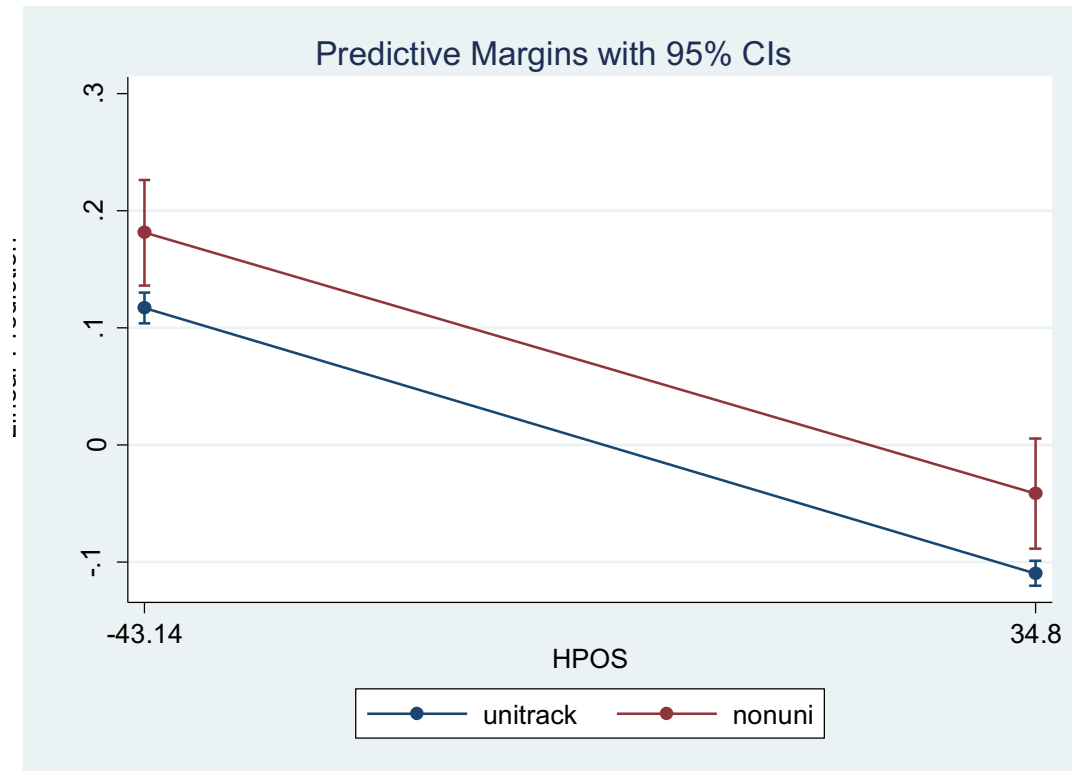


Figure 1: Effect of SES on Mindset Depending on School Type

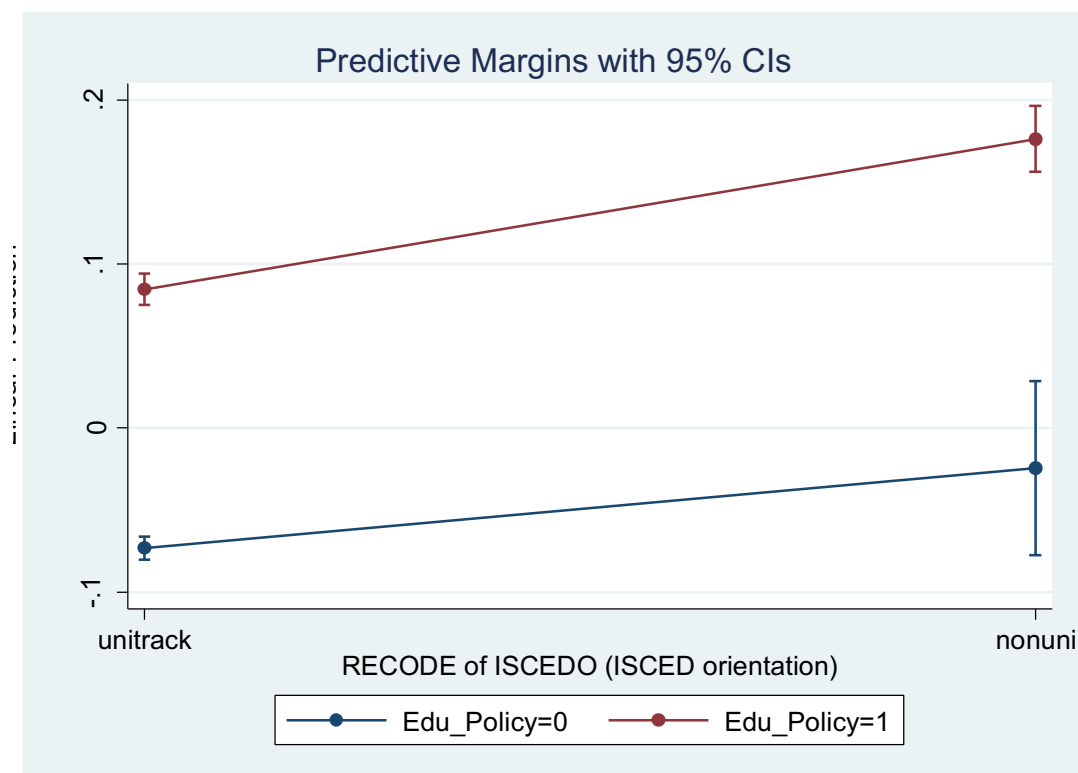


Figure 2: Effect of School Type on Mindset Depending on Educational Policy

Study 2

The feature observation of study 2 was measuring whether being less fixed minded would serve as a buffer against the negative impact low SES has on future job expectation. New independent variables included student mindset (continuous), and performance in math and reading (both continuous). All other independent variables used were the same as study 1. The dependent variable of study 2 was future job expectation (continuous).

Dependent Variable	Coef.
Future Job Expectation	(Standard Error)
Mindset	-0.79*** (0.07)
Track Placement (Non-Uni School)	-8.02*** (0.20)
Student SES	0.13*** (0.003)
Track Placement * Mindset	0.32 (0.21)

Fixed * HPOS	0.02*** (0.003)
2 nd Gen	6.59*** (0.20)
1 st Gen	7.21*** (0.23)
Sex (Male)	-6.63*** (0.12)
Educational Policy (BST)	-0.86*** (0.13)
Read	0.03*** (0.001)
Math	0.04*** (0.001)
Constant	3.48 (0.10)
Adjusted r Square	22.04%

* $p \leq 0.1$; ** $p \leq 0.001$; *** $p \leq 0.0001$

Table 2. Does Being Less Fixed Minded Serve as a Buffer against the Negative Effect Low SES has on Future Job Expectation?

Although mindset research has generally been applied to educational aspirations rather than future job expectation, results been the two variables have varied (Ahmavaara & Houston, 2007; Glerum et al., 2019; Glerum et al., 2020; Laurell et al., 2022). As seen in table 2, an increase in student fixed mindset predicted significantly lower future job expectation. As expected, students in non-university schools had significantly lower future job expectations than students in university schools. Similarly, students from BST countries had significantly lower future job expectations than students from comprehensive countries. The relationship between student SES status and future job expectation has been well documented, and results from the current research replicated the past finding that students from lower SES households had significantly lower future job expectation (Cook et al., 1996; Schoon & Parsons, 2002; Bigler et al., 2003; Howard et al., 2011). Research on the effect of gender on educational and career aspirations has been mixed (Marini, 1978; Mau & Bikos, 2000; Mendez & Crawford, 2002; Powers & Wojtkiewicz, 2004; Chang et al., 2006; Patton & Creed, 2007; Perry et al., 2009; Howard et al., 2011; Watt et al., 2012; Salmela-Aro & Upadaya, 2017). Results of the current research revealed that females had significantly higher future job expectation than males. This finding is likely to at least be partially explained by the phenomena that boys are more likely to be tracked into non-university schools than girls in BST countries (Lehmann & Peek, 1997; Jürges & Schneider, 2011; Legewie & DiPrete, 2012). Past research has also

shown that academic performance predicts higher educational and career aspirations (Shapka, Domene, & Keating, 2006; Savolainen, Ahonen, Aro, Tolvanen, & Holopainen, 2008; Guo, Marsh, Morin, Parker, & Kaur, 2015; Korhonen et al., 2016; Widlund et al., 2020), and the current research replicated that finding. Regarding the significant interaction, - at least according to my literature review - this study serves as the first of its kind to show that a decrease in fixed mindset served as a buffer against the negative impact low SES had on future job expectation.

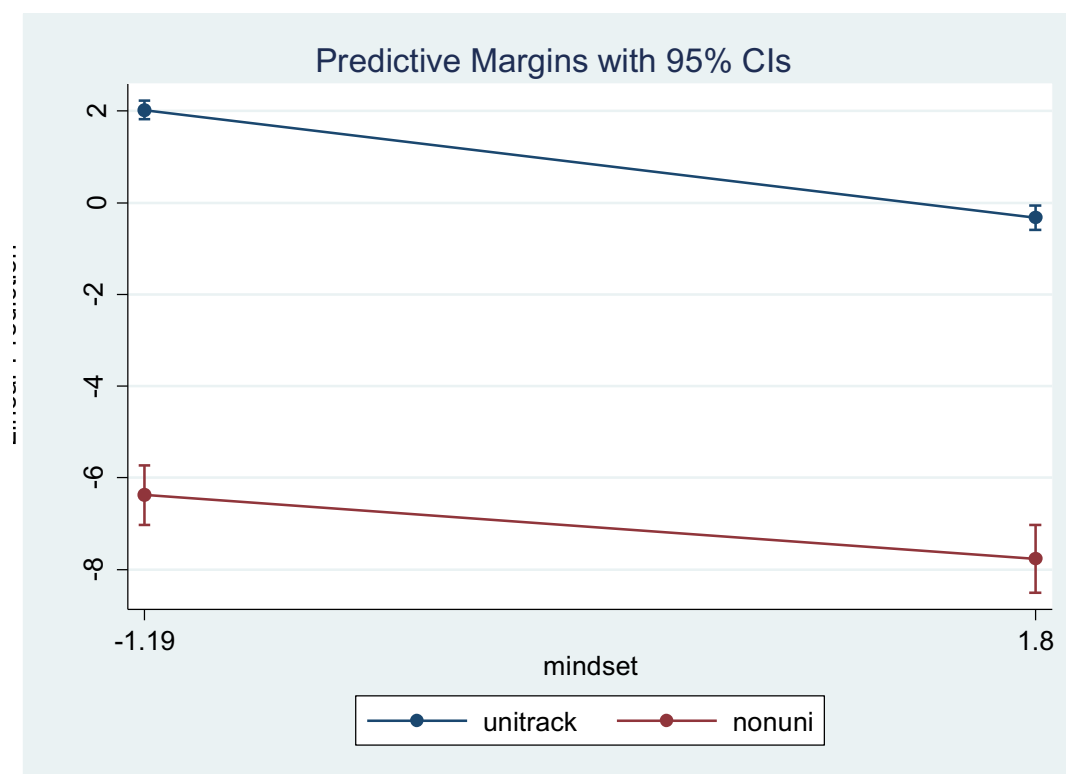


Figure 3: Effect of Mindset on Future Job Expectation Depending on School Type

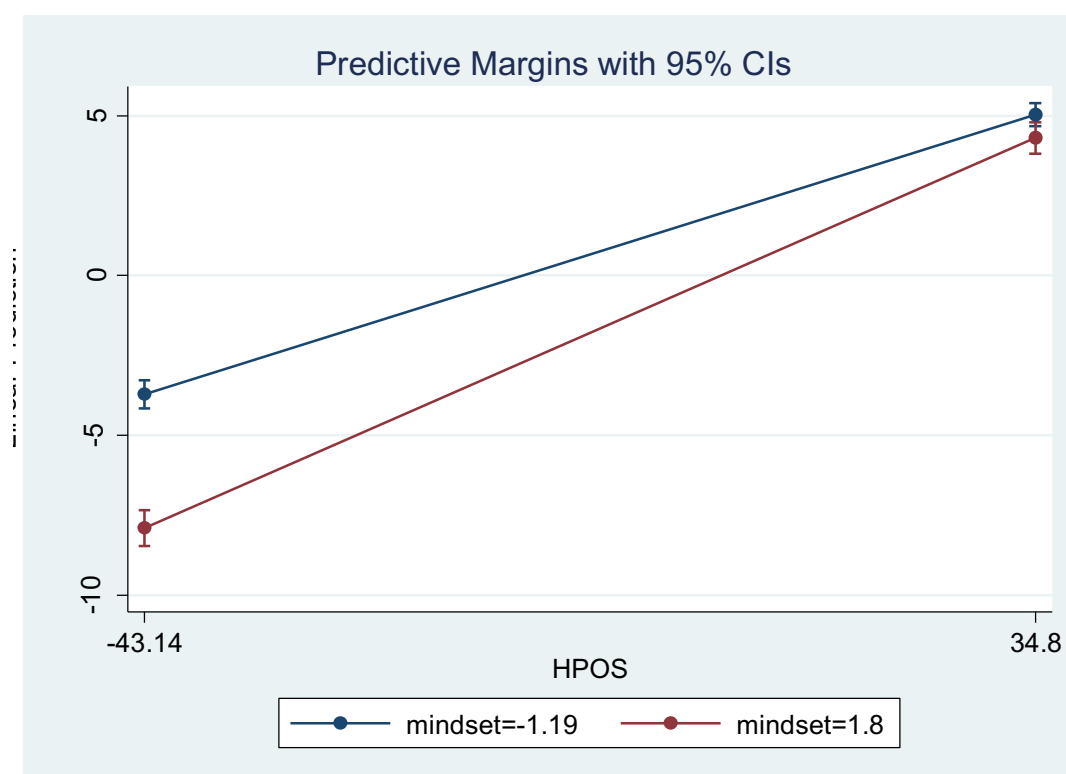


Figure 4: Effect of SES on Future Job Expectation Depending on Mindset

Studies 3 and 4

No new independent variables were added for studies 3 or 4. The dependent variables were performance in math and reading (both continuous), respectively.

Dependent Variable	Coef.
Performance in Math	(Standard Error)
Mindset	-14.16*** (0.28)
Track Placement (Non-Uni School)	-34.02*** (0.83)
Student SES	1.15*** (0.01)
Track Placement * Mindset	2.81** (0.88)
Mindset * HPOS	0.11*** (0.01)

2 nd Gen	-5.42*** (0.82)
1 st Gen	-5.49*** (0.94)
Sex (Male)	11.87*** (0.47)
BST	14.13*** (0.51)
Constant	-7.05 (0.39)
Adjusted r Square	15.28%

* $p \leq 0.1$; ** $p \leq 0.001$; *** $p \leq 0.0001$

Table 3. Does Being Less Fixed Minded Serve as a Buffer against the Negative Effect Low SES has on Performance in Math?

Dependent Variable	Coef.
Performance in Reading	(Standard error)
Mindset	-19.08*** (0.32)
Track Placement (Non-Uni School)	-42.43*** (0.96)
Student SES	1.16*** (0.01)
Track Placement * Mindset	4.61*** (1.002)
Mindset * HPOS	0.14*** (0.01)
2 nd Gen	-5.97*** (0.95)

1 st Gen	-13.63*** (1.07)
Sex (Male)	-23.55*** (0.53)
Educational Policy (BST)	-1.05* (0.58)
Constant	17.90 (0.45)
Adjusted r Square	16.55%

* $p \leq 0.1$; ** $p \leq 0.001$; *** $p \leq 0.0001$

Table 4. Does Being Less Fixed Minded Serve as a Buffer against the Negative Effect Low SES has on Performance in Reading?

Past research has shown that students with a growth mindset outperform students with a fixed mindset (Stipek & Gralinski, 1996; Blackwell et al., 2007; Romero et al., 2014; Alvarado et al., 2019); while other research has failed to replicate this finding (Li & Bates, 2019; Bahník & Vranka, 2017). Studies 3 and 4 support the finding that a decrease in fixed mindset significantly predicted higher academic performance in both math and reading. Non-university school students have a less challenging curriculum than university school students (Betts & Grogger, 2003), so it was expected to find that they performed significantly worse at math and reading than the university school students. Prior research has also found that low SES predicts significantly worse academic achievement (Coleman, 1966; White et al., 1993; Sirin, 2005; Reardon, 2011; Berkowitz et al., 2017;), and studies 3 and 4 replicated this finding. Studies 3 and 4 also replicated the finding that immigrants perform significantly worse than their natural born citizen counterparts (Warren, 1996; Rumberger & Thomas, 2000; Portes & Rumbaut, 2001; Riphahn, 2003; Fekjaer, 2007; Heath & Brinbaum, 2007; Lutz, 2007; Phalet et al., 2007; Rothon, 2007; Støren & Helland, 2010; Jonsson & Rudolphi, 2011; Dicks & Lancee, 2018) as well as the finding that female students tend to outperform males in reading and male students tend to outperform females in math (Spencer et al., 1999; Ma, 2008; Marks, 2008; Shafiq, 2013; Stoet & Geary., 2013; Schwabe et al., 2014; OCED, 2015; Cobb-Clark & Mosochion, 2017; Kim & Kwak, 2018). A literature review could not find any past studies indicating that BST countries were significantly better at math than comprehensive countries nor that comprehensive countries were significantly better at reading than BST countries; thus, this finding could be the result of chance rather than educational policy. Moreover, as previously stated, BST countries submit more information on students from university schools to the PISA dataset than they do for students from the non-university schools. The lack of having a proportional number of students from both university and non-university schools in BST countries could have confounded the results of this finding. Studies 3 and 4 also provided evidence that the least fixed minded students in non-university schools performed better at math and reading than the most fixed minded students in the university school. Prior research on this interaction could not be found. Past research has also found that having a growth mindset serves as a significant buffer against the negative impact low socioeconomic status had on academic performance (Claro et al., 2016).

Similarly, Destin et al., (2019) found that student fixed mindset predicted lower academic performance in both high and low SES students. Other research has shown that having a growth mindset only benefits students from higher SES families (Bernardo, 2020; King & Trinidad, 2021). Studies 3 and 4 from this research replicated the findings from Claro et al., (2016) and Destin et al., (2019) in that being less fixed minded served as a significant buffer against the negative impact coming from a low SES had on performance in math and reading.

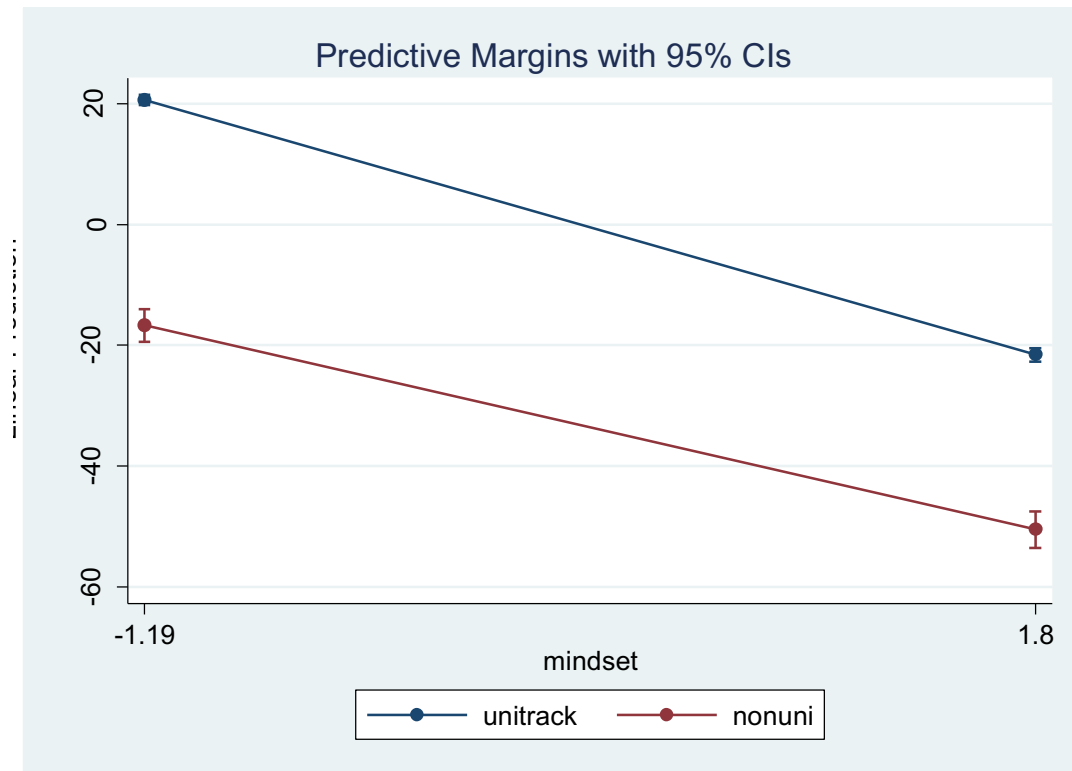


Figure 5: Effect of Mindset on Performance in Math Depending on School Type

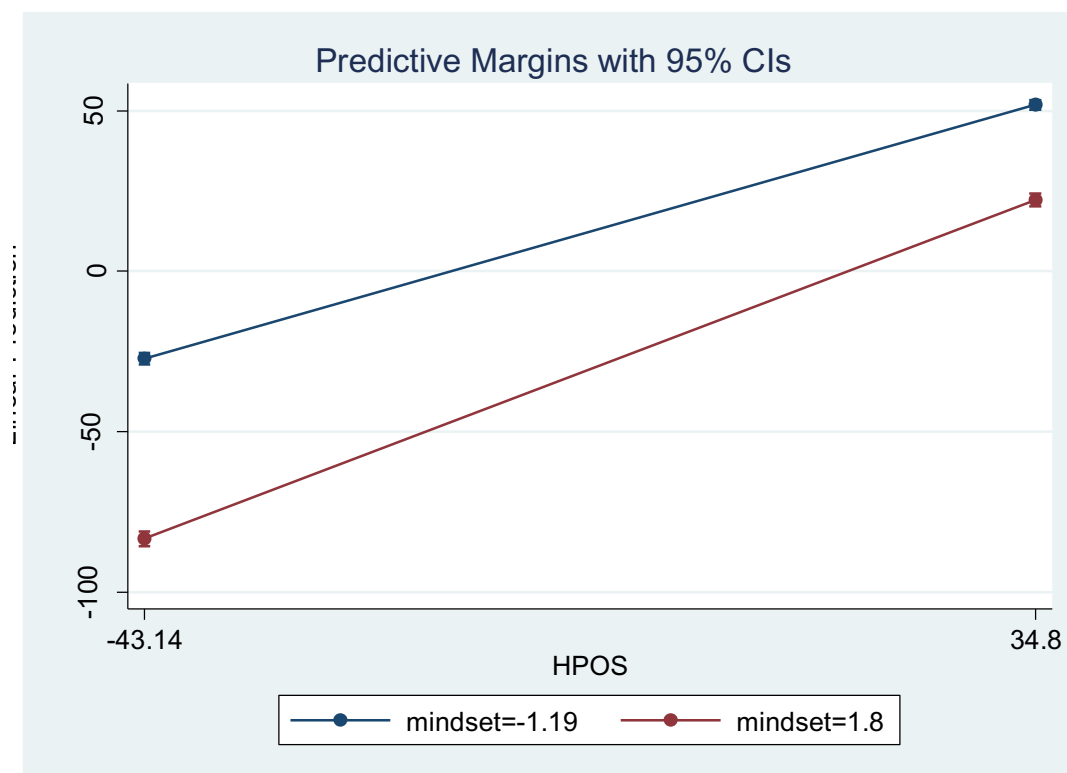


Figure 6: Effect of Mindset on Performance in Math Depending on SES

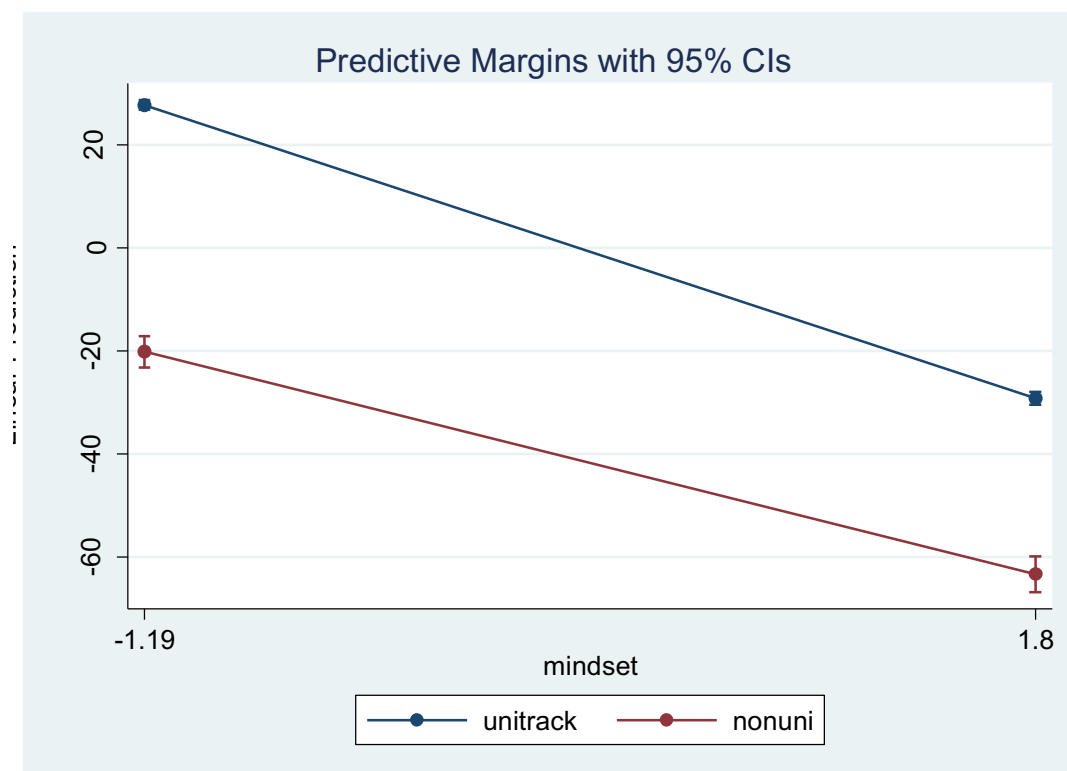


Figure 7: Effect of Mindset on Performance in Reading Depending on School Type

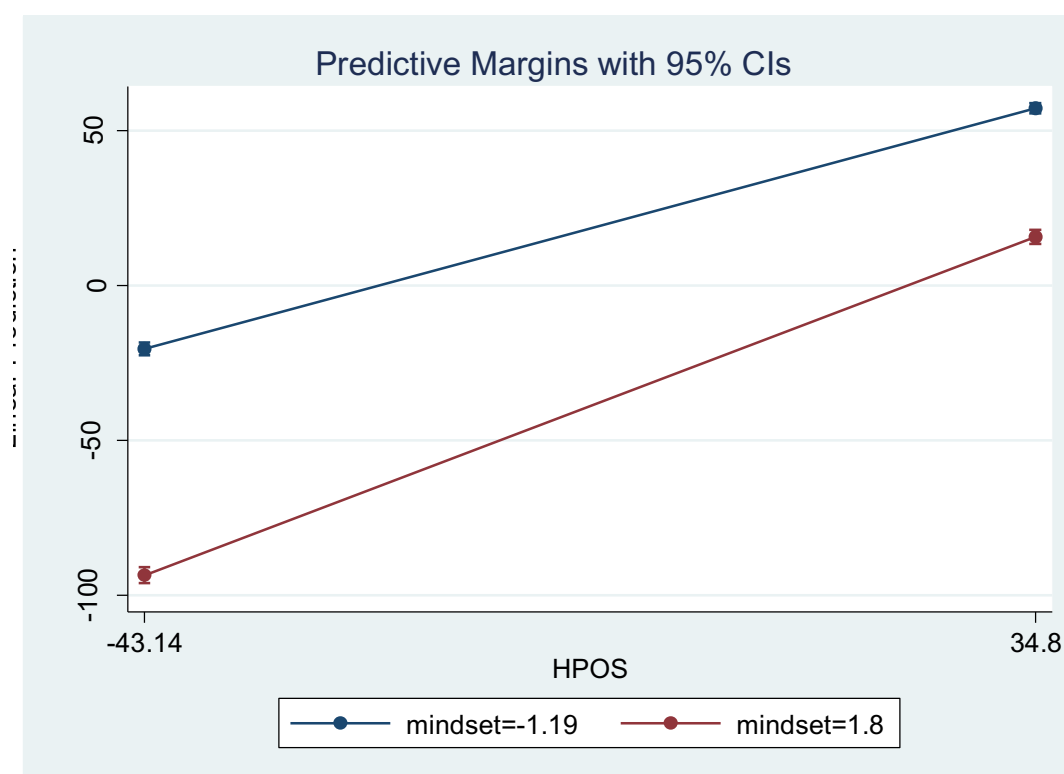


Figure 8: Effect of SES on Performance in Reading Depending on Mindset

Beginning at the turn of the 21st century, mindset interventions – interventions designed to make students more growth minded - received early success in the United States (Aronson et al., 2002; Good et al., 2003; Blackwell et al., 2007). Researchers eventually designed “scaled-up” versions of these mindset interventions to intervene with many students at once (Paunesku et al., 2015; Yeager et al., 2016). On the contrary, a meta-analysis using studies from all over the world found that mindset interventions were only effective in at risk or low SES students (Sisk et al., 2018). However, Sisk et al., (2018) failed to take educational policy into consideration. In 2017, Orosz et al., conducted a mindset intervention in Hungary (a BST country). Results revealed that students in the growth mindset intervention were significantly more growth minded than students in the control group post-intervention, but this significant difference disappeared by the end of semester follow up. Although one could criticize this research for only including higher performing students in their sample, it must be questioned whether mindset interventions can be effective in BST countries at all. After all, the results of their research do fit the model of classical conditioning (Pavlov, (1927/1960)). The results of study 1 provided preliminary evidence that students from BST counties were significantly more fixed minded than students from comprehensive countries. I hypothesized that this is likely due to the macrosystem or educational culture of BST countries. For example, school serves as a neutral stimulus for a young student in a BST country who has not yet learned about the process of tracking. However, the student will eventually learn from their teachers or parents that “at the age of x years old, the process of tracking will determine your educational future”. This is a fixed unconditional stimulus paired alongside what was previously a neutral stimulus, which theoretically should cause the unconditioned response of “my educational future is determined at x years old”. Henceforth, whenever the student thinks about or goes to school (CS), the concept that they will be tracked at age x will be on their mind (CR).

(NS) School + (US) “you will be tracked at age x” (UR) “my educational future is determined at age x”
 (CS) Going to or thinking about school (CR) “my educational future is determined at age x”

Given the results of Orosz et al., (2017), this could be what is happening with BST students. The mindset intervention did make students more growth minded post-intervention, this could be viewed as the process of extinction (Pavlov, 1927/1960). In other words, the mindset intervention caused the fixed beliefs of intelligence to become extinct within participants. However, after the intervention students returned to their normal educational culture, and their mindset levels returned to base level. This could be viewed as spontaneous recovery (Pavlov, 1927/1960). Although I am not an expert in classical conditioning, given the findings of study 1, experts on the matter should consider if mindset interventions have the potential to be successful in countries that practice the educational policy of BST. Perhaps the effect of BST on the psychology of students is too powerful for mindset interventions to have any long-term success in these countries.

Conclusion

Researchers have also found that the process of BST puts students from lower SES (Bouon, 1974; Contini & Scagni, 2011; Ichou & Vallet 2011; Schneider & Tieben, 2011; Panichella & Triventi, 2014), male students (Lehmann & Peek, 1997; Jürges & Schneider, 2011), and students from younger birth months (Jürges & Schneider, 2011; Schneeweis & Zweimüller, 2014) at a significant disadvantage. Based on my literature review, there were no studies that justify any of these disadvantages associated with the process of BST. Moreover, my research provided preliminary evidence that students from BST countries were significantly more fixed minded than students from comprehensive countries, and that being less fixed minded served as a significant buffer against the negative impact low SES had on future job expectation, performance in math, and performance in reading. These findings collectively argue that the process of BST should be abolished, and researchers should establish new ways to modernize this outdated practice.

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Effects of Synchronous and Asynchronous Instruction on Learners' Reading Motivation During COVID-19 Pandemic

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Abstract

Education suffered greatly from the COVID-19 pandemic which necessitated the provision of distant, emergency instruction by teachers. While educational institutions work to reduce the possibility of community transmission, online learning has emerged as a vital lifeline. To reach students remotely and minimize disruptions to education brought on by the COVID-19 epidemic, the Department of Education in the Philippines has produced synchronous and asynchronous instruction for use at the elementary school level. When classes follow predetermined schedules and times, this is called synchronous learning. Students can finish their assignments at their own pace in asynchronous classrooms. This research study aimed to analyze the effects of synchronous and asynchronous instruction on learners' reading motivation during the Covid-19 pandemic. The researcher used the mixed method using a quantitative and qualitative approach. Purposive sampling was used in choosing the 110 participants from DepEd elementary schools. The data analysis used was mean and standard deviation for the quantitative, and thematic analysis for the qualitative data. The findings reveal that learners were interested and motivated while attending the synchronous and asynchronous mode of instruction during the Covid-19 pandemic. Reading motivation was discovered to be a strong indicator of reading ability using synchronous and asynchronous instruction. It implies that reading motivation is a key element that supports the development of these reading skills and is implemented as part of the new standard teaching for the kids in the Department of Education or DepEd in the Philippines. In conclusion, synchronous and asynchronous instruction is effective in reading motivation.

Keywords: Asynchronous, Synchronous, Motivation

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Introduction

The COVID-19 pandemic significantly affected education, leading to the need for remote instruction by teachers and educators. Despite the challenges, there were instances of innovative teaching approaches worldwide (Ferdig et al., 2020). The global impact of the COVID-19 outbreak led to widespread closure of schools, prompting UNESCO to recommend the use of distance learning and open educational platforms to continue teaching remotely (UNESCO, 2020-03-04). Online learning became crucial for education during efforts to prevent community transmission (Murphy, 2020). In response to the pandemic, the Department of Education (DepEd) developed synchronous and asynchronous instruction for elementary school students. Synchronous learning follows set schedules, with both teachers and students participating in real-time activities, while asynchronous classes allow students flexibility in completing their work within a specified timeframe.

Moreover, the implementation of this new instructional approach in DepEd emphasizes the importance of reading motivation for students. Enhancing reading abilities is crucial, and research suggests that intrinsic motivation plays a more significant role than extrinsic motivation in predicting reading success (Guthrie et al., 1999; Gottfried, 1990). Instructors face the challenge of motivating students, as active participation is essential for comprehensive learning (Rotgans & Schmidt, 2011). Reading motivation encompasses both extrinsic (external rewards) and intrinsic (personal interest) factors (Deci & Ryan, 1985; Deci et al., 1991). Ultimately, intrinsic motivation proves more predictive of reading success in elementary and middle school students (Guthrie et al., 2000).

Student motivation tends to decline in elementary school, making traditional instruction less effective (Hatter, 1981; Wigfield et al., 1997 cited in Guthrie, Wigfield & VonSecker, 2000). Influential educators like John Dewey and Jean Piaget advocated the constructivist approach, suggesting that knowledge is best created through experience rather than passive learning (Kim, 2005 cited in Johnson and Cuevas, 2016). Reading requires motivation, as it's a challenging activity that kids can choose to engage in or avoid (Baker and Wigfield, 1999).

Research indicates that older students are less motivated to read, and motivation significantly predicts reading skills (Gottfried et al., 2001; Marcoulides et al., 2008; McKenna et al., 1995; Smith et al., 2012 cited in Locher, Becker, & Pfof, 2019). Negative experiences can reduce habitual motivation, and students' reading motivation is influenced by their experiences (Locher, Becker, & Pfof, 2019). Deci and Ryan's Self-Determination Theory (SDT) emphasizes the need for autonomy in understanding variations in students' reading motivation (Locher, Becker, & Pfof, 2019). Education plays a crucial role in developing students' intrinsic motivation to read (Locher, Becker, & Pfof, 2019). Boys may perceive less value in reading than girls, affecting their motivation (Gambrell and Marinak, 2007).

Reading-related rewards may enhance intrinsic motivation by combining the desired activity with a reward, creating a supportive classroom environment (Gambrell and Marinak, 2009). Student motivation to read impacts academic achievement across subjects (Johnson and Cuevas, 2016). Inquiry learning, particularly student-driven approaches, can increase motivation and critical thinking (Johnson and Cuevas, 2016). The research gap lies in the lack of studies on synchronous and asynchronous instruction for primary students. The current study aims to fill this gap by analyzing the impact of these methods on learners' motivation to read during the COVID-19 epidemic.

Related Literature

Research proves that motivation is a crucial factor, influencing nearly all aspects of human behavior (Murayama, 2018). In education, motivation is particularly important, as university students' grades are positively linked to their enjoyment of subjects like mathematics (Schukajlow & Krug, 2014). While motivation is recognized as significant, there's limited research for a comprehensive understanding of it. The Self-Determination Theory (SDT) by Deci and Ryan identifies competence, relatedness, and autonomy as key elements of motivation. This theory gave rise to the Intrinsic Motivation Inventory (IMI), a multidimensional scale validated for measuring motivation (Drew, 2020; Ostrow & Heffernan, 2018). The IMI assesses Interest/Enjoyment, Perceived Competence, Effort/Importance, Pressure/Tension, Value/Usefulness, and Relatedness, providing a comprehensive view (Drew, 2020; Ostrow & Heffernan, 2018). Limited studies use these 6 subscales to measure motivation. Measuring motivation is challenging due to its diverse factors and subtle nature. By employing the 6 subscales mentioned, the study aims to assess and quantify students' motivation during the COVID-19 pandemic.

Interest/Enjoyment and Motivation

Interest, according to Hidi & Renninger (2006), is a motivational factor that describes the connection between a person and an object. This aspect has a strong link to academic achievement, capable of sparking and maintaining academic behavior (Eccles & Wigfield, 2002; Hidi & Ainley, 2008; Krapp, 2002; Renninger et al., 2015; Schukajlow & Krug, 2014; Trautwein et al., 2019). Enjoyment is the most common positive emotion in the classroom, yet there are few studies on its connection to academic achievement. Including this in the study's subscales provides insights into students' intrinsic motivation since it is the only self-reported motivation scale.

Both interest and enjoyment contribute to intrinsic motivation. Interest is the primary emotion for intrinsic motivation, initiating attention and exploratory behavior. Enjoyment, on the other hand, sustains activity continuation and persistence, contributing to both intrinsic and extrinsic motivation (Schukajlow & Krug, 2014; Izzard, 1977; Reeve, n.d.).

Perceived Competence

Perceived competence is how good a student feels about learning, and it's related to satisfaction with performance (Marsh, Craven & Debus, 1999; Yeung, Craven, & Kaur 2014; Reeve, n.d.). Although it's a motivation determinant, there's little research connecting it to motivation and other subscales. Competence Motivation Theory and Self-Determination Theory support the role of perceived competence in motivation. In Competence Motivation Theory, the degree of approval or disapproval is a key aspect, directly related to a child's mastery attempts. Similarly, Self-Determination Theory states that feeling incapable creates an unpleasant experience, and people desire to feel competent. Feeling competent increases the likelihood of excelling in a task (Drew, 2020; Ostrow & Heffernan, 2018). Demonstrating competence leads to a self-perception of success and boosts persistence (intrinsic motivation) in activities where past performance was good. Lack of competence results in feelings of failure, diminishing interest in activities. Without competence feedback, interest declines, and individuals explore other activities that pique their curiosity (Drew, 2020; Reeve, n.d.; Williams & Gill, 1995).

Effort/Importance

Academic effort is a crucial element in motivational research, but there's limited study on students' perceived effort and its link to motivation and academic performance. Understanding motivation in organizations is clearer when looking at its component—efforts. According to Yale University Professor Victor Vroom's Expectancy Framework, workers' perceptions of their effort matter as it relates to their performance and outcomes. Internalization and self-regulation happen when people engage in activities they find useful or valuable. Effort/importance, along with other subscales, is vital in measuring students' motivation as one of its essential components.

Pressure/Tension

Pressure/Tension, a motivation subscale from the IMI, is considered an intrinsic motivation negative predictor (Ostrow, K. S., & Heffernan, N. T. 2018). Muza, Muhammad, and Aliero's study in 2020 found a significant relationship between academic stress and academic motivation, both intrinsic and extrinsic ($r=0.706$ and $r=0.632$, respectively). Another study by Sarouni, Jenaabadi & Pourghaz in 2016 revealed a significant and negative connection between mental pressure and academic achievement motivation. This means that as mental pressure increases, academic achievement motivation decreases.

Value/Usefulness

Utility value is about how someone sees a task as useful and relevant to their life or future goals. In education, this is crucial because the more value someone sees in a task, the more motivated they are to engage in it. According to Harackiewicz (2008), perceived utility value and interest are significant predictors of students' course interest and grades. Several studies show a positive link between the perceived usefulness of studying and students' persistence and academic performance (Harackiewicz, Tibbetts, Canning, & Hyde, 2014). Recognizing the importance of value/usefulness in students' motivation and achievement, Urdan and Turner (2005) suggest that academic activities should be developed in ways that are relevant and personally meaningful for students.

Relatedness

Relatedness is about the sense of belonging and meaningful connections (Escandell & Chu, 2021). It goes beyond individual connectedness and includes harmony and inclusion in group settings, satisfied through personal connections and open conversations between students and instructors (Vansteenskiste et al., 2020, as cited by Escandell & Chu, 2021). This subscale in studies assesses friendship connections and interpersonal interactions (Ostrow, K. S., & Heffernan, N. T., 2018). In the Self-Determination Theory, relatedness is seen as one of the psychological needs. According to this theory, student-instruction relatedness fosters both intrinsic and extrinsic motivation and improves academic performance (Vansteenkiste & Ryan, 2013, as cited by Escandell & Chu, 2021). Studies supporting the Self-Determination Theory indicate that satisfaction of relatedness, along with autonomy and competence, leads to better academic motivation internalization. For example, Jang et al.'s study cited by Niemiec & Ryan (2009) showed a positive correlation between satisfying these three needs and students' academic achievement. Another study on instructor-student relationships (Vansteenkiste & Ryan, 2013, as cited by Escandell & Chu, 2021) found that greater intrinsic

motivation and academic success result when psychological needs are met through quality relationships, regardless of culture, age, or gender.

Methodology

Research Design

The researcher used the mixed method using a quantitative and qualitative approach. Purposive sampling was used in choosing the 110 participants from DepEd elementary schools. The data analysis used was mean and standard deviation for the qualitative, and thematic analysis for the qualitative data.

Sampling Procedure

The researcher used purposive sampling to select 110 DepEd teachers from elementary schools in Iligan City, Philippines, focusing on experts in the cultural subject.

Participants

The participants were 110 elementary DepEd teachers assigned to the divisions of Iligan City and Lanao del Norte. A letter was sent to the respective Division Superintendents asking for their permission and support in the study. After gaining their approval, the same process was also done in asking the permission of the principals of the respective schools.

Instruments

The participants completed the Intrinsic Motivation Inventory (IMI), a scale supporting the Self-Determination Theory by Deci and Ryan (Ostrow and Heffernan, 2018). The IMI has 6 subscales—Interest/Enjoyment, Perceived Competence, Effort/Importance, Pressure/Tension, Value/Usefulness, and Relatedness, with a total of 16 items. Othman (2011) notes that incorrect item bundling can affect the scale's accuracy. Using the Likert Scale, participants rate their agreement with statements on a scale of 1 to 5: 1=Strongly Disagree, 2=Somewhat Disagree, 3=Neutral, 4=Somewhat Agree, and 5=Strongly Agree (Trochim & Donnelly, 2007, as cited by Othman et al., 2011). To determine the Motivation score, items for each subscale are summed, identifying areas needing improvement. Eight items (1, 2, 6, 7, 10, 12, 13, and 16) require reverse coding before scoring and analysis. A higher score indicates greater motivation (Sundre, 2000).

Interest/Enjoyment

This subscale consists four items from the Questionnaire (numbers 1-4). It seeks to assess the students' attitudes towards the activities conducted in synchronous and asynchronous mode during the pandemic.

Perceived Competence

The second subscale has two items (numbers 5-6), and it measures students' satisfaction with their performance of the tasks.

Effort/Importance

This subscale has 2 items in the questionnaire (numbers 7 and 8.) It assesses students' opinion of whether they exerted effort in the activities and if they find the importance of performing well in the activities.

Pressure/Tension

The fourth subscale, Pressure/Tension is the only negative predictor in the IMI questionnaire. It seeks to assess if students feel anxious and pressured while doing the activities. It has 2 items placed in numbers 9 and 10.

Value/Usefulness

Value/Usefulness is the fifth subscale consisting of 2 items (numbers 11 and 12). It assesses students' opinions if they feel that the activities/tasks are important and beneficial to them.

Relatedness

The Relatedness subscale has 4 items placed in items 13 to 16. It seeks students' perceptions of the closeness and sense of connection they feel with their classmates while in a synchronous and asynchronous mode of instruction during the pandemic.

The questionnaire's Internal Consistency and Reliability were assessed through the Cronbach Alpha Test. According to Nunnally & Bernstein (1994), as cited by Othman, et.al., (2011), a scale's Cronbach alpha coefficient should be at least 0.70 to indicate a strong correlation between a scale and itself. It yielded an $\alpha = 0.821$. This means that the questionnaire has good reliability/internal consistency.

$$\alpha = \left(\frac{k}{k-1} \right) \left(\frac{s_y^2 - \sum s_1^2}{s_y^2} \right)$$

$$s_y^2 = 78.74$$

$$\sum s_1^2 = 17.69$$

$$\alpha = \left(\frac{k}{k-1} \right) \left(\frac{s_y^2 - \sum s_1^2}{s_y^2} \right)$$

$$\alpha = \left(\frac{16}{16-1} \right) \left(\frac{78.74 - 17.69}{78.74} \right)$$

$$\alpha = \left(\frac{16}{15} \right) \left(\frac{61.05}{78.74} \right)$$

$$\alpha = (1.067)(0.77)$$

$$\alpha = 0.821$$

Procedures

Not all teachers were present on the school premises during the data gathering because the pandemic prompted scheduling among teachers. Some of them were also on leave. In order to gather the data needed, the questionnaires along with the consent forms were left to the school heads to be distributed to the teachers. The researchers then scheduled another school visit for the questionnaire retrieval. Questions of the same subscales are arranged in the questionnaire, consecutively. Eight of the items-- numbers 1,2,6,7,8,12,13 and 16 are stated

in negative sentences. Before proceeding to compute the mean and standard computation, items in negative construction are reverse coded first.

Results and Discussion

For a Likert scale's results to be valid, the items' means and standard deviations should be roughly equivalent (Othman, 2011). The means and standard deviations are in close proximity with a range of 2.53-3.85 and 0.88 and 1.30, respectively. Moreover, the rule of thumb when using standard deviation for Likert scale is that its maximum and minimum standard deviation should be around 2:1. (Julious, 2005, as cited by Othman, et. al., 2011). The study yielded a maximum standard deviation of 1.30 and a minimum of 0.88 which is near the 2:1 ratio. The following are the results for each subscale:

Interest/Enjoyment

Interest refers to an individual learner's interaction with his/her environment, or other aspects of it. According to Krapp, (2002), as cited by Roth & Hsu (2008), in terms of innate abilities, little can be done about it, that is why those who show interest in increasing academic performance recognizes the impact of the learner's interest. Enjoyment, on the other hand, is also considered to be related with motivation (Paton, et.al, n.d.; Navarro et al., 2016; Hashim, Grove and Whipp 2008; Wallhead and Buckworth 2004). Hence, a high score in the Interest/Enjoyment subscale is a good indicator of learner's motivation.

Table 1: Mean and Total Mean Score with SD for the Interest/Enjoyment Subscale

Statements	Mean	Std. Deviation	Verbal Interpretation
The pupils did not enjoy doing the activities	3.34	1.14	Neutral
The pupils find the activities uninteresting.	3.49	1.11	Neutral
The pupils find the activities fun.	3.73	1.00	Somewhat Agree
The pupils think that the activities are quite enjoyable	3.71	1.00	Somewhat Agree
Overall	3.57	0.83	Somewhat Agree

Legend: "1.00-1.50 Strongly Disagree", "1.51-2.50 Somewhat Disagree", "2.51-3.50 Neutral", "3.51-4.50 Somewhat Agree", "4.51-5.00 Strongly Agree".

The first subscale measured is interest/enjoyment, composed of four items which are assigned as items 1-4 in the questionnaire. After reverse coding items 1 and 2 which are initially phrased as negative statements, both yielded a neutral result (3.34, 1.14, and 3.49, 1.11, respectively.) Aside from the neutral responses in the first two questions, the remaining two questions (items 3 and 4) in the Interest/Enjoyment subscale result in Somewhat Agree Responses. Considering the four items in the said subscale, it is revealed that students Somewhat Agree that they feel interest and enjoyment while learning during this pandemic (3.57, 0.83).

Perceived Competence

Studies of motivation involve the measurement of competence and competence comes in many forms—whether the desire to be it, to appear in such a way to others, feelings of competence, or avoidance of incompetence feelings. (Urdu, 2005). For this study, the perceived competence subscale focuses on the definition given by Ostrow and Hefferman, 2018 which is the feeling of confidence and capability. A high perceived competence is a good indicator of a student's motivation. Moreover, according to Self-Determinator Theory, the higher the perceived competence, the more a student will internalize and excel in a given task.

Table 2: Mean and Total Mean Score with SD for the Perceived Competence Subscale

Statements	Mean	Std. Deviation	Verbal Interpretation
The pupils are satisfied with their performance of the tasks	3.72	0.88	Somewhat Agree
The pupils feel like they were not able to do well in the activities	2.97	0.95	Neutral
Overall	3.35	0.68	Neutral

Legend: "1.00-1.50 Strongly Disagree", "1.51-2.50 Somewhat Disagree", "2.51-3.50 Neutral", "3.51-4.50 Somewhat Agree", "4.51-5.00 Strongly Agree".

The second subscale measured is Perceived competence, composed of two items which are assigned as items 5 and 6 in the questionnaire. After reverse coding item 6 which is initially phrased as a negative statement, it yielded a neutral response (2.97, 0.95). Meanwhile, item 5 which measures students' satisfaction with their performance gave a Somewhat Agree response (3.72, 0.88). Considering the two items for the second subscale, the students' Perceived competence in this pandemic is Neutral.

Effort/Importance

Students' beliefs about the impact of their efforts on their performance affect their motivation to work hard according to an article from Carnegie Mellon University. Hence, given that Effort/Importance is one of the subscales of motivation, a high result in the effort/importance subscale is a good indicator of student motivation.

Table 3: Mean and Total Mean Score with SD for the Effort/Importance Subscale

Statements	Mean	Std. Deviation	Verbal Interpretation
The pupils did not put a lot of effort in the activities	2.97	1.08	Neutral
The pupils find the importance of doing well in the tasks	3.69	0.89	Somewhat Agree
Overall	3.33	0.78	Neutral

Legend: "1.00-1.50 Strongly Disagree", "1.51-2.50 Somewhat Disagree", "2.51-3.50 Neutral", "3.51-4.50 Somewhat Agree", "4.51-5.00 Strongly Agree".

Table three shows the result for the third subscale which is Effort/Importance. The said subscale is composed of two items, placed in statements 7 and 8. After reverse coding statement 7 which was initially stated using negative phrasing, it yielded a result of neutral (2.97, 1.08). Meanwhile, the other items resulted in Somewhat Agree. Considering the results of the two items for the Effort/Importance subscale, there is a Neutral response in terms of student's effort and the importance of the tasks given (3.33, 0.78). Hence, the students neither placed a lot or minimal effort in the activities.

Pressure/Tension

Pressure/Tension has an inverse relationship with achievement motivation (Sarouni, Jenaabadi & Pourghaz, 2016). Hence, lower levels of pressure/tension (higher levels of relaxation) correspond to increase in academic achievement motivation. Hence, in the interpretation of data for this study, the item stated to indicate pressure/tension was reverse-coded. After reverse coding, a high score for this scale has now a direct relationship with student motivation.

Table 4: Mean and Total Mean Score with SD for the Pressure/Tension Subscale

Statements	Mean	Std. Deviation	Verbal Interpretation
The pupils were relaxed when doing the activities	3.58	1.06	Somewhat Agree
The pupils were pressured when doing the activities	3.30	1.00	Neutral
Overall	3.44	0.76	Neutral

Legend: "1.00-1.50 Strongly Disagree", "1.51-2.50 Somewhat Disagree", "2.51-3.50 Neutral", "3.51-4.50 Somewhat Agree", "4.51-5.00 Strongly Agree".

Table four shows students' feelings of Pressure/Tension while learning in asynchronous and synchronous modes during the pandemic. The Pressure/Tension subscale has two items placed in numbers 9 and 10 of the questionnaires. Given that the subscale yielded a neutral interpretation (3.44, 0.76), it was revealed that students are neither relaxed nor pressured while learning using the said modes of learning.

Value/Usefulness

Even if a task is unenjoyable, if it has a utility value to the students (meaning they see how the task relates to their future goals), they will still value the outcome it produces, according to Wigfield (1994), as cited by the University of Connecticut. Hence, learners see the activities' importance or long-term benefits as beneficial for them. In this data, a high score for value/usefulness is a positive indicator of student motivation.

Table 5: Mean and Total Mean Score with SD for the Value/Usefulness Subscale

Statements	Mean	Std. Deviation	Verbal Interpretation
The pupils realize that the activities are important	3.85	0.90	Somewhat Agree
The pupils did not realize that the activities they did are beneficial to them	3.04	1.15	Neutral
Overall	3.44	0.85	Neutral

Legend: “1.00-1.50 Strongly Disagree”, “1.51-2.50 Somewhat Disagree”, “2.51-3.50 Neutral”, “3.51-4.50 Somewhat Agree”, “4.51-5.00 Strongly Agree”.

When it comes to the value/usefulness of the activities, there was also a neutral interpretation (3.44, 0.85). However, in terms of the activities’ importance, a favorable response was observed (3.85, 0.90).

Relatedness

This subscale refers to people’s needs to be connected with one another (Drew, 2020). Satisfaction with this subscale leads to better internalization of academic motivation. (Vansteenkiste & Ryan, 2013, as cited by Escandell, & Chu, 2021.) Hence, relatedness has a direct relationship with motivation.

Table 6: Mean and Total Mean Score with SD for the Relatedness Subscale

Statements	Mean	Std. Deviation	Verbal Interpretation
The pupils feel distant to their classmates	2.53	1.30	Neutral
The pupils feel close to their classmates	3.19	1.18	Neutral
The pupils are positive of having a chance to interact with classmates more often	3.45	0.96	Neutral
The pupils would prefer it if they would not have to interact with their classmates in the future	3.38	1.12	Neutral
Overall	3.14	0.69	Neutral

Legend: “1.00-1.50 Strongly Disagree”, “1.51-2.50 Somewhat Disagree”, “2.51-3.50 Neutral”, “3.51-4.50 Somewhat Agree”, “4.51-5.00 Strongly Agree”.

The table shows the respondents’ feelings of relatedness while learning during the pandemic. It is shown that the respondents are neutral regarding their experience of feeling-relatedness as a motivation while learning during the pandemic with an overall weighted mean of (3.14, 0.69). The respondents are found neutral on the statements “The pupils feel distant to their classmates” (2.53, 1.30), “The pupils feel close to their classmates” (3.19, 1.18), “The pupils are positive of having a chance to interact with classmates more often” (3.45, 0.96) and “The pupils would prefer it if they would not have to interact with their classmates in the future” (3.38, 1.12).

Conclusion

The results of each subscale show that students feel interest/enjoyment while attending the synchronous and asynchronous mode of instruction during this pandemic. It means that the activities and tasks the students undertake in the said modes of instruction are interesting and enjoyable enough. It is a good indicator of motivation. However, in terms of the other subscales- Perceived Competence, Effort/Importance, Pressure/Tension, Value/Usefulness, and Relatedness, neutral findings were revealed.

Given that a neutral result was yielded for five out of six subscales, activities that enhance students' perceived competence should be given emphasis for synchronous and asynchronous instruction. Moreover, it is also important for learners to see the importance of the task at hand and the effects of their efforts on their performance. The instruction should also be designed to enhance the sense of connection between learners and learners to teachers. Lastly, teachers should strive to provide a learning environment that produces less pressure/tension.

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Competences to Deal With the Sustainable Development Goals

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Abstract

The sustainable development goals run the risk to be only present in the official discourses without an effective integration in the research and innovation practice. UNESCO and EU have developed competence frameworks for sustainable development education, but these are strongly focused on formal and non-formal education environments. But learning in innovation processes is intentional informal learning, requiring procedures of competence development more adequate to adult learning and open innovation processes. The implications in science-based innovation processes suggest conceiving them as amutual learning processes between the multiple actors involved. In any sustainable innovation process, the objective is the development of sustainable competences to promote not only the innovation envisaged but also social innovation promoting sustainable understanding of the relation between human beings and their ecological and social environment. However, a weakness of the responsible research and innovation processes is that it leaves aside the responsibility. Just limited (and vague) references to the human rights and ethical standards valid in the EU is not enough. We developed (and used and prepare material) 64 individual competences. The competence atlas was used for the development of a flexible framework for sustainable competence as a tool for the tailored design of learning programs in areas three key areas: water management, waste management and environmental protection. As innovation process learning it should be open, but oriented to specific goals, including the implications derived from public engagement. The triple, quadruple, and quintuple helix approaches of expressed well these challenges.

Keywords: Sustainability, Competences, Adult Education, Third Mission

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Introduction

The Erasmus+ project 5P competences aims to develop a competence framework tailored to the specific needs of adult education in the field of sustainable development. The competence framework is intended to support the development of courses on sustainability topics, helping to ensure that educational offers are tailored more precisely to the needs of the course participants.

This approach addressed the Third Mission of the Universities contributing to education for sustainability for the whole population. It addressed not the formal education offers of the universities, but its wide range of activities including citizens science project with sustainability contents. The project aims to develop an online sustainable framework of competences that adults must learn in the way to sustainable action. The program organizers can manage activities to design, implement and evaluate their programs on sustainability topics.

In the first stage of the project, policies documents on adult education in the countries covered by the project (Germany, Greece, Romania and Spain) were analyzed for its relevance for the project objective. The results confirm the impression that adult education for sustainability is an underdeveloped area at all education levels. This is confirmed by the analysis of relevant international references published by the United Nations e.g., Incheon Declaration, the UNESCO's education for sustainable development goals (UNESCO, 2017) or the European Union' Green Competence framework (EU, 2022).

From the perspective of informal adult education, these documents are insufficient for several reasons:

- The learning objectives and the competences are formulated in a very general manner. That means that the justification of their relevance does not necessarily cover the concept of sustainability e.g., like 'systems-thinking competency', strategic competency' or 'self-awareness competency' (UNESCO, 2017, p. 10).
- The educational objectives are primarily connected to formal learning at schools, VET and universities. These catalogues are not connected to problems or situations of everyday life. But the everyday life is the reason for informal learning.
- It is (nearly) impossible to deduce hints for pedagogical actions out of analytical categories which are giving reasons for weighting the educational objectives (or competences) for individual persons or which are giving reasons for the order in which the parts of the competences can or should be taught.

Adult education on sustainability and the respective competence development should address more situations of everyday life outside the formal education environment and the professional life. To do so, 5P-Competence used the development tasks approach as originally proposed by Havighurst (1972) and further developed, for instance, by Hurrelmann (1986) for his socialization approach. We take this approach as a reference for the development for general development tasks in relation to sustainable development.

Looking at the literature there are three concepts standing in the foreground that are relevant for the competences for sustainability and the learning objectives: Generation, justice and responsibility:

- The topic of generation is closely connected to sustainability and is explicitly mentioned in the competence framework GreenComp. The idea is, that every generation is living in a world (or learning to live in a world) that was influenced and designed by the previous generations. She overtakes the world from these generations, is continuing some things and changing others so that she can give the world to the next generation(s).
- Justice is directly mentioned in some competences of the GreenComp. It is referred to in some sustainable development goals (SDG 5: Gender Equality or SDG 10: Reduced Inequality) and it is implicitly referred to in some other goals (SDG 1: No Poverty or SDG 2: Zero Hunger).
- Feeling responsible was already addressed by Havighurst and Hurrelman. Sustainability is just another aspect of responsibility. It means being responsible for one's own actions, for one's own values and one's engagement related with sustainability aspects.

Related to these topics three developmental goals can be drawn out:

- The maintenance of the own existence and the continuance of the world for the next generations. That means the future of one's own, the future of the society and the future of the forthcoming generations. The main question that is raised is: on what (material) basis can this future be designed? This means our management of resources. The developmental task is to learn how to handle our material resources to give us as persons, other persons, and other societies a worthwhile and sustainable future.
- The second developmental task is focusing on the social cohesion of a society, on the social contact of persons among themselves and on the results of a comparison between a person and other human beings. It is about fairness and values around it. The developmental task is to create social values and a concept of social fairness.
- The third developmental task is connected to one's own position in the world. This is not ascribed as it might have been the case in former times; it is earned, and it can be assured by one's own efforts. Therefore, it is important to be convinced of one's own self-efficacy and to be engaged in sustainability as far as one's own abilities and interests allow that.

Under this perspective, in each country a search for formal and informal learning project on sustainability was undertaken with the objective to analyze if and how they address specifically these three development tasks and which actual competence they are developing.

The competence approach has gained in the last decade high relevance in the design of school and university education, as well as in IVET and CVET. It can be understood as steering a functional oriented learning process for instance to societal demands of knowledge and behavior or labor market requirements. Adult education (excluding here CVET) often has not

such functional orientation (e.g., universities' programs for older people, talks, discussion on sustainability for a broad public, broad offer of activities in civic centers or the participation of citizens science projects). Other local activities on sustainability do not even have the declared learning objectives despite that learning occurs.

To promote sustainable behavior in society, these informal learning activities are essential. In so far, the development of a framework of sustainable competence could be a useful tool to foster learning on sustainability in these activities.

The identification of a wide range of projects in sustainability and the analyze of the competences – defined in terms of knowledge, skills, and attitude – brings up a wide range of singular competences, which requires an aggregation to general competences. To do this, the project take as reference the work of Erpenbeck & Heyse (2007) who have developed a so-called competences atlas (see Figure 1). It includes 64 individual competences, which could be used to assemble profiles of competence behavior in specific areas as water management, waste management, caring of the environment, etc. This competence atlas is used as an example for the development of a flexible framework for sustainable competence as a tool for the tailored design of learning programs and other type of activities, which include learning.



Figure 1: competence atlas for sustainable development
(based on Hezse, V. & Erpenbeker, L. 2017).

In the next step the three above mentioned developmental tasks (material resources, social cohesion / justice / social fairness, self-efficacy; see also the definitions above) can be integrated into the model as it is shown by the colors red, green and yellow (Figure 2). Again, the mapping cannot be done clearly and unambiguously, but it is plausible. The marking of the competences affected by the developmental tasks shows, that there is a clear focus in the conceptual literature about ESD by the UNESCO. That does not mean that the competences that are not highlighted in the figure are not important. Their acquisition is primarily either a more general competence (such as organizational skills, verbal ability, or problem-solving ability) or it is specialized (such as planning skills or decision-making activity).

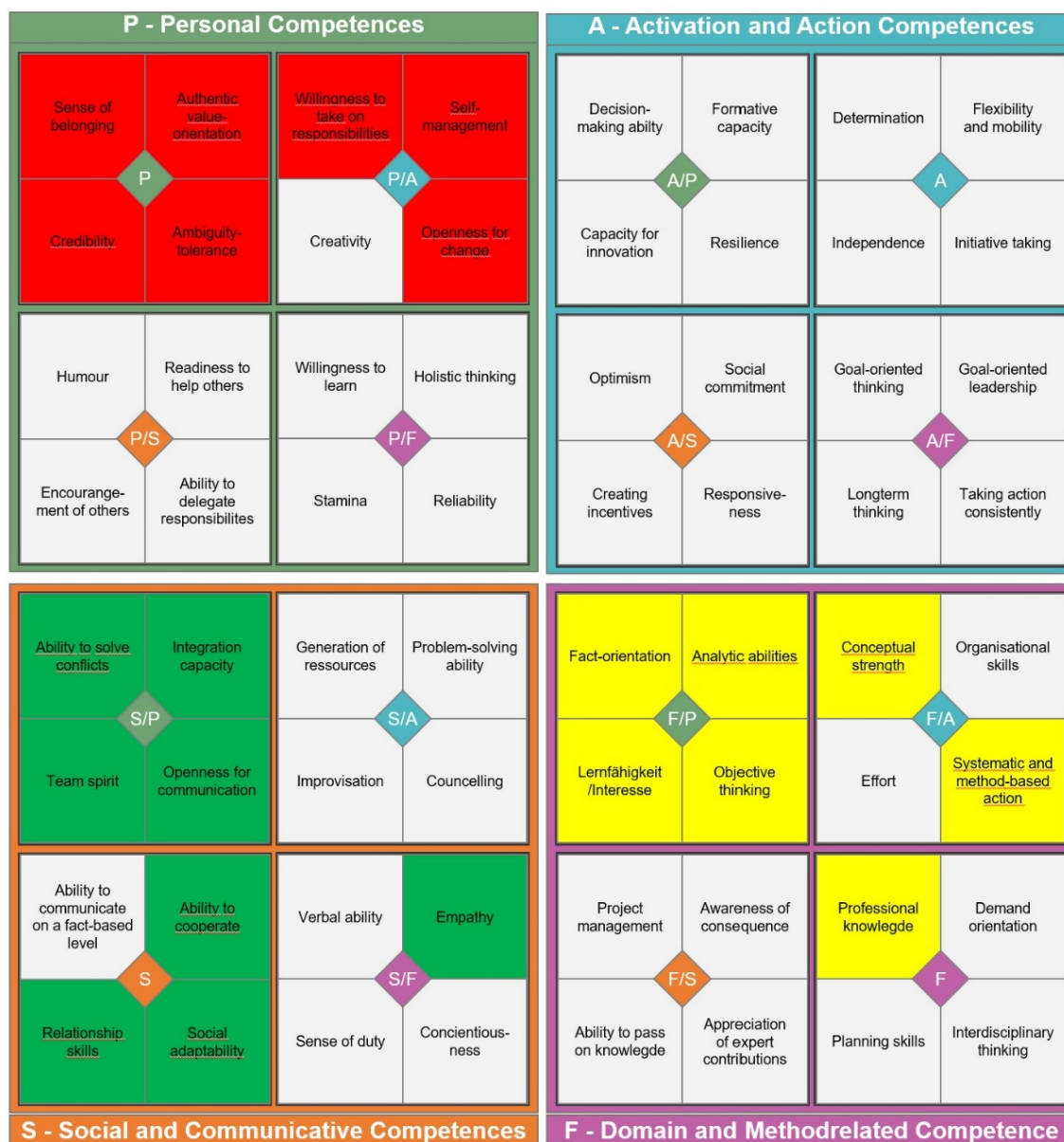


Figure 2: 5P competence atlas - developmental tasks
(based on Hezse, V. & Erpenbeker, L. 2017).

Our competence framework is derived from integrating projects in the field of ESD on the international, national, and regional level in each country. For this purpose, the competences that are required to reach the goals of the projects mentioned are deduced from information gathered from projects and initiatives in the field of sustainability development. Therefore, categories are created inductively from the projects' goals mentioned. The categories can be subordinated to the developmental tasks, and they can so be integrated into the competence atlas as well.

Conclusions

Independently from the coding of the competences it is important to mention the level, the projects are aiming at the psychological distance of the actions and works, and the goals connected with them. According to Bronfenbrenner's social-ecological socialization theory the following differentiations are important:

- Micro level: Actions that are directly connected to a person or those who are in a direct contact with her.
- Meso level: Actions aiming at the (personal) environment of a person, including for example persons who are closely connected to each other such as family or close friends.
- Exo level: Actions referring to groups or events in the direct environment of a person. An environment in which persons are not a member by themselves, but which has a strong effect on the possibilities of action, such as changes for sustainable consumption or sustainable usage of energy.
- Macro level: Actions aiming at things that relate to the whole of a society, such as values, conventions, traditions, rules and regulations, laws, or ideologies.

More than three quarters of the projects are located on the micro level, which is corresponding to the fact, that informal learning is the focus of this project. Nearly 37 % of the project are connected to the macro level. That means that they are aiming at a political level. Most of the projects are affecting more than one level.

Similar to that are the results concerning the developmental tasks. Most of the projects (75 %) are aiming at competences concerning material resources, 54 % on competences concerning self-efficacy and 56 % on competences concerning social values.

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An Exploratory Pilot Study on the Integration of Neurodiverse University Students Into Mainstream Learning and Their Performance: Case of Jones Learning Center

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Abstract

This pilot study explores the impact of inclusive classroom on neuro-diverse college students at Jones Learning Center (JLC) - University of the Ozarks, and their consequent academic performance having participated in an integrative process designed to support students who are intellectually capable of obtaining a college degree, but who require support for learning challenges owing to specific LDs, AD/HD, or ASD. The purpose of this work is to explore the overall processes and practices of (JLC) inclusive program, and to identify its effectiveness in supporting the academic performance of enrolled students with learning disabilities following integration into mainstream university learning. The research process begins with testing the first hypothesis directed toward determining the extent to which the academic performance of JLC students did improve after involvement with the program, then proceeds to the second hypothesis directed toward determining the extent to which collective applied knowledge at JLC is distinctive from typical practices in the field. This research uses a mixed methods approach. Data was collected at JLC in the form of secondary data of Grade Point Average, primary data obtained via structured questionnaire administered to students and alumni, and primary data obtained throughout conversational interviews conducted with staff and educators. The significance of this study is that, first, it validates the effectiveness of the special program at JLC for college-level students who learn differently, and second, it identifies the distinctiveness of their mix of techniques, methods, and practices, namely in their comprehensive individualized one-on-one approach.

Keywords: Inclusive Classroom, Neuro-Diverse College Students, Learning Challenges, Academic Performance, Collective Knowledge

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Introduction

The Jones Learning Center (JLC), affiliated with the University of the Ozarks in Arkansas, is renowned for pioneering inclusive classroom programs in the U.S., specifically tailored for college students dealing with learning challenges. The JLC program is designed to serve college-level students with specific documented Learning Disabilities (LD), Attention Deficit/ Hyperactivity Disorder (ADHD), or Autism Spectrum Disorder (ASD) with average or above average intellectual abilities - who can think critically but need additional support in a traditional academic environment.

This work delves into the profound impact of such inclusive environments on neurodiverse students at JLC, particularly emphasizing their academic performance trajectories. While this paper presents a preliminary analysis of the JLC's efficacy in bolstering the academic prowess of students with learning disabilities, it is imperative to note that it forms a segment of a broader research initiative. This overarching project aims to meticulously unpack the multifaceted processes, specialized methodologies at JLC, and involves the discovery, sharing and dissemination of collective knowledge inherent to its program.

Background

The JLC's foundational philosophy is to cater to college students diagnosed with specific Learning Disabilities (LD), Attention Deficit/Hyperactivity Disorder (ADHD), or Autism Spectrum Disorder (ASD). These students, characterized by average or superior intellectual capacities, often necessitate additional scaffolding in conventional academic settings due to their unique learning profiles.

Globally recognized yet diversely interpreted, the terms Neurodiversity (ND) and Learning Disability (LD) serve as broad categorizations. ND encapsulates the myriad ways in which the brain functions, fostering a spectrum of skills, cognitive styles, and challenges. It underscores variations in learning, sociability, attention, and mood without pathologizing these differences. Conversely, LDs are conditions that act as barriers, preventing individuals from assimilating knowledge at a pace commensurate with their age cohorts (Wood, 2019; Armstrong, 2010; Milton, 2012; Fletcher et al., 2007; Grünke & Cavendish, 2016).

Students diagnosed with LDs often grapple with traditional learning paradigms, encountering challenges in reading, writing, listening, and reasoning, among other skills. ADHD and ASD emerge as prevalent disorders associated with LDs. The manifestation of these challenges is multifaceted, with each individual presenting a unique constellation of symptoms and strengths (Kuder & Accardo, 2018; DuPaul et al., 2017; Cortiella & Horowitz, 2014; NASET, 2005; LDA, 2012; Shaywitz et al., 1995; Shroff, 2021).

Neurodiverse students, in addition to their diagnostic challenges, often confront emotional and psychological impediments that can adversely impact their academic trajectories. These challenges are accentuated by deficits in organizational skills, time management, and study strategies. Consequently, such students may struggle with time management, articulating their needs, acclimatizing to the college milieu, and maintaining focus, especially in the face of sensory sensitivities. However, it's pivotal to underscore that many of these students, despite their academic challenges, possess the intellectual acumen requisite for learning (Reaser et al., 2007; DuPaul et al., 2017).

Recent empirical studies illuminate the correlation between positive psychological attributes and enhanced life satisfaction, academic accomplishments, and diminished mental distress, even in neurotypical college students. A salient finding underscores that students who foster robust connections with their academic institutions and peers, irrespective of their diagnostic profiles, report elevated life satisfaction levels. This, in turn, mitigates feelings of stigma and social ostracization, catalyzing enhanced academic outcomes (Casagrande et al., 2020; McLeod et al., 2019). Thus, a pivotal determinant of academic success for neuroatypical students hinges on their social integration within the campus ecosystem and their perceived sense of belonging and contentment within the academic community.

It is within that context that the inclusive pedagogical framework at JLC is being explored, hoping to enable neurodiverse students to better cope in mainstream academic settings. By comprehending the multifarious challenges these students encounter and the determinants that influence their academic outcomes, educational institutions can architect more responsive and inclusive support mechanisms.

Methodology & Data Collection

With a growing emphasis on inclusive education and the need to ensure that all students, regardless of their unique learning needs, are provided with optimal opportunities for success, this research seeks to delve deeper into the specialized programs that cater to this philosophy. Hence, the purpose of this study is to:

- provide a comprehensive exploration of the general process, special techniques, and practices within the Jones Learning Center (JLC) inclusive program; and
- identify and analyze the effectiveness of this process, techniques and practices in supporting the academic performance and success of enrolled college students with learning disabilities at regular classrooms framework.

Accordingly, in the context of understanding specialized educational programs and their impact on student success, and given the specific objectives of the Jones Learning Center (JLC) program, this research narrows its focus lens to primarily concentrate on:

- neuro-diverse college students with documented LD, ADHD or ASD;
- with average or above average intellectual abilities;
- who can think critically but need additional support to demonstrate their abilities within a mainstream academic environment.

To guide this inquiry and provide a structured framework for our exploration, the pivotal questions we seek to address are:

Q1: What are the odds that there is an empirical relationship between the special program at JLC for enrolled college students with learning disabilities and the likelihood of their improved academic performance and success?

Q2: What are the odds that the overall process along with the techniques, methods, and practices at JLC program to support students with learning disabilities are distinctive or different by some means from commonly used practices in the field?

Data Collection

Data collected for the present part of the study came from a structured questionnaire administered to a pilot sample of students and alumni at JLC. The intention is to eventually cover all students enrolled in the last 3-5 years. As a result, the adopted pilot sample involved

32 participants, of which 18 current students and 14 alumni. This represents about 36.1% of current students and 5.6% of alumni population within the aforesaid period. The questionnaire design was influenced by surveys from Gelbar, Shefyck, and Reichow (2015) and West (2019), aligning with the study's scope.

On another note, it is worth mentioning that additional set of primary data is being collected through semi-structured interviews with nearly all staff and educators linked to JLC; using an in-depth conversational approach as outlined by Schober and Frederick (1997). The said data will be mainly used for the other part of this research project, which is not discussed in the present paper, related to knowledge discovery, sharing and dissemination. The exploratory part will not rely on specific conceptual framework, but analysis will follow Braun and Clarke's thematic qualitative method (2006) using deductive approach for identifying themes.

Methodological Background

This research adopts a descriptive statistics approach. Following Leedy and Ormrod (2001), clustering and data reduction techniques, principal components and factor analysis were applied so as to analyze the current state of the phenomenon through observation and correlation. Working hypotheses are employed, following the concept outlined in Oppenheimer and Putnam (1958). These hypotheses are open to further development without committing to their validity or absolute truth. As such, confirmatory data analysis would test these hypotheses rigorously, while exploratory data analysis, as suggested by Tukey (1980), remains speculative and open-minded.

The research adopts a Bayesian perspective to tackle its research queries, contrasting with the frequentist framework in how data and parameters are treated. Bayesian methods consider parameters as random and data as fixed, while frequentist methods view it inversely. This leads to differing approaches to statistical inference. Prominent among frequentist techniques is maximum likelihood (ML) estimation, which boasts attributes like consistency and asymptotic normality, reliant on large sample sizes. In contrast, Bayesian methods, with their unique theoretical underpinnings, do not hinge on large samples. Techniques like Markov chain Monte Carlo (MCMC) in Bayesian analysis prioritize the number of samples over infinite samples. Nevertheless, the authors acknowledge that Bayesian methods do not resolve small sample issues entirely; however, they possess qualities that make them suitable for more conducive to modeling small sample data conditional on the choice of prior distributions.

Preliminary Data Analysis

The questionnaire encompasses sections on General Background, Academic History, Diagnosed Disabilities, and Accommodations provided. We have derived aggregate scores related to metrics such as "Social Integration," "Organizational Integration & Performance," and "Institutional Connectedness." In our pilot sample, males constitute 56.3%, while females make up 43.8%. The majority of respondents fall within the younger age brackets. Notably, 90.6% of participants embarked on their college journey immediately after high school. The reliability of our questionnaire is underscored by a Cronbach's Alpha value of .8536, indicating strong consistency.

Table 1 below delineates the categories of statements along with the count of statements in each category. These statements are assessed using Likert scale evaluations.

<i>Category</i>	<i>Number of Statements</i>
Background	3
Academic Background	13
Disability	3
Accommodations	3
Social Integration	4
Organizational Integration	6
Institutional Connectedness	3

Table 1: categories in questionnaire with number of statements

As such, Table 2 here below presents selected data extracted from Spearman's correlation coefficients, specifically for statements D1 – D2 and S1 – S10. The most interesting information is found in the 'cluster' of coefficients which can be observed ranging horizontally from D1 to S3 and vertically from the "Count of years at JLC" to "Diagnosed with ADHD." This cluster provides valuable insights that will guide the construction of our model and shed light on the relationships between variables.

<i>Statement</i>	<i>D1</i>	<i>D2</i>	<i>S1</i>	<i>S2</i>	<i>S3</i>	<i>S4</i>	<i>S5</i>	<i>S6</i>	<i>S7</i>	<i>S8</i>	<i>S9</i>	<i>S10</i>
Gender	1											
Age		1										
Academic status		0.730	1									
Credit enrolled			-0.497	1								
Credit completed		0.635	0.888	-0.379	1							
GPA end of high school						1						
GPA 1st term JLC						0.424	1					
Current GPA						0.565	0.732	1				
Started college directly after HS									1			
Attended a college										1		
Count of Years in JLC		0.595	0.696		0.650						1	
Graduated		0.659	0.910	-0.712	0.738						0.518	1
Major	0.499											
Diploma		0.709	0.885	-0.693	0.726						0.538	0.973
Currently working		0.684	0.854	-0.668	0.686						0.482	0.938
Diagnosed ADHD		-0.384	-0.406									-0.376
Diagnosed ASD												
Diagnosed LD												
Count accommodations			-0.368									
Accomm. like HS												
I have the social skill to succeed												
I have made new friends in college			0.523									0.462

Table 2: extract from correlation matrix, Spearman's correlation coefficient estimate, D1-D2 / S1-S10

Further, the below Figure 1 displays the outcomes derived from the Agglomerative Hierarchical Clustering (AHC) algorithm. Both the K-means and AHC algorithms pinpoint two distinct clusters. Notably, it is particularly troublesome that one cluster solely encompasses the statement related to the "Count of Accommodations." This is likely a reflection of the collinearity present among the variables.

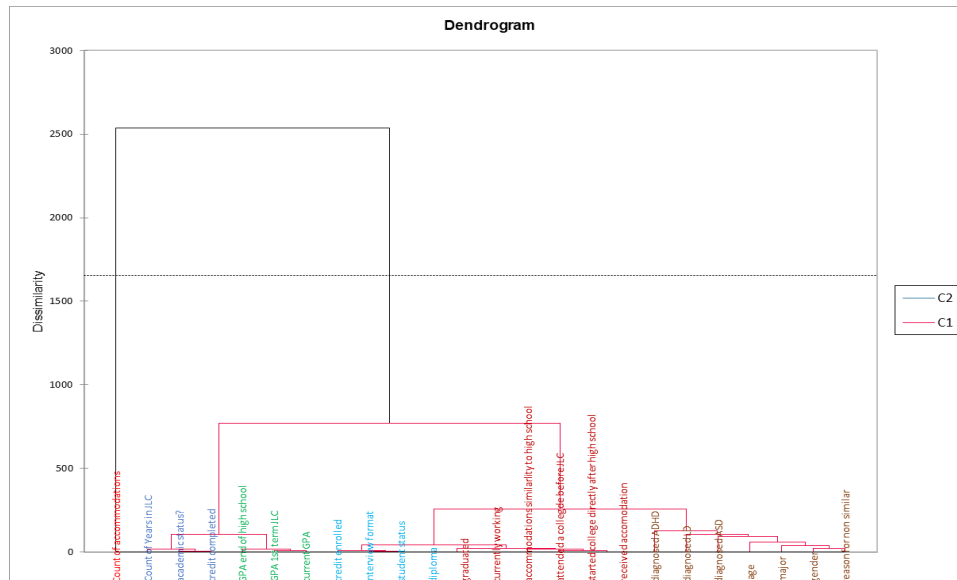


Figure 1: Dendrogram for variables considered in JLC analysis

Figure 2 presents the Scree plot derived from the Principal Component Analysis (PCA). The PCA suggests that the majority of the variation is encapsulated within the initial two principal components. This observation further substantiates the presence of collinearity.

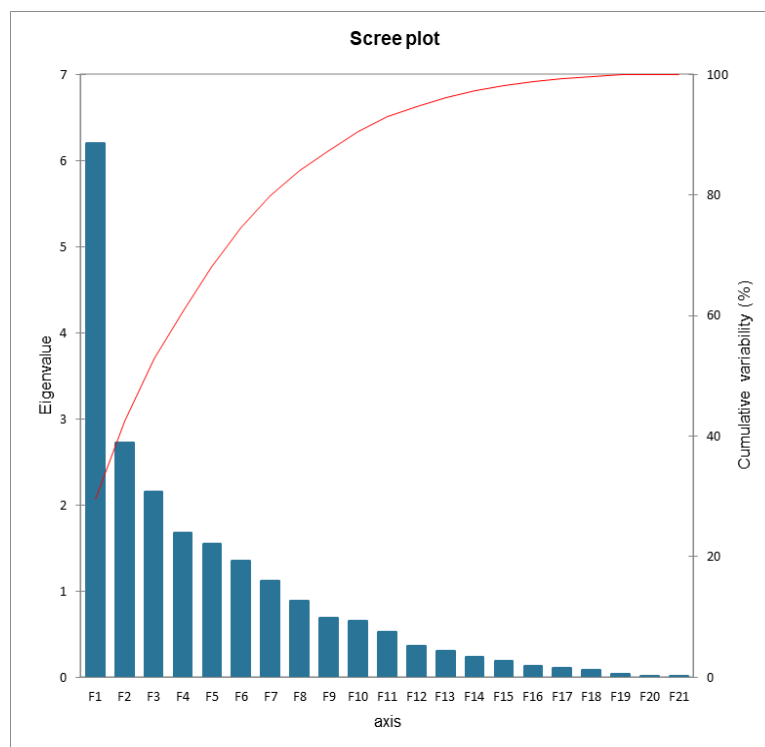


Figure 2: PCA Scree Plot

In Table 3 below, it's worth noting that comparison between estimated coefficients (Model 1) and posterior medians (Models 2 and 3) shows that the Bayes medians are relatively similar. However, clear differences emerge in terms of magnitude. Conducting tests concerning priors, especially when additional scientific information is introduced, could provide valuable insights. Particularly intriguing are the results associated with the 'Diagnosed' variables. These consistently fall below zero, suggesting that the average ordered logit for these variables being in an elevated category decreases when other model variables remain constant.

<i>Statement</i>	<i>Coefficient Model 1</i>	<i>Median Model 2</i>	<i>Median Model 3</i>	<i>Average Models 2 and 3</i>
Gender	1.486685	1.815221	1.838857	1.827039
Age	.101438	-.1580154	.066655	-0.04568
Academic Status	1.154742	1.238989	1.239599	1.239294
Count of years in JLC	-.9412441	-.9645586	-1.041351	-1.00295
Diagnosed ADHD	-.1368063	-.3159668	-.235952	-.27596
Diagnosed ASD	-.5669814	-.3159668	-.7322394	-.73085
Diagnosed LD	-.7936337	-.8469059	-.9331018	-0.89

Table 3: Comparison between estimated coefficients and posterior medians

Ethical Considerations and Limitations

Maintaining integrity, transparency, and confidentiality is paramount in this research. To ensure this, all questions were pre-shared and approved by the management at Jones Learning Center (JLC). Additionally, to uphold participant confidentiality, individual identifications were encrypted. This measure restricted full data access solely to the research team, and all collected data was securely stored.

Generally, study limitations refer to design or methodological constraints that can influence the interpretation of research outcomes. The primary limitation of this study pertains to the sample size and selection criteria. The second limitation arises from the diverse perspectives and theories within the realm of special education, which can introduce varied interpretations. Lastly, the third limitation concerns the academic background of the researchers. Their expertise predominantly lies in business and management, rather than in the specialized field of special education.

Conclusions

This study underscores three primary insights: firstly, it reasonably offers an affirmation on the effectiveness of the special program at JLC for college-level students who learn differently, and second, it underscores the pivotal role of certain survey variables, and third, it delineates the unique blend of techniques, methodologies, and practices employed at JLC, particularly their comprehensive, individualized one-on-one approach.

However, several considerations emerge from the preliminary findings of this pilot study. The pilot data revealed the existence of collinearity, which could potentially mask the true relationships between variables. Addressing this collinearity in future research endeavors will be crucial to bolster the accuracy and validity of the results. Based on this, collecting insights from the pilot study has prompted an ongoing effort to refine and enhance the questionnaire to better capture relevant data.

Furthermore, to ensure a more comprehensive and representative understanding, there's an intention to expand the sample size. The aim is to encompass students who have been part of JLC over the past 3-5 years. This expansion seeks to bolster the generalizability of the results and offer a more encompassing view of the experiences of neurodiverse students at JLC.

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Teaching Peace Linguistics in ESL Classrooms: A Catalyst for Global Peace

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Abstract

Peace Linguistics is a branch of Linguistics aimed at helping users of languages to create conditions for communicating peacefully in varied contexts by humanizing the use of language and raising awareness of individuals' communicative roles to interact in a dignified manner. This field of linguistics is borne out of the need for the use of language to achieve peace in the global context since conflicts are inevitable in linguistic interactions. This paper examines how Peace Linguistics could be harnessed in teaching peace through humanizing the English Language in a second language situation. The study presents different teaching strategies and contents that could encourage students to use the target language creatively and learn to humanize the language to harmonize disagreements, alleviate communicative aggression, and build communicative dignity to achieve peaceful co-existence. The need to be intentional in creating long lasting state of peace using language is through peace oriented linguistic education. To this end, this study explores the use of certain de-confrontation linguistic devices/ features such as-hedges, negativized positive antonymous adjectives, positivized expressions, polite requests through the use of courtesy subjuncts and the use of declaratives instead of Wh- challenging questions that students can learn to be able to interact in a dignified manner in order to alleviate communicative tensions, as a means of promoting human rights globally for the world to be a better place to live.

Keywords: Teaching, Peace Linguistics, Catalyst, Global Peace

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Introduction

Language has been defined in various ways by different scholars based on their perceptions of the concept. It is described as the medium or vehicle for conveying ideas, a system of arbitrary vocal symbols used for social operation, the totality of meaningful utterances in any given society (Lamidi, 2000; Akindele and Adegbite, 2005). Language is a body of words and the systems for their use, common to a people who are of the same community or nation, the same geographical area, or the same cultural background (Mabekoje, 2009). Language study is a field of interest to many scholars; the study of language as a science is their major concern. Linguistics as the scientific study of language is the subject whose focus practitioners devote their attention and energy to understanding why human language is the way it is (Crystal 1999). Linguistics as a field has its focus on man's means of interaction and social involvement (Ahumaraeze, 2021).

Linguists' interest in language study covers three main areas namely: language structure, language meaning and language in context. Language structure deals with word structure (Morphology), sentence structure (Syntax), speech sounds and their rules and patterns between them (Phonetics and Phonology); meaning of language (Semantics and Pragmatics), and language in context, that is the way language is used which covers a wide range of fields or branches since language is used almost in all areas of human endeavours. These branches are Psycholinguistics which deals with language acquisition and use; Sociolinguistics (language use and its connection with society); Applied Linguistics (application of the knowledge of language studies to solving real life language related problems); Conversational and Discourse Analysis (language use in social contexts) and Stylistics (the use of different styles in language).

The subject of language has been given priority attention because of the communication (interactional and interpersonal) roles it plays in the society. The significance of language in the process of communication cannot be over emphasized. Language functions in communication as a tool for information dissemination and for building interpersonal relationships. In the educational process, language is key determinant of learning outcomes. Based on this, language pedagogy has shifted emphasis from the formal or structural approach of language study to include language functions and the context of use, that is what learners do with their language, what communicative strategies they employ and how these are developed (Alo, 2003). In other words, attention is now on Communicative Competence. Communicative competence is concerned with the knowledge and ability which speakers need to possess in order to use language appropriately in communicative situations. It involves the ability to use the resources of language (words, phrases, sentences, rhetorical devices) correctly and appropriately in given contexts and situations. This encompasses knowledge of social and conversational rules, as well as, speakers' own and outer world which they are presumed to have to enable them to use and interpret sentences meaningfully.

Communicative Competence is the kind of knowledge required to engender peace in the society. A speaker that knows what to say, with whom, where and how to say it will definitely foster humanization and contribute immensely to societal and global peace. Thus, Peace Linguistics is concerned with the quality of interaction, which is dependent upon the communicative competence of the interlocutors. This implies that "the language quality of interaction required certain level of linguistic abilities, awareness of language and culture of self and others, personal and communal backgrounds, circumstances and social status in each community" (Bello, 2020:210). Going by this, Gomes de Matos affirms that teachers must

first believe in the importance of positive interaction with their students and practice peaceful communication with them. Based on this understanding, this study aims at examining contents and methodology of teaching Peace Linguistics in ESL classrooms.

Peace Linguistics

Peace Linguistic is an interdisciplinary approach to language study that advocates for peaceful use of language (Ahumaraeze, 2021). It encompasses other disciplines such as Peace Studies, Conflict Resolution, Sociology and other branches of Linguistics. It is a discipline in which” linguistic theorizations, findings and methods are applied to non –linguistic issues with the specific goal of creating a peacefulco-existence of human beings among whom intermittent discords, crises and misunderstanding are always inevitable” (Omole and Bello cited by Bello, 2020:210). Gomes de Matos, the proponent of Peace Linguistics was of the view that Language and Peace have long existed as two interrelated concepts, and there have not been so much effort, globally on the systematic method at integrating the two, not just theoretically but in the practical sense (Gomes, 1990). An attempt to bridge the existing conspicuous gap between Language and Peace led Gomes to devote most his works to application of Linguistics to Peace because Language is one of the vital instruments that human beings use to position themselves and interact with or disassociate from others either verbally or non-verbally (Luzkarime, 2019). This has cumulated into a good number of publications on the concept, such as ‘Pedagogyof Positiveness (Communicating Constructively in Portuguese) in 1996,’ Communication for the good, Toward Communicative Peace’ in 2002. The focus of these publicationsis language users, the vital agents of language systems.

It has been established that language users always choose consciously, subconsciously or unconsciously from the available linguistic alternativesin any given context. In formal contexts, the choice is almost always done based on the fact language users are aware of their expressions. However, in informal contexts, such as casual conversations with friends, relations and associates, language users seem to be less conscious of their language use and communicative implications of their expressions which in most cases result in confrontations (Bello,2020). Peace Linguisticsis borne of the need to curb linguistic violence and aimed at exposing how language could be used not only as an ordinary tool for exchange but also a tool for communicating peacefully (Ahumaraeze, 2021). According to Friedrich (2007), Peace Linguistics istherefore developed in order” to emphasize the use of humanizing language, the design of strategies to deal with differences constructively, language that fosters peace rather than language used with the opposite agenda in mind, a focus on agreement rather than disagreement and controversy, and avoiding of pompous language which typically brings up reservations, walls, and resistance” (Bello, 2020:211). More recently, Peace Linguistics is defined in terms of what peace linguists are expected to do , by prioritizing the humanizing nature of language use and also being aware of the other side of communicative reality which is dehumanizing use of language (Gomes, 2012). All the linguistic principles, methods, findings and applications are seen as attempts by linguists and language teachers at promoting peace at a global level.

Thus, Gomes de Matos is of the opinion that Peace Linguistics as a study of Language-Peace Interaction is realized by communicative acts of language users in peace- building, peace – dignifying, peace enhancing and peace-sustaining purposes. He challenges language users, particularly teachers and learners to engage in building, dignifying, enhancing or sustaining what he calls LIFE PLUS; that is life-improving force of peaceful language use (Gomes de

Matos, 2012). Since we communicate in ways that tend to humanize or dehumanize, connect or disconnect at various degrees, we do so both verbally and non-verbally (Jocelyn Wright 2019). In performing relevant peaceful actions, language users are encouraged to fulfill their responsibilities as humanizers and dignifiers (Gomes de Matos, 2013). According to him, the theoretical foundations of Peace Linguistics are predicated on the need:

- To be a peaceful communicator in all languages you use and will use. How? By communicating constructively, peacefully for the good of persons, groups, communities and countries;
- To dignify your daily dialogue. How? By interacting as a communicative dignifier, prioritizing the use of positivizers, nouns, verbs, adjectives, adverbs used positively (Gomes de Matos, 2015b); and
- To plan your (spoken/written/signed) language use by anticipating and avoiding possible harmful effects on your listeners/ readers/ viewers. If possible, learn how to enhance your pragmatic competence in the language you will be using (Gomes de Matos, 2014b).

From the fore goings, Peace Linguistics is an interdisciplinary approach aimed at helping educational sector and other sectors of human endeavours to create conditions for the preparation of human beings as peace language users, co-existing in a peaceful world.

Teaching Peace Linguistics in ESL Classrooms: Content and Methodology

In Gomes de Matos' theoretical foundations of the introduction to Applied Peace Linguistics, four principles that could be useful as educational implications for peaceful language users and peace educators are highlighted. These are:

- Be a peaceful bridge person between/ among persons, groups, communities.
- Dignify your dialogue.
- Honour humanism and foster humanization.
- Act as a peace patriot at all times.

Based on the scope of this paper, Principle 2 is the most relevant to peace linguistic pedagogies and contents in ESL classrooms. In addressing the question- Dignify your dialogue. How? The principle clearly states the approaches/strategies that could be employed by teachers in teaching, entrenching and dignifying peace in daily classroom dialogue by:

- Addressing other persons with respectful language and optimistic vocabulary.
- Disagreeing through empathic language, that is, by placing oneself in other's shoes.
- Using positivizers (adjectives and verbs) which can enhance positive qualities/traits in people.

Teachers as life molders/enhancers play important roles in their day to day interactions with students to humanize language use in language learning especially in a second language situation where the resources in the mother tongue or native language interplay with the features of the second language which makes SL Learning a bit challenging. The strategies proposed for the teaching of Peace Linguistics in this paper are in tandem with Bello's 2020 de-confrontation strategies, which are modalization, hedging, negativisation and positivisation. However, this paper examines the use of certain peace oriented linguistic devices such as negativized positive expressions, positivized expressions, polite requests through the use of courtesy subjuncts and the use of declaratives instead of Wh-challenging questions for effective teaching of Peace Linguistics in ESL classrooms.

Contents and Methodology

As there are crises of various kinds all over the world, there have been different measures put in place by law /peace enforcement agencies in different countries to address the crises, yet no solutions have been proffered to reduce crises in our societies. Having employed these measures, language is therefore seen as a veritable alternative tool for bringing peace into the world and one of the ways of achieving this is to teach Peace Linguistics in the classroom. Each linguistic environment has its own cultural values and norms that are characteristic of the language use in such a community. An expression could be acceptable and engender peace in a language situation, which may not be welcome in another, hence there will be conflicts. There is a number of strategies that could prove useful in preparing ground for peaceful environment; one of such is by teaching the language of peace in the classroom.

As students learn peace language, they will acquire the linguistic features and devices that be used in their day-to-day interactions with their peers. Ultimately, they will be reflexive, open-minded and develop the capacity for problem solving. Some of the language devices that be taught are the following:

A.) Hedging

This is the process of presenting a cautionary expression in a more acceptable and soothing way. Hedges are expressions that warn the addressee on how to take or interpret the contents of a clause (Bello,2020). Hedges could be used to minimize conflicts between or among the discussants. The following are some of the examples:

- I think we may need to reconsider our position/ instead of/ We need to reconsider our position.
- I'm not entirely convinced by your argument / Instead of / Your argument is wrong.
- I'm not totally happy with this decision / Instead / I'm unhappy with this decision.

A discussant could be accused without being offensive as the following expressions illustrate:

- You're kind of being rude. / Instead of / You're rude.
- That's sort of a strange idea. / Instead of / That's a strange idea.
- It's kind of a waste of time. / Instead of / It's a waste of time.
- That's somehow boring. / Instead of / That's boring.

These types of expressions can down tone or minimize the potential threats that could possibly lead to conflicts.

B.) Negativised Positive Antonymous Adjectives

Negativized positive antonymous adjectives which appear to present some positive values in terms of meaning, despite the use of the negative adverb 'not' could also be taught in the classroom as we have in the following examples:

Non- Negativized Form

You're sluggish.
You're arrogant.
You're wrong.
Your face is dull.
You're lazy.

Negativized Antonymous Form

You're not fast at doing things.
You're not humble enough.
You have not got it right.
Your face is not bright.
You're not up and doing.

You're wicked.
 You're hostile.
 You're stingy.

You're not kind enough.
 You're not friendly enough.
 You're not generous enough.

C.) The Use of Positivized Expressions

Positivizers have the tendency of lessening the potential threats in the expressions which may likely make the addressee feel humiliated as we have in the following expressions:

Non- Positivized Expressions Positivized Expressions

- I don't want to go out for dinner tonight. / I appreciate the invitation but I have other plans tonight.
- I can't lend you any money right now. / I understand your plight but I'm not bounyant to lend you money at the moment.
- I don't have the time to talk right now. / I appreciate your desire to chat, but I'm currently very busy.
- I don't really like your idea. / I appreciate the thought you put into that idea but I'm not convinced it's the best option.
- He failed the test despite all our efforts. / He tried hard to pass the test but couldn't make it.
- You're not talented in that area. / You have different area of expertise distinct from that.
- You're always unhappy. / You're only excited once in a while.
- The outfit looks horrific on you. / The outfit looks quite beautiful on you but needs to be slim fitted.
- I don't have any free time to engage in discussion with you. / I will be free in a moment to discuss with you.

Positivised expressions as the above can avert conflicts in discourse.

D.) The Use of Polite Requests Through the Use of Courtesy Subjuncts

Polite requests could be employed in conversations to show consideration for the feelings and desires of the interlocutor in order to create and uphold peaceful interpersonal relationships through the use of courtesy subjuncts. Courtesy subjuncts are used to convey a formulaic tone of politeness in order to tone down the abruptness of commands. As exemplified in the following expressions:

- | Imperatives (Commands) | Polite Requests |
|--|---|
| • Pass me the salt. | / Could you <i>kindly</i> pass me the salt? |
| • Carry this box with me. | / Could you <i>please</i> lend me a hand with this heavy box? |
| • Place it on the table I will attend to it later. | / You could place it on the table I will attend to it soon, <i>please</i> . |
| • Close the door | / Could you <i>please</i> close the door? |

E.) The Use of Declaratives instead of Wh-Challenging Questions

Wh-challenging questions could be confrontational. In the alternative, declaratives may be used to forestall any likely conflicts as illustrated in the following expressions:

- The time is far spent, why haven't you started the engine? / The time is far spent, you ought to have started the engine.
- Why couldn't you wait for other participants before introducing the guests? / You ought to wait for other participants before introducing the guests.

F.) Students could also be exposed to peace related vocabulary that could be acquired through indirect exposure to the words at home or school, by listening, talking and reading widely on their own, by engaging in activities that could promote deep processing of word meanings. Students should be encouraged to understand and use peaceful words in their day-to-day language use. Their exposure to peaceful expressions through real life experiences will help them imbibe peaceful use of language. By giving the synonyms and antonyms of the word 'peace', their meanings, when and how they could be used, students will be acquainted with peace related vocabulary.

Examples of such are: synonyms of peace such as, *reconciliation, concord, tranquility, serenity, quietness, ease, stillness, rest, harmony, accord, etc.*

Antonyms of peace, their meanings and use could also be learned, e.g., *aversion, bloodshed, confrontation, discord, enmity, fighting, rivalry, tension, abomination, antagonism, conflict, hostility, animosity, disagreement, etc.*

G.) Students could also be exposed to special quotes or expressions on peace such as:

- “If we have no peace, it is because we have forgotten that we belong to each other.”
- Mother Teresa
- “When power of love overcomes the love of power, the world will know peace.”
- Jimi Hendrix
- “Peace begins with a smile.”
- Mother Teresa
- “Peace cannot be kept by force; it can only be achieved by understanding.”
- Albert Einstein
- “Better than a thousand hollow words, is one word that brings peace”
- Buddha
- “Peace is our gift to each other.”
- Elie Wiesel

These are some of the contents to be taught in ESL classrooms in order to build in students the attitudes and attributes of peace.

Methodology

Since the goal of teaching peace linguistics is to foster peace in any context of language use, the best method of teaching would be communicative/ interactive method. This method presents learning materials in a natural discourse with authentic language examples that promote active engagement in the language learning process through the use of dialogue, discussion, role play, etc. Through these methods, students, particularly in primary and secondary schools, will develop team spirit, tolerance, forbearance, patience, and self-control which could in turn foster peaceful co-existence.

Conclusion

This paper has examined the teaching of Peace Linguistics in ESL classrooms: what can be taught (contents) and how (methodology) in order to foster peace among learners and by extension in the larger society. The language teacher as a peace linguistic applier, according to Gomes de Matos (2014), needs to be concerned with how his language students express their communicative dignity in speaking, writing, or signing; convey communicative harmony during classroom interactions and in online communication, improve their communicative humility by apologizing when being unfair to someone, prevent acts of communicative aggression, use the language peacefully as a communicative- life improving force among others. It is strongly believed that if these peace driving communicative acts could be imbibed by teachers and learners, there would be peace globally.

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An Alternative Approach to Working With Assessment in School –How to Make Students Profit From Teachers’ Feedback

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Abstract

A programme on assessment for learning has been running in Norwegian schools for years, and this has resulted in teachers putting much effort into making criteria lists and giving thorough feedback to students. One element of the programme that may have been less prioritized is the involvement of students in the assessment work. This study reports on experiences from a psychology class in secondary school, where the students were engaged in assessment processes by applying the following questions: 1) Why is it important with assessments during the learning process? 2) What types of feedback do you profit most from and become motivated by? 3) When is it challenging to understand feedback? 4) What do you want to focus on when you receive feedback? 5) How will you follow up the feedback from the teacher so that you can learn from it? The students reported that they wanted more oral feedback, as written feedback was often difficult to understand, and that they needed time to work with improving what they planned to focus on. The teacher followed up on the students’ preferences in the following assessment process, and evaluations from students showed that of 22 students, 18 agreed that participating in the assessment work helped them understand the teacher’s feedback, find out what was important for them to work on and develop their skills in the subject. Furthermore, 17 agreed that it gave them motivation and 11 agreed that they managed to follow up on their plans.

Keywords: Assessment, Feedback, Participation

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Introduction

Research on feedback reveals a shift in assessment practices from summative to formative assessment (Black & William, 1998; Hattie & Timperly, 2007). This shift means moving from primarily assigning final, summative feedback, mostly in the form of grades, to viewing assessment and feedback as an integral part of the learning process. As described by Sadler (1989), formative assessment focuses on using evaluations of student work to enhance and shape their competence instead of relying on "trial and error learning" (p.120). The importance of involving learners in formative assessment processes is highlighted; learners should have a concept of the goal they are aiming for, be able to compare their current performance to this goal, and take action to bridge the gap.

Feedback has an essential role in formative assessment, surpassed only by the clarification of learning targets and success criteria for students (Hattie & Timperley, 2007; Ruiz-Primo & Brookhart, 2018; Sadler, 1989). Echoing Sadler's (1989) description of formative assessment, Hattie & Timperly (2007) emphasize three key questions to be posed by either teacher or student for feedback to be effective: "Where am I going?" to define objectives or goals, "How am I going?" to evaluate current progress toward those goals, and "Where to next?" to identify the necessary actions to further enhance progress (Hattie & Timperly, 2007, p.86). Brookhart (2018) refers to the type of process described by Sadler (1989) and Hattie and Timperly (2007) as a "formative learning cycle" (p. 64) and highlights the importance of certain feedback characteristics in order for it to affect learning; it should be suitably worded and delivered, both teacher and student should learn from it, and the student must have appropriate opportunity to apply the feedback (Brookhart, 2018; Ruiz-Primo & Brookhart, 2018).

Formative assessment practices as described here have been implemented in the Norwegian educational system through national assessment regulations and in the national curriculum. It is affirmed in the regulations that all assessment until the completion of the subject's education should be formative, and that students have the right to participate in the assessment of their own work and reflect on their own learning, understand what they are expected to learn and what is expected of them, be informed about their proficiency, and receive guidance on how to continue to enhance their competence (Regulations to the Education Act, 2006, §3).

There has also been a focus on enhancing the competence of teachers in formative assessment through the national initiative *Assessment for learning* (Norwegian Directorate for Education and Training, 2014). A result appears to have been that students are provided with many detailed learning goals and long criteria lists for achieving different grades. However, there has been less focus on the role of the student as active in monitoring and regulating own learning (Horverak, 2015), which is an important aspect of formative assessment practices. These observations align with the results from The National Pupil Survey (Norwegian Directorate for Education and Training, 2022). This shows that while students often perceive teachers as conveying goals and expectations, they feel less involved in the assessment process and they could receive more feedback on how to improve.

These findings could be symptomatic of two notable gaps in the realm of assessment practices. The first gap relates to the extent to which students understand teachers' feedback, and the second gap to the extent to which students are proficient in using that feedback. This has led to the following research question: How can students be engaged in assessment

processes so that they profit more from teachers' feedback? In the following, an example of how students can be engaged in assessment work will be presented, as well as results from an intervention where this approach was applied. Finally the results will be discussed in relation to relevant theory on formative feedback.

Methodology

To investigate how students can be engaged in assessment processes to profit from feedback, an intervention was carried out in a psychology class in upper secondary school. A five-step method for mastery, participation and motivation (Langeland & Horverak 2021) was adjusted to the topic of assessment and applied in the class. The sample consists of 22 upper secondary school students. The approach implemented builds among others on self-determination theory (Ryan & Deci, 2017), emphasising the needs for competence, autonomy and relatedness as conditions for intrinsic motivation (figure 1).

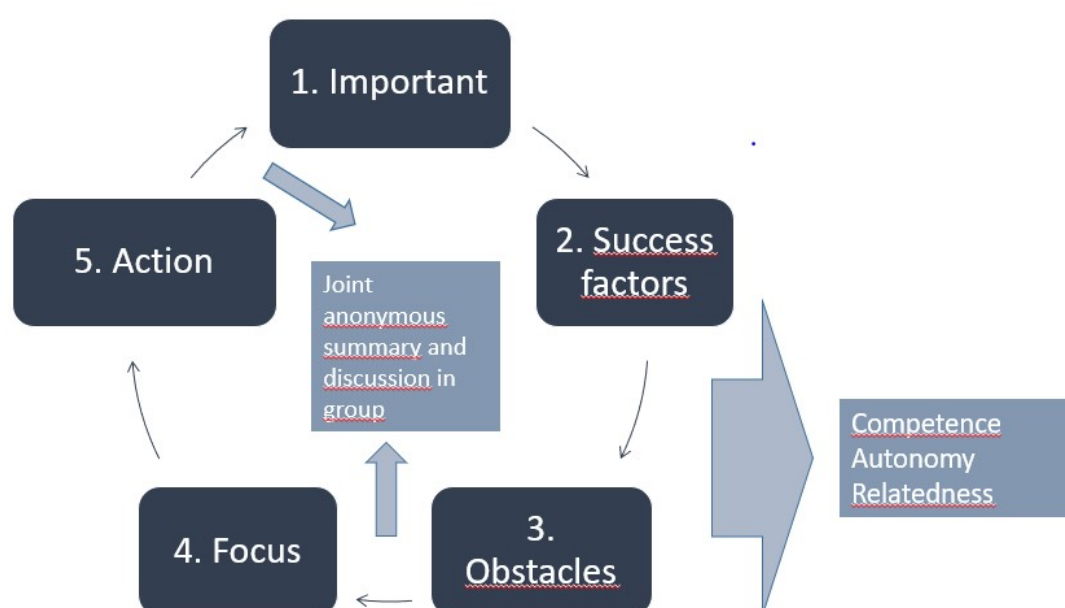


Figure 1. The five-step method (published in Horverak & Aanensen, 2019; Horverak, 2020)

The questions that were used were: 1) Why is it important with assessments during the learning process? 2) What types of feedback do you profit most from and become motivated by? 3) When is it challenging to understand feedback? 4) What do you want to focus on when you receive feedback? and 5) How will you follow up the feedback from the teacher so that you can learn from it? The answers to the questions were summed up in a PowerPoint to show a picture of the students' thoughts. These reflections served as important information to the teacher, and they also confirmed the two expected gaps in assessment and feedback – the students' lack of understanding the feedback, and the problem of how to work on it to improve. It was decided that the students should choose one specific aspect from the feedback to work on, with support from the teacher. The students also discussed with the teacher how, where, when and with whom they could work on it.

After the intervention, the participating students filled in evaluations with claims concerning the intervention and a five-point Likert-scale from "totally disagree" to "totally agree". The students considered whether participating in assessment processes had helped them find out

what was important to work on, whether it gave more motivation to follow up on the feedback, whether they had managed to follow up their own plans to work with a chosen topic, whether it helped them understand the teacher's feedback and whether it helped them develop their skills in the subject. They were also asked to give examples of what they had worked on, how they had worked with it, and how it had helped.

Results

First, some typical examples from the students' answers to the five questions in the intervention are presented, to show how the intervention worked. Second, the results from the evaluation are presented in a bar chart. This is complemented by examples of student reflections on the open questions from the evaluations.

To the first question, why it is important with assessments during the learning process, the students said that it helps them to improve and to master the subject. They know what to work on and how to develop their skills. They also reported that it helps them know what may cause a lower grade.

The second question consists of two different parts - what types of feedback the students profit from, and what types they get motivated by. The students said that they profitted from both written and oral feedback. From written comments, they profitted from short comments and keywords, while from oral feedback, they profitted from the possibility to ask questions and from examples shown by the teacher. To the second part of this question, what they get motivated by, the students mentioned compliments and positive comments, but also specific comments about what needs to be improved.

The answers to the third question clearly show the first gap in the assessment problem: The students often do not understand the teachers' feedback. They reported that they get confused by the mismatch of positive comments followed by a low grade, and that it is an obstacle that they do not know how to work on aspects the teacher say they should improve. Another challenge mentioned is that they think the teacher does not have time to talk to them and answer questions. One of the students commented that it is difficult 'when the teacher just writes a lot on the paper and expects me to understand'. Another challenge mentioned by a student is that sometimes the grade does not make sense in relation to the efforts made to complete the task. It is also mentioned that the feedback is not specific enough.

The answers to question the fourth and the fifth question show the second gap in relation to feedback practices – the problem students have to follow up on the feedback. Question four, what to focus on, and five, how to follow up, were difficult for the students to answer. They said that they wanted to focus on what they did wrong and what needed to be improved, and some wanted to focus on just the grade, and did not read the comments at all. On question five, how to follow up on the feedback, one student said that 'I do not know, I need help to know how to work with the feedback', and another one said 'I try to understand the feedback'. Others said they would work harder and practice, and some pointed to the lack of time to follow up the feedback.

After having discussed what to follow up on and how, some of the aspects that stood out, and which the students wanted to work on, were how to write good introductions and closures, and how to use references and theory. One suggestion on how to work on these topics, was that the teacher should explain and show through relevant examples. Another one was that

the students were to work with their chosen aspect for improving, in groups or alone, and guided by the teacher when needed.

The evaluation of this intervention shows that the students benefitted from this way of working with assessment.

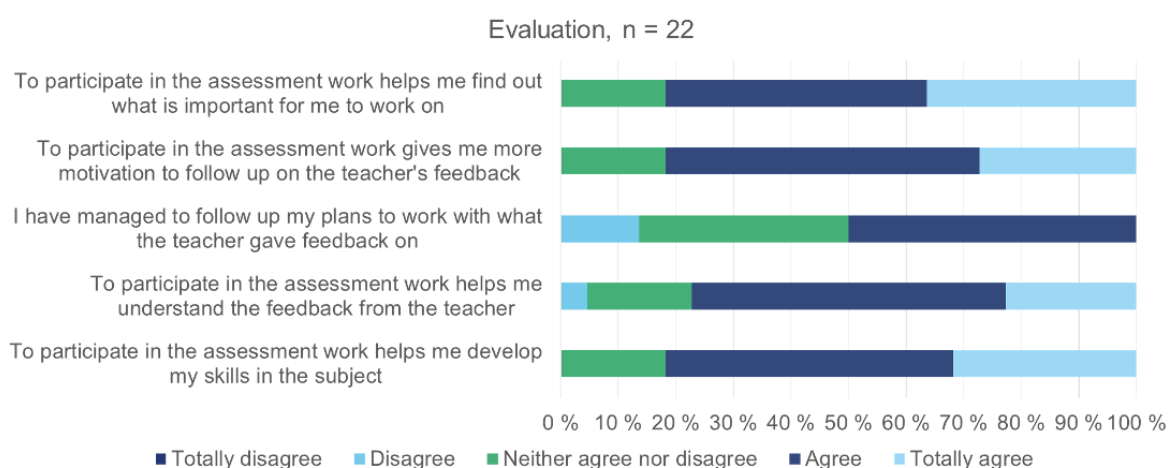


Figure 2. Evaluation

Of 22 students, over 80 % agreed that participating in assessment work helped them find out what was important to work on, gave more motivation to follow up and helped them develop their skills. Just below 80 % agreed that it helped them understand the feedback from the teacher. However, only 50 % agreed that they followed up their plans to work with what the teacher gave feedback on.

The students also reflected on what they had worked on and improved. One student reported, “I have tried to understand the feedback I have received, and that we have gone through it (the five points) in class. This has helped me a lot to get a more coherent assignment”. Another student commented on working thoroughly with sources:

I have worked on referring to other sources, as statistics and research. I worked on this by using a previous presentation from an assignment and find more sources I could have used. This has helped me as I have used time in class, and not only on my own at home.

Finally, some of the students commented on having become better at writing closures, “I have worked on improving the closure. To improve, I have asked questions and looked at good examples on the internet concerning how a good closure should be. This has helped me strengthen my presentation”. These examples show a consciousness about own improvements after having followed up on the feedback.

Discussion

The results of this study show that to get more students engaged in assessment work, and to ensure that they profit from feedback, it is important to take students’ voices seriously, and follow up on their reflections on their own learning process. Students want more oral feedback, as written feedback is experienced as unclear and difficult to understand. They also

need specific comments to get motivation to follow up, and the students' comments reported above shows that it is sometimes a problem that the feedback is not specific enough. This could be related to unclear criteria or goals for the assignment. When doing assignment, knowing 'where I am going' is a crucial aspect (Hattie & Timperley, 2007).

Based on the answers to the final two questions on what is to be focused on and how to proceed, it is clear that the students are uncertain about how to follow up on the feedback. They do not choose specific focus areas, but rather focus on understanding the feedback, and getting help with this. Whether or not the goals and criteria have been clearly defined by the teacher, the students answers indicate that it is somewhat unclear to the students where they are going and what they need to improve. Then it is also difficult for them to know where to 'go next' (Hattie & Timperley, 2007) and progress in their learning.

It may be a challenge to spend much time on following up on assessment in class, as there might not be enough time to get through what the teacher has planned for the semester based on competence aims. Then one should reflect on - What is most important? That the teacher gets through the plan. or that the students develop their skills in the subject? The students want to practice on what they struggle with and do wrong. It is difficult for students to make and follow up a plan to improve, if the teacher does not give them time to follow up on comments from feedback. Working with feedback to improve what is challenging is an important aspect of formative assessment (Black & William, 1998; Hattie & Timperley, 2007), and results in more efficient learning. The process described in this intervention, where students are engaged in the assessment process, and work on following up in class, could be one example of a 'formative learning cycle' (Brookhart, 2018, p. 64), where there is focus on the goals of learning activities, how to proceed and how to follow up in future work.

Another challenge is that students easily focus on the grade and not the comments when they receive feedback. This may lead to increased external motivation and decreased intrinsic motivation (Ryan & Deci, 2017). In order to support students to become intrinsically motivated, it may be an idea to hold back grades, and work with comments before a final grade is given. As mentioned by the students, giving specific feedback also supports motivation. As pointed out by Brookhart (2018), feedback should be suitably worded and delivered. Based on the students' reflections revealed in the results of the current study, this means that it should be specific and given through oral communication.

Conclusion

Engaging students in feedback processes as described in this study, shows an example of formative assessment practices and how students may work to follow up on feedback (Black & William, 1998; Hattie & Timperley, 2007). The majority of the students reported that they profited from participating in assessment processes. It helped them find out what was important to work on, gave motivation, helped them understand the feedback and helped them develop their skills. However, the evaluations in the study showed that only half of the students reported that they followed up on their plan to improve. This shows that it is important to support students to find time to follow up and evaluate their own process.

The students in this study chose to work with general skills as making a good introduction or closure, when they were to follow up on the feedback. These are skills that could be transferred to different subjects. Hence, the intervention shows an example of how one can work with feedback to develop transferrable skills, which is a general goal in all education

(Pelegrino & Hilton, 2012). This is also in line with the renewal of the knowledge promotion for Norwegian schools (Ministry of Education and Research, 2017).

Even though this study shows promising results, this is a limited study. It is a case-study showing how this approach worked in one psychology class, with one teacher. There is a need for further investigation of the potential of engaging students in assessment work, and more extensive and longitudinal studies across different subjects and contexts.

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Discursive Fragments of Kayabi / Kawaiweté / Brazil Indigenous Youngsters About Life Project

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Abstract

The general objective of this paper is to present a study on the life projects, realities and expectations of young indigenous high school students from the Kayabi / Kawaiweté of the tribe Tatuí, in the city of Juara / Mato Grosso /Brazil. We used qualitative, bibliographical and ethnographic approach in education research to answer the questions. We interviewed eight youngsters from the tribe, high school students at the Juporijup State School. These youngsters aim to leave a legacy for indigenous and non-indigenous societies from experiences carried out in the present and from the learning inherited by their ancestors. This research is justified by the need to disseminate the ideas of indigenous youngsters who currently are fighting for the preservation of their cultures in a scenario in which indigenous lands are being flooded by agribusiness, and the construction of hydroelectric plants, among others, which have a great impact on the environment and on indigenous societies. The data are based on an investigation into the self-representations of young Kayabi / Kawaiweté and their relationship with their life project. We concluded that the conceptions of time and bonds with the community are important elements in the life project of these young indigenous people participating in the research. The conception of past, present and future is strongly related to the culture of the group to which they belong.

Keywords: Youngsters, Indigenous, Life Project

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Introduction

The Life Project theme gained evidence from the High School reform supported by Law nº 13.415/2017 implemented in the Brazilian educational system. The reform in question points to the youngsters as protagonists. This protagonism develops through the realization of their “Life Project”. According to Santos (2016), the life project is built on the most diverse perspectives and conceptions of the world that make up the context in which each youngster is inserted. A context of constant transformation and movement.

According to authors such as Damon (2009), Brurrow and Hill (2010), Bronk (2009), Boutinet (2002), Guimarães (2005) and Araújo, Arantes and Pinheiro (2020), the formation of the subject's identity is related to the construction of their life project. The relationship between identity and life project, according to Araújo, Arantes and Pinheiro (2020), takes place in the interaction that each subject has with himself, with others and with his social context, constituting a unique life trajectory for the subject.

Therefore, this paper focuses on investigating the self-representations of youngster Kayabi / Kawaiweté and their relationship with their life project. To answer the research questions, we opted to carry out the research with a qualitative, bibliographical and ethnographic approach in education. We interviewed eight youngsters from the Tatuí tribe, high school students at the Juporijup State School, located at indigenous land Apiaká / Kayabi, in the city of Juara-MT, 695 km north of the capital of the state of Mato Grosso and with a territorial area of 21,492 km². The tribe is located in the Amazon Forest, in the vast Amazon Basin, having as tributaries of the Amazon River the Arinos River, which receives the Peixes / Tatuí River, and the Telles Pires River, into which the Apiaká River flows (FERREIRA, 2014).

Life Project

We emphasize that the expression “Life Project” is a term called by the non-indigenous culture, thus, the young collaborators report that they understand life project as “me in the future”. Based on their understanding of the terminology, the interview begins individually by asking:

“How do you characterize the present? And the future?”

- C1. “The present is special; the future I don’t know, I only think about now, the future is very far away”.
- C2. “The present is very complicated because when you want to take a course in the city, transportation is difficult, so you have to stay in the city. If I think about going to college, I have to leave the tribe and stay in the city, then there are no conditions to stay there. The future is something that is yet to appear”.
- C3. “The now. Life. The future? It doesn't exist yet”.
- C4. “Lately I don't think about him. I wonder if I'll be able to study, if my family will support me, what they'll say.... As for the future, I only think about it”.
- C5. “Today's present has been wonderful and the future I hope will be even better”.
- C6. “The present is great, it is now. And the future I hope is good”.
- C7. “Good. Is today. The future is far away”.
- C8. “The present is now, the future is yet to come, let it be the best, right?”

It is noticeable, in the speeches of the young people interviewed, that they live in the present and conceptualize the future as something that is yet to come. It is something that does not exist. In the documentary *Reflections on good living: Present*, professor and writer Daniel Munduruku (2020) mentions that “Living the present is the great teaching that indigenous peoples offer to Brazilian society” and he explains that, for many indigenous peoples, the word “Future” does not exist in their language, as it is a time not lived and not experienced. The author argues that indigenous peoples create words based on their own experiences; consequently, the word future cannot be originated, because it does not exist, it does not come from something experienced.

The writer reports that, for indigenous peoples, today is just what compromises them, such as, planting, harvesting, fishing, hunting, studying, etc., guided by a feeling of cosmic and universal belonging, which goes beyond of the white man's vision, which imposes on non-indigenous society the idea of producing to satisfy the desires of the body and society.

Daniel Munduruku (2020) reports that indigenous peoples do not develop the idea of accumulating things to enjoy in the future (capitalism), because there is no such thing as being happy when you conquer something, the moment is now. For them, the idea is that the present time is received from the universe, a gift, which must be experienced now, enjoyed immediately. In the words of the author, “[the] belonging means that we are inserted in a greater understanding of life and existence, that is why indigenous peoples sing, perform rituals, ceremonies, etc. precisely to communicate with nature now”.

This is evident from the responses of the researched participants in the following question: How do you see your life in 2 to 5 years? Young people unanimously answer, “I don't know, I never thought, I know about now”, “I still don't know, I never thought? Will I be trained? I haven't thought about that yet”.

In fact, we realize that the construction of the life project of indigenous youngsters takes place from the experiences lived in the present, in the daily learning in the community and with the family. According to a Kayabi teacher, in his culture, educating children for what they will be in the future starts from an early age, teaching them values, beliefs, traditions, the importance of studies, for example. Teaching children the values for what they will be in the future is the family's task and not the school's, and this starts from childhood.

For Damon (2009), young people want to fulfill their dreams based on their reality and families must teach them the way to achieve this. In the meantime, seeking to understand the role of the family for the interviewees, we ask: Is the family a source of support for building your future? All respondents were categorical in mentioning that the family is the basis of everything. In this sense, Damon (2009) argues that young people value adults who have experiences and care about them.

Therefore, for the construction of a vital project, Damon argues that it is necessary for the family to guide young people with practical and constructive advice. The life project is carried out from the individual interests and cultural values of the context in which the young people are inserted, as well as from the influences of other people and community projects. To investigate which values families teach, we asked:

“What teachings did you receive and do you still receive from your ancestors?”

In addition:

“Which teachings collaborate to build your self in the future?”

- C1. “My grandparents taught me not to give up on my dreams and this is very important. They encourage us to move forward.”
- C2. “To preserve nature and our culture”.
- C3. “To respect and to listen to others”.
- C4. “To achieve something we have to have respect and wisdom”.
- C5. “So, they always talk to me, to share their examples, teachings such as education, our culture, how it was in the past, respect. Do not leave the example of the grandparents behind, always pass it on”.
- C6. “To study to protect our land that has been destroyed by non-indigenous people”.
- C7. “To study and to respect the other”.
- C8. “To respect others and respect yourself, valuing your roots”.

All the subjects mention that such teachings start from childhood and that they remain until the present day “The families, elders are always guiding us” complements C8 in his answer. A Kayabi teacher reports that the elders prepare the children for the cycle of their life in the community, narrating the entire culture and tradition of their people, so that it never ceases to exist.

Damon (2009) reports that young people, when receiving guidance and counseling consistently and effectively, accept these teachings, which become essential for building their life project, built on ethnic and moral values, arousing the subject's interest in doing the difference in the world you live in.

We noticed, in the speeches of the subjects of this research, that the teachings received by the young people from their ancestors are supported by the values of ethics, respect and collectivity and are built in the midst of narratives that consider the life history, values and traditions that permeate generations, constituting the identity of the indigenous youth.

According to Baniwa (2006), indigenous youth currently have a purpose that unites them in rescuing and in the historical memory of their people, continuing their collective life projects, endowed with values and customs inherited by their ancestors, lived through the rituals, traditions and beliefs. The desire for change and transformation beyond the “me” allows indigenous youth to fight for the greater good with resistance, resilience, optimism and perseverance in the context of protecting and preserving their peoples.

The anthropologist mentions that the indigenous youth is attributed the act of fighting and resisting to maintain the rights conquered by their people, care for the demarcated lands, appreciation of cultural traditions, protection, sustainability of the villages, the language and the knowledge, which are the existence of the indigenous being.

It is possible to observe that young Kawaiweté/Kayabi are also attributed this responsibility and hope when analyzing, for example, the answers referring to the following question:

- “What does your family expect from you?”
- “What about your community leaders?”

- C1. "Being a good person and helping the community". "Many things are expected, for example, that we graduate".
- C2. "Having a better future, being able to help them and the community". "May we preserve our culture and remain in the community".
- C3. "They talk a lot to study, which is important". "May we study and preserve our culture and take care of the community".
- C4. "Study, be what we want, help the family and the community". "That we do a good thing for the community, they help young people to be better later on: study to be a good chief, study to come back and help the community".
- C5. "She is very proud of her son focusing on what the community wants and working for it".
- C6. "Don't just sit there, be responsible". "We are expected to focus on the interests of the community, study and help".
- C7. "Be sensible and be a good person". "May it not be lost and help the community".
- C8. "A lot. Finish your studies". "Young people are the future of the community, to keep the culture and traditions".

According to Damon (2009), having a purpose and a noble cause means fighting and acting to achieve it, attributing to it not only meanings, but also motivation and persistence to achieve objectives and goals. In this way, young indigenous people seek their place in the world as subjects of resilience, to continue and preserve the indigenous knowledge left by their ancestors.

According to the author, for the construction of a life project, it is necessary that the young person knows not only himself, but the context in which he is inserted, realizing the difficulties, conflicts and interests present in his surroundings, to set long-term goals and thus contribute to society, based on all ethical teachings and learned values. "The element closest to a prerequisite for a culture of vital projects is the notion of community (DAMON, 2009, p. 17)". Given the above, ask yourself:

"What does your indigenous community represent to you?"

- C1. "Various things, my language, a specific culture, very special".
- C2. "The community makes people stronger. So it's everything".
- C3. "I like to live in it".
- C4. "It teaches us to strengthen ourselves more and not get lost".
- C5. "It represents many things, even more so when there are cultural parties, presentations, singing that shows our culture".
- C6. "Strength, culture and presence".
- C7. "Everything".
- C8. "A lot, I am proud to be an Indian".

For Baniwa (2006), each indigenous people is a unique society, with characteristics of its own group. Its particular cosmology bases on the entire cultural, economic, social and religious life of a community. The young people interviewed mention that the community is a source of ethnic and cultural strengthening and a source of learning. Damon (2009) considers this experience as indispensable, when thinking about the construction of a vital project:

What about the other places where young people spend time in the community soaking up popular culture? What kind of guidance do they find there? It's the big lottery in youth development. Some are fortunate to have adult mentors who introduce them to vital goals and projects that inspire them, as well as practical ways to achieve them. Others will have contact with the best of arts, history and literature that the media and schools are capable of transmitting. (DAMON, 2009, p.132)

It is in this diversity of teachings and learning that the life projects of young indigenous people are built, who have, in themselves, the projection of the community in keeping their culture and traditions alive, in memory of their ancestors.

In order to get to know the representations of the community for young people, we asked:

“What do you consider a problem for Kayabi indigenous teenagers/youths?”

In addition, for indigenous peoples:

“What do you consider a problem?”

- C1. “The drink. This is too much. The young man is drinking a lot”. “The time frame indigenous peoples are fighting to preserve our lands. My parents went to Brasília in a movement against the time frame”.
- C2. “Alcohol”. “Alcohol is now a problem for indigenous peoples”.
- C3. “Alcohol is a problem”. C3 “Alcohol, time frame, many things”.
- C4. “Alcoholism and the fact of wanting to leave the village to study, party, work ... Some parents don't let them because they are afraid their children will get lost out there”. “Currently, I think it's the time frame. It is tense. Because if there is no demarcation, we indigenous people can lose our lands”.
- C5. “Alcohol and the lack of continuity in studies in the village”. “The division in the village, sometimes the chief takes things to the community, some like it and others don't, they are against it and they can't carry out the work”.
- C6. “Alcohol”. “Protect our lands, the jump”.
- C7. “Alcohol”. “Do not approve the time frame”.
- C8. “Cachaça. Alcohol. Not being able to have the complete studies. Not having college within the village. Having to go away to study”. “Several, but the timeframe is the biggest”.

In the speeches of the young people, it is noticeable how much they are informed about current facts, which point to the concern with the social, the political and the sense of citizenship. In this sense, social concerns are restricted to alcoholism in the village and, in terms of citizenship and politics, concerns related to the fight against the *Marco Temporal* and the defense of the Salto Sagrado Kayabi. Considering the importance of listening to young employees, a few lines are described below, explaining the issues raised.

Alcoholism in indigenous communities is a worrying scenario, which is not restricted to the Kayabi people. Guimarães and Grubits (2007) argue that, among Brazilian indigenous groups, the so-called “social diseases” have been occurring, of which alcoholism is a part, which is one of the main causes of death, due to the fact that subjects, when intoxicated, encounter accidents, fights, etc. Therefore, a prevention and health care policy must urgently be formed to discuss and deal with this problem in the context of indigenous communities.

The *Marco Temporal da Terra Indígena* (Indigenous Land Time Frame) is an ongoing proposal in the Federal Supreme Court that challenges constitutional acts, as it proposes that indigenous peoples claim and demarcate only the lands they already occupied up to the date of enactment of the Federal Constitution of 1988. a threat to indigenous peoples, since most ethnic groups today would be harmed, due to the colonization process, which meant that they were no longer in their lands of origin. Indigenous movements fight and resist this scenario, which places indigenous peoples on a vulnerable level, with their rights denied and discussed at all times.

Kayabi Fall

This is the case with the Kayabi Fall. Another concern mentioned by the young people interviewed is the Apiaká-Kayabi indigenous land. This territory is located in the *Rio dos Peixes* region, below a large fall that, according to Kayabi (2016), is known as the Sacred Fall, because for the Kawayweté people, it is sacred, since it represents the strength and resistance of the people. The fall is marked by tradition, mystical stories and the culture of the Kawayweté/Kayabi people.

According to Kayabi (2016), the fall belongs to the Kawayweté/Kayabi people, but, in the first land demarcation, around 1975, it was outside the indigenous land. After a great struggle by the Kawayweté/Kayabi people, in 1978, the leaders began to claim the expansion of the reserve.

Figure 1: Kayabi Sacred Fall



Fonte: Dionísio Mairaiup Source: Dionísio Mairaiup

Currently, the fall is the target of government leaders and large companies seeking the implementation of hydroelectric plants, in the words of Kayabi (2016):

Today, a conflict that frightens us is the construction of hydroelectric plants in indigenous areas, belonging to the Kawayweté people and other peoples. They are being made either on indigenous lands or very close to them. This knowledge about the Sacred Fall and the resistance to not letting the plant be built in the fall are valuable and need to be recorded, they are part of the memory and struggle of my people. Past, present and future generations must know and help this movement to protect the Sacred Kayabi Fall. (KAYABI, 2016, p. 7)

In 2012, according to the website Kanindé *Associação de Defesa Etnoambiental*, the court suspended the construction of a hydroelectric plant. The decision was made through a judge of the 2nd Federal Court of Mato Grosso, who invalidated the license granted by the Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA), under penalty of a daily fine of R\$ 100 thousand reais, if the explosions of natural rocks in the region continued. According to the Kanindé website, the judicial suspension begins with a strong report from indigenous people:

The construction of this hydroelectric plant, drowning the waterfalls of Sete Quedas, polluting the waters and drying up the Teles Pires downriver, would destroy the fish that are the basis of our diet. In addition, Sete Quedas is a sacred place for us, where the Mãe dos Peixes and other spirits of our ancestors live — a place where one should not move. (KANINDÉ, 2012, p. 1)

Kayabi (2016) reports that generations must unite in the movement to protect the Kayabi Sacred Fall, as its destruction results in the weakening of the Kayabi people.

The Kayabi Fall is sacred to my Kawayweté people. In it is the strength of the shamans, place of Ita Mait, on its banks the arrow. It is the place where the Kawayweté seek strength. It is difficult to explain the sacred, but it is in the feeling that it appears, when Kawayweté fall, he knows that the feeling is strong and seeks his energy. Going on the jump in the most sacred place has to be accompanied by a shaman, when we arrive we need to talk to the shaman, the water gets angry and the wind lifts the leaves. There must be silence and the pajé will accompany him to provide protection and then prepare the pajelança. The jump holds the culture, wisdom, and entire spirituality of the Kawayweté people. The jump has life, it is alive and cannot be destroyed, and the destruction of the jump is the weakening of the Kawayweté people. It is important for our life, culture and tradition. (KAYABI, 2016, p. 7)

Certainly, we can observe this finding in the speeches of the young people interviewed. They show a committed and attentive vision to the social and political scenario that surrounds their context, and such observations made point to what Damon (2009) mentions as a purpose “noble”, because, according to him, the construction of a vital project is thought from a central concern, which goes beyond the self.

The research participants did not mention a concern with the absence of parties, material assets, among other ostentations of capitalism, but turned their attention to the difficulties of the current world, the pressures of the social and political groups to which they are exposed and the concern with the other. When concluding the block of questions referring to this category, the young people interviewed answered the following question: Does living in the village interfere with building your future?

All respondents were proud and belonging to their community, bringing only the difficulty of continuing their studies, since, to attend Higher Education, they need to leave the community and live in the city.

They also mention that living in the city requires staying away from the family, community and indigenous knowledge, and that non-indigenous society is very prejudiced and exclusive. The students also reported that even though the Public University has policies for accessing

indigenous youth to studies, it does not have a policy of permanence in the institution, with young people having to face difficulties such as financial problems and the challenges of being away from the community.

Due to the above, this paper investigated the representations of the “I” of young Kawaiweté and their relationship in the construction of their life project, as well as seeking to identify the most emerging issues that guide these young people. When analyzing the participants' responses, we see that their representations of the self are constituted by the idea of a noble purpose and a vital project. As proposed by Damon (2009), as they have discourses of ethics and values aimed at the family, to the cosmos, for the community and for longings located beyond the self-thought of in the collectivity.

In this context, Damon (2009) identifies four groups of young people: the disengaged, the dreamers, the superficial and those with vital projects. The disengaged are those who do not have any life project, are self-centered, show little concern for the world beyond the self, do not seem to seek a goal and are apathetic and disinterested. Dreamers have ideas for the projects they want, but do little or nothing to implement them. Superficial ones, on the other hand, even engage in projects with purpose, but lack focus and determination, frequently changing from one activity to another. Those who have vital projects seek something to dedicate themselves to that has meaning and meaning, being aware of what to do and why. Through an objective and a goal, they have planning for a coherent future, which motivates them to build, every day, steps to fulfill their objective.

Such young participants in this research, then, seek support in their families and in the community for the realization of their ideals, not establishing immediate concerns, such as competition, material gains and financial security, as they think of a greater good for the community.

It is clear; therefore, that contact with the teachings of values, ethics, respect and community begins very early of young person's life, of their family. The elders, family members and the community propagate indigenous knowledge and traditions.

In this way, there is a conception of time facing the present and they consider the past, as it carries ancestral teachings. In this logic, the future not yet experienced does not have immediate projections, imposed by capitalism. However, such factors do not refer to the lack of future projects for the young people interviewed, given that it is built daily in the present.

Conclusion

In this way, the young people interviewed respond to the general objective of this research by pointing to a life project concept in the same way as conceptualized by Damon (2009). As a vital project, they have a desire to leave a legacy for their community, expressing a vital project that seeks to satisfy beyond their own self, seeking to make a difference in the context in which they are inserted, by proposing a tomorrow that contributes to their family and their community.

They express the desire to leave a legacy for their families and for indigenous and non-indigenous societies, as well as having a speech marked by the cultural values of their ethnicity. They have the perception of time facing the present, which does not exclude their

planning and point out that it is in the now that the future that did not exist until then is built. Therefore, the past is valued, as it is from it that their ancestors narrate experiences.

Such young people have a desire to contribute to the collective, to their community, considering and preserving their values, traditions and customs. In this way, they demonstrate central concerns, such as the political scenario, sustainability, territory protection, citizenship and social well-being.

Therefore, they elucidate family and school as a source of support for the realization of their life projects. In dissonance, they do not present a neoliberal and capitalist vision and exclude from their speeches the concern with the accumulation of material goods, money, power and individualism.

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Developing an Online Knowledge Center Model to Enhance the Necessary Skills for Workers in Industrial Enterprises

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Abstract

The objective of this research was to develop an online knowledge center model to enhance necessary skills for workers in industrial enterprises. The development process showed that 1) there were 8 major components of this kind of online knowledge center model: concept and goal, internal/external content and internal/external courses, technology, search/information retrieval system, community/sharing, knowledge center teams, knowledge center rules, and data analytics. 2) The skill development and enhancement process through an online knowledge center model can be looked at from both the perspective of the service providers and the perspective of the end users. For the service providers there are 5 steps: 1) setting the conceptual background and setting goals, 2) designing the online knowledge center, 3) developing and setting up the online knowledge center, 4) analyzing and reporting on the results, and 5) improving the online knowledge center based on evaluation. For the end users there are 6 steps: 1) preparation, 2) registration, 3) utilizing the online knowledge center as a member of an industrial community, 4) utilizing the content and courses in the online knowledge center, 5) applying the knowledge gained in work and life situations, and 6) sharing what one learned within the community.

Keywords: Online Knowledge Center, Necessary Skills for Workers, Industrial Enterprises, Vocational Skills, Adult Online Education

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Introduction

The dynamic trends and movements of the world in the 21st century have forced Thailand to confront many challenges, including both external pressures caused by globalization and advancements in science and technology, and internal pressures from demographic, environmental, economic, social and political changes. In particular, the fact that much more of the world of work has become digital has had serious impacts on the lives and future opportunities of working people. Digital technology, combined with new tools and devices, has in many cases reduced the need for human labor. Therefore, it is imperative to prepare people with appropriate skills that match their individual abilities and their potential, while also matching the situation of society and the economy as a whole (International Labour Organization, 2017). Learning and education that can help people raise their skill levels, or “up skill,” and learn ways to handle new tasks, or “reskill,” is necessary to support the labor market of the future. Working people will need the ability to work together with people, machines, automated systems and robots. The demand for digital and technology-related skills is pressuring working people to develop new skill sets all the time if they want to continue to be employed. “The Future of Jobs Report 2018” by the World Economic Forum, based on the results of a worldwide survey of employers at various kinds of enterprises, stated that employers thought 54% of workers are in need of upskilling and reskilling.

The COVID 19 crisis helped highlight the importance of online learning for people of every age group. People of working age can scarcely avoid working online anymore. In their free time, they are encouraged to seek out online training to gain beneficial new skills and knowledge or to hone their expertise in their chosen field. Although the COVID 19 situation has improved, online learning is definitely still expanding. To further encourage the growth of essential online learning opportunities, access should be expanded so they can reach more segments of the population (OECD, 2020). In managing online learning and training in order to upskill and reskill workers to match the demands of employers now and in the future, one thing the service providers should take into account is that to take full advantage of online learning opportunities, learners first have to possess sufficient digital proficiency. They also need to have access to an adequate computer or similar device that is well suited for online learning, and there must be an adequate internet connection. The service providers face the challenge of presenting worthwhile content and courses in an online learning format and also building quality assurance mechanisms into the system to make sure that the end users’ online learning experience is worth the investment and the time spent. Online knowledge centers are a format that meets the needs of the present situation and can reduce problems associated with limitations of time, place and budget for learning. They can help give working people who are already employed an important learning resource through which they can refine and expand their skills and access specialized knowledge for their careers. The online knowledge center model is a realistic, practical and sustainable way to achieve these goals.

In the first phase of this research on developing an online knowledge center model to enhance necessary skills for workers in industrial enterprises, the researcher surveyed the opinions of 385 workers in primary industries in Nonthaburi Province and nearby areas about the main skills that they thought were important and desired to support work in the digital era. The skills that the survey respondents valued included literacy, ability to get the gist of what is presented, ability to write clearly and understandably, ability to summarize key points, ability to think rationally, problem-solving skills, creative thinking skills, ability to work successfully with unusual and diverse people and environments, ability to work with others to

achieve goals, teamwork skills, leadership and ability to coordinate people with different skills to work together, other professional skills for each line of work, ability to learn, and lastly, kindness, discipline and morality.

When the workers were surveyed on their opinions of the ideal format of an online knowledge center to enhance necessary skills for workers in industrial enterprises, the majority responded that the best platform/provider would be a website, followed by eLearning and, lastly, an online social network. For the second topic of “form of access to an online knowledge center,” most of the respondents favored providing free public access, followed by “both open to the public and to members who register,” and lastly, “open only to registered members.”

The third survey topic explored components of an online knowledge center. Five major components were identified: 1) a professional career development curriculum most survey respondents thought the online knowledge center should have a curriculum composed of work-oriented courses that were developed independently and also some units or resources sourced from other agencies associated with various industrial fields and enterprises; 2) media and information within the online knowledge center most survey respondents thought the center should be a compilation of many kinds of media about industrial, vocational and professional skills that people could access online by themselves for independent study; 3) internal support systems most survey respondents thought the system should provide good security for online knowledge center users, and efficient data storage, with search and retrieval functions organized into categories for different industries and careers; 4) channels for interaction most survey respondents thought the system should be designed to include an online meeting component, and should enable communication on smart phones via social media apps like Line or Instagram, and should include a chat room; 5) devices for using the online knowledge center – most of the survey respondents thought that users would probably access the center through smartphones, portable laptop computers or desktop computers (Supanida and Dungbhorn, 2021).

To develop the draft online knowledge center model for this research, the researcher reviewed relevant literature and analyzed the results of the previous opinion survey of 385 workers in primary industries in Nonthaburi Province and nearby areas to gain insight into the best approaches and necessary foundational principles for developing an online knowledge center model to enhance necessary skills for workers in industrial enterprises.

Research Objectives

The objective was to develop an online knowledge center model to enhance necessary skills for workers in industrial enterprises.

Extent of the Research

The research was divided into 2 phases.

Phase 1: Develop a draft of the online knowledge center model. The evaluators were a group of 3 educational technology experts.

Phase 2: Certification of the developed online knowledge center model to enhance necessary skills for workers in industrial enterprises by qualified experts.

The experts invited to consider approving and certifying the model consisted of (1) fourteen experts on educational technology and (2) one measurement and evaluation expert, for a total of 15 experts.

Research Method

Phase 1: A draft online knowledge center model to enhance necessary skills for workers in industrial enterprises was developed in 3 steps:

Step 1.1 Review of the literature and data analysis about online knowledge centers, their components, steps of development, and the opinions of industrial workers about different aspects of online knowledge centers and online learning centers.

Step 1.2 Write up a draft model for a proposed online knowledge center model to enhance necessary skills for workers in industrial enterprises.

Step 1.3 Get educational technology experts to evaluate the draft online knowledge center model.

Phase 2: Fifteen qualified experts are asked to certify the online knowledge center model to enhance necessary skills for workers in industrial enterprises.

Research Tools

Phase 1: A questionnaire about opinions on the proposed draft model of an online knowledge center model to enhance necessary skills for workers in industrial enterprises.

Phase 2: A certification form to approve the online knowledge center model to enhance necessary skills for workers in industrial enterprises.

Statistical Analysis

The descriptive statistics of mean and standard deviation were used to analyze data on evaluation and recommendations that were gathered using an evaluation form with each item rated on a scale of 1 to 5.

Research Findings

After completing step 1. (Review of the literature and data analysis), step 2. (Writing up a draft model for a proposed online knowledge center model to enhance necessary skills for workers in industrial enterprises), and step 3. (Getting educational technology experts to evaluate the draft online knowledge center model), the researcher revised the draft model according to recommendations. The revised model is shown in Figure 1.

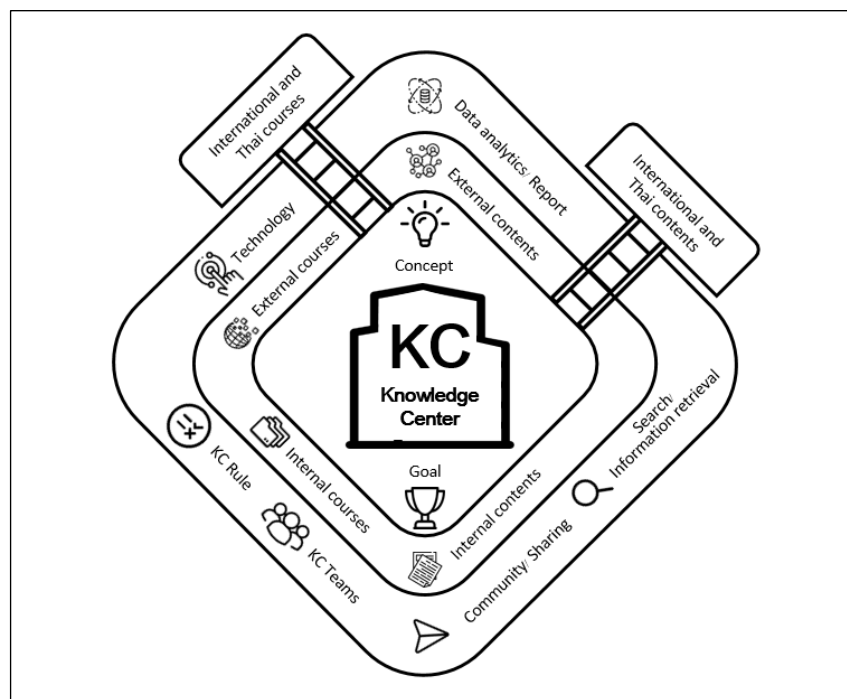


Figure 1: Model of an online knowledge center to enhance necessary skills for workers in industrial enterprises

The online knowledge center model to enhance necessary skills for workers in industrial enterprises has 8 components:

Component 1. Concept and Goal – Identifying, defining and understanding the concept of an online knowledge center model and concepts surrounding the idea of enhancement of necessary skills for workers in industrial enterprises was the first important component before initiating development work. The underlying concepts also remained pertinent for the stage of operation of the center. The objective of enhancing skills for workers in industrial enterprises formed the major conceptual framework for defining the center's concept and goal. The online knowledge center was to operate under the principles of skill enhancement for adult workers in different industries so they could adapt to extremely rapid changes in the workplaces of the 21st century. One central concept was to equip workers with knowledge and skills they could build on for their careers in the future. Another primary goal was to provide a source of knowledge, information, educational media and links to related agencies for people working in the industrial sector.

Component 2. Internal/External Content and Internal/External Courses – One of the main parts of the online knowledge center is the content and course materials, which consist of both educational content developed by the service providers themselves and some media, training programs or courses that are sourced from external agencies. Both internal and external parts must be up to standard and truly beneficial for end users in their work lives.

Component 3. Technology – Of course, technology is an essential component for facilitating network connections, data storage and database management, and data transmission so the service provider can provide and manage services efficiently. The component of technology has to be very stable and secure as well as high capacity so that it can handle the needs of a

large number of users at any given time. The technology component comprises internet, information technology devices and a cloud system.

Component 4. *Search/Information Retrieval System* – The important point of this component is that all the content should be well organized in different categories and topics. The types of content relating to different industries and enterprises and different kinds of work should be well managed in an orderly way so it will be easy to search for and access any specific topic an end user is interested in finding. The online knowledge center will contain a wealth of resources with diverse and rich data, but ideally each end user should be able to retrieve the data they want on a given topic instantly. The search system component and the information retrieval component will facilitate both the service providers and the end users.

Component 5. *Community/Sharing* – The main point of this component is to create and build online community networks of users in similar lines of work and in the same industries. Members of each network can then share and exchange useful information relevant to their work. They can communicate knowledge about their work challenges and experiences in a friendly, creative and constructive social atmosphere. This kind of community interaction will contribute greatly to end users' efforts to upskill and reskill. Members can also use the online communities as a venue to spread knowledge that they have gained from learning at various sources to give others new viewpoints and to launch beneficial discussions where different members can contribute new knowledge and useful observations at any time. The community/sharing component consists of online communities, online sharing and exchange of knowledge, and online dissemination of ideas.

Component 6. *Knowledge Center Teams* – Naturally, the online knowledge center is conceived, designed, developed, built, managed, and used by people, so the teams of individuals involved in all these functions are essential to help the online knowledge center reach its goals. The major teams are the data and content selection and inspection team, the content production and development team, and the IT team.

Component 7. *Knowledge Center Rules* – Clearly stated and legally correct rules are needed to ensure the smooth management of the online knowledge center, to protect the security and privacy of the users, to make sure there is no copyright infringement, and that sources are properly cited. The rules for members to follow should be written out and should include rules specified by the online knowledge center itself and those that apply to relevant government or international laws and regulations including copyright laws, trademark laws, personal privacy laws, human rights laws and computer malfeasance laws.

Component 8. *Data Analytics* – This component is necessary for data analysis and reporting. It comprises both analysis of end user data and a data reporting system.

Necessary skill enhancement for workers in industrial enterprises through the use of the online knowledge center model

There consisted of the form of the online knowledge center model for **service providers** and the form of the online knowledge center model for **end users** with the following details.

The form of the online knowledge center model for service providers there were 5 steps:

Step 1. *Planning and setting goals* – The consultation team and the administrative team joined stakeholders to set the conceptual background and set goals for establishing the online knowledge center as a source of learning that could connect workers in different places to foster the development of knowledge and exchange of ideas. The goal was to compile and develop lessons and courses that working people could choose from according to their needs and interests and access at their convenience, from anywhere and at any time, to upskill and reskill as needed.

Step 2. *Designing the online knowledge center* – The administrative team designed the content, curriculum, technology, data search and retrieval systems, rules, related teams of personnel, online community functions, data analytics, and reporting systems of the online knowledge center based on the concepts and goals that were identified.

Step 3. *Developing and setting up the online knowledge center* – The online knowledge center was developed by the following personnel:

- (1) The content and curriculum selection/inspection team rated and chose items to make available in the center and transmitted information about them among communities in the network of industries.
- (2) The internal content development team studied, planned and developed course materials and content for the center, produced content, and evaluated all the materials and content produced.
- (3) The IT team was responsible for front end work, back end work, and social media work.

Step 4. *Analyzing and reporting on the results* – The evaluation team analyzed data about end users and their utilization of the center to find correlations, to make reports and to form guidelines for developing the online knowledge center.

Step 5. *Improving the online knowledge center based on evaluation* – Content and features of the online knowledge center were updated and improved based on the data from the evaluations in step 4 and feedback from end users.

All 5 steps are shown in Figure 2: Online knowledge center format for *service providers*.

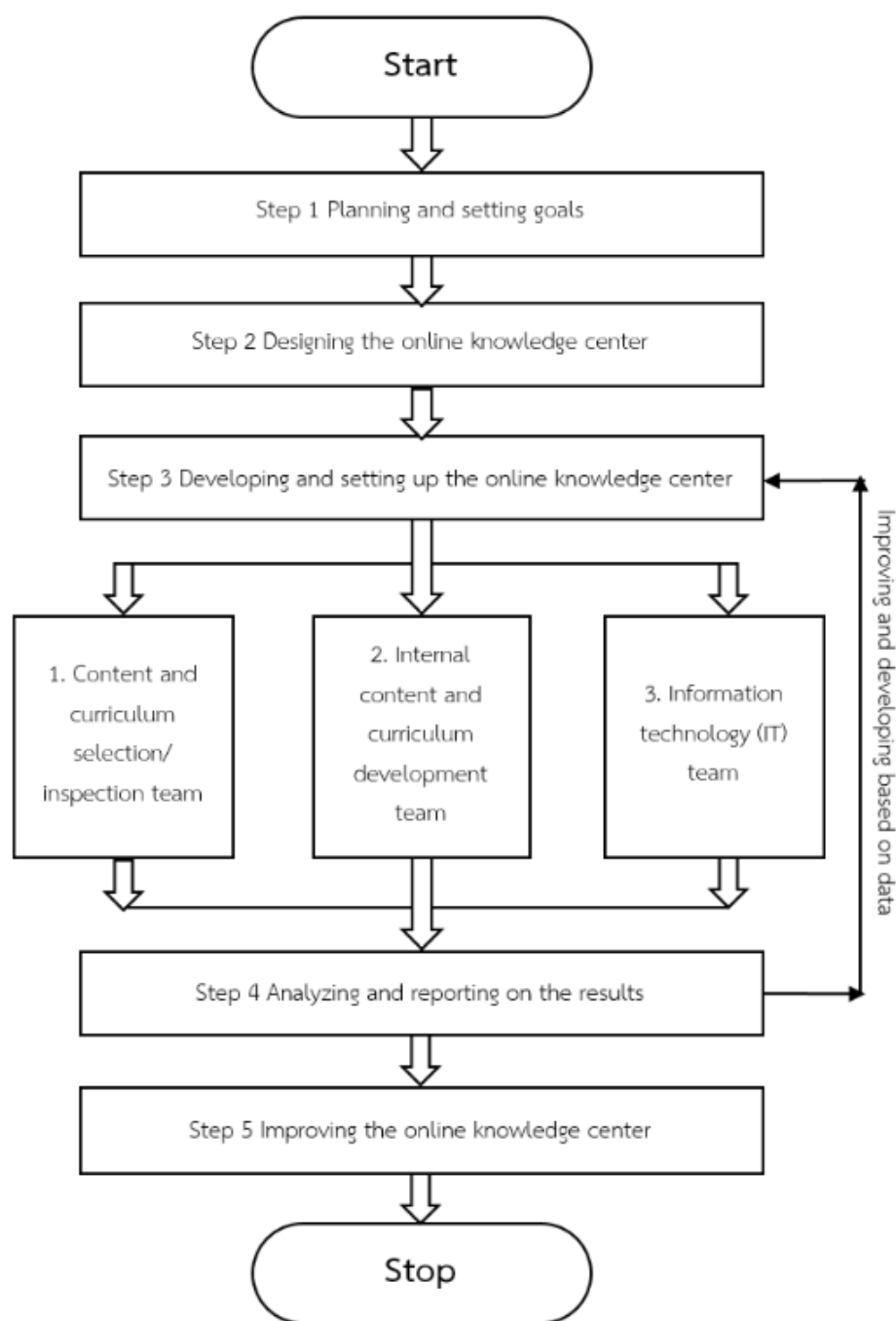


Figure 2: Online knowledge center steps for *service providers*

The form of the online knowledge center model for end users had 6 steps:

Step 1. *Preparation* – For infrastructure, the end users had to prepare devices and equipment, data storage equipment, an electrical system, and internet access. For their personal preparation, they had to become familiar with how the online knowledge center works, how to learn and study, how to search for information, and how to communicate with others.

Step 2. *Registration* – Each end user had to register and create an account, and after that they could access the networks of online communities and all the courses and content in the online knowledge center.

Step 3. *Utilizing the online knowledge center as a member of an industrial community* – Using the main start page of the online knowledge center website, members can read and add news, exchange ideas, share opinions, and share experience and expertise. The web-boards can be used to express opinions and interact with other members/users. There is a help desk where users can ask questions and get assistance with any problem they may encounter using different functions of the online knowledge center.

Step 4. *Utilizing the content and courses in the online knowledge center* – End users can choose all kinds of content and courses from among both those developed internally and the selected external resources, to upskill and reskill as desired. Each course has an introduction that explains the steps, learning activities, and evaluation from the start to the end so users can meet all the learning objectives.

Step 5. *Applying the knowledge gained* – After learning from the courses and content as desired, the end users can apply what they have learned to develop their personal work process and that of their work unit and organization. The online knowledge center will ask for feedback on the results to evaluate how useful and beneficial the content really is in each case.

Step 6. *Sharing what one learned within the community* – After passing through all of the above 5 steps, the end users can apply and practice the new knowledge, techniques, methods and skills they learned as well as demonstrating them and teaching them to others in the online knowledge center community through the feed. This is an additional resource for members of the community who work in the same industry. The content people share will be screened and vetted by the content inspection team before it is broadcast.

All 6 steps are shown in Figure 3: Online knowledge center format for *end users*.

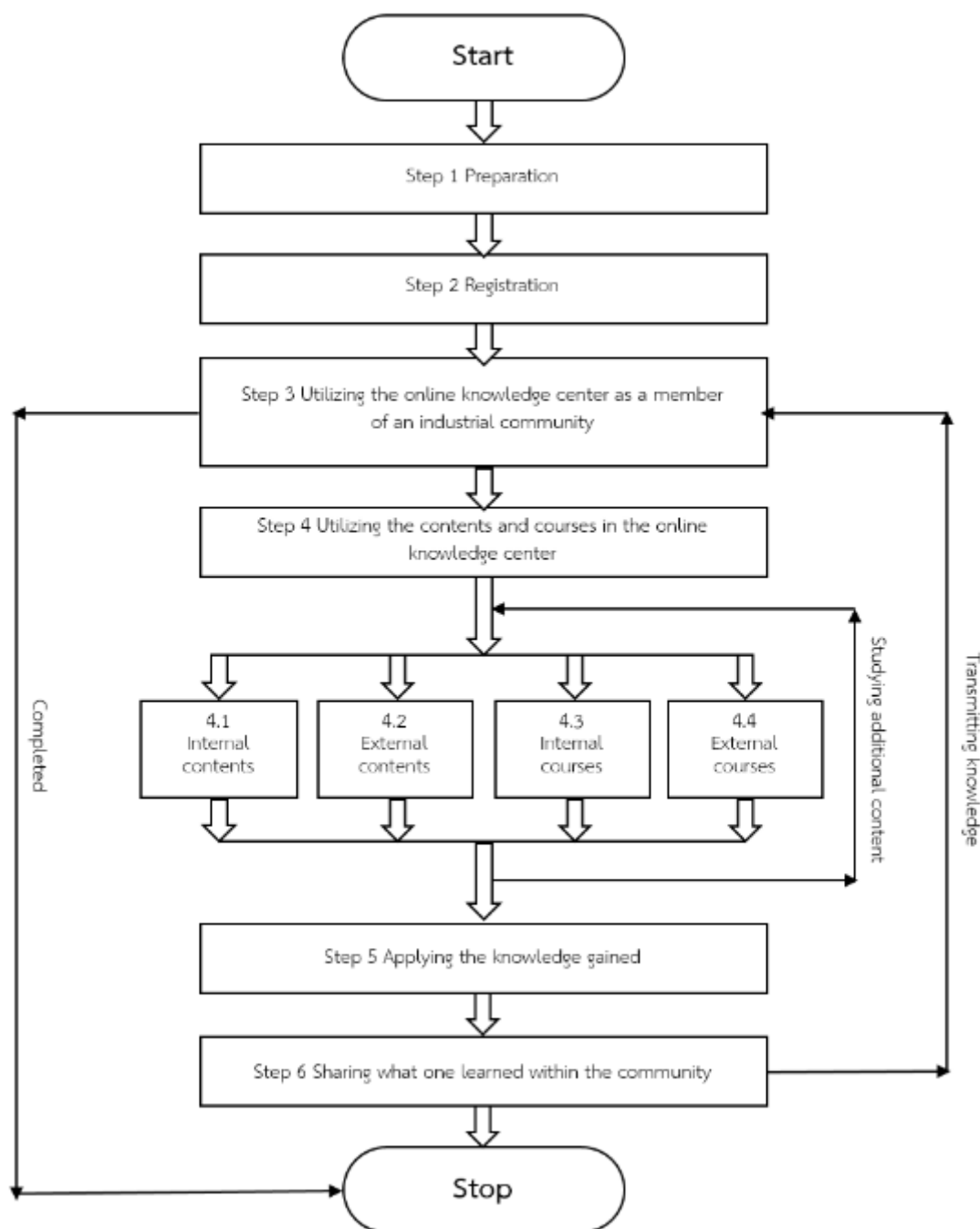


Figure 3: Online knowledge center steps for *end users*

Discussion

The development of an online knowledge center model to enhance necessary skills for workers in industrial enterprises showed that there were 8 components: 1) concept and goal, 2) internal/external content and internal/external courses, 3) technology, 4) search/information retrieval system, 5) knowledge center teams, 6) community/sharing, 7) knowledge center rules, and 8) data analytics. As for the format of the online knowledge center to enhance necessary skills for workers in industrial enterprises, for the service providers there are 5 steps: 1) setting the conceptual background and setting goals, 2) designing the online knowledge center, 3) developing and setting up the online knowledge center, 4) analyzing and reporting on the results, and 5) improving the online knowledge

center based on evaluation. For the end users there are 6 steps: 1) preparation, 2) registration, 3) utilizing the online knowledge center as a member of an industrial community, 4) utilizing the content and courses in the online knowledge center, 5) applying the knowledge gained in work and life situations, and 6) sharing what one learned within the community. This is similar to the online learning center of Disability Leaders of Tomorrow (2019). The components of the Disability Leaders of Tomorrow online learning center (DLoT.ed) were a registration system, assistance, a venue for expressing opinions, and a platform with the training curriculum.

Our results were also consistent with research by Kwanying Sriprasertpahp et al (2015) on the development of an online community called “The ICT-Loving Thai Teachers Network.” They identified 10 components of the online community that helped keep it operating: use of the system by members, the fact that it was a system that arose through synthesis, the strength of the methods of communication used, the emphasis on self-made media produced by members, the fact that most media were images and text, the use of activities in the online community that involved exchange and learning, the fact that content came from both direct experience and summarizing items found on external sources, the use of internet search engines, devices used to access the online community using the internet, and evaluation and constructive criticism from online community members.

Further, our research results correspond to those of Supaporn Sornsiththirat (2016) from a report on a study of the development of a knowledge management format for a professional community network using online social media that aimed to promote proficiency enhancement and professional expertise accumulation for civil servants. The community network’s knowledge management consisted of 5 major components: personnel, process, networking, technology, and professional community culture. Knowledge management for the professional community network using online social media had 7 steps: orientation, practical training, self-led knowledge management, one-to-many knowledge management, one-on-one knowledge management, group knowledge management, and knowledge evaluation.

Our findings regarding the steps of promoting necessary skill enhancement for workers in industrial enterprises were similar to the findings of Jaroen Poowijit (2021), who reported that there are 8 methods to achieve results efficiently when managing online teaching/learning: 1) clearly define and state the approaches to online learning; 2) design content and methodology that matches the learners’ interests; 3) choose suitable online teaching tools; 4) encourage learners to work together online; 5) utilization through both group work and individual work; 6) making use of each learner’s existing resources; 7) opening teaching opportunities by letting learners summarize or reflect on lessons and share their learning experiences; and 8) periodically adjusting and making improvements on the online teaching management based on feedback elicited from learners.

Looking at it from the dimension of studies about promoting online learning specifically for adult learners, some conclusions from our study resembled those in an article by the OECD (2020) about lessons from the COVID 19 crisis regarding the potential of online learning for adults, which suggested that promoting online training for adults can help open up opportunities to reach a very large number of learners. The OECD concluded that online learning can be a very valuable alternative to in-person training. If an individual can find a way to improve relevant work skills in an efficient way that is up to international standards, then that avenue can lead to long-standing employment opportunities, and online training can

also increase productivity for companies and the economy as a whole. However, an interesting problem about online learning on a global scale is that if we want all adults to benefit from it on an equal basis, we have to first make sure that every adult has the required digital skills and computer and internet access. Online learners also have to have sufficient personal incentives to want to upgrade their skills. The lesson the COVID 19 global pandemic crisis taught us is that it is possible to overcome various limitations to make online learning as effective as possible, because in fact when it is absolutely necessary, then everyone can adapt and find ways to continue living under new challenges.

The results of the present study in terms of the perspective of the end users of the online knowledge center also echo the observations of Johnny Wood (2021), who wrote on the increase in the number of people learning online. He wrote that interest in online learning tended to grow from 2016 to 2021, because it was documented that in that period the number of applicants registering for open educational resources (OERs) and Massive Open Online Courses (MOOCs) rose approximately 32%. This increase suggests that online education and learning has gained greater public acceptance, and more people are willing to seek online distance education and online learning opportunities as a way to raise their level of knowledge even if they are in remote locations.

Similarities were also seen with the work of Alessandro (2018), who wrote about the components of online learning under the framework of the European commission in 2020, which comprises both digital learning and online learning. Digital learning covers a wide range of diverse learning formats and method that can be combined using different software to support digital learning. Online learning is learning based on using the internet, and can include the use of social media applications to create joint learning experiences for many learners together. Online learning can be individual and personal or can have group work components. It can take place at any time and in any place using a mobile device or a stationary device. It mostly relies on open educational resources.

Recommendations

Recommendations for Using the Research Results

Several things should be taken into account when using the developed model for an online knowledge center in order to make sure that the enhancement of necessary skills for workers in industrial enterprises is done really effectively.

In terms of the components of an online knowledge management center, researchers should study and develop new tools, and should assess the content and courses that were internally developed by the online knowledge center team to determine if they really met the needs of skill enhancement for workers in industrial enterprises. The people in charge of content and course production and content and course selection should study the actual current situation and demand for different skills in different industrial sectors.

In terms of the equipment used by the end users of the online knowledge management center, when standards and specifications are decided on and set, the technology team should survey and think about what kinds of devices and technology the majority of end users already own or have access to. If most users have to upgrade their equipment, this would mean an added cost burden. For some, they might decide that because of the added equipment cost, it would

not be worth it to invest in skill enhancement through the online knowledge management center.

In terms of online community building and sharing knowledge and experiences, the venue for this should be very easy to use. It should have design features that encourage continued participation and frequent interaction. The team in charge of operating the online knowledge management center should create incentives for people to participate in the online communities.

Recommendations for Future Research

In this research, an online knowledge center model for enhancing the skills necessary for workers in industrial enterprises was developed. The model can serve as guidelines for creating this type of online knowledge center. Further research should assess the actual use of the online knowledge center by real workers in industrial enterprises in the real world to see how beneficial it is, and if the skill enhancement is impactful and long-lasting. Then the results could be used to develop, improve and raise the standard of the online knowledge center.

Conclusion

In summary in this study, entrepreneurs, researchers, or academics take the elements and steps of the online knowledge center model to promote necessary skills for workers in industrial establishments to create an online knowledge center for use with real workers. Based on 8 major components of this kind of online knowledge center model: concept and goal, internal/external content and internal/external courses, technology, search/information retrieval system, community/sharing, knowledge center teams, knowledge center rules, and data analytics. Including, the skill development and enhancement process through an online knowledge center model can be looked at from both the perspective of the service providers and the perspective of the end users. Entrepreneurs and stakeholders adapt this online learning center model and create an online knowledge center to serve workers, which is another approach for upskilling and reskilling sustainably.

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Impact of Innovative Approaches of University Leadership on Administrative and Academic Staff Motivation

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Abstract

There is an increasing recognition that higher education institutions require highly motivated academic and administrative staff which is affected by efficient university leadership and, in its term, creates the basis for students' high performance and excellent outcomes. The most essential strategy in reaching the success of the university is motivating the staff and encouraging them to put more effort in teaching and scientific work in order to enhance individual and organizational performance. For this reason, the role of university leadership is crucially important to encourage the staff and support them to develop professionally. The problem of motivation is closely related to innovative approaches applied by leadership which ultimately determines university high performance. Considering some specificities of university personnel, and of academic staff in particular, the need for selecting different forms of motivation is essential and is a prerequisite for the university success in general. The present research which was conducted in Georgia and Poland, in state and private universities, applied quantitative and qualitative approaches, specifically survey and interview methods. The analysis of the study is based on the results of the responses obtained from two hundred eighty-eight research participants which helps to understand how changes in motivational model based on leadership style and innovative approach could enhance academic and administrative staff motivation in Georgian and Polish universities, as well as demonstrate the positive correlation between the highly motivated staff and university leadership.

Keywords: University Leadership, Innovative Approaches, Academic and Administrative Staff Motivation

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Introduction

The article studies the role of the university leadership in motivation and the effective performance of academic and administrative staff. The study has been inspired by some quick, informal preliminary surveys of university lecturers, both state and private, who admitted that they experience a lack of adequate support and encouragement for innovation, professional growth, and research development. This has been the main inspiration for studying innovative approaches to academic and administrative staff motivation in Georgian and Polish universities. Internalization of the Georgian higher education system has been promoted for the past two decades as an effort to align it with Western higher education. The Government of Georgia has applied to European Union for candidacy of EU membership, therefore the state institutions take all necessary steps to accelerate Georgia's accession to the Union.

Raising the quality of teaching and learning at higher education institutions is one of the goals among the others to be attained by our country to align with EU higher education standards. Besides, According to the 2018 Bologna Process Implementation Report, decisions on recognizing foreign qualifications for academic purposes are the responsibility of higher education institutions. In addition to the multiple benefits associated with student mobility, such as European integration and the exchange of knowledge, experiences, and intellectual capital, the free movement of students to study and work within Europe is a founding principle and long-term objective of the Georgian Higher Education Policy. The university leadership plays an instrumental role in this process.

Motivation and Its Importance, Innovative Approaches

Employees' motivation requires cooperation of leaders, managers and employees. Building organizational commitment and trust, providing good working conditions by considering employees' needs and promoting good social relations will generate effective leadership process. Motivated staff is more productive, happy and highly committed to their job which is essential for the university success and promotion. Therefore, adopting a suitable leadership style focused on motivating academic and administrative staff according to their needs is an attractive option. A number of experts, such as Vroom (1964); Kotter (1999), and Schein (2004) agree that developing a strong organizational culture is a key to success, which is related to performance and leadership. It also depends on leaders' ability, perception, behavior and collective values which are widely shared. Leadership competencies include the ability to motivate academic and administrative staff. Higher education leaders have to reveal academic and administrative staff needs and requirements and target innovative approaches. Academic and administrative staff need personal freedom, more involvement in decision making processes, the ways to introduce their opinions and approaches about any issue related to their responsibilities. The university leadership should have adequate awareness and information for preparing and developing appropriate atmosphere amongst academic and administrative staff and understand their work and needs. They should encourage the whole staff to do to work efficiently, give them a chance for promotion and advance individual approaches. When top management considers these recommendations and increases employees' motivation levels, it directly reflects on their productivity and, therefore, on success of HEI. Low levels of motivation and job satisfaction at higher education institutions lead to employees' demotivation among academic and administrative staff. The principal role of university is to distinguish the requirements of academic and administrative staff based on work condition and to meet them according to organization's policies.

The role of university leadership in motivation of administrative and academic staff has not been researched in the light of the 21st c. challenges in higher education on the examples of Georgia and Poland. Therefore, the problem of motivation is closely related with innovative approaches to leadership which ultimately determine university high performance. Furthermore, the research aims at studying the relationship between the highly motivated academic and administrative staff and efficiency of university leadership, referring to its effective strategies in order to meet their needs and expectations. The answers are likely to provide some insight into leadership styles involving human resource management that might work more successfully for Georgian and Polish universities to promote good morale, academic and administrative staff motivation and job satisfaction, which is essential for university success.

In order to explore the relationships between the university leadership and staff motivation, the following hypothesis was formulated: If university leadership incorporates innovative, well-organized approaches to motivate administrative and academic staff considering their necessities and aspirations, the overall performance and effectiveness of staff and lecturers will significantly increase. The article is based on a number of motivation theories which guide leaders to choose appropriate ways of refining workplace environment and increase the quality of service, constantly look for ways to refine the daily practice of the employee performance which is directly related to their motivation.

The leaders of the institution shall consider a range of incentives and design their own unique systems of incentives that will fit the needs of employees within the workplace; they can use two main types of incentives: financial and non-financial. Financial incentives are directly related to cash, including pay increases or bonuses, while non-financial or moral benefits are ways to save the budget, hence they mainly deal with recognition, advancement and basic psychological needs of the employees. Staff motivation is a major tool for keeping and enhancing academic and administrative staff professional knowledge, also teaching and research skills to achieve high performance.

Leadership Theories and Styles in Education

There are theoretical underpinnings for the field of educational leadership and management, assessing different leadership models, and discussing the evidence of their relative effectiveness in a HEI. Leadership as a concept includes various branches that in their turn represent numerous leadership theories. Both successful and unsuccessful leaders are characterized by certain forms of behavior. The most popular behavioral theory still remains the typology of individual leadership styles, developed in the thirties by a German psychologist Kurt Lewin (Billig, 2014)(Billig, 2014). It highlights three leadership styles: authoritarian; democratic; neutral. Many parameters distinguish these styles from each other: the nature of decision-making, the degree of delegation of authority, the method of control, the choice of sanctions, etc. The main difference between them are, however, their preferred management methods.

This section aims to determine the effectiveness of different leadership approaches and identify leadership behaviors which provoke certain kinds of actions and decision-making. A deep overview of the leadership theories provides a great chance to understand the nature of leader behavior in different situations. Theory of contingency focuses on particular variables which characterize environment and try to specify which leadership style should be applied in a given situation. The relationship between the situation and the leader who is in charge of

the condition predetermines how well the leader and the followers will manage the emerging task. The contingency theory is often called a leader-match theory. The leader can be effective provided that the gap between the skills and the particular environment requirements are close (Fiedler, 1976). The situational leadership is quite rigid for a leadership style as there has to be a match between the situation and the leader. As long as leaders realize the importance of the Contingency theory, they create positive ambience at the workplace. In terms of education, the Contingency theory occupies an important niche as it is often seen as a way for leaders, managers and various organizations to assimilate to ambiguity by designing a strategic plan with alternative scenarios. There is a belief that the leader copes with the changing circumstances only with the help of experience gained in similar situations. Situational leadership theory may sound as the most appropriate approach to use it in any working environment. It is not one-sided, neither it sticks to one and the same set of rules. On the contrary, it lets the leader choose upon the decision making in order to provide the best possible outcome. This leadership theory implies taking actions according to the situation in which there cannot be a single model for problem-solving. There are several approaches to Situational leadership, differing in the choice of criteria that determine the management situation. For example, Fiedler (1967) proposed an approach in which the most important situational factors are the relationships between the leader and the followers, the structure of the work clarity regarding what and how to do and the imperious position of the leader in the organization. The theory has become most popular in recent years with P. Hersey and C. Blanchard as the authors, as their work, *Situational Leadership II*, is based on the belief that people can and want to develop, and that there is no single best management style to encourage this development. Leadership style must adapt to the specific situation.

On the other hand, Transformational leaders help their followers develop and grow into leaders themselves by responding to what the followers need and also empowering them as they achieve their own and the organization's goals and objectives. Leaders in higher education must assess the outcome of the shared vision and see if it has successfully met student and/or staff needs or whether challenges remain. Transformational leadership brings teams together to co-construct, learn and reflect on visions and goals. This kind of collaboration often supports positive change and broadens effectiveness of professional leadership practices. When working in education, teams of professionals bring personal commitment and passions toward planning and improving their collegiate community. Bleedorn (2003) explains that "transforming leadership creates a dynamic connection to the ideas of other enlightened, systematic thinkers and observers". University administrators act as transformational leaders by integrating a shared vision of change, empowering voices in a collaborative community and, reflecting on vision value (ibid).

In case university leaders who wish to motivate academic and administrative staff adopt some features of authentic leadership behavior and combine it with the characteristics of transformational leadership, their level of effectiveness will increase (Ilies et al., 2005). Subsequently, this creative approach of the leaders attitude toward their goals has a positive impact on employees' intrinsic motivation. Moreover, such leaders encourage the followers' self-determination.

To summarize leadership is a type of managerial interaction that is based on a combination of various sources of power that is more effective for a given situation and is aimed at encouraging people to achieve common goals. Leaders also know how to balance the individual aspirations of team members with a focus on creating synergies, which is a common result that far exceeds the sum of team members' individual contributions.

Employee effectiveness as can be seen fully depends of successful leadership and management and therefore, leadership motivation. Higher education leaders have to examine how they can lead their organizations better and figure out what effective leadership approaches would best fit their institution (Black, 2015), so, that it is possible to achieve organizational goal productivity and the overall quality of work life (Nanjundeswaraswamy & Swamy, 2014). As the university is an academic institution, professionals such as university employees need a different form of leadership (Bryman, 2007; Eacott, 2011; Lumby, 2012). Therefore, not just one particular type of leadership could be considered appropriate but a combination of a few approaches for example, transformational and authentic leadership, which, according to a situation and circumstances could be found most effective to motivate university staff in a given place, time and situation.

Research Methodology and Methods

The design of the present study is based on the mixed-methods approach. This is intentional, as both quantitative and qualitative approaches provide the data which permit to make an in-depth analysis and reveal the effect of university leadership on administrative and academic staff motivation in a wider perspective. Using mixed methods in the research gives credibility to the study and strengthens its results (Alghazo & Anazi, 2016).

Observing secondary data (publications, scholarly articles, dissertations or any other sources relevant to the particular issue) provided the researcher with general understanding of the problem selected to be investigated. The research intends to explore the phenomena which have not been investigated in the Georgian or Polish contexts and set correlation between university leadership approaches and academic and administrative staff motivation at universities.

The study aimed to identify university leadership approach and styles at Georgian and Polish HEIs, customizing reality where this leadership occurs and how it makes an influence on administrative and academic staff motivation. In this case, the researcher used inductive reasoning in order to test the reality provided by the university leadership and ‘crosscheck’ the provided data by administrative and academic staff. The goal of the quantitative research methodology was to identify whether the university top managers’ current strategy and leadership styles were appropriate to motivate administrative and academic staff, or not.

The surveys and interviews are one of the primary data or first-hand collected information gathering instruments for this study. The target audience was the administrative, academic, invited staff and university top managers from Georgian and Polish Universities. The primary data were collected through an online questionnaire and interviews to achieve the specific objectives from various universities in Georgia and Poland. The qualitative data, was gathered for deeper explanations. This allows the researcher to analyze data using different statistical methods.

Following the research questions, two different sets of survey questions as a primary quantitative research tool have been developed. One for the leadership, and the other for the administrative and academic staff of the HEIs. A survey, sent to the administrative and academic staff in order to understand how they are motivated and how they evaluate the effectiveness of cooperation between the university leadership and employees, collected the data reflecting the level of satisfaction in regards to the methods of motivation. Almost the same questions (with some modifications) were sent to university top managers to learn

their position as well as the measures taken by them to achieve meaningful motivation of the employees. Ultimately the responses obtained from the two sets of survey questions have been used for the comparison of responses and allowed the researcher to analyze data using different statistical methods. The online questionnaire was distributed via email among the university administrative and academic staff in Georgia and Poland. The questionnaire was first piloted with education experts and several employees within the university.

The researcher conducted semi-structured interviews with the top managers of the HEIs in Georgia and Poland in order to gain a clear understanding of their attitude toward administrative and academic staff motivation. The semi-structured interview consisted of non-standardized questions, though the researcher had a set of topics and questions to be asked. It allowed the researcher to maintain the focus and the structure of the interview while asking for further details and clarifications where necessary.

The representatives from Georgian and Polish HEIs were categorized into two groups: 1. University top managers; 2. Academic and administrative staff. The total number of the respondents was two hundred and eighty-eight. (n= 288) two hundred twenty-four (n=224) among academic and administrative staff members and sixty-four (n=64) top managers of the targeted HEIs). Two types of questionnaires were sent to the respondents. One for administrative and academic staff (20 Questions: 15 close-ended and 5 open-ended), and another for university top managers (11 close-ended, 1 open-ended and 5 interview questions). Quantitative questionnaire data were analyzed using the Statistical Package for Social Sciences. (SPSS Version 23).

As the researcher intended to interview university top managers, the selection of institutions depended on the researcher's possibility to reach out the respondents. The researcher used self-designed, open-ended questions, giving respondents the opportunity to reply freely in their own words. Five interview questions (n=5) were applied for the university leadership.

The open-ended questions were determined as the best chance to identify valuable and unexpected responses from the respondents. Participation was voluntary and anonymity and confidentiality were taken into account. Open-ended questions and interviews were analyzed through comparative content analysis using NVivo 12 and emerging themes and patterns were collected according to the frequency of words and phrases. The top managers answers were 'cross checked' with the academic and administrative staff. The interviews were conducted in Georgian and English. According to their permission, all the interviews were recorded and later transcribed. The recordings were deleted as soon as the data were analyzed.

Research Results

The study aimed at demonstrating the significance of a broadly constructivist view on enhancing motivation among university employees. The psychological aspects of the motivation among teachers and lecturers have been identified as well, which is largely connected with the respect and recognition of achievements. This research argues that it is both possible and desirable to combine these two insights. Despite the fact that the survey was mainly focused on collecting quantitative data, there is considerable value, perhaps, in the personal verbal evaluation to be gained from exploring 'everyday' understandings of rather multifaceted and complicated problem of motivation. Epistemologically, qualitative

data of this sort poses potential to significantly broaden our knowledge of the role of motivation.

So far, too little effort has been spent on listening to the stories that university academic and administrative staff have to tell about how university motivational policy and strategy is understood and experienced in the context of everyday life. This gap has been partially addressed in the present study focusing on the everyday understanding of motivation among university staff.

The university top managers and leaders outlined the following important factors in the process of staff motivation, among which the priority was given to “respect and recognition, together with just and fair attitude including equal reimbursement”. This view on motivation is explicitly relational, inasmuch as interaction with others constitutes a prerequisite for the achievement of the desired result. It is also understandable that expression of *respect and recognition from management* is based on high demand of the university staff, of those who undertake the most important function in the country – raising and educating the youth. The next category constructed based on the majority’s view is personal support which embraces: “advancement, guaranteed salary and good working condition, and support in solving academic and administration problems”. Personal support and understanding may emerge in many ways, and it plays an important role in good operational working of the organization. Consequently, it has always been fully appreciated by employees.

The following also demands a particular interest because it is closely connected with the proper functioning of the higher education institution, which includes: meaningful communication with the staff, involving persons working in academic and administrative positions in decision making, and support in solving academic and administrative problems which motivate a person raising their self-esteem and maintaining loyalty to the university.

Recognition of achievements and financial support has been at one of the leading positions in both: close-ended and open-ended questions. Almost all respondents verbally expressed the need for “acknowledgement and appreciation” of the administrative and academic staff members, while the latter are the assets of the university, the intellectuals creating an image and setting up much needed relations with the public, due recognition of their role and the tasks fulfilled – all serving one of the most important directions in the range of motivation.

But the ways of recognition also vary, it involves verbal praise on the one hand, and praise plus financial support, on the other. At the same time, it suggests personal promotion and a set of responsibilities allowing freedom in making decisions individually. Mutual respect, trust and loyalty aggregating between the management and employees is the result of such attitudes on the part of administration.

As it was expected, incentives, as one of the most powerful means of motivation have been mentioned by top managers, but, as it is associated with additional financial expenses, this aspect has been less accentuated than the other ones, e.g. showing respect. However, it has been mentioned that academic staff’s scientific activities, such as publications, participation in international conferences and seminars, which also sustains their professional development, should be financed by university. This is an issue of mutual interest and creates an organization culture based on morality, shared understanding about university advancement, and as the researcher argues, it is one of the findings of the present research.

Conclusion

The research achieved all the posed goals and objectives, answered all research questions, proved the hypothesis which is reflected in the corresponding results. This alignment is shown in table 1.

Table 1. Alignment of goals, objectives, RQ, Hypotheses, & Results

Alignment of goals, objectives, RQ, Hypotheses, & Results				
Goals	Objectives	Research Questions	Hypotheses	Results
The goal of the research is to investigate the role of the university leadership in motivating academic and administrative staff in Georgia and Poland.	To identify the factors influencing academic and administrative staff motivation which are based on university top management's current strategy and leadership styles.	RQ 1: What is the role of university leadership in raising employees' motivation in the case of Georgian and Polish universities? RQ 2: What are the factors affecting staff motivation?	H1: If university leadership incorporates well-organized approaches to motivate administrative and academic staff considering their necessities and aspirations, the overall performance and contribution of employees and lecturers will significantly increase.	87% Georgian top managers positively assess (mean 5.56 out of 7), 90.6% Polish top managers positively assess (mean 5.62 out of 7)
The research aims at studying the correlation between the highly motivated academic and administrative staff and efficiency of university leadership, referring to its effective strategies in order to meet their needs and expectations.	To study the particular needs and expectations of the recipients in Georgia and Poland based on quantitative and qualitative approaches. In addition, the focus is made on the effectiveness of staff motivation resulting in university high performance.	RQ3: What are the expectations of academic and administrative staff from university leadership in terms of motivation? RQ4: What strategies can be developed by the university leadership to improve staff motivation and job satisfaction?		Salary (67% Polish and 64% Georgian top managers)

Source: Developed by the researcher.

Critical review of motivation theories and comparison of those to the results of primary data, give an interesting picture. Based on our observation, due to the fact that modern universities are induced to meet lower level motivational factors which should be confirmed during university authorization and accreditation stages carried out by state institutions, only about 30% of administrative staff chose "improvement of working conditions" in a multiple-choice question.

If the employees at the university feel that there is a lack of appreciation and incentive awards for work done, inequity may exist. For instance, employees who feel their work is not being appreciated, may work less, or undervalue the work of other employees.

The two highest motivational factors in Herzberg's Two-factor Theory has been proved by the research data, e.g. the highest ranked motivator, recognition, proved to be a major motivation factor among academic staff. The third ranked motivator, salary increase, which is a hygiene factor, also appeared to be one of the strongest motivations, but not a decisive one. Paying Georgian and Polish university academic and administrative staff lower wages 'hygiene factor', rather than what they believe to be unfair may lead to job dissatisfaction. Conversely, employees will be motivated when their work is recognized, but will not necessarily be motivated only by high payment.

The collected data showed that the majority of employees working at the private universities are more satisfied than at the state universities with the salary they draw.

As the study results showed, involvement in decision making for Georgian and Polish university staff is equally crucial; the employees of the universities of both countries are involved in decision making processes which is the source of satisfaction, though private university employees are more involved than of those state ones.

Job enrichment can be used to make work more interesting and increase payment by adding higher-level responsibilities to a job and providing monetary compensation to employees for accepting this responsibility. Based on the data collected from the survey, job enrichment should be an effective way to motivate employees of Georgian and Polish universities, as they expressed the readiness and willingness towards taking additional responsibility, additional power and freedom of decision making.

The highest percentage (of respondents in Georgian Private universities) recommended the expression of more recognition and appreciation towards academic and administrative staff. The quality of staff involvement in decision making should be improved. 45% of the respondents recommended that the level of equality should be balanced at the universities and the quality of improving staff motivation strategy should be improved at Georgian universities. The other recommendations stated by the employees were: increase of salaries, more clear definitions of job responsibilities and mission/goal of organization, employee development policies, encouragement of social/cultural activities, professional trainings and so on.

The level of trust, respect and high expectation from management and colleagues has been one of the most commonly identified motivating factors by academic staff.

Career advancement and promotion at the universities was very positive and encouraging, as over the years consistent and hardworking employees have risen through the ranks to their current positions. Interpersonal relationship among management and staff was considered excellent.

As the quantitative and qualitative research showed, most of the participants are interested in professional development and constantly try to have academic freedom, incentives, recognition, appreciation, more involvement in decision-making process and material or intangible support. It seems that top managers have a good theoretical knowledge concerning which motivational factors are more important. However, as it is evident from the employees' responses, those means of motivation mentioned by the university leaders are not fully utilized by them.

Georgian and Polish private and state university employees must be willing to let managers know what motivates them, and managers must be willing to design reward systems that motivate employees.

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Helping Refugees and Immigrants in Norway to Finish Lower Secondary School – Self-Regulation, Motivation and Mastering of English in Adult Learning

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Abstract

Immigrants and refugees who aspire to live and work in Norway must often finish the equivalent of 10 years of primary and secondary school in one or two years of intensive studies. In the case of the subject English, students' levels vary enormously, from complete beginners to fluent users. To help students find motivation and self-regulate their own learning in class, a five-step method has been applied, where the students identified 1) What is important when learning English? 2) What do I master already? 3) What is challenging for me? 4) What should I focus on? and 5) How can I work with this? This case study presents findings from a class of immigrants (n=8) who worked with these five questions to self-regulate and define their own needs in the subject English. By building their own metaphorical staircase based on the answers to these five questions, the students made plans concerning what to work with and how and followed up on this for periods of one to two weeks. When evaluating, the students reported to be able to choose activities, to feel in control, and to see their own limitations. One student commented that "I get to practise everything I need (read, listen, write, speak)" and another wrote "I can see my goal. It's my own decision how much time I need to get there." The data shows that with the five-step method, all students can work at their own pace, allowing for individual adaptation, self-regulation and motivation.

Keywords: Self-Regulation, Motivation, Mastering, English, Immigrants

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Introduction

Many refugees and immigrants who come to Norway must adapt to a radically different culture and society from what they are used to. There are requirements to learn Norwegian, take a course in life mastery (Integreringsloven, 2020), and generally a formal education is needed to get a job. As part of the adaptation process in Norway, they must finish the equivalent of 10 years of primary and secondary school within two years. This means that not only do they need to master the Norwegian language well, but they also need to have knowledge about various subjects in Norwegian. In other words, they must graduate from lower-secondary education as adults according to the Norwegian curriculum, to continue to upper-secondary education or vocational training. In addition to learning about Norway and learning Norwegian, English is one of five compulsory subjects. This obviously means language learning, but the subject competence objectives focus much on social science and social studies in English, learning about and reflecting on topics like English as a global language, sustainable development, democracy and citizenship, as well as indigenous peoples in Norway and the English-speaking world. Alongside their lower-secondary education, learners must also continue to develop their Norwegian language skills. All things considered, it is easy to assume that many immigrants in Norway find themselves in an overwhelming situation that is challenging for their motivation.

Naturally, students' backgrounds differ socially and culturally, in civil status and work experiences, as well as in education. In the classroom of the current study, the variation also includes an age span from 16 to 30. Since the students are not the same age, some are parents and others are living with their parents. One is a teenager dreaming of becoming a medical doctor, playing football in his sparetime, while his classmates try balancing the roles of parenting and being a partner as well as being a full-time student. Their children catch all kinds of bacteria and viruses, which sometimes prevents their parents from attending school. Other students are occupied with finding a spouse or part-time jobs. Two of the students have come back from maternity leave after two babies were born during the school year.

Within two years these students will be evaluated according to the competence aims for 10th grade English, and they may possibly have written and oral exams so that they can receive a diploma for lower-secondary education. All of this makes way for several challenges, motivationally as well emotionally, but also when it comes to time management. The classroom includes students who have studied English for several years, who have difficulty finding motivation to re-do lower-secondary level English at first. Some boredom is to be expected, both for those who struggle and those who find some of the teaching too basic.

Very often students believe that they know what to expect in class, only to find that the English classes in Norwegian lower-secondary education have different content or other work methods and goals compared to that of their home country. Others fear the English subject, due to bad experiences or lack of experience, and some even are used to not having teaching materials at all or having worked with teaching methods that only reward reproduction, resulting in low listening comprehension and speaking skills. Low self-esteem related to previous English learning experiences may be a motivation killer for those who expect failure.

According to the Norwegian Education Act (1998 § 9a), every student has the right to a safe and good learning environment that promotes health, well-being, and learning. Immigrants need not only feel safe, but they also need to feel a sense of belonging and of purpose. This

can be challenging enough by itself. On top of this, Norway is a country with a cold climate and generally a somewhat reserved population who not necessarily is inclusive of foreigners, whether they are immigrants or refugees who come from abroad or ethnic Norwegians who come from another part of the country. Without generalising too much, it is safe to say that many immigrants and refugees are likely to experience a cultural shock.

One of the best ways to overcome this shock and adapt to the Norwegian lifestyle and culture is presumably to go to school and study. It may not be enough just to live in the country and try to adapt, because more knowledge and perspectives are needed. Like all students and students in Norway, immigrant students have both the right to feel inclusion as well as to participate in class. (Meld. St. 6, 2019-2020, p. 11). The research question of the current study is: How can we help adult immigrants to self-regulate and be motivated when learning English in school? To answer this question, a case study is presented, including 8 immigrant students of English in an adult teaching centre in the south of Norway who worked with a five-step method and metaphorical staircases with individual learning aims to increase their self-regulation and motivation for learning English. The methodology applied will be presented below, after a short description of what self-regulated learning means, followed by results and a discussion of results related to relevant theory.

Self-Regulated Learning

Self-regulation in a learning context means that learners activate their thoughts and actions to achieve their learning goals (Schunk & Zimmerman, 2012). More specific, this means that learners set goals, decide on strategies, monitor and evaluate their own learning (Pintrich & Zusho, 2002). Another definition of self-regulation emphasizes identifying problems and comparing different solutions to these, as well as making a plan to carry this out (Boekaerts og Niemivirta, 2005), which is a process that is quite similar to the approach applied in the intervention in the current study. In general, self-regulation is about planning one's own learning process, carrying the plan out, and evaluating the process, in order to make new plans (Skaalvik & Skaalvik, 2018).

Research has shown that self-regulation in learning, meaning identifying goals, planning learning activities and evaluating one's own learning process, leads to more efficient learning (Black & William, 1998; Hattie & Timperley, 2007). However, motivation also plays a part in this picture. Students with higher motivation are more concerned with and conscious about their own learning process, leading to efficient learning (Schunk & Zimmerman, 2012), whereas unmotivated students engage less in their learning process, leading to less efficient learning. One of the problems within self-regulation is how to get students who struggle, with motivation and subjects, to become engaged in their own learning process. The method described below is one suggestion of how to approach this problem. This method aims at engaging students on both low and high levels in their learning process and supporting them to set their own goals and get adequate challenges in the learning process.

Methodology

This is a case study that investigates the outcomes of a five-step method for mastery, participation, and motivation in relation to engaging immigrant adult learners of English to identify their own strengths and weaknesses. The study may be considered an intervention, albeit without a control groups, where the method was implemented in class so that all eight students worked with their personal staircases individually. Based on this, they then

identified their own needs and levels, and built metaphorical staircases with specific aims and goals included for each step.

The method used in this classroom and outlined here comes from a project called SAMM, a systematic approach to mastering life (Horverak & Aanensen, 2019; Horverak, 2020; Horverak et al., 2022). SAMM includes a five-step method to help learners achieve their goals through finding answers to five central questions: 1) What is important for me? 2) What am I good at? 3) What is challenging for me? 4) What should I focus on? and 5) How can I work with this? This approach builds on Ryan & Deci's self-determination theory (2017), stating that in order to achieve intrinsic motivation, the basic needs of autonomy, competence and relatedness must be met.

The five-step method can result in various approaches in the classroom, as sub-areas of "mastering life". In this case the questions have been slightly adjusted, to reflect the status of English as a school subject in general, aiming for prior knowledge, acknowledging their expectations, and previous experiences when the school commences. The method was also used in a micro-perspective, as a learning reflection, after working on a topic (figure 1).

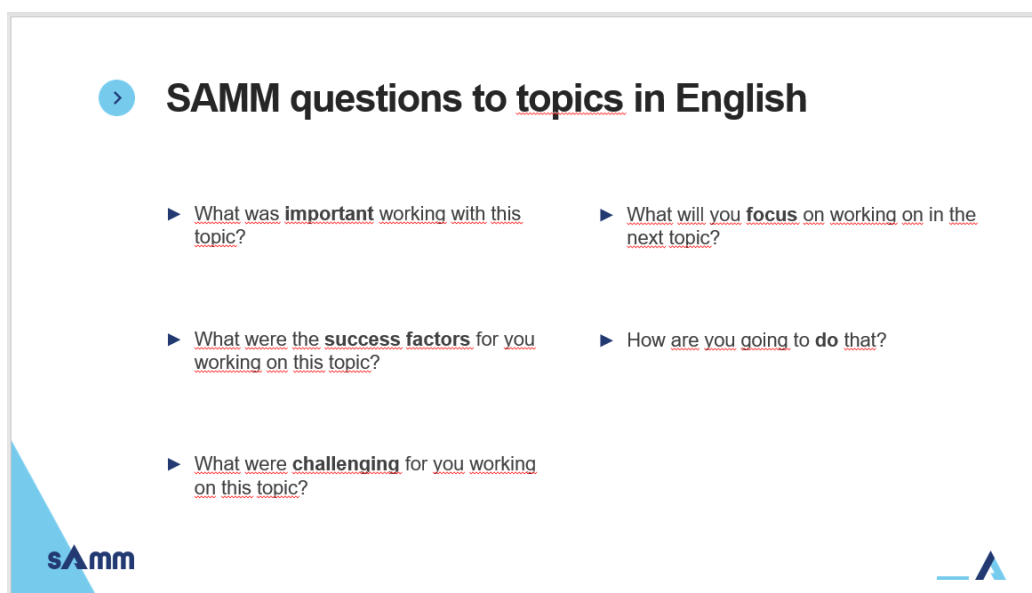



Figure 1: Five-step method for topics in the English subject

The students then reflected on what was important, success factors, challenges and what they found would be necessary to be able to move on to the next topic or chapter. Students shared reflections like: "Next time I must learn vocabulary in a better way", "I want to retake the vocabulary test", or "I will write more summaries to practice extracting what's the most important ideas".

This class used an adaptation of the five-step method as a plan for working on a topic or a chapter in English classes. This means that the teachers devised a staircase with five steps where some basic elements are set. After a period of implementation guided by the teacher, the students took on the responsibility of filling in what they planned to do, how much they would work, which phase they would work with, which method they would use, and finally how they wanted to present what they had learned (figure 2).



English Subject

5. Explore and present (choose 1-2)

- ☐ Write a 5 paragraph text
- ☐ Make a PP presentation
- ☐ Make a podcast/video presentation
- ☐ Write a learning log with SAMM questions (self evaluation)

Time: _____

Book: _____

Topic: _____

Chapter: _____

4. Continue language learning choose what suits you:

- ☐ I must practice more: _____
- ☐ Watch English speaking TV-series: _____
- ☐ Find and learn and use new phrases/vocabulary; Write in notebook
- ☐ Follow and study with Instagram/teacher: _____
- ☐ Write a summary of the chapter: _____
- ☐ _____

3. Use the language

- Dialogue practice: «Let's talk» questions: p _____
- Read to teacher (WhatsApp or at school)
- Write: exercises in ovrkbook: p _____

2. Practice

- Online exercises chapter: _____
(keep a logg on exercises you do)
- Grammar at «test-english» _____ (topic)

1. Get to know and learn new content

- Vocabulary: workbook p _____ practice pronunciation, spelling and comprehension.
- Choose minimum 10 words you want for Friday's vocabulary test – take a photo, mark words and send on WhatsApp
- Listen and read: textbook p _____

(ex.)	1	2	3	4	5	6	7	8	9	10






Figure 2: Five-step staircase in the English subject

As figure 2 shows, step 1 is basically about getting familiar with new content. The students plan the number of pages to read and decide which vocabulary to work on and learn the upcoming week. It even becomes so concrete that they can pick which 10 words they want for their vocabulary test by the end of the plan. Step 2 is where they work with the language, using online resources and grammar exercises. The students should here log what they work on. Step 3 is about using the language they are trying to acquire, by writing exercises, conversation and speaking exercises, and reading out aloud to the teacher, either in person or through a recording. The latter can be done on any mobile and sent for example through WhatsApp.

Step 4 opens for various learning activities, where the teacher has made several suggestions for the students to choose from, but also left open space for student suggestions. Finally, step 5 is where the students choose to dig deeper into some of the content and choose how to present what they have learned. Step 5 is also where evaluation is made, both teacher evaluation on presentations but also the self-evaluation through the SAMM questions (figure 1).

After the intervention, the students participated were asked about how they perceived working with the staircase in English. They were also asked what they liked about this way of working, and what could be challenging. The results present a summary of the students' reflections and reflections from the teacher that carried out the intervention in her English class on how the approach worked, and why it worked this way.

Results

Students reported a high level of satisfaction with the method. They emphasised the feeling of being in control of their own studies, being able to work independently of the teacher and the other students, while at the same time having a sense of belonging in a class. The teacher mentioned that this approach presupposes that the teacher has spent time and effort on building relations with the students and between the class members, to make a safe

environment for having different prerequisites for learning the subject, a variety of levels, working on different topics or books, even different paces, and progress. In this group, applying the approach in such a safe learning environment, this has led to students supporting each other, motivating each other, and acknowledging and applauding classmates' achievements and mastery instead of competing. The teacher emphasized that the stronger students could reach far, whereas the students who started late in life learning English were allowed to work in a pace and on a level they felt adequate. Whenever students were absent for longer periods of time, they generally reported that they were neither stressed out nor demotivated. Rather, when they came back, they knew right away where to pick up and continuing working from.

The teacher also mentioned challenges. One was that some students were passively attending school or even being absent due to life being overwhelming in so many ways, that school was just even one more possibility of failure in life. She reflected that teaching English to a class in plenary would have the high probability of targeting only a few of the students at a time. High achievers would be difficult to provide with enough and appropriate material, and under-achievers or absentees would be hard to reach and help keeping up the pace. There was a need for meeting a diverse set of needs and a need for giving them the chance to take more control and responsibility for their learning process and setting own achievable goals.

Discussion

To sum up, the results show that there is a potential in applying a metaphorical staircase as a plan for regulating one's own learning, in combination with reflecting on one's own learning process. There are many good reasons for building such a metaphorical staircase. Not only do the students identify their own exercises and goals, but they also build strong self-regulating skills. They can more easily see how their effort bears fruits and are likely to realise more about what is essential for learning more and improving their English. This in turn will probably lead to more motivation. In addition, the method gives them a tool for lifelong learning in that they become more independent and learn more about how they learn best.

Students may benefit from having certain expectations laid before them. Being expected to and given the opportunity to reflect on their own learning, circumstances and not least given the chance to affect factors having effects on mastering in a relevant subject is valuable and meaningful. It acknowledges the individual and is an important factor in emotion regulation and the sense of well-being. While accommodating for individual adaptation, the five-step method also opens up for class discussion about topics and exercises, and even aims.

However, it may be challenging for individuals to take control in the learning process, as the five-step approach and the stairs facilitate. A model that describes student participation outlines four elements of the learning process; content, methods, organization and presentation (Bjørkvold, 2010), and the element of organizing one's own work is pointed out as the most challenging. It is easier for students to choose content and methods, and how to present what they have learnt. The metaphorical staircase described here is meant to support student autonomy in the process of learning to regulate the learning process. Some content, methods and presentation options are outlined, and then the students choose from these, and possibly add new suggestions. This may help them gradually take more and more control in their own learning process, whether they are on a high or a low level.

The main obstacles for implementing this approach with metaphorical stairs are having enough time and getting the students to understand how to work with the stairs. It takes time for the students to realise how the stairs is an efficient tool to support their learning. The stairs provide a plan, and it also gives the user the opportunity to take control, and to adjust according to their own needs. The time factor is also a result of the fact that many of the immigrants have fled a society where their opinion put them in danger, and in some cases even life-threatening danger. Many immigrants have been supposed to follow a leader and not think for themselves. As the opposite is the case in Norway, not only does society expect students and citizens to think for themselves, but our democracy is also dependent on critical thinking. In Norway, members of society are expected to speak up and voice their concerns when they disagree with something. Many immigrants in Norwegian classrooms go through a shock phase or a culture shock in this sense. This may be one of the reasons why this method takes time and effort to adapt. However, in this class, they finally did not only adapt to it, but even embraced it. It takes time and efforts to help students build their own staircase. They need to identify goals and think about which exercises to work with, and this takes both time and energy.

Conclusion

The results of this study show that the five-step method gives the students freedom and power, something which leads to stronger self-regulation and higher motivation for working with learning English. Although students must discover a sense of belonging and purpose themselves in the learning process, the teacher can assist through plenty of facilitation, customization, and guidance individually, and less teaching in plenary. The five-step method outlined below offers differentiation and adaptation to each student's unique challenges and style of learning while simultaneously directing them towards a stronger sense of taking part in their studies and taking responsibility for their own development.

The approach outlined here aims at empowering immigrants in a situation where they may feel that they have lost control (Horverak et al., 2022). However, whether this type of empowerment is possible in a situation where much is outside of an individual's control could be questioned. Empowerment was originally about making people aware of suppression, to make them fight for freedom (Askheim & Starrin, 2007), whereas in the programme for immigrants in Norway, there is an expectation to adapt to the system. This is a form of state-governed empowerment. The same could be said about the stairs in the classroom. The teacher strives to empower the students, by making them become more independent in the learning process. The frames and competence aims are still given, and the students have to adapt to the situation. Still, having some influence on activities in the classroom, and one's own progression, gives some autonomy and control to the learner.

Having autonomy in the learning situation may lead to more intrinsic motivation to learn (Ryan & Deci, 2017) and more efficient learning (Black & Willian, 1998; Hattie & Timperley, 2007). Through building their own metaphorical staircase with individual learning aims, these students felt more satisfied with their learning process, and they also gained an improved feeling of control of what they were learning and when and why. By making the five questions in the five-step approach more concrete and relevant for the subject, learners were able to identify specific needs and requirements, as well as aims, desires and goals for each step of the staircase. They could themselves identify what they wanted to work with and when, and the teacher would be available to help them out whenever they faced challenges. By applying the five questions described above when

evaluating their own learning, the students reflected on relevant elements for their own learning process, which have been emphasized in research on assessment (Black & Willian, 1998; Hattie & Timperley, 2007) – where are they going, how will they get there, and where will they go next?

This case study is very limited in scope and time, but the results are promising, and both the teachers and the students were positive to the five-step method. There is a need to try out the approach in more contexts, as different subjects and also different countries or cultures. The hope is that giving the students independence and responsibility will give them motivation and help them increase their self-regulation, and that this will support them to succeed in a new and foreign situation.

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Critical Control Points Course Detection Methodology at University Education

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Abstract

The research presents an innovative study based on adding value to the university educational process. Currently, there is no clear definition to detect at which stage of a career students lag behind after failing a specific subject or activity. An educational innovation proposal, based on the extrapolation of the Hazard Analysis and Critical Control Point System coming from the industrial setting to the university education context, is presented: the Critical Control Point Detection System concerning the curriculum and students' trajectories. The purpose of this work is to generalise a Critical Control Points Detection Methodology, in higher education, through the localization of courses that have greater incidence in the curriculum and identifying the negative result through student performance due to failure. For the curriculum analysis, indicators related to centrality measures were built with a directed network based on the curriculum subjects. Courses were classified as Critical-Control-Point candidates when the numerical values of measures exceed or equal to a minimum threshold value. For student performance, a measure of course failure was used. Those candidate courses exceeding a predefined failure threshold were classified as Critical Control Points. Critical-Control-Points courses implied at least one semester of lagging for any student failing on it. The Critical Control Point Detection Methodology was performed for Chemical Engineering and Law curriculums at the University of the Republic (Uruguay) using a $(55 \pm 5)\%$ threshold of failure for more than two years during five years. The Critical-Control-Point courses match previous perceptions from university lecturers.

Keywords: Education, Critical Courses, University, Computational Methodology

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Introduction

The article is based on a university generalisation research carried out in the Innovation Management Master's degree belonging to the Engineering School of the University of the Republic, Uruguay (Pratto Burgos, 2023).

The University of the Republic is an autonomous public institution that offers higher education opportunities to the general population. Furthermore, it promotes and protects research conducted in both scientific and artistic fields. The University is composed of different Schools (Universidad de la República, 1958).

The increasing popularity of machine learning can be observed across diverse fields according to today's Fourth Industrial Revolution. How well a machine-learning solution works depends on the working type of data and how well the learning algorithms perform (Sarker, 2021).

Machine learning (ML) tools can assess an individual's level of understanding, detect lacking-of-knowledge areas, and offer real-time support. Furthermore, ML is capable of identifying areas where the teacher-student ratio is unbalanced, allowing for the development of educational programs that cater to the larger student population. ML has numerous advantages that demonstrate its transformative impact on the education field (Jagwani, 2019).

Incorporating ML techniques provides an innovative means of investigating data in computing education. Researchers will have the ability to employ algorithms for discovering novel relationships and creating adaptable models (Zahedi, et al. 2020).

At the University, students strategize their trajectories from admission to graduation. In this way, the student trajectory implies the path a student follows during their time in the Faculty.

The theoretical student trajectory refers to the ideal learning journey based on the suggested curriculum. When examining students' trajectories it is important to take into account the date of data query because academic student progress is changing over time. Student's academic performance is determined by the number of courses they have completed by passing or failing them.

Students' real trajectories are different from theoretical ones because students' performance does not match what the curriculum teaches them. This causes them to pursue individualistic (real) academic trajectories. Deviations from curriculums are not always associated with failure. These terms are employed to characterise diverse social and educational settings (Directores que hacen escuela, 2005).

By examining the students' real trajectories, we can identify similar or probable paths that align with the theoretical trajectory. However, alternative paths that differ from theoretical trajectories can also be discovered (Terigi, 2009).

When progressing through university, students might face difficulties that cause them to diverge from their theoretical trajectory. Failing in specific, essential, and critical courses for their educational progression is one of the hurdles that can be faced avoiding to lag for their degree.

Currently, universities lack a meaning to identify when a student is unsuccessful in a crucial course, hindering their advancement in their academic pursuits. Without a distinct definition of critical courses, universities cannot accurately assess instances where students are not progressing in the curriculum. This leads to many guesses that are not proven to be true.

A Critical Control Point (CCP) is a term derived from the industrial and service food sectors. It refers to "the phase at which intervention may be taken to prevent or mitigate a food safety issue or reduce its level of hazard". The procedural method also includes validating the system's ability to accurately identify CCP effectiveness (Food and Agriculture Organization of the United Nations [FAO], 1997).

A CCP course in university means that by failing on it, you have lagged for at least one semester in the curriculum. In the article, the most relevant Analysis and Critical Control Point System (HACCP) phases in the food industry are applied in the educational sector, following the two main principles, second and third from FAO (1997): identifying CCP and setting critical limits.

Dueñas (2016) studied CCPs in the education field from a subjective perspective, describing them as highly complex subjects in university. When the average student number exceeds 15, Dueñas affirmed that highly complex subjects should include a failure rate of over 20%.

The research proposes to devise a methodology to locate CCP courses offered in university institutions. Particularly, the following research question is explored based on both principles of HACCP: how do we define a CCP course at university based on the measures obtained from the generalised methodology, and how well it aligns with lecturers' insights?

To organise and gain insight into the methodology presented in this article, based on a systemic point of view, two perspectives are separately analysed: the curriculum and the university students' trajectories performance.

Theoretical Framework

Networks and Centrality Measures

Courses in a curriculum can be visualised as a network, reflecting the prerequisites necessary for enrolment. For example, you might need to pass a course before you can take the next level of that course. As more difficult a course is, the more prerequisite courses are required to be taken before it. We can comprehend and organise this prerequisite system by creating a detailed strategy or visual representation.

According to Kolaczyk and Csárdi (2014), a network can be seen as a visual representation that illustrates the interconnectedness of various components within a complex system. A network is a mathematical concept consisting of vertices, also called nodes, and edges, lines connecting these vertices. In a directed network an edge is represented by an arrow going from one node to another in a specific direction.

Networks can aid in comprehending the functionalities and processes of diverse entities by measures' estimation. "Centrality measure is such an important index because it indicates which node takes up a critical position in one whole network" (Zhang & Luo, 2017).

In the research, the centrality measures used are *degree*, *closeness*, *eigenvector*, and *betweenness*.

Degree centrality quantifies the number of connections with other nodes in the network. Additionally, the significance of a node in a network is quantified through Closeness centrality, which entails the distance summation between one node and other nodes (Zhang & Luo, 2017).

The closeness centrality concept concerns the proximity between a node and its neighbours' elements. The shortest average connection distance with all other nodes in the network is associated with a node having a high numerical value (ArcGIS Pro 3.0.).

Determining the influence of a specific node in a network can be achieved through the eigenvector centrality. The measure expresses how important nodes are connected to others in the network. By computing this centrality measure, we can determine whether specific clusters possess a greater level of influence (ArcGIS Pro 3.0.).

Finally, betweenness centrality indicates how well a node is linked in a network. When a node serves as a crucial pathway for other nodes to communicate, connect, transport, or transact, it gains significance and obtains a high numerical value of betweenness centrality (Zhang & Luo, 2017).

Curriculum

The curriculum outlines the content, purpose, methodology, and timeline for students to acquire knowledge. The overarching aim of a well-designed curriculum is to facilitate students in obtaining knowledge, skills, and values, associated with capabilities and competencies, that will enable them to live meaningful and productive lives. Indicators of a successful curriculum encompass the progress made by students in learning and their subsequent application of acquired knowledge to enhance personal, social, physical, cognitive, moral, psychological, and emotional development (Stabback, 2016).

Methodology

CCP Course Detection

When creating the CCP course detection methodology, we examine the indicators' estimation in the curriculum and in the students' trajectories. We aim to comprehend the significance of both indicators' perspectives occupied in the university context.

According to the second principle of the HACCP plan, the initial step is to identify the CCP (FAO, 1997). To follow the step, courses provided by the curriculum are mapped by using a network. Such courses are represented by nodes and linked by arrows, among the other courses, according to the prerequisite classes required for enrolment.

The curriculum-based network assists in organising and scheduling the necessary courses before enrolment. For example, if a student wishes to enrol in a particular course, the network will furnish information regarding prerequisite courses that the student must finish before becoming eligible for the desired course (represented with arrival arrows to the target course).

The four centrality measures, applied to each network node, help us identify courses as CCP candidates.

According to the third principle of the HACCP plan, the methodology needs to set up threshold limits (FAO, 1997). The numeric value that must be achieved for each centrality measure is determined by applying the elbow rule to courses taking part in the curriculum.

The elbow rule consists of a graph plotting the approximation sum of squared errors on the y-axis and the values on the x-axis. The presence of distinct clusters will be appreciated in a noticeable decline in the graph (Schubert, 2022).

In the research, for each centrality measure the elbow rule is used with the numerical centrality value plotted in the y-axis, arranging them in diminishing order. The "elbow" is the term used to refer to the point where the slope of the plot changes prominently. This point additionally denotes the numerical boundary. Courses exceeding a minimum threshold limit value (TLV) in three or four centrality metrics are regarded as CCP candidates.

Finally, when evaluating the students' trajectories, the methodology will rely on the measure of course failure ratio in completing a CCP candidate course throughout 5 years. The ratio involves assessing the percentage of students who did not successfully complete the course/exam at a particular course edition. The research includes the period spanning from 2015 to 2019.

The TLV course failure ratio is $(55 \pm 5)\%$. This conclusion was reached by examining twelve specific courses in the Chemical Engineering curriculum degree of the Engineering School. As a result, if a CCP candidate course has a course failure ratio exceeding $(55 \pm 5)\%$ for more than two years within 5 years, it will be concluded as a CCP course (Pratto Burgos, 2023).

In summary, the CCP Course Detection Methodology takes into account the following stages:

1. *Create a network using the curriculum courses (nodes) and the relationships between them based on the courses before enrolment.* Thereby, in order to enrol in a desired course, students must have successfully finished the required prerequisite courses: arrivals edges in the network proceeded from those courses.
2. *Quantify the four centrality measures:* degree, closeness, eigenvector, and betweenness from the curriculum-based network.
3. *Find strong performance courses in three or four centrality measures,* according to the reference threshold value.

Courses complying with the third stage will be identified as CCP candidates.

4. *Determine the course failure ratio,* during 5 years, only for the CCP candidate's courses.
5. *Consider CCP courses* when the course failure ratio exceeds $(55 \pm 5)\%$ in more than two years within the analysed curriculum.

CCP courses will be finally obtained in the fifth stage and they may be strongly advisable to consider by students during the enrolment procedures.

Implementation

This section explains the CCP Course Detection Methodology introduced in Chemical Engineering and Law curriculums corresponding at the University of the Republic in Uruguay (Consejos de las Facultades de Ingeniería y Química, 1999; Frezelmí, 2021).

To utilise the methodology, it requires accessing essential data from the Chemical Engineering degree curriculum and its prerequisite courses schedule. The University's Administrative Central Office manages course enrolment taking part in the curriculum and their required pre-requisite courses for enrolment (Sistema de Gestión Administrativa de la Enseñanza [SGAE]).

The Statistical Software R is used to process data. The Windows operating system allows users to download the software's latest version at no cost. In the research, R version 4.1.1 was used through RStudio (integrated development environment) version 2021.9.1.372. The R programming environment offers a wide range of tools and resources in the data analysis field to facilitate data processing (Fernández Casal, et al., 2022).

To create the network and quantify centrality measures, the "igraph" package was used in the R environment. To maintain a consistent database format, the "read.excel", or "read.csv", function was applied to convert the spreadsheets from Excel, or CSV, format into data frames. A table-like structure called data frames is utilised to organise data encompassing rows and columns.

The students' trajectories perspective requires them to evaluate the measure of the course failure ratio in completing a CCP candidate course throughout 5 years. Individuals under observation are students who are presently actively pursuing their studies in Chemical Engineering and have completed CCP candidate courses.

SQL queries are used in the Trebol-fuentes platform, managed by the Central Computer Service of the University of the Republic, to retrieve data on students' performance from student-activity databases. The student's ID, course name, grade, course or exam activity, and activity date are crucial pieces of information to be gathered. Academic data up to April 2022 is analysed in this research (Servicio Central de Informática [SeCIU], 2019).

The query code follows the SQL rules by using the "Select", "From", and "Where" parameters in its structure. The "Select" parameter mentions the required variables for the query: student's ID, course name, grade, course or exam activity, and activity date. Information is retrieved from specific tables by using the "From" parameter. The "Where" parameter is associated with the conditions of the query.

At the University of the Republic Engineering School courses are graded on a scale from 0 to 12. Failing the course and being unable to take the exam is the consequence for students who receive a grade ranging from 0 to 2. Achieving a grade between 3 and 5 will enable students to pass the course, granting them the opportunity to take the exam. Provided students' grade falls between 6 to 12, they will successfully complete the course and be exempted from the exam (Peláez & Collazo, 2017).

The higher-education-generalised methodology involves contrasting the Law Degree, at the University of the Republic, with the Chemical Engineering Degree. For the 2016-approved

Law curriculum, the CCP Course Detection Methodology was applied to determine whether the centrality measures align with those employed in the Chemical Engineering curriculum.

Findings and Discussion

To assess the importance of a node in a network, its distinctive qualities are taken into consideration using the centrality measures. The characteristics can be given by the use of local information, e.g., degree, or global network information, e.g., closeness, betweenness, and eigenvector centrality, requiring the entire structure of the network (Akrati Saxena & Sudarshan Iyengar, 2020).

The TLVs for each centrality metric, programmed in the R environment through the network, are as follows: degree has a threshold of 4, closeness has a value of 0.63, 0.73 for eigenvector, and 22 for betweenness. These measurements apply to both the Chemical Engineering and Law curriculum.

The centrality-measures-based distinctions among the CCP candidate courses are considered significant in the pre-requisite courses schedule, characterised in the network, only if they surpass the TLV. The determination of the CCP candidate course power relies on the positioning of the courses in the network, as determined by centrality measures interpretation.

Four courses in the Chemical Engineering curriculum surpassed the TLV of at least three different centrality measures. About the Law curriculum, there exists a single course that has exceeded the threshold limit value in four centrality measures. Consequently, the methodology's curriculum perspective identifies specific courses as CCP candidates.

Through a successful performance in CCP candidates' courses, students can thrive academically without lagging for in their studies and advancing in the curriculum at a suitable rate. Therefore, it is essential to investigate the students' lack of success in those CCP candidate courses through the course failure ratio.

The measure of course failure ratio in completing a CCP candidate course, throughout 5 years in the Chemical Engineering curriculum, is illustrated in table 1. The table also includes students who were unsuccessful in passing the CCP-candidate-course exam.

	Course edition year									
	2015		2016		2017		2018		2019	
	n	CFR (%)	n	CFR (%)	n	CFR (%)	n	CFR (%)	n	CFR (%)
Course 1	10	77	14	67	27	63	31	74	33	55
Course 2	16	53	25	64	37	49	48	63	42	44
Course 3	32	89	49	86	69	77	74	63	79	56
Course 4	10	44	10	44	8	30	9	22	16	25

Table 1: CCP-candidates-courses failure ratio (CFR) and student numbers who fail each CCP-candidates' courses (n) in the Chemical Engineering curriculum.

Database academic information lower than 5 years, from the closing-date database query, might come across a reduced number of current students. It can be explained that when graduating as an Engineer, students are required to dedicate 5 years to their studies at the Engineering School. Consequently, a 5-year period was selected to simplify the process of locating current students within the database avoiding their graduation. Due to a health emergency, the university had to suspend on-site activities, thus excluding the years 2020 and 2021 from the analysis.

From 2015 to 2018, table 1 indicates that courses 1 and 3 have maintained scores surpassing the TLV course failure ratio (55 ± 5)% in four editions. In contrast, course 2's TLV has not been exceeded for over two years, and for course 1, the TLV has not been surpassed in any year. Therefore, courses 1 and 3 are CCPs that play a significant role in the Chemical Engineering curriculum. The methodology's results indicate that failing to pass both courses will result in a student being lagged for at least one semester and unable to continue with the curriculum.

Confirmed by Chemical Engineering lecturers from Engineering School, courses 1 and 3 are identified as the crucial courses in the Chemical Engineering curriculum. They accomplished this conclusion by comparing the methodology's findings with the lecturers' insights. The methodology's adjustment was changed based on the lecturers' expertise. The iteration process consisted of two phases: modifying the centrality measures TLV and introducing the TLV on the course failure ratio (Pratto Burgos, 2023).

According to the CCP Course Detection Methodology and the lecturers' insights, a CCP course definition can be inferred at the university.

For a CCP course to be effectively detected it is necessary to exceed, or equal to, centrality measures (degree, closeness, eigenvector, and betweenness) ideally at 4, 0.63, 0.73, and 22 respectively, based on the pre-requisite course curriculum network. Furthermore, the CCP course must demonstrate a course failure ratio over (55 ± 5) % for at least three years in a five-year term.

The CCP Course Detection Methodology and its definition are subject to certain limitations. The TLV course failure ratio fluctuates according to the specific higher-education institution. Nonetheless, the TLV proposed in this article serves as a basis for authorities to strategize improvements for every institution. Additionally, people responsible for using the methodology should consistently access students' performance databases. It allows them to continuously implement it and effectively monitor every aspect.

Conclusion

The CCP Course Detection Methodology was created to help university institutions detect crucial courses (CCP). They were based on the second and third principles of the HACCP plan, which is used in the food industry. The purpose of the methodology was to identify CCP courses in which students were lagging for at least one semester at university.

By constructing a curriculum-based network, the CCP Course Detection Methodology makes it possible to locate nodes (courses) that possess substantial significance using local and global centrality measures like degree, closeness, eigenvector, and betweenness within the network. Courses will be deemed significant if their centrality measures are equal to or

surpass the TLV. Only those courses achieving high scores in three or four centrality measures will be eligible for consideration as CCP candidate courses.

According to the students' trajectories perspective, the TLV course failure ratio represents the percentage of students who did not achieve a passing grade in their courses. Only courses that consistently score in a percentage above $(55 \pm 5)\%$ for at least three years, in a five-year term, will be considered as CCPs.

The curriculum-based network to locate CCP candidate courses was implemented for the Chemical Engineering and Law curriculum, both from the University of the Republic, Uruguay. Following that, the significant interconnectedness of each course in the network was evaluated through the centrality measures. The implementation evidenced that five courses, four from the Chemical Engineering curriculum and one from the Law curriculum, are strong contenders for being regarded as highly significant in each curriculum due to their strong performance in more than three centrality measures.

Only two courses, of the four CCP candidates courses from the Chemical Engineering curriculum, exceed the TLV course failure ratio of over $(55 \pm 5)\%$. Hence, both courses are identified as CCP in the curriculum assessed between 2015 and 2019. The methodology's result aligns with the Chemical Engineering lecturers' insights. CCP courses are considered important components of the curriculum according to their lecturers' experience.

The methodology's result and the lecturers' insights lead to a CCP definition. It adjusts a course exceeding, or equalling to, centrality measures values (degree, closeness, eigenvector, and betweenness) at 4, 0.63, 0.73, and 22 respectively, through the curriculum-based network, and it must demonstrate a course failure ratio over $(55 \pm 5)\%$ for at least three years in a five-year term.

The CCP Course Detection Methodology limitations determine its functionality and implications. Different higher-education institutions have different TLV ratios of course failure. Nevertheless, the $(55 \pm 5)\%$ TLV might be utilised as a basis to begin planning curriculum improvements.

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Professional Competencies and Cognitive Abilities of Teachers

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Abstract

The teaching profession depends on skills and professional competencies, which can be summarized under the term professional competence. Professional competencies entitle the teacher to perform skilled activities as teachers. In the present study, we investigated which cognitive skills support better development of professional competencies. The main aim of the study was to examine the relationship between teachers' professional competencies and their cognitive abilities. A total of 591 teachers aged 20 – 72 years ($M=43.56$, $SD=10.92$) participated in the study. Teachers' professional competencies were measured using the Teacher Interaction Questionnaire, the Slovak Teaching Style Questionnaire, and the Didactic Competencies Questionnaire. Cognitive abilities were measured as critical thinking disposition (using the Critical Thinking Disposition Scale), scientific trust (using the Credibility of Science Scale), and psychological misconceptions (using the Psychological Information Questionnaire). Results (controlled for age and practice) showed positive relationships between critical thinking disposition and the interaction styles of leadership, helpfulness, understanding, and student-teacher responsibility ($r= .382 - .502$), alongside with didactic competencies (planning and preparation, realization, classroom climate, diagnosis and evaluation, and self-reflection; $r= .410 - .731$) and with managerial and supporting teaching styles ($r= .404 - .709$). There were no associations with scientific trust or psychological misconceptions. The findings suggest the importance of supporting the development of critical thinking during undergraduate teacher education to promote the development of professional competencies.

Keywords: Professional Competence, Cognitive Ability, Teacher

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Introduction

The teaching profession depends on skills and professional competencies, which can be summarized under the term professional competence. Professional competencies entitle the teacher to perform skilled activities as teachers. The teaching profession is one of the most complex professions in today's society, and the same complexity is therefore expected of teachers' professional competencies (Zuljan et al., 2012). Professional competencies include knowledge, skills, values, attitudes, motives, and personality traits that are manifested in a certain characteristic behavior that influences the quality of performance and work activity. A teacher's behavior in school also affects his/her way of thinking, teaching style, experience, teaching approach, self-perception in the role of a teacher, ability to self-reflect, motivation to choose the teaching profession, interest, motivation to develop, and more. (Darák et al., 2007; Verešová, 2023; Verešová et al., 2023). Although there is no consensus on teachers' professional competencies, it is still possible to summarize teachers' professional competencies as a set of different abilities, skills, dispositions, attitudes, and knowledge that support teachers' effective work (Moreno-Murcia et al., 2015). In the present study, we based concept of professional competencies on the competence model (Kasáčová, 2006; Kasáčová et al., 2006) created in Slovak cultural and legislative environment: (1) student-centered competencies, (2) teacher self-development competencies and (3) competences oriented toward educational processes.

We have focused on competencies oriented toward educational processes, specifically on interaction and teaching styles and didactic competencies. *Didactic competencies* are competencies related to planning, organizing, managing, evaluating, and implementing the teaching process (Rovňanová, 2015), having knowledge of pedagogy and psychology (Štuřáková, 2017). Preferred *teaching style* represents the way a teacher performs and manages tasks, processes and also communicates and socializes with students (Ford et al., 2016; Grasha, 2002; Mohanna et al., 2007). In present study, we focused on supportive, goal-oriented, knowledge-oriented and managerial teaching styles revealed in previous research (Ballová Mikušková, 2022) based on studies of Mohanna et al. (2007) and on the Grasha-Reichmann model (Ford et al., 2016; Grasha, 2002). Finally, we examined the *interaction styles* as a way of teachers' interaction, behavior and communication, especially with students. Based on Leary's model of personality (Leary, 1957) and the model of teacher interaction behavior (Wubbels et al., 1987), the interaction style represents eight aspects of teacher behavior: organization, help, understanding, responsibility, uncertainty, dissatisfaction, rebuke, and severity.

Research shows that professional competencies could relate to psychological literacy, the knowledge and adaptive use of psychological constructs including critical psychological thinking (Sokolová, 2018; Sokolová et al., 2017). The present study is part of a larger research in which the relationship between professional competencies and psychological literacy is investigated. So, in the present study, we investigated which cognitive abilities, as components of psychological literacy (critical thinking disposition, scientific trust and psychological misconceptions), support better development of teachers' professional competencies.

There is a lack of research regarding the relationship between professional competencies and cognitive abilities, as components of psychological literacy. In general, cognitive abilities appeared as a positive covariate of professional competencies (Čavojová & Jurkovič, 2017a, 2017b; Jursová Zacharová et al., 2019). Similarly, scientific reasoning skills should promote

goals of education (Kuhn et al., 1988) because well-developed scientific reasoning is useful for in-depth understanding (Krell et al., 2020). We focused on critical thinking as one component of psychological literacy, but the research on the relationship with professional competencies of teachers is missing.

In professional competencies' development, the trust in science—knowledge of key psychological terms and concepts, as well as skills to apply psychological knowledge to life (Boneau, 1990; O'Hara, 2007)—can play an important role. Indeed, when teachers have trust in science, they value science and technology, reject pseudoscience, and teach the population competently (Fuertes-Prieto et al., 2020). Trust in science seems to be connected more with the educational content than with professional competencies in general, similarly are psychological misconceptions. There is a high prevalence of some psychological misconceptions among teachers and also students (e.g., Bensley & Lilienfeld, 2017; Menz et al., 2021) and research shows that because misconceptions are resistant to instruction, they are a barrier in teaching (for review see e.g., Bensley et al., 2014), and it can be assumed that they could also interfere with professional competencies of teachers.

Since the results regarding the relationship between professional competencies and cognitive abilities, as components of psychological literacy, are ambiguous, we conducted exploratory research. The main aim of the study was to examine the relationship between teachers' professional competencies and their cognitive abilities. In the cross-sectional study we focused on examination of potential associations between professional competencies and cognitive abilities.

Methods

A total of 591 in-service teachers (89% women) aged 20 – 72 years ($M=43.56$, $SD=10.92$) participated in the study. Participants were asked to participate through e-mail sent to directors of all elementary and high schools in Slovakia. The survey was conducted online on the Survio platform and data were collected in the fall of 2022. After signing a consent form, all participants filled out questions about their age, sex, professional competencies, and cognitive abilities. Participation was voluntary and anonymous, and as a reward for participation, we sent vouchers to 10 participants drawn to purchase books. The study was carried out following ethical principles introduced by the American Psychological Association.

To assess teachers' professional competencies, we asked participants to rate their preferred interaction styles, teaching styles and didactic competencies.

Interaction styles were measured using the modified Slovak version of the Questionnaire on Teacher Interaction (QTI). In the original version of the QTI (Gavora et al., 2003; Wubbels & Levy, 2005), students evaluate their teachers, and each teacher receives a score for each of the eight sectors of teacher behavior based on Leary's personality model: leadership, helpful, understanding, student-teacher responsibility, uncertain, dissatisfied, objecting, and strict. The present study used a modified version of the Questionnaire on Teacher Interaction – Self-assessment (QTI-S), adapted for teacher self-assessment (Ballová Mikušková, 2022; Verešová, 2021). This instrument includes 40 statements about teacher behavior, which are rated on a five-point Likert scale (1 = never; 5 = always).

Teaching styles were measured with the Slovak Teaching Style Questionnaire (STSQ; Ballová Mikušková, 2022), which is a combination of items from the Teaching Style Inventory (Ford et al., 2016; Grasha, 2002) and the Staffordshire Evaluation of Teaching Styles (Mohanna et al., 2007). This instrument included 20 items rated on a five-point Likert scale (1 = strongly disagree; 5 = strongly agree). The average scores for the four teaching styles (supporting, goal-oriented, knowledge-oriented, and managerial) were computed.

Didactic competencies were measured using the Didactic Competencies Questionnaire (DCQ; (Ballová Mikušková, 2022; Rapsová et al., 2021, in Verešová et al., 2023). This instrument included 57 items on teaching behavior in five phases of teaching (planning and preparation, realization, classroom climate, diagnostics and evaluation, and self-reflection), which are rated on a five-point Likert scale (1 = strongly disagree; 5 = strongly agree).

Cognitive abilities were measured as disposition to critical thinking, scientific trust and psychological misconceptions.

Critical thinking disposition was measured using the Critical Thinking Disposition Scale (CTSQ; Sosu, 2013). Participants were required to rate 11 statements on a 5-point scale (1 – I strongly disagree, 5 – I strongly agree). The items focus on two dispositional domains – critical openness (7 items; the ability to change one's views and thinking as a result of convincing evidence) and reflective skepticism (4 items; the individual's ability to look at information critically, question evidence and learn from past experiences). A higher mean score indicates greater critical openness and reflective skepticism.

To measure trust in science, we used the Credibility of Science Scale (CSS; Hartman et al., 2017). Participants had to rate 6 statements on a 5-point scale (1 – I strongly disagree, 5 – I strongly agree). The higher the average score, the greater the scientific trust.

Psychological misconceptions were measured using the Slovak version of the Psychological Information Questionnaire (PIQ; Kowalski & Taylor, 2009; Sokolová et al., 2017) The version of the PIQ used consisted of 25 items – psychological mis/information. Participants had to assess whether the information was true or false. For each correct answer, participants received 1 point. The higher the average score, the lower the belief in psychological misinformation.

Results

The descriptive statistics of the measures of professional competencies and cognitive abilities are shown in Table 1. The most preferred interaction styles were helpful, leading to responsibility, leadership and understanding. All didactic competencies were well developed, and teachers preferred a supportive teaching style. Teachers had high disposition to critical thinking and a medium trust in science. And belief in psychological misconceptions was high.

Table 1: Descriptive statistics of professional competencies and cognitive abilities of teachers

		M	SD	min	max
interaction styles	<i>leadership</i>	4.27	0.56	1.00	5.00
	<i>helpful</i>	4.49	0.57	1.00	5.00
	<i>understanding</i>	4.27	0.56	1.20	5.00
	<i>student-teacher responsibility</i>	4.40	0.56	1.00	5.00
	<i>uncertain</i>	1.94	0.69	1.00	4.60
	<i>dissatisfied</i>	2.14	0.60	1.00	4.60
	<i>objecting</i>	1.72	0.60	1.00	4.20
	<i>strict</i>	3.90	0.65	1.00	4.80
didactic competencies	<i>planning and preparation</i>	4.14	0.50	2.15	5.00
	<i>realisation</i>	4.80	0.48	2.19	5.00
	<i>climate in class</i>	4.39	0.51	2.86	5.00
	<i>diagnostics and evaluation</i>	4.90	0.54	2.00	5.00
	<i>self-reflection</i>	4.14	0.74	1.40	5.00
teaching styles	<i>manager</i>	3.66	0.63	2.00	5.00
	<i>knowledge-oriented</i>	3.34	0.79	1.00	5.00
	<i>goals-oriented</i>	3.92	0.70	1.50	5.00
	<i>supporting</i>	4.21	0.67	1.00	5.00
critical thinking disposition	<i>critical openness</i>	4.23	0.51	2.71	5.00
	<i>reflective scepticism</i>	4.25	0.61	1.75	5.00
scientific trust		3.53	0.91	10.00	5.00
psychological misconceptions		0.38	0.13	00.04	0.79

Note: M – mean, SD – standard deviation, min – minimum, max – maximum

Relationships between professional competencies and cognitive abilities of teachers were measured by correlation analysis (Table 2). Results (controlled for age and practice) showed positive relationships between critical thinking disposition and the interaction styles of leadership, helpfulness, understanding, and student-teacher responsibility ($r = .382 - .502$), alongside with didactic competencies (planning and preparation, realization, classroom climate, diagnosis and evaluation, and self-reflection; $r = .410 - .731$) and with managerial and supporting teaching styles ($r = .404 - .709$). There were no associations with scientific trust or psychological misconceptions.

Table 2: Relationships between professional competencies and cognitive abilities of teachers

control variables: <i>age, practice</i>		critical thinking disposition		scientific trust	psychol. misconcep.
		<i>critical openness</i>	<i>reflective scepticism</i>		
interaction styles	<i>leadership</i>	.457***	.403***	-.104	-.102
	<i>helpful</i>	.480***	.481***	.089	-.060
	<i>understanding</i>	.502***	.382**	.127	.138
	<i>student-teacher responsibility</i>	.472***	.492***	.157	.038
	<i>uncertain</i>	-.158	.126	-.250*	-.230
	<i>dissatisfied</i>	-.055	.075	-.011	.035
	<i>objecting</i>	-.177	-.030	.048	-.008
	<i>strict</i>	.076	.071	-.187	.000
didactic competencies	<i>planning and preparation</i>	.515***	.470***	-.002	.082
	<i>realisation</i>	.731***	.546***	.088	.119
	<i>climate in class</i>	.634***	.410***	.069	.007
	<i>diagnostics and evaluation</i>	.692***	.469***	-.011	-.055
	<i>self-reflection</i>	.582***	.502***	-.089	.118
teaching styles	<i>manager</i>	.603***	.404***	.113	-.098
	<i>knowledge-oriented</i>	.243	.352**	-.193	-.361
	<i>goals-oriented</i>	.344**	.249	-.146	-.178
	<i>supporting</i>	.709***	.576***	-.112	-.231

Discussion

In the present study, we aimed to examine the relationship between teachers' professional competencies and their cognitive abilities. In the cross-sectional study we found relationship between dispositions to critical thinking (critical openness and reflective scepticism) and desired interaction styles (leadership, helpful, understanding, and leading to responsibility). Similarly, all didactic competencies and teaching styles were associated with critical thinking dispositions (except no relation between critical openness and knowledge-oriented, and reflective scepticism and goal-oriented style). These connections can be explained by the very definition of what critical thinking disposition are. Critical thinking dispositions is the way people reason, argue, make decisions, are open to new ideas, learn from new experiences, take a critical view when evaluating ideas, etc. This enables teachers to better understand the subject matter, critically assess information, reveal relationships and connections between individual phenomena, form opinions and attitudes towards the given issues (Sosu, 2013; Zormanová, 2012).

Surprisingly, there were no relationships with scientific trust and psychological misconceptions. On the other hand, important finding was high belief in psychological misconception of teachers which could be explained by moderate teachers' cognitive abilities (Ballová Mikušková, 2018; Čavojová & Jurkovič, 2017b, 2017a). Although our findings are in line with previous results of (Bensley & Lilienfeld, 2017; Menz et al., 2021) which show that teachers in training had psychological misconceptions about school practice, these

findings could be alarming. As authors point out, the pedagogical-psychological misconceptions can negatively affect the procedures and strategies used in their pedagogical activity (e.g., diagnosis and assessment). A solution is offered in the form of psychological courses aimed at developing cognitive skills, from analytical to critical thinking. For example, Cho (2022) found students engaged in analytic thinking as less likely subjected to psychological misconceptions.

Conclusion

Teacher education should continue to focus on the development of professional competencies and new skills, especially psychological literacy (Sokolová et al., 2014, 2017) as one of the most important 21st century literacy skills (Cranney et al., 2022; Hulme & Cranney, 2021). Based on our findings, special attention should be paid to the development of critical thinking during the education of student teachers, as this could enhance the development of their professional competencies.

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Use of Machine-Learning in Engineering Students' Trajectories

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Abstract

Students' trajectories show the student path in the educational system from the beginning to the end of their studies. There are several statistical tools to achieve its understanding and subsequent decision-making by the institution. Each stage of the student's trajectory can be described by educational, socio-economic, demographic and cultural variables. The purpose of the research is to apply the machine learning techniques of Principal Component Analysis and k-means at the first interpretation of students' trajectories. It allows to set up clusters and prioritisation variables that organise the academic trajectory characterisation. Techniques were applied to a population of 92 Surveying students of the Engineering School at the University of the Republic (Uruguay), with admissions between 2018 and 2022. For the database processing, the statistical software R was used through RStudio, modelling five variables. In this population, data can be represented by combinations of the original variables after the Principal-Component-Analysis application. The variables that hold the highest level of importance corresponded to: Engineering School admission age and progress level determined with the obtained credits and expected credits ratio. Both variables describe the 57% of the population. On the other hand, k-means clustering has shown three groups of interest generated according to both importance variables obtained with the Principal-Component-Analysis tool. The application of machine learning techniques made it possible to plan and systematise the subsequent qualitative analysis, which included surveys and interviews.

Keywords: Machine-Learning, Students' Trajectories, Education, University

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Introduction

During the period from August to December 2022, the Engineering School Teaching and Learning Center of the University of the Republic of Uruguay carried out a monitoring of academic results and students' trajectories for the Surveying degree current curriculum. The initiative came from the Engineering School's Surveying Career Committee (SCC) based on the new curriculum implementation starting in 2023.

The SCC requires inputs to recognize areas that could benefit from improvement, leading to reduced university dropout and increased graduation rates, among other things. In this context, the general objective of the proposal was to provide the SCC an initial map of surveying students' characterisation over the last five years, as well as the main students' trajectories identification and their approach to the reasons behind them (Unidad de Enseñanza, 2023).

In the period between 2018 and 2022, 144 students were enrolled in the Surveying undergraduate degree at the Engineering School (Área Ingreso Avance Estudiantil y Rendimiento Académico [IAERA], 2023a), which corresponds to 1.4% of the total number of engineering degree programmes for the same period (IAERA, 2023b). Of the total enrolments, 92 students opted only for the Surveying undergraduate degree while the remaining 52 students opted for Surveying and other degrees from the Engineering School.

The Engineering School courses are graded on a scale of 1 to 12. The student does not pass the course when the mark obtained is 1 or 2 and must repeat the course the following year. If the mark is between 3 and 5, the student passes the course and must take a test to pass the course. Finally, a mark obtained by the student between 6 and 12 indicates that he/she does not have to take any exam because the course is taken directly (Unidad de Enseñanza, 2022).

Academic credits are gained by passing the course directly or the exam. A credit is defined as the unit of measurement of the academic work time devoted by the student to achieve the training objectives of each of the courses that make up the curriculum. Each credit is equivalent to 15 hours of student work, including hours of instruction, or equivalent activity, and hours of personal study. Each course has a certain number of credits associated with it, which requires 450 credits to obtain an engineering degree at the Engineering School (Universidad de la República, 2014).

The problem is caused by the methodology used to address a first approach to understanding student trajectories due to the numerous paths that students take at the university. A first approach to the concept of student trajectories was provided by Bourdieu (1994) through the concept of the sociological trajectory in which the agent occupies successive positions in a moving space in which he transforms.

Currently, the trajectory of a student is defined as the path students take throughout their university stay. "The trajectory is a description of the student's different positions along the curricular path, with expected times defined as normal" (Ruiz Barbot et al., 2017).

The theoretical trajectory is given by the course of the student, in accordance with the schedules stipulated by the program. On the contrary, a real trajectory is a deviation that the student makes by distancing himself from the curriculum obligations.

The first phase of comprehending students' trajectories requires gathering human and computer resources to achieve a first approximation. Determining and implementing computer and mathematical tools is crucial to begin to comprehend real student pathways.

During the fourth industrial revolution, digitalisation, artificial intelligence, the development of machine learning, and industry automation, among others, were all introduced into existence. Martnez-Ruiz (2019) argued that digital transformation was not only a catalyst for the transformation of time and space but also a crucial factor in redirecting educational challenges.

Educators are confronted with both challenges and opportunities when using artificial intelligence in education, both in their classroom practices and academic management of courses. On the one hand, teachers use artificial intelligence in the classroom as a stimulating didactic tool, thus "enriching learning environments in the context of Higher Education and awakening students' interest and taste for using technologies in their future teaching practice" (Ayuso del Puerto & Gutiérrez Esteban, 2022).

Using artificial intelligence in academic management, teachers can detect different levels of university dropout risk based on course performance. Pedagogical actions can be taken based on social, geographical, cultural, and life dynamics data. Computer systems used as a tool for education "allow both to maintain and expand mass education and at the same time to develop personalised education with automatic and individual attention, both administrative and academic" (Rama, 2023).

The use of artificial intelligence should not create a gap between the use of technology and conventional methods of extracting information or resources in the classroom. To reverse the differences in technological resources, students and teachers should receive equal access in their educational institutions involving training teachers by bringing them closer to a national and international virtual environment (Ayuso del Puerto & Gutiérrez Esteban, 2022).

Virtual environments enable the use of machine-learning approaches, such as artificial neural networks, to demonstrate effectiveness in student classification. This is a significant improvement over the limitations of traditional approaches (Musso et al., 2020).

Inputs are needed for machine learning to be used. Among them, databases are relevant in students' trajectories quantitative research, taking into account variables associated with their academic performance such as achievement, university dropout, success or failure on courses, without delving into the real evolution of the admission or the students' complex situation (Guevara & Belevi, 2013).

When working with databases that require interpretation for subsequent decision-making, machine-learning techniques are often employed. Classification, regression, and clustering are all techniques used in machine learning. The paper deals with clustering techniques, specifically Principal Component Analysis (PCA) and k-means.

PCA is an unsupervised statistical method (modelling data through their relationships without comparing with previous data) that allows simplifying the complex information of sample spaces, which provide multiple variables, into a few components while preserving their information. Amat Rodrigo (2017) suggested that this technique can be very useful when used in conjunction with other statistical clustering techniques like k-means.

Like PCA, the k-means methodology corresponds to an unsupervised method. The k-means methodology “aims to divide elements into groups or clusters”, similar to PCA (López & Fernández, 2018).

University students’ trajectories are random and rarely follow a specific pattern. It will be important to find a computational alternative that allows students’ temporal descriptions to characterise them. As a result, machine learning techniques, applied to an academic database, are useful for interpreting academic trajectories.

The proposal of the research is to apply the PCA and k-means clustering techniques on a database related to the academic trajectories corresponding to students of the Surveying undergraduate degree of the Engineering School of the University of the Republic of Uruguay. Particularly, the following research questions were explored: 1. What are the two representative variables that explain the population after application of PCA technique?; 2. Are there student clusters described with the two representative variables generated from the application of the k-means technique?; 3. How can I interpret the clusters from the academic trajectories perspective?

Methodology

To process and create the database, the R statistical software (version 4.1.1) is used by Rstudio (integrated development environment) version 2021.9.1.372. The extraction of information related to student data is carried out through SQL queries to the trebol-fuentes website (Servicio Central de Informática [SeCIU], 2019) taking as a reference that the date of extraction of academic data is April 2022.

PCA and k-means techniques application require data inputs extracted from queries to the trebol-fuentes database (SeCIU, 2019) transformed from CSV format to data frames (structure for storing data sheets in R) within the programming environment in R. Each student is identified by a code provided by the trebol-fuentes database (SeCIU, 2019) related to their civil identification number or passport.

The variables to be obtained have been selected based on their relevance to give a first estimate of academic students' trajectories. They should also take into account academic progress, as well as personal and demographic information.

Numerical variables are required by PCA and k-means techniques, so gender and country of birth must be converted to numbers. The transformation is performed by using the binary-variable-generation criteria. For the student's gender, the variable 1 corresponds to male and 0 to female. For the country of birth, 1 corresponds to Uruguay and 0 to foreigners.

For the PCA and k-means techniques, “FactoMineR” (Lê et al., 2008) and “stats” packages are used respectively in the programming environment in R. Clusters’ visualisations are made with the “factoextra” package using the `fviz_cluster` function (Kassambara & Mundt, 2020).

Findings and Discussion

Five variables and ninety-two observations are present in the data extracted from the trebol-fuentes query (SeCIU). Observations correspond to students with two conditions simultaneously fulfilled: 1. students who opted for Surveying as the unique degree (no other

chosen degree of the Engineering School), and 2. students who were admitted during the 2018-2022 period. Both conditions correspond to the 94% of the total number of Surveying students who have been admitted to the Engineering School having chosen the degree as the unique option or among others. The five variables extracted correspond to: 1. Engineering School admission age, 2. grade point average until database query date April 2022, 3. obtained credits and expected credits ratio according to the Engineering School admission year, 4. gender (male and female), 5. country of birth.

The grade point average refers to the post-course average on a scale of 1 to 12. The average may change over time as the student will receive new grades as they complete the course. The average was quantified by analysing the grades up to April 2022, when the trebol-fuentes database was queried (SeCIU, 2019).

The obtained credits and expected credits ratio refer to the ratio between the credits obtained by a student, after passing courses up to April 2022, and the expected credits according to the enrolment year to the Engineering School. The curriculum takes into account 45 credits expected by semester. Numerical values furthest from 1 indicate that the student falls behind the expected progression.

The PCA technique allows us to describe the student population using a proper combination of the original variables without losing the original insight. Figure 1 shows which of the original variables are closely related to the new dimensions (Dim), corresponding to: 1. Engineering School admission age (adm_age), 2. obtained credits and expected credits ratio (obt_exp_cred).

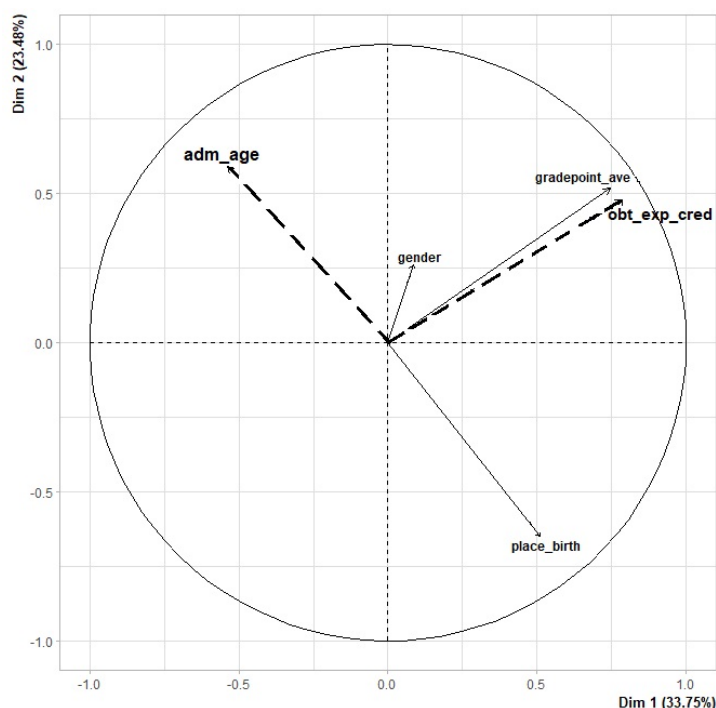


Figure 1: PCA graph of analysed variables shown through vectorial representation. Vectors in the dotted line correspond to the two best-explain population variables.

Data keeps 57.23% of the original information when it is modelled with the two crucial-variable contributions: 23.48% for the Engineering School admission age dimension (adm_age) and 33.75% for the obtained credits and expected credits ratio dimension

(obt_exp_cred). The PCA technique is employed to elucidate a comprehensive explanation of the primary variables that describe data, but its interpretation is enhanced by using the k-means technique.

The joint application of PCA and k-means techniques generates three student clusters whose interpretation is centralised in the two crucial variable contributions explaining the 92 students' information dataset. The Surveying undergraduate degree has three distinct groups of students situated in well-defined quadrants with minimal overlap between them (figure 2).

Students located in quadrant 1 maintain opposite crucial variable signs: negative variable obtained credits and expected credits ratio and positive variable Engineering School admission age. Conversely, the student cluster located in quadrant 2 owns both crucial variable contributions positively. Finally, the student cluster located in quadrant 3 is formed with both crucial variable contributions negatively (figure 2).

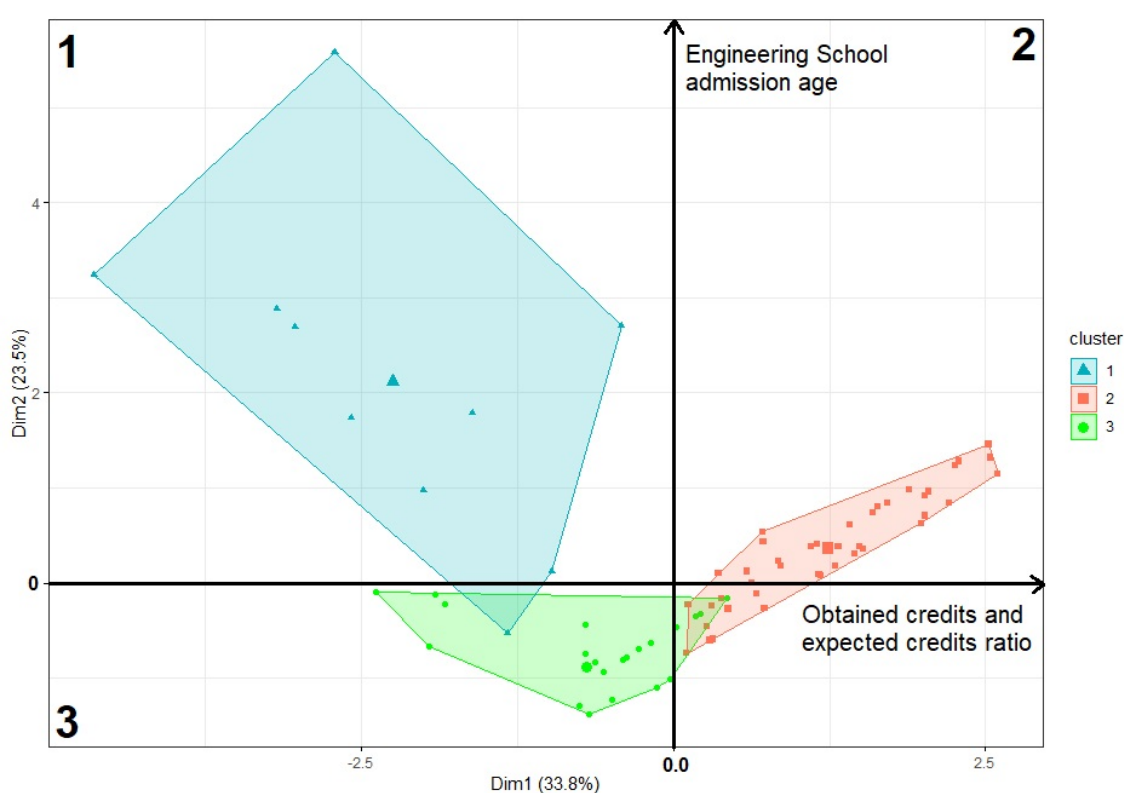


Figure 2: Two-dimensional cluster plot according to the highest contribution variables.

Unsupervised machine learning methods come from using mathematical models to create and distinguish clusters. Model interpretation is important to assign a specific trait to each group. Clusters should not overlap or they should be negligible, otherwise, it would be difficult to assign characteristics to the analysed student population.

Students admitted to the Engineering School shown in positive quadrants of figure 2 (quadrants 1 and 2) means that their admission ages are either equal to or higher than the average admission age because of the positive value axes. There is a consensus that the typical age for students to begin university is around 18 or 19. This is because they have an ideal high-school ending age corresponding to 17 years old and then they matriculate to university next year. Therefore, we interpret students located in clusters 1 and 2 as students

who have an Engineering School admission age of 20 years old or older. Among them, the k-means technique divides them into two groups based on the variable obtained credits and expected credits ratio (figure 2).

Students located with negative obtained credits and expected credits ratio axis (quadrant 1 of figure 2) are associated with progress far from the ideal trajectory. This means that they are not doing well in their academic progress, lagging for the curriculum, and starting university when they are 20 years old or older (N = 10).

In contrast, students located in quadrant 2 of figure 2, with both positive crucial variables, own a good credit balance and consequently, they follow the curriculum as planned. Additionally, these cluster's students are 20 years old, or older, when they are admitted to the Engineering School (N = 41).

Finally, quadrant 3 is associated with both negative crucial variables. From one point of view, the negative Engineering School admission age axis represents the situation where students are admitted to the school at an age younger than 20 years old. From an additional point of view, the negative obtained credits and expected credits ratio axis means that their progress is not good according to the curriculum's requirements. As with quadrant 1, it implies that their progress is far from the ideal trajectory (N = 41).

Using unsupervised machine learning techniques like PCA and k-means, we can describe a population using two variables. These variables are not associated with the other three variables extracted from *trebol-fuentes* database (SeCIU, 2019): grade point average, gender, and country of birth. The two variables let us understand the relationship between the students' progress and the Engineering admission age through cluster creation. In such wise, cluster interpretation and data analysis after PCA and k-means techniques implementation found that Surveying students ages, lower than 20 years old, have high changes to lag for the curriculum.

Qualitative research, which involves clusters, can be enhanced with the use of other machine-learning techniques. These techniques can predict how well students will perform by considering several factors directly resulting in their potentially lagging for the degree or dropping out of university. One reason why students may take longer to complete their admitted curriculum is because they are enrolled in other engineering degrees at the same time. This can directly affect their performance in the courses they are currently pursuing (Pratto & Alessandrini, 2020).

The database information extracted includes details about students' demographics such as age, gender, university admission age, and country of birth; and their academic performance such as grade point average and obtained credits. The analysis failed to take into account other factors, resulting in an unfairly biased representation of the information. The authors Cruz et al. (2022) argued their findings in easier terms. Variations were observed in the types of data investigated through the use of machine-learning techniques. Data bias can be attributed to factors such as psychological aspects, student status in the course, and performance in certain subjects.

By clustering data according to the relationship between two variables, we gain an initial insight into the student trajectories. Results from PCA and k-means techniques application provide valuable qualitative perspectives on students in each cluster, helping us understand

the first impact at university. We can enhance a detailed description of the individual groups by including additional characteristics of the population obtained by sampling each cluster. Each one can be arbitrarily sampled to collect information from each student by interviews. Finally, it aids in gathering social information reducing data bias restricted by the mathematical models.

Conclusion

Applying the PCA technique allows one to gain an initially clearer understanding of students' trajectories in the Surveying field. It focuses on two crucial variable contributions extracted from the *trebol-fuentes* database (SeCIU, 2019): Engineering School admission age and obtained credits and expected credits ratio. These variables can model the data while maintaining the value of 57.23% on the original information. Additionally, the k-means technique, when used with PCA, enables students to be classified into three distinct clusters depending on their positive or negative variables and placement within the graph quadrant.

The initial group, located in quadrant 1, gathers an opposing correlation between the two crucial variable contributions. Primarily, the negative obtained credits and expected credits ratio axis suggested students who have a lower number of credits compared to their ideal trajectory. Secondly, this students' cluster includes those who were enrolled in the Engineering School older than the admission age average, provided by the positive Engineering School admission age axis. The association between both variables suggests that students admitted to university at the age of 20 years old, or older, demonstrate unsatisfactory academic development about the theoretical trajectory given by the curriculum ($N = 10$).

Quadrant 2 includes the second cluster, comprising students who display both positive crucial variables, such as Engineering School admission age and obtained credits and expected credits ratio. A satisfactory student's academic progression at the university admission age of 20, or older, is associated with both positive variables ($N = 41$).

Finally, the third group, located in quadrant 3, is composed of students with the negative crucial variables. Insufficient academic progress in the Surveying undergraduate degree is a consequence of admission to Engineering School at the age of less than 20 years ($N = 41$).

Students' trajectories can be analysed by using unsupervised machine learning methods like PCA and k-means. Both methods initially contribute to comprehend the behaviour of students in their university degree.

Using academic information as a source, clustering helps us to continue the data analysis using predictive machine-learning techniques and also organising a sampling. It means that we can gather social information about student's experiences by talking to them. It avoids the bias caused by emotions or other psychological factors that might not be considered in academic databases.

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Internal and External Factors Lead to Curriculum Change at Higher Education Institutions in Georgia

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Abstract

Various internal and external factors influence curriculum change and implementation which include but is not limited to the state educational policies, leadership and management, education institutional settings, teachers, technological advancement, resource materials, etc. These internal and external influential factors are closely interconnected. The UN Sustainable Development Goal Four (SDG4) focuses on education and aims to ensure inclusive and equitable quality education for all; With this purpose it is critical to revise the curriculum based on the feedback obtained from all stakeholders. This article analyzes some internal and external factors which caused curriculum change of the Philology Program, International Black Sea University (IBSU), Tbilisi, in 2022. To get a full picture of the change process, the case study applied qualitative method, interviewing the decision-makers, the program coordinator, the lecturers who are responsible for implementation of a new program, and the recipients – the students. The study used some statistics from IBSU Students' Affair Department for the verification of the results. The article highlights the problem of curriculum change from different perspectives - from policy changes by the Ministry of Education of Georgia to expected outcomes. The arguments and analysis offered by the authors will enable the researchers, policy makers, lecturers and implementers to get first-hand information about the students' and academic staff's recent experiences regarding implementation of curriculum change, sharing necessary knowledge and technique how to deal with persistent issues during teaching/learning process. The article concludes with the considerations on the scale of changes needed in HEIs to keep steady pace with ever-evolving environment over the world.

Keywords: Curriculum Change, Curriculum Enrichment, Curriculum Design/Redesign, Higher-Education Institutions, Internal and External Factors

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Introduction

Curriculum design has always been the most critical part of any learning institution. As Edmond Short stated, there is always a need for newly formulated curriculum models that address contemporary circumstance and valued educational aspirations (Nyame & Setordzi, 2021). It does not matter how well-designed curriculum is, it still requires regular renewal. Major internal and external frame factors should be identified for needs assessment. It is important to support country efforts in dealing with issues within the process of curriculum redesigning and implementation across different levels and settings of education. Curriculum change theory is defined as the substitution which occurs when a new element substitutes another which is already present and alteration exists when new contents, items, materials, or procedures are added up into existing materials and programs (Harbon, 2000).

As Decker F. Walker highlighted the individual and collective curriculum practices of educators can and do have long-lasting implications on the lives of persons and on the society where we live. All professional educators have a responsibility to consider, keep track of and alter those implications (Walker & F.Soltis, 2004). Some feel that local educators, administration staff and students are the only legitimate curriculum decision makers; however, a moment's reflection showcases that other external actors also may have their hands in curriculum decision-making process. For instance, these actors include the Ministry of Education that declares new regulations or decrees concerning education, non-governmental organizations working on education matters and accrediting associations that have an exhaustive list of requirements that HEIs have to meet to be accredited, out of which many concerns with curriculum designing or implementation. Since curriculum represents the bridge between education and employment, it should help students to develop necessary skills essential to lifelong learning and it should also be aligned with current labor market needs.

Method

Statistical data obtained from the Students' Affairs Department, IBSU, has been a valuable source as it provided opportunity to observe the ongoing changes in students' achievements of two academic years in dynamics. Apart from the secondary sources, primary data for the present research has been gathered through interviews and survey analyses from university students and the head of the Teacher Training Educational Program (TTEP) at IBSU (Georgia). We interviewed those particular people because they are directly affected by the changed policy and strategy as we expected to get first-hand information both from the decision-makers and the end-users; therefore, we ensured the credibility and reliability of data collected. Semi-structured Interview (SSI) method was used to obtain both quantitative and qualitative data from the research participants. We could ask to our applicants some follow-up questions leading to an exploration in greater depth on key concepts and the interviewees were more open to express their own ideas in a wider manner. The interviews were followed by group discussions in which the head of the department, education specialists, doctoral students, bachelor level students, and the end-users took part.

The survey was conducted with a total population of 51 students and the selected sample applying the Stratified Random Sampling technique that equals to 38 students in total. Independent and dependent variables have been identified. The reshaped curriculum targeted to the demands of the beneficiaries was selected as an independent variable, while the students who were affected by the changes were considered as a dependent variable in the present research. The following theoretical framework was chosen for the present research. The

curriculum which is now both - content-based and competency-based, focuses on development of learning competencies; Curriculum is elaborated along the lines of four main curriculum approaches, namely: humanistic approach, developmentalist approach, social reconstruction, and social efficiency.

External and Internal Factors

Because of changes into the National Qualifications Framework worked by the National Center for Educational Quality Enhancement the enriched TTEP was integrated into the English Philology BA program, IBSU, to meet Teachers' Professional Standards, National Qualification Framework and the Georgian legislation.

Teacher Training Educational Program, IBSU, has been developed by the head of English Philology Program, IBSU, Prof. M. Chkhotua supported by the academic staff in 2021 to meet new regulations of the Ministry of Education for teachers' preparation and training. Novelty of the TTEP, IBSU is that it is incorporated into the 4-year English Philology BA Program and the second-year students have opportunity to register for this 60-credit program, upon completion of which the student gets a certificate of English Language Teaching. In February 2022, TTEP got the State Accreditation and enrolled the first students. The incorporated program was innovation on Georgian market as it was targeted to the students' needs and offer the them a flexible scheme to avoid additional a two-year training program for the Teachers' Certificate. The program includes Fifteen subjects, out of which three are electives (a student can choose one of them), and plus 10-credits which a student gets for trainings at school.

In academic year 2023, 51 students out of 70, chose TTEP program. It indicates to the increased interest among students who strive to get profound knowledge in the field, as well as enhance employment opportunities to fit to the official requirements.

Though private universities are relatively free from external pressures that would infringe their independence, the Ministry of Education of Georgia still maintains its control over the quality of education. They have to meet the state norms of authorization as well as program accreditation process established for education institutions. Nowadays, because of many external and internal challenges, financial and academic delivery model applied by universities is no longer stable. If permitted to run without apparent direction, higher education will not yield the desired results necessary to achieve national aims (Dickenson, 2023).

Restructuring curriculum and creating a TTEP Program which complies with the requirements of the Ministry is an example how some external factors influence curriculum development and, on the other hand attract students offering them employment opportunities. Ultimately, the enriched curriculum upscales university revenues and enhances its reputation.

The only source of revenue for universities in Georgia - both state and private ones are tuition fees and state scholarship. Increase in the tuition revenues is the major source of funding for private institution like IBSU. In September 2022, the Consumer Price Index increased by 0.8 percent compared to the previous month, while the annual inflation rate amounted to 11.5 percent (Georgia, 2022). With regard to the annual core inflation, the prices increased by 7.5 percent. Inflation rate reflected on the financial stability of the universities. Private universities including IBSU consider it inappropriate to use the standard measures of inflation to evaluate the growth of amount of tuition and fees. IBSU administration has not increased the tuition fees for students in spite of high inflation rate in the country. To rectify this situation, and to

attract more students, the University amended its policy, upgraded curricula of the educational programs, and incorporated some changes in management, e.g., measures for motivating administrative and academic staff.

The universities in Georgia, like in other countries, strive to accomplish four main goals: increase revenues, improve quality of teaching/learning, attract more students, and enhance their reputation. Curriculum enrichment accepted by the majority contains four components: planning, content, implementation and evaluation.

Planning: curriculum enrichment means giving a greater importance to a curriculum by adding values to meet educational needs, which was Primary objective of TTEP and aimed putting emphasis on the overall development of the students, helping them to acquire relevant skills and become competitive at labor market. Therefore, curriculum planning is based on a thorough process of needs assessment.

Content: determining the curriculum content is another key component for enhancing education quality. All parts of content should serve certain goals, but what is more significant, content should be practical for its target audience. Content of TTEP has been designed to be both - content-based and competency-based, which made it more engaging, effective and purposeful based on current needs of teaching/learning. The content of the new program has been enriched, accordingly, the syllabi for some newly-introduced subjects have been set-up.

Implementation: after content development it is essential to ensure proper implementation of curriculum. There are various aspects that influence enriched curriculum implementation including University leadership, trained staff, motivated students, available learning materials, institution environment, class practices, and supervision. Thus, all efforts should be made in order to consider all intervening factors not to hinder enriched curriculum implementation process. IBSU leadership has been supportive, adequate technical equipment has been purchased, and some training sessions for the lecturers have been financed.

Evaluation is a very important component of enriched curriculum implementation. This is the process of measuring and exploring the scope to which the learning programs and learning activities actually produce the expected learning outcomes. Evaluation process lays the foundation for producing curriculum-related decisions. Feedback on curriculum adjustments and lecturers' evaluation were obtained within the framework of research methodology of the present article, the results of which are presented below:

- 38 second-year students of TTEP answered the survey questions.
- 65% answered that they applied for the program because it offered enriched content and innovated curriculum;
- 19% mentioned practical aspects of the course and increased employment opportunities. While 16% of the survey participants supported the opinion that restructured curriculum reflect more social and humanistic approaches.
- Almost 90% acknowledged that new TTEP was engaging and easy to follow.

One open question - what is the most interesting and enjoyable aspect of the TTEP for you - revealed the students' deep interest towards academic subjects among which they named: intercultural education, educational psychology, special education, and education technologies.

Another open question showed the expectations of the students, the analysis of the qualitative answers revealed that they believe the offered program will help them to achieve not only

professional but academic goals as well. It was clearly stated by the majority that they are as much interested in raising their awareness and deepening knowledge in different academic subjects such as psychology and education theories.

Almost all respondents underscored the role of the practice offered by the program which envisages teaching English to school children in different grades.

In the personal interview with the head of the Program, Dr. Prof. Chkhotua, some problems which occurred during planning and implementation process of the TTEP has been discussed. The resistance from the side of the state authorities was a long-standing and serious, because, the program was designed in an original way, and intended to incorporate it into BA English Philology program. Also, she confronted some criticism because of curriculum, which was argued to be more academic content-based, rather than competency-based, and learning skills development. In her interview she also mentioned the support from the IBSU leadership which made her goal achievable. From her perspective, the choice of the majority of the Philology students made for a new program is a main indicator of the success.

Consequences of Curriculum Change

This year 910 students have been enrolled in the International Black Sea University BA programs which is about 10-12% more than in previous years. This is a direct result of university policy focusing on increasing quality, implementing innovations and enriching curriculum which ultimately enhances reputation of the university. In the national rating, in 2023, IBSU has been rated as the second among 53 authorized universities functioning in Georgia.

Based on the results of the present research, it can be concluded that one of the reasons the university has attracted greater number of students is due to its innovations, also modernized and enriched curriculum, like TTEP, which has been successfully incorporated into already existed Program.

Another evidence of students' satisfaction is their high evaluation which indicates to the effectiveness of leadership and management supporting and financing new programs, implementation of curriculum enrichment and innovative approaches in teaching/learning.

Conclusion

When is a Curriculum Change a Change for Better? The academic year 2021 was a right time for change TTEP curriculum to be a change for better for many reasons:

- to better adapt to demands dictated by the Ministry of Education of Georgia,
- to attract students who would be guaranteed to be competitive on a labor market;
- to update and enhance university teaching-learning quality and
- to make the university more challenging and demanded.

There is an increased demand for professional educators especially at HEIs. The shortage of well-qualified teachers hinders endeavors to attain high quality education throughout country. It is important to remember that Georgia, as one of the post-Soviet countries, started to develop the national education policy after it gained independence from the soviet regime, therefore the acute need for professionals in the field of education still remains unmet. The University

leadership tries to fill this gap, considering the needs of the country, one good example of this policy is foundation of a new education program for teachers.

Nowadays, higher education and qualification which responds to current needs is more important than ever, because for rapidly changing environment it is crucial to invest in education as it has tangible results on equity, well-being, personal growth and prosperity of population. However, financial investment is not a sole contribution to quality education; It requires adequate planning and implementation of diverse programs at all levels of education. Moreover, in many cases, there is a frequent need to fully change or alter existing curricula at educational institutions. Fast changing environment forces university leadership to initiate curriculum change, which is considered as inevitable and a basis for progress.

Appendix

Survey Questions

The following questionnaire has been applied for interviews:

1. What is your position or occupation? (Tick more one answers)
 - a. head of the program
 - b. lecturer
 - c. administrative staff member
 - d. researcher
 - e. other
2. How is the new enriched curriculum different from the old one?
3. Teacher Training Educational Program (TTEP):
 - a. has enriched the content of the curriculum
 - b. made it more practical and targeted to our employment needs
 - c. it now reflects more social and humanistic approaches
4. How easy, or complicated has been the process of implementing new curriculum?
 - a. very difficult, had to overcome some obstacles
 - b. somewhat difficult because of management problems
 - c. easy
 - d. actually no big problems
5. How would you evaluate the difficulties in the implementation process of the enriched curriculum?
1-10
6. What is percentage of faculty students who chose this TTEP?
 - a. 1 - 25%
 - b. 26 - 50%
 - c. 51 - 75%
 - d. 76% and more
7. Have you conducted any surveys to identify the students' satisfaction level regarding your institution's modified curriculum?
8. What are the results of the students' survey?
9. How many students completed the program with high grades?
10. What is the employment rate of the graduates?
11. What would you change if you start from the beginning?
12. What are the future perspectives of the Program?
13. What further changes are expected?
14. Does the policy worked out by the Ministry of Education of Georgia in preparing the students for teaching career enhance their qualification and knowledge.
15. What would be your attitude towards the necessary changes imposed by the state policy?

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The Effectiveness of Different Teaching Methods in Teaching Different Languages: Case Study of English and Korean

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Abstract

Grammar Translation Method (GTM) and Communicative Language Teaching (CLT) are the most common methods used for teaching a foreign language. This research aims to investigate the effect of using different teaching methods; the GTM and the CLT method in teaching both English and Korean. This is an experimental research. The sample of this study comprises 8 English learners from A2 level and 15 Korean learners from A2 in which all of them were females from BCW Language School in Oran, Algeria. The findings of this research indicated that the GTM was more effective in teaching both languages. This research concluded that learners who were taught by using Grammar-Translation method progressed notably in grammar and vocabulary in both languages.

Keywords: Grammar Translation Method, Communicative Language Teaching, English as a Foreign Language, Korean as a Foreign Language

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1. Introduction

When learning a foreign language, the instructor is faced with a challenge to choose the method with which they choose to deliver their courses. According to Smith (1980:159), there are two types of knowledge that every learner and of course instructor need to take into consideration. The first is explicit knowledge which he defines as “the conscious analytic awareness of the formal properties of the target language.” This type of knowledge is rooted in teaching the structure of the language, i.e. grammar, to promote language learning. On the opposing end of this knowledge is implicit knowledge. This second type is said to be more spontaneous and natural. Smith (1980) argues that this type of knowledge “lends support to the direct method.” As a teaching method, it promotes communicative performance when learning a foreign language.

Explicit knowledge lies in the heart of the Grammar Translation Method GTM. The core belief of this method is that grammar which according to Penny (2000) “a set of rules that define how words (or parts of words) are combined or changed to form acceptable units of meaning within a language” is introduced to learners, who then engage in spoken or written exercises to practice them. Subsequently, the learners apply these structures in less structured speaking or writing tasks. The teacher may use the learners’ native language in teaching the grammar of the target language.

The Grammar Translation Method dates back to the ...it focuses on the written form of language, giving importance to the rules of the grammar of a language. Advocates of this approach believe the language used in the literary texts is the ideal form of the language. By focusing on explicit knowledge, learners can be trained to attain proficiency by memorizing the rules and regulation of grammar of the target language. For instance, Hedge (2000) argues that teaching grammar to learners will result in the production of accurate forms of English.

The Grammar Translation Method, also known as the Classical Method, centered on the use of translation. Its primary feature is its emphasis on comprehending grammatical rules (sentence structure) and their application in translating passages from one language to another. In essence, teachers employing the GTM teach grammar and employ it as a tool to instruct students in translating between languages.

On the other hand, implicit knowledge takes on a natural setting. A method which focuses on implicit knowledge is the Communicative Language Teaching (CLT). In this approach, language is viewed as a social tool. During the 1970s and 1980s, Communicative Language Teaching (CLT) emerged as a groundbreaking method for language instruction, sparking considerable enthusiasm and interest (Hymes, 1972). Consequently, teachers worldwide began reorganizing their teaching resources, classroom materials, and syllabi in response to this development (Richards, 2006). According to Riggensbach and Lazaraton (1991), CLT places a strong emphasis on learners’ understanding of how language is used in authentic communication, actively engaging them in real-life activities like negotiating meaning and participating in group interactions.

Chomsky’s (1965) states that a cognitive approach has the potential to enhance learners’ proficiency in acquiring grammar, which is centered on language forms and structures. Moreover, it helps them understand and use the language with greater efficiency. Littlewood (2007) argues that many governments in East Asia promotes the use of the communicative approach as a new method to improve the use of English in their countries. These East Asian

countries endorse the prevalence of CLT as a dominant model with task-based language teaching (a contemporary iteration of CLT) holding a central role in government discourse since the 1980s. Littlewood (2013:3) states, “The communicative perspective on language is primarily about what we learn. It proposes that when we learn a language we are primarily learning not language structures but language ‘functions’.”

Whereas GTM focuses on teaching grammar through translation, CLT focuses on language use. Therefore, the study at hand, to discover whether GTM as a teaching approach is better suited to teaching a foreign language than the CLT approach. It also aims at finding which teaching approach is better suited for teaching English and which one is the better option for teaching Korean. In addition, the study compares between the results of the two languages. In a nutshell, the study answers the following research questions:

1. Which of the two teaching approach; the Grammar Translation Method and the Communicative Approach is more effective in enhancing learners' performance in learning Korean?
2. Which of the two teaching approach; the Grammar Translation Method and the Communicative Approach is more effective in enhancing learners' performance in learning English?
3. To what extent do the initial proficiency levels, as indicated by pretest scores, influence the effectiveness of different teaching methods in improving language proficiency, as measured by post-test scores, in a diverse student population?

2. Literature Review

Khan & Mansoor (2016) research the effectiveness of the Grammar Translation method in learning English in Pakistan. They distributed a questionnaire on level one and two students at intermediate level in Pakistan Atomic Energy College for Girls, Chashma, Mianwali, Punjab, Pakistan. In this Educational institute, English is taught as a compulsory subject. The questionnaire is used to attest the views of learners on this teaching method. Their study suggest through students' opinion that this method is very helpful in English as a second or third language learning.

Abrejo, Sartaj & Memon (2019) draw attention to the obstacles that hinder English language teachers from incorporating CLT into their public sector college classrooms in Hyderabad, Pakistan. Their objective is to understand and observe the attitudes and approaches of both teachers and learners towards CLT in Pakistan and how these factors impede the method's adoption. Their study concludes that a significant number of college teachers acknowledged that they continue to employ traditional teaching methods, specifically the Grammar Translation Method, in their language instruction. However, the researchers highlight that students in public sector colleges in Hyderabad, Sindh, would benefit from instruction using a communicative approach, emphasizing the urgent necessity of adopting CLT (Communicative Language Teaching). However, several factors consistently hinder teachers from implementing CLT, including time constraints, limited access to diverse resources, and the presence of large class sizes.

Zimba & Tibategeza (2021) analyse Communicative Approach (CA) strategies used by teachers in teaching English in secondary schools in Mzuzu City in Malawi. The researchers collected data via interviews and questionnaires from four government secondary school with a total of 48 participants, 40 students from Form Four classes and eight English teachers from the secondary schools. The study showed that CA strategies used by the teachers in the

classroom include pairing, question and answers, debates, group discussions and role play, and filling in gaps. Classroom Assessment (CA) strategies are employed to assist students in acquiring proficiency in the English language.

Al-Khamisi and Sinha (2022) take into consideration classroom observation reports to scrutinize the importance of using the CLT approach in Omani EFL context. This study follows the overall structure of looking at the broader literature review underpinning the calls to adopt CLT in the Omani EFL context. They conclude that the introduction of CLT method in Oman has generated conflicting attitudes among English teachers and between teachers and students. Classroom observations reveal that some teachers, particularly male expatriate Arab teachers, tend to adopt an authoritarian teaching style influenced by the hierarchical structure of Arab society.

3. Research Methodology

This study adopts a mixed method approach. It is both qualitative and quantitative in nature. This study seeks to determine whether learners in the experimental class can achieve notable progress in their language learning skills following an experimental level of 3 months. In essence, it assesses whether the experimental teaching approach positively impacts their learning abilities.

The study also aims to investigate whether language learners in the experimental class, who undergo the experimental teaching approach, demonstrate greater progress in their language learning in comparison to the control class. Each language (English and Korean) is tested for the adequacy of the teaching approach best suited for the said language teaching. This research objective centers on investigating which of the two language teaching approaches, i.e. the Grammar Translation Method and the Communicative approach is more effective in boosting learners' overall progress in the process of language learning.

3.1. Participants

In the experiment, two groups of English class and two groups of Korean class were selected from the British Culture Wahan BCW language school as the Experimental group and Control group. One class of the Korean class is the experimental group and the other is the control group and the same goes for the English class. The experimental groups will be labeled throughout the research as K1 for Korean and E1 for English. The control groups will be labeled throughout the research as K2 for Korean and E2 for English.

A pretest was administered to all four groups to determine their level in the designated language; within each language group (English and Korean), one class is designated as the experimental group, while the other serves as the control group. The pre-tests results showed that they share a similar level of the overall language proficiency. The two classes of each language were taught by the Grammar Translation Method and the Communicative Approach respectively. The classes are four hours a week divided into two session of two hours per session.

Groups of Classes	Number of learners	Teaching Method
Group 1 K1	4	Grammar Translation approach
Group 2 K2	4	Communicative Approach
Group 1 E1	6	Grammar Translation approach
Group 2 E2	7	Communicative Approach

Table 1: Participants selected after the incorporation of the pretest

3.2. Data Collection Tools

1. Pre-test is used to test the subjects' language competence before the experiment. The testing paper for the pre-test comprises 30 multiple choice questions with a full mark of 60. One question is marked 2 points. The test is meant to provide an overall measure of the learner's language proficiency in the target language. The discussion of the test results are provided in section 4.1.
2. Post-test: Post-test is used to test the subjects' grammatical competence after the experiment. The testing paper for the post-test includes 30 multiple choices with a full mark of 60.

3.3. Data Collection Procedure

The researcher herself developed the pretest and the posttest since she is responsible for these classes. The test questions for both the pretest and the posttest included questions that cover various aspects of language proficiency in the target language, including grammar, vocabulary, reading and writing comprehension. Each question was a multiple-choice question, with three options each. Each question was Assigned 2 points for a total possible score of 60.

The pretest was scheduled after the A1 level was rapped and before the beginning of A2 classes at the language school classrooms. The participants were instructed on the purpose of the test and the allotted time for completion. They were also instructed that they should not collaborate or seek assistance from others during the test. After the test completion, the papers were labeled with participants identifiers. The same measures were taken for the posttest.

Upon the data collection was completed, the pretest scores were analyze to evaluate the impact of the teaching methods by comparing mean scores, calculating effect sizes, and conducting statistical tests, as will be discussed in the following sections.

4. Results

Teaching methods used in education are many and different, each with its own advantages and disadvantages. In this study, two teaching approaches are assessed in teaching two different languages. The two languages are from different language families, the first being English while the second is Korean and both language are taught by the researcher herself in a language school in Oran, Algeria.

In the experiment, two groups of each language were selected as the subjects of this study. These groups were taking language classes at the BCW language school in Oran, Algeria. The four groups were in level A2, which is a pre intermediate level. One group of Korean learners were taught using the grammar translation method and the other group was taught

using the communicative language approach. One group of English learners were taught by the grammar-focused method and the other group by the communicative approach. The level is taught twice a week for two hours a session during a 3 months period.

Before conducting the experiment, all four groups of students underwent a pre-test. This test is designed to assess their proficiency in the respective languages. The results from this pre-test are used to confirm that the groups have a similar starting level of language proficiency. This is crucial to ensure that any differences observed in post-test results are due to the teaching methods, not initial proficiency. The statistical analyses of the post-test scores were made with the help of SPSS v21.

4.1. Pretest Results

A pretest was conducted to figure out any difference in the achievement of the four groups' before and after the incorporation of the teaching method. The test is marked out of 60 with 30 items in total. The initial group members were as follow:

Groups of Classes	Number of learners
Group 1 K1	5
Group 2 K2	6
Group 1 E1	6
Group 2 E2	7

Table 2: Number of participants before the pretest

4.1.1. Korean Class Pretest Results

Learners	N	Mean	Std. Deviation
K1	5	48.25	3.09
K2	6	44.75	9.94

Table 3: Korean Class Pretest scores

The pretest results showed that between Group K1 (Experimental) and Group K2 (Control) in the Korean language class, there are significant differences. The first group of Korean class had a higher mean pretest score (48.25), indicating that they would start with a higher level of language proficiency compared to the other group. Additionally, the smaller standard deviation in Group K1 suggested that the scores in this class were clustered more closely around the mean, indicating less variation in language proficiency levels within the group. Since differences in pretest scores can influence the outcomes of a posttest and make it challenging to attribute post-test score differences solely to the teaching methods (Grammar Translation vs. Communicative Approach), the learners were filtered and only those with similar scores were chosen as participants of the study through matching. Participants from the experimental and control groups were matched based on their pretest scores to create more comparable sets of participants and control the variation. After the matching process, the Korean class groups are as follows:

Groups of Classes	Number of learners	Teaching Method
K1	4	Grammar Translation approach
K2	4	Communicative Approach

Table 4: Number of Participants in the Korean groups

4.1.2. English Class Pretest Results

Group E1 of the English class (Experimental) has a slightly lower mean pretest score (50) compared to the control group E2, which has a slightly higher mean (52). However, the difference between the means is relatively small. This indicates that there is no significant variation in pretest scores within the groups of the English class. This suggests that the experimental group and the control group have relatively similar starting language proficiency levels.

Learners	N	Mean	Std. Deviation
E1	6	49.66	6.25
E2	7	50.42	3.86

Table 5: English Class Pretest scores

4.2. Posttest Results

After the selection of learners for both the English class and the Korean class groups, classes began on December 2022 and ended in March 2023. It should be mentioned that the learners that were eliminated from the Korean groups were still able to take the course but were not part of the experiment. After the classes ended, a posttest which is usually an exam to test whether learners are able to move up a level were administered. The next section discusses the results of the Korean groups' posttest scores.

4.2.1. Korean Posttest Results

The posttest consisted of 30 multiple-choice questions, each worth two points, for a total possible score of 60. The scores were analysed using SPSS v 21 and the following table shows the scores of the experimental group and the control group. This experimental group was taught using the Grammar Translation Method while the control group was taught using the Communicative approach. The teaching approach is discussed in the discussion section below.

Learners	N	Mean	Std. Deviation
K1	4	52.00	2.16
K2	4	50.50	7.59

Table 6. Korean Class Post-test scores

As we can see, K1 (Experimental group) has a higher mean post-test score (52) compared to K2 (Control group), which has a lower mean (50). This suggests that, on average, the first group which was taught using the grammar translation method performed better on the post-test as opposed to the control group which was taught using the Communicative method. Furthermore, K1 has a smaller standard deviation (2.16) compared to K2, which has a significantly larger standard deviation (7.59). A larger standard deviation suggests greater variation in post-test scores within that group. The post-test results indicate that the teaching method used in the experimental group may have been more effective in improving language proficiency, as evidenced by the higher mean post-test score.

The pretest results clearly indicate an initial difference in language proficiency between K1 and K2 groups, with K1 having a higher starting level of proficiency. As we can see, the posttest results show that, despite the initial proficiency difference, K1 (Experimental group)

maintained its lead and exhibited a higher mean posttest score compared to K2 (Control group). However, the smaller standard deviations in both pretest and posttest scores for K1 suggest that this group displayed less variation in proficiency levels, which may indicate more consistency in learning outcomes.

4.2.2. English Posttest Results

As for the English class, the following table shows the posttest results. The experimental group E1 was taught using the GTM whereas learners in the control group were instructed in the CLT method.

Learners	N	Mean	Std. Deviation
E1	6	58.16	1.47
E2	7	55.42	2.43

Table 7: English Class Post-test scores.

The results of the posttest of both groups shows that the experimental has a higher mean posttest score (58) compared to the control group, which has a lower mean (55). The experimental group was taught using the GTM while the control group was taught using the CLT method. The results suggest that, on average, the experimental group performed better on the post-test. In addition, the experimental group has a smaller standard deviation (1.47) compared to E2, which has a larger standard deviation (2.43). This indicates greater variation in post-test scores within the control group. The results indicate that the GTM was more effective in improving language proficiency than the CLT method.

The pretest results show a small initial difference in language proficiency between the experimental group and the control group, with E2 starting at a slightly higher proficiency level, as opposed to the Korean groups. Nonetheless, the posttest results suggest that E1 (Experimental group) not only closed the initial proficiency gap but also exhibited a significant improvement, surpassing E2 in mean post-test scores. Furthermore, the smaller standard deviations in both pretest and posttest scores for E1 suggest that this group displayed less variation in proficiency levels, which may indicate more consistent learning outcomes overall.

5. Discussion

The study at hand aims at analyzing the effectiveness of different teaching methods in teaching English as a foreign language and Korean as a foreign language. By using the GTM as a teaching method, a significant emphasis was placed on teaching the rules and structures of the language (in both language groups K1 and E1), including verb conjugations, noun declensions, sentence structure, and tenses. Moreover, lessons usually included written texts in the target language as part of reading enhancing in the target language. In addition, the teacher made sure that learners' vocabulary is being enriched in the process, typically through vocabulary lists and memorization, with an emphasis on word meanings and usage in sentences.

As for the CLT method, the main goal was to enable learners to communicate effectively in real-life situations. This includes speaking and listening, as well as reading and writing, in meaningful contexts and everyday language that is relevant to the learners' needs and interests. During classes, learners engage in tasks and activities that mirror real-life communication situations. In K2 and E2 groups, the teacher created opportunities for students to interact and communicate in

interactive learning. Activities such as role-plays, debates, group discussions, and problem-solving tasks were used during classes.

As the aforementioned results demonstrate, the posttest for both English and Korean classes provide valuable insights into the comparative effectiveness of these teaching methods for language learning: the Grammar Translation Method and the Communicative Language Teaching. These results are indicative of the performance of two groups, K1 and E1 (Experimental groups) and K2 and E (Control groups), which were exposed to these teaching methods, respectively.

In examining the posttest results, several key findings emerge. In both experimental groups, a notably higher mean posttest score was observed, in contrast to the control groups K2 and E2, which had a lower mean posttest score. This discrepancy implies that, on average, participants in the experimental group, who were taught using the Grammar Translation Method, outperformed their counterparts in the control group, who were instructed through the Communicative Language Teaching method. This suggests a potential advantage in terms of language proficiency for the Grammar Translation Method, as it led to higher posttest scores.

These findings collectively suggest that, in our study, the GTM appeared to be more effective in enhancing language proficiency among participants when compared to the CLT method. However, it is essential to interpret these results within the context of the study's limitations. The initial differences in pretest scores between the two groups may have influenced the posttest results to some extent. Additionally, other factors, such as the duration of the instruction and the participants' previous language learning experiences, may have played a role in the observed differences. Moreover, the tests that were administered were written tests rather than oral and they did not incorporate any speaking testing. This may be considered as a limitation of the study and why the GTM approach was more effective in the learners overall performance.

6. Conclusion

In conclusion, our study demonstrates the potential benefits of the Grammar Translation Method for improving language proficiency. It is recommended that further research is in order to explore the specific aspects of this method that contribute to its effectiveness. Additionally, considering the limitations of our study, future investigations should aim to replicate these findings and consider a broader range of variables to gain a more comprehensive understanding of the relative merits of different language teaching approaches.

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Using Augmented and Virtual Reality to Improve the Students' Technical Skills

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Abstract

Augmented and virtual reality represents unique instructional media, affording educators opportunities to create, customize and scale authentic, student-centered and interactive learning experiences. The aim of our study was to gain insights into v-learning from the perspective of teachers and students. Our paper sets out discursive issues surrounding student performance in welding skills and opinions of participants - students and teachers - regarding pros and cons of AR. Our study confirmed AR had the ability to engage pre-service teachers to train welding skills as AR learning environment tended to provide an effective supporter of traditional education. It was more likely to lead to certain benefits such as increased motivation of learners.

Keywords: AR, VR, Students, Learning, Teaching

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1. Introduction

In recent years, the integration of augmented and virtual reality technology into educational settings has gained significant attention as a promising approach to enhancing teaching and learning experiences. Augmented and virtual reality, technologies that immerse users in computer-generated environments, offer unique possibilities for transforming traditional pedagogical methods across various disciplines. One particularly promising area of application lies in the realm of technical skill development among university students. As industries continue to demand graduates equipped with practical expertise, educators are exploring innovative tools to bridge the gap between theoretical knowledge and real-world proficiency. Augmented and virtual reality stand out as potent tools that have the potential to revolutionize the way technical skills are taught and acquired.

2. Potential and Challenges Suggested by Recent Research

- Traditional education methods often struggle to fully engage students in acquiring technical skills due to limited opportunities for hands-on experiences, especially in fields that require tangible practice. Augmented and virtual reality break through these limitations by offering an immersive, interactive, and safe environment where students can actively engage with complex scenarios. By simulating real-world situations, AR and VR allows students to apply theoretical concepts in realistic contexts, thereby facilitating a deeper understanding of the subject matter.
- Engagement and motivation are crucial factors in effective learning, particularly when it comes to acquiring technical skills. Augmented and virtual reality's ability to provide a dynamic and visually compelling environment can capture students' attention and sustain their interest throughout the learning process. According to Slater and Wilbur (1997), A/VR's immersive nature can trigger a heightened sense of presence, making learners feel as if they are physically present in the simulated environment. This heightened presence can lead to increased engagement, motivation, and retention of learned material.
- Virtual reality also offers the potential for personalized and adaptive learning experiences. Through AR and VR simulations, educators can tailor scenarios to match the students' skill levels and learning pace, providing a customized journey for each student. As noted by Johnson et al. (2016), adaptive learning environments have the advantage of addressing the diverse needs of students, ensuring that both fast learners and those who require more time receive appropriate challenges and support.
- Resource constraints, such as access to specialized equipment and physical spaces, often hinder educational institutions' ability to provide practical training for technical skills. Augmented and virtual reality offers a solution to these limitations by enabling students to practice in virtual laboratories, workshops, or environments that closely mimic real-world settings. This accessibility can democratize technical skill education and create equitable learning opportunities for all students.
- While the potential of virtual reality in enhancing technical skill acquisition is promising, challenges such as the high initial costs of AR/VR setup, technological barriers, and the need for high-quality content development must be addressed. Moreover, empirical research is essential to validate the effectiveness of AR/VR-

based interventions in comparison to traditional methods. As AR/VR technology evolves and becomes more accessible, further research should focus on optimizing instructional design and exploring the long-term impact of VR-enhanced technical education.

3. Research Characteristics

3.1 Research Objective

The aim of our study was to gain insights into to a/v-learning from the perspective of teachers and students. Our paper sets out discursive issues surrounding student performance in welding level training and opinions of participants - students and teachers - regarding pros and cons of AR/VR.

3.2 Research Methodology

Our research followed a mixed method strategy combining qualitative approaches to data collection and the ensuing discussions.

We used following methods:

- Student essay analysis (opinions on achievements in level of welding training measured by AR program)
- Self-reporting of participants on welding training
- Semi-structured interviews with teachers/trainers of AR program

3.3 Research Sample

Our research was attended by 20 students at a partner secondary technical school aged 17-19 who enrolled in the course *Welding*. For the first month of the 3-month course, students were presented with traditional lectures on welding methods, theory, including traditional video training for successful mastery of welding. They were then divided into 4 groups of 5 students and trained in the AR program in a 6 of sessions.

After each session, the results in 21 categories and welding quality parameters were measured using the AR program. At the end of the course, students were asked to write a 1-page essay about their experiences with the AR program and assess its effectiveness in all 21 categories. At the beginning of the semester, students also reported their level of initial theoretical and practical knowledge of welding methods on a scale of 1-10 (10 is the highest level of knowledge skills) and were asked to compare it after their AR training. At the end of the course, we also conducted semi-structured interviews with 4 teachers – supervisors of the training.



Fig. 1: Students train their welding skills with the help of AR

4. Research Results and Discussion

Based on the objectives of our research these findings emerged from the collected data:

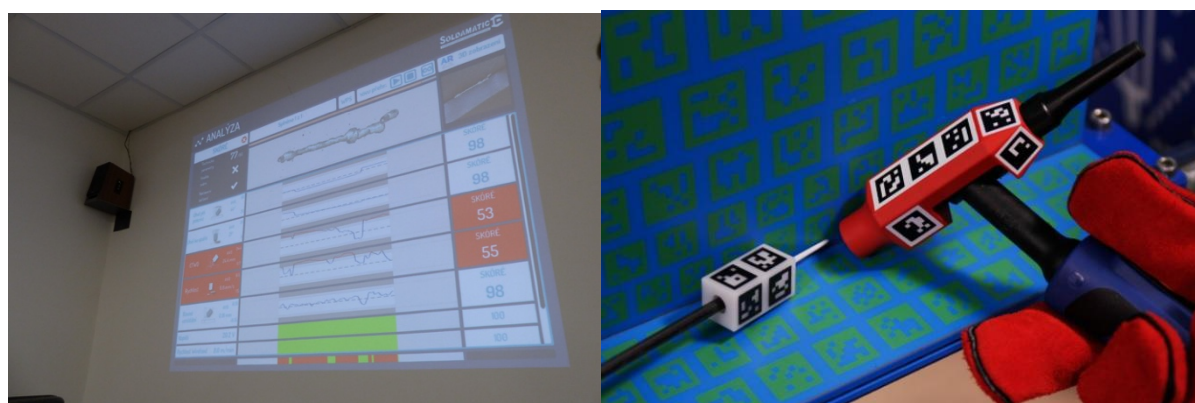
4.1 Students Essays – Experience With VR Program

Students reflected on their experience with the AR program as highly motivating and fun, but also tiring. Improvement and confidence were mentioned in all 21 aspects of welding quality (see Table 1), but the results appear to be different. Speed and fluency of welding improved in almost all reports, and students found that checking number of correct welding parameters was easier after training. Some specific parameters of welding quality seemed more difficult to students and will require more practice. Although students' enthusiasm for AR-learn has been expressed in all the essays, this should not replace traditional teaching and learning practices, but reinforce them. Still, students believed that learning AR had a purpose by making the training meaningful. Some of their comments: "... People can forget what they write, they can also forget what they listen to, but they don't easily forget what they live and enjoy...", "... AR can help to think positively and not give up, push a trainee outside of his comfort zone...", there should be the need to work through challenging situations..., "it is nice that we can practice in a simulated situation before being with real materials..." Some limitations were expressed by some students though as they were concerned about a saturation effect: "...I don't think that it will work... people might also get bored if they use it all the time..."

When to summarize the pros and cons expressed in most essays, they would be as follows:

- feeling like being in a real welding process and with real materials, enjoyment, new experience, emotions, enthusiasm, fun, loss of fear,
- fatigue and discomfort working with AR glasses, loss of concentration after certain time.

Aspect (21)	No change	Slight change	Moderate change	Considerable change
1) Distance from material	0	2	8	10
2) Speed of welding	0	3	5	12
3) Angle 1	0	9	8	3
4) Angle 2	0	4	12	4
5) Angle 3	0	6	11	3
6) Angle 4	0	7	9	4
7) Fluency	0	1	6	13
8) weld penetration	2	10	8	0

Table 1: Crucial parameters**Fig. 2:** Parameters of welding

4.2 Fear of Real Welding

At the start of the semester, 12 students of 20 scored 7-10 on the scale which was interpreted as high level fear of real welding, Nine of them described their fear as a huge problem. At the end of the course, most students reported mild or no fear, see Table 2.

Level of fear (1-10)	Student self-report at the start of the semester	Student self-report at the end of the semester
1-2	1	10
3-4	1	4
5-6	4	3
7-8	9	3
9-10	5	0
Students - total	20	20

Table 2: Level of fear: student self-report at the start and at the end of the semester



Fig. 3: Welding training

4.3 Semi-structured Interviews With Teachers/Trainers

According to the opinions of teachers who taught both theory and AR in the course, students significantly improved their practical welding skills during the course. The student's performance showed that AR helped students learning better. The results revealed that there was a significant positive impact of VR environment on the development of students' welding skills.

"... The use of AR tools allowed students to practice welding as in real welding. "

"Welding skills have greatly improved with the use of AR tools in the laboratory..."

When asked to summarize the pros and cons of VR-learn these were prevalent opinions as expressed by teachers:

- Plus: High motivation, visible progress, more confidence, better performance of students
- Minus: Cost of equipment, need to divide the students into small groups, need of technical support

5. Conclusions

Our study confirmed that AR is able to engage future welders before starting service to train their welding skills, as the AR learning environment tended to provide effective support to traditional education. It certainly led to some benefits, such as increased student motivation. Educators need to have a clear understanding of how these platforms add, but critically replace, traditional teaching and learning practices, rather than reinforce them. Thus, there are

factors to consider both with this platform and with the students themselves when incorporating this technology for welders before entering the service.

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Preservice Teacher Perceptions of Using 360° Cameras and Virtual Reality for Education Preparation

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Abstract

Using XR technological tools such as 360° cameras and virtual reality in education preparation has been found to be a beneficial way for preservice teachers (PSTs) to reflect on their teaching styles and experience the virtual classroom (Ardisara & Fung, 2018; Coffey, 2014; Ferdig & Kosko, 2020; Feurstein, 2019). Additionally, utilization of XR in PST training has been associated with increases in teacher-student engagement (Kosko et al., 2021), self-efficacy and confidence (Walshe & Driver, 2019), and interpersonal teaching behavior and style (Theelen et al., 2019). The purpose of this qualitative case study was to understand how preservice teachers perceived the use of 360° cameras and virtual reality to video record, review, and critique their own teaching and explore immersive learning experiences. Participants included preservice teachers enrolled in a course whose lessons were collected by 360° cameras, and data were their written self-reflections on their experiences. Data analysis included inductive analysis, sentiment analysis, and word clouds. Results indicated overall positive perceptions of teacher candidates towards using XR, including its use as a self-reflection tool which provided them with different perspectives and a better overall view of the classroom, their teaching, and student behavior. Results indicate that using XR as a self-reflection and learning tool in teacher preparation programs is beneficial to teacher candidates; further research could examine the pre- and post-benefits of using XR for reflection through assessments of teacher candidate performance.

Keywords: Preservice Teacher Perceptions, 360° Cameras and Virtual Reality, XR in Education Preparation, Qualitative Analysis

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Introduction

Immersive, digital technologies such as augmented or virtual reality (AR/VR) allow for users to experience situations or contexts within engaging, virtual spaces, such as the virtual classroom (Dick, 2021). Furthermore, virtual experiences offered through AR or VR can allow educators and preservice teachers (PSTs) the opportunity to experience classroom settings without challenges such as travel or cost (Dick, 2021). Past research has indicated that using AR and VR technological tools such as 360° cameras and virtual reality in the education preparation of PSTs resulted in higher engagement with students (Kosko et al., 2021), increased self-efficacy and confidence (Walshe & Driver, 2019), increases in interpersonal teaching behavior and style (Theelen et al., 2019), and motivation for improvement (Coffey, 2014). Furthermore, PSTs have indicated that using these tools to observe their teaching was a beneficial way to reflect on their teaching style and view the entire classroom across different conditions (Ardisara & Fung, 2018; Coffey, 2014; Ferdig & Kosko, 2020; Feurstein, 2019; Kosko et al., 2021; Roche & Gal-Petitfaux, 2017; Seidel et al., 2011; Theelen et al., 2019; Walshe & Driver, 2019). The purpose of the current study was to understand how PSTs perceived the use of 360° cameras and virtual reality to (i) video record, review, and critique their own teaching; and (ii) explore immersive learning experiences in the classroom. We provide relevant background and our theoretical stance and perspective before presenting methods and results.

Digital, immersive technologies such as augmented reality (AR), virtual reality (VR), mixed reality (MR), and extended reality (XR) are being used across the United States for teacher training and within K-12 and higher education classrooms (Dick, 2021). For example, PSTs use 360° cameras and headsets to observe their own teaching or the teaching of others as a tool for learning, and classrooms may use other AR/VR platforms for students to virtually experience immersive simulations or field trips (Dick, 2021). Ultimately, immersive technologies provide a wide range of opportunities for users to interact with learning through realistic simulation in situations which may not be possible otherwise. The current study examined how PSTs perceived using 360° visual experiences, a component of VR, of themselves teaching as learning and reflection tools for their education preparation.

While the use of immersive technologies in the classroom is still relatively new, it is rapidly growing and globally expanding within the field of education (Dick, 2021). For the context of the current study, it is important to understand the differences in immersive technologies used, all of which exist across the virtuality continuum, or the spectrum of experiences between our physical world and the fully virtualized world (Tremosa, 2022). AR provides a view of the physical, real world through a digital lens, such as an image we see on a computer screen (ARM Blueprint Staff, 2022; Tremosa, 2022). VR replaces this view, in which the users are immersed within a pre-created virtual world. MR merges the real AR world with the virtual world of VR, such as through inserting virtual objects within real-world environments through the lens of a VR headset. VR, AR, and MR are all XR technologies, or any technology which adds digital elements to some reality to alter the user's experience. In the current study, PSTs used 360° cameras (AR technology) to record themselves teaching before using virtual reality headsets (VR) to watch their recording, resulting in an immersive MR experience for learning and reflection.

Augmented, Virtual, and Mixed Reality in Teacher Education

One primary factor of education preparation for PSTs is experience gained from observing and reflecting on their own teaching styles, as well as observations and lessons gained from others' teaching. PSTs can observe their own teaching through watching recorded videos of themselves in action within the classroom, such as through basic video recordings or watching 360° videos on platforms like virtual reality headsets. Research indicates that there are positive outcomes associated with watching oneself teaching compared to watching others teaching, including the ability to notice to a greater extent the different components of instruction and student learning (Coffey, 2014; Seidel et al., 2011). In the current study, 360° videos and virtual reality were used to allow PSTs to reflect on their own teaching and the use of XR in their education preparation. In addition to providing an opportunity for PSTs to be immersed in the observation of their own pre-recorded instruction for learning, XR technologies provide opportunities to PSTs to visualize content and remotely learn and collaborate with others; furthermore, they are accessible, in which their use eliminates travel or distance to observe a classroom setting (Golubenko, 2019). The use of immersive XR tools has become a beneficial and cost-effective way to enhance PST student development and learning (Lee & Hwang, 2022).

While the use of XR for self-observation in teacher education is used in various PST programs and has been examined in past research, (Ardisara & Fung, 2018; Coffey, 2014; Ferdig & Kosko, 2020; Feurstein, 2019; Kosko et al., 2021; Roche & Gal-Petitfaux, 2017; Seidel et al., 2011; Theelen et al., 2019; Walshe & Driver, 2019), XR has other beneficial roles in teacher education. For example, PSTs developed course lesson plans and coursework using virtual reality in one past study (Chen & Tsai, 2022). Virtual reality simulations can help PSTs to discover appropriate solutions for challenges or situations which they may encounter within the field. For example, VR simulations were created in one PST program for students to experience different types of encounters they may have with students' parents and to try different approaches in engaging (Faldet et al., 2021). Videos of students within the classroom can be recorded with 360° videos and then watched by PSTs using VR headsets, which allows them to be immersed into the virtual classroom (Loewus, 2017). Through observing the virtual classroom recorded with actual students, PSTs can practice being confronted with student behaviors and other situations, such as students' engagement with the teacher or the classroom setting in general. However, using real VR video can be very expensive and may not represent the general classroom if only featuring a select group of students.

While past research has indicated that PSTs perceived positive benefits in their education training through using XR technologies (Coffey, 2014; Kosko et al., 2021; Theelen et al., 2019; Walshe & Driver, 2019), it should be noted that integrating XR within PST programs requires finances and time, including the training and motivating of PSTs to use VR within their future classrooms (Casano-Calle et al., 2022). Furthermore, although the virtual reality generated through XR technology is realistic and immersive, it does not provide the same consequences or experiences that would occur in the field, nor does it provide room for live feedback from observers (Golubenko, 2019). Despite its disadvantages, XR technologies are becoming more popular in education training and provide various benefits for teacher training and reflections as an immersive tool.

Current Research Using XR in Virtual Reality

Past research has indicated that using XR technological tools such as 360° cameras and virtual reality in the education preparation of PSTs resulted in higher engagement with students (Kosko et al., 2021), increased self-efficacy and confidence (Walshe & Driver, 2019), increases in interpersonal teaching behavior and style (Theelen et al., 2019), and motivation for improvement (Coffey, 2014). Furthermore, PSTs have indicated that using these tools is a beneficial way to reflect on their teaching style and view the entire classroom across different conditions (Ardisara & Fung, 2018; Coffey, 2014; Ferdig & Kosko, 2020; Feurstein, 2019; Kosko et al., 2021; Roche & Gal-Petitfaux, 2017; Seidel et al., 2011; Theelen et al., 2019; Walshe & Driver, 2019). One primary focus of current research on using XR in virtual reality regards its use on PSTs' reflections of their teaching after watching themselves teach using a 360° camera, including their increased ability to observe the classroom in entirety during their teaching experience. For example, in one qualitative study, PSTs were asked to reflect on their teaching before and after watching a video of themselves teaching using a 3D headset (Walshe & Driver, 2019). The researchers found that participants benefited from observing the entire class, such as noticing the actions and engagements of individual students. While two participants believed that using a 360° headset complicated their teaching reflection process in one study (Feurstein, 2019), most found it to be an unobtrusive and helpful way to engage in video reflection.

Compared to watching oneself teach via a basic video camera with one angle, watching one's teaching using a 360° video has been found to benefit PSTs through allowing them to better explore and observe their teaching contextually and practically, increasing their field of view of the classroom without moving the video camera, and immersing them within the classroom experience (Ardisara & Fung, 2018; Coffey, 2014; Feuerstein, 2019; Roche & Gal-Petitfaux, 2017). For example, Theelen et al. (2019) found that their participants noticed interactions more clearly between teachers and students when they watched a teaching video that was taken with a 360° camera using a 360° headset, as compared to using a 2-D video recording. Similarly, Coffey (2014) found that PST participants were able to pick up on non-verbal cues in the classroom which they otherwise would not have picked up on from watching themselves on a VR headset. Participants who reflected on watching themselves through a 360° lens felt motivated to improve their teaching and found it to be helpful for further improvement in their teaching.

The specific platforms in which virtual reality was used for education preparation has also been examined and compared in research (Ferdig & Kosko, 2020; Kosko et al., 2021). For example, Kosko et al. (2021) examined how PSTs' reflections on what they noticed within a classroom of 3rd grade students using Cuisenaire rods differed based on whether the PSTs used 360° laptops or headsets, versus a standard laptop. PSTs who were most encouraged to attend to the assigned teacher and students were those who used the 360° headsets, which the researchers noted might have been due to the higher perceptual capacity of the headset, as compared to the laptop. In a similar study (Ferdig & Kosko, 2020), although nonsignificant, researchers found that PSTs' power to notice changing conditions in a 3rd grade classroom during a math lesson was greater for those who used a 360° headset compared to a 360° laptop.

The use of VR and AR within the classroom and PST training has also been researched for its benefits outside of teacher readiness or reflection. For example, one study used reflections of PSTs on using 360° cameras to watch classroom practice as indicators of their presence

within the classroom and to validate an existing presence scale (Gandolfi et al., 2020). Another study compared pre- and post-tests of the technological readiness of PSTs before and after using VR as a training tool and found that it was linked with an increase in their technological capabilities (Lee & Hwang, 2022). Using VR simulations for PSTs was found to encourage collaboration and increased interaction in one qualitative study (Faldet et al., 2021).

XR technology, such as the use of 360° cameras and virtual reality, for reflection or simulation in PST training is becoming more common in higher education. As it is still relatively a new platform for learning in teacher education, it is important for current research to continue to examine its influence and the role it plays in teacher preparation. Accordingly, we examined how PSTs perceived the use of XR technologies in their teacher preparation, as shown through their written self-reflections.

Theoretical Stance and Perspective

Crotty (1998) stated that an epistemology “is a way of understanding and explaining how we know what we know” (p. 3). We framed our study through the epistemological realm of constructivism, which suggests that all people’s way to understand the world or phenomena is valid and deserves to be respected. We used constructivism to understand how our participants made meaning of the role that using 360° cameras and virtual reality played in their reflections on their education preparation. Through the epistemological lens of constructivism, we also incorporated the theory of Bourdieu’s habitus to assist in understanding our topic. Bourdieu (1977) defined habitus as “systems of durable, transposable, *dispositions*” (p. 176) in which one’s habitus “produces individual and collective practices, and hence history, in accordance with the schemes engendered by history” (p. 181). It acts as an internal law that places an individual in a certain social position that they are socially qualified for and engenders one’s thoughts and actions to be situated within the context of their social habitus or position. In other words, individuals are ultimately governed by their inhabited cultures and therefore behave and think within their culture’s expectations, norms, and institutions. One’s personal identity—one’s habitus—must be compliant with one’s culture. We used Bourdieu’s habitus to inform our research because we believed that it would help us to understand how participants’ cultures and positions within our teacher education program impacted their identities and how certain tools, or virtual reality used in reflection, could affect their habitus and perception of self as teachers.

A researcher’s theoretical perspective not only guides their research, but it also allows them to claim their own stance in approaching a topic. Our theoretical perspectives ultimately represent our view of the world, the social life within it, and the assumptions in which it is grounded (Crotty, 1998). We used the theoretical perspective of interpretivism in the current study, which is based on a culture, context, and reality that are socially constructed. Specifically, interpretivism acknowledges that there are multiple truths, and the interpretivist attempts to understand the world through the eyes of the participant (Sipe & Constable, 1996). We used interpretivism to guide our study because we personally believe that reality is socially constructed. Furthermore, interpretivism guided our understanding of how our participants constructed their perceptions of the role that using 360° cameras and virtual reality played in their education preparation and reflections.

Research Questions

The following research questions guided our study:

1. How do preservice teachers perceive the use of 360° cameras and virtual reality to video record, review, and critique their own teaching?
2. How do preservice teachers use 360° cameras and virtual reality to explore immersive learning experiences?

Methods

Study Design and Data Collection

This qualitative case study examined the perceptions of PSTs on using 360° cameras and virtual reality to video record, review, and critique their own teaching; explore immersive learning experiences; and the benefits of using the technology as potential learning tools with K-6 students. Data included the written self-reflections collected from PSTs within their FOED 3800 course, in which they spent 60 contact hours in the public school setting working with mentor teachers to learn best practices for teaching. PSTs were recorded giving a 30-45 minute lesson using 360° video cameras, and the videos were then uploaded for viewing using a virtual reality headset. After viewing themselves teaching using the virtual reality headset, PSTs submitted a written self-reflection on their experiences using the XR tools as a method for education preparation, as well as their own observations of their teaching.

Sample

The sample included 35 PSTs enrolled in one teacher education course at a public 4-year university in Tennessee in Fall 2019, Fall 2020, and Spring 2021. Data were not collected in Spring 2020 due to the COVID-19 pandemic, in which all public schools turned to online instruction and PSTs completed their practicum hours virtually, therefore being unable to implement the 360° video instruction for reflection using virtual reality headsets. The course in which participants were enrolled is a field experience/practicum course that all elementary education preservice teachers are required to take as part of their program of study. PSTs take this course during their junior year in either the fall or spring semester prior to their residency. The course requires them to complete 60 contact hours in a public school K-6 classroom, in which they learn from mentor teachers, learn about behavior management, and practice teaching during their practicum experience. All participants in the current study gave consent for their data to be used.

Data Analysis

Data were analyzed using triangulation of inductive analysis, sentiment analysis, and the generation of word clouds. We first individually used inductive analysis to open code all reflections, which allowed us to further understand the meaning of using XR in teacher education, as perceived by our participants, through generating themes and categories (Thomas, 2003). We then discussed our generated categories and codes to reach conclusions, which further strengthened the trustworthiness of our results.

In addition to inductive analysis, we used sentiment analysis, which allows researchers to pinpoint and describe participants' sentiments, or emotional responses, towards some phenomenon (Becker et al., 2016). For the current study, sentiments were developed through

inputting each reflection into R Software and using syntax coding (Showrav, 2022) to algorithmically determine the sentiments of participants towards using XR technologies in teacher preparation. Lastly, we generated word clouds to further triangulate our results. Word clouds are technologically computed to represent data as images, in which the size of a certain word or phrase is representative of its frequency within the data (Mathews et al., 2015). Using all three forms of analysis increased the trustworthiness of our results and findings.

Conclusion

Thematic Analysis

Through inductive thematic analysis, 5 categories and 28 codes emerged (see Table 1). One category which emerged was *self-reflection*, which resulted in a wealth of information and numerous codes including *instructional changes*, *successful implementation*, *review classroom management*, *self-evaluation/critique*, *eye-opening*, *real-time feedback*, *nervousness*, and *review classroom presence*. The majority of students found the reflective nature of the tool to be very useful. Students shared that “Overall, I think that this experience with the 360 degree camera and the virtual reality really helped me see what I need to improve on,” and “After viewing the 360 video I realized how naïve I was about all the students paying attention.”

The category that highlights *The Future of Teaching* demonstrated the candidates’ views on XR use in teacher training and in-service teacher classrooms moving forward. The codes that emerged were *pedagogical tool*, *compare/contrast*, and *Preservice Teacher (PST) programmatic improvements*. As with other categories, participants identified many positive future uses for XR. Students shared that “The Oculus 360 is a great tool in my opinion for new teachers to use to help them see where to improve or increase confidence,” and “I think that this is the future of teaching and should be seriously considered as a tool for new and upcoming teachers.”

The category *XR features* yielded a variety of detailed information that had a primary focus on the positive and negative attributes of the technology being used. Codes that were identified from the reflections included *easy technology*, *360 view*, *dizziness*, *immersive*, *innovative*, *hearing/audio*, *expensive*, *classroom distraction*, and *comparison to standard video*. Respondents overwhelmingly identified the technology and the relevance of the 360° view when compared to standard video. An excellent summary statement that one participant pointed out was “I think that this is beneficial because it allows the lesson to be much more authentic for those that are viewing it using a VR headset.”

The category *Sentiments toward XR* emerged from six codes and represented the sentiments or attitudes which participants reported regarding their experiences with using the 360° videos for reflection. Sentiment codes included *increased confidence*, *helpful*, *positive experience*, *difficult to watch*, and *surprise*. Many participants believed that watching their video increased their confidence; for example, one participant stated, “I think that seeing myself teach really gave me a boost of confidence as a future educator. This showed me that I am a strong, willing, prepared, and capable teacher that can provide students with the content they need to succeed.” Participants indicated that this tool was helpful, or “beneficial for a future teacher,” and an overall positive experience. Some candidates found watching

themselves teach “extremely hard to watch,” and many were surprised by the things they noticed within the video. One candidate noted, “I definitely found some surprises.”

Perspectives emerged as a prominent category and included the *in vivo* code *into the students’ shoes*, *candidate awareness of student behavior*, and *candidate-student interaction/awareness*. This category represented the overall perspectives, or point of view, which participants noted they were able to experience through using XR. The *in vivo* code *into the students’ shoes* represented 21 occurrences in the data in which participants noted the video allowed them to “watch themselves from a students’ point of view.” Participants also noted that they became more aware of student behavior, as one reflected, “I was able to go back and watch the students, see what made them engaged or even maybe when I lost them in the lesson.” Candidates also noted their increased awareness of their own interactions with students, as one candidate simply stated, “By using the 360 video, I could also engage in student activity.”

Category	Codes	Dimensions	Frequency
Self-Reflection tool		Positive/negative	
	Instructional changes		52
	Successful implementation		27
	Review classroom management		15
	Self-evaluation/critique		23
	<i>Eye-opening</i>		7
	<i>Real-time feedback</i>		4
	Nervousness		12
The future of teaching	Review classroom presence		3
	Pedagogical tool		18
	Compare/contrast		5
	Preservice Teacher (PST)		14
XR features	programmatic improvements		
		Positive/negative	
	Easy technology		2
	360 view of classroom		12
	Dizziness		6
	Immersive		5
	Innovative		2
	Hearing/audio		4
	Expensive		3
	Classroom distraction		7
Sentiments toward XR	Comparison to standard video		13
		Positive/negative	
	Increased confidence		15
	Helpful		13
	Positive experience		26
	Difficult to watch		3
	Surprise		6
Perspectives	<i>Into the students’ shoes</i>		21
	Candidate awareness of student behavior		15
	Candidate-student interaction/awareness		17

Table 1: Generated Categories, Codes, Dimensions, and Frequencies

Sentiment Analysis

Sentiment analysis was conducted using R Software, in which participants' reflections were manually inputted and then statistically analyzed for word frequencies in relation to various sentiments. The most prominent sentiments found included anger, trust, anticipation, and surprise, within the context of XR. The most frequently used words in reflections included those regarding students, the lesson itself, the video, and 360° video (see Figure 1).

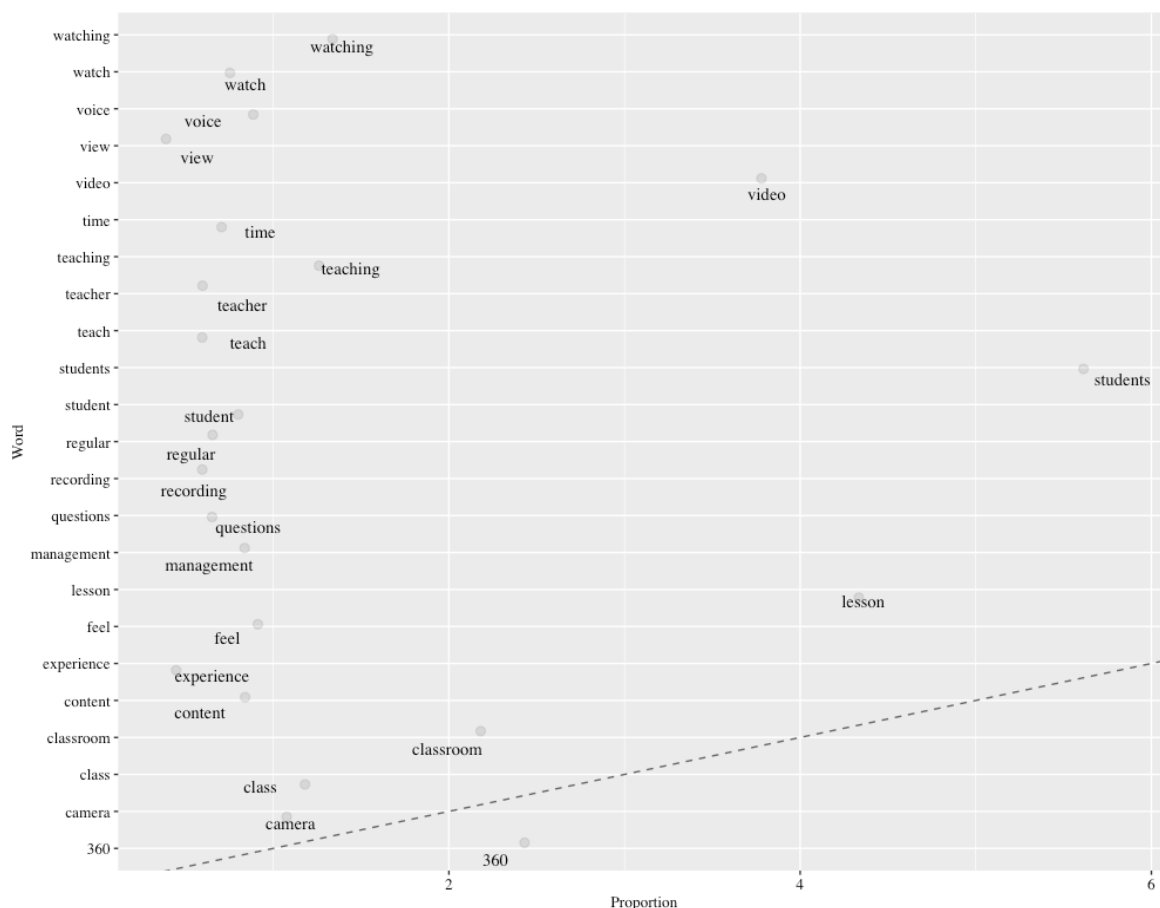


Figure 1: Frequencies of Words in Student Reflections

Two frequent sentiments which emerged were those regarding anger and trust (see Figure 2). The most frequently stated reflections which encompassed anger in participants' reflections included those surrounding features of XR, such as it being "distracting" to the classroom or difficult to use/watch. Trust was another sentiment found in reflections, in which many participants associated trust with their lesson, classroom management, confidence, and overall excitement of using XR.

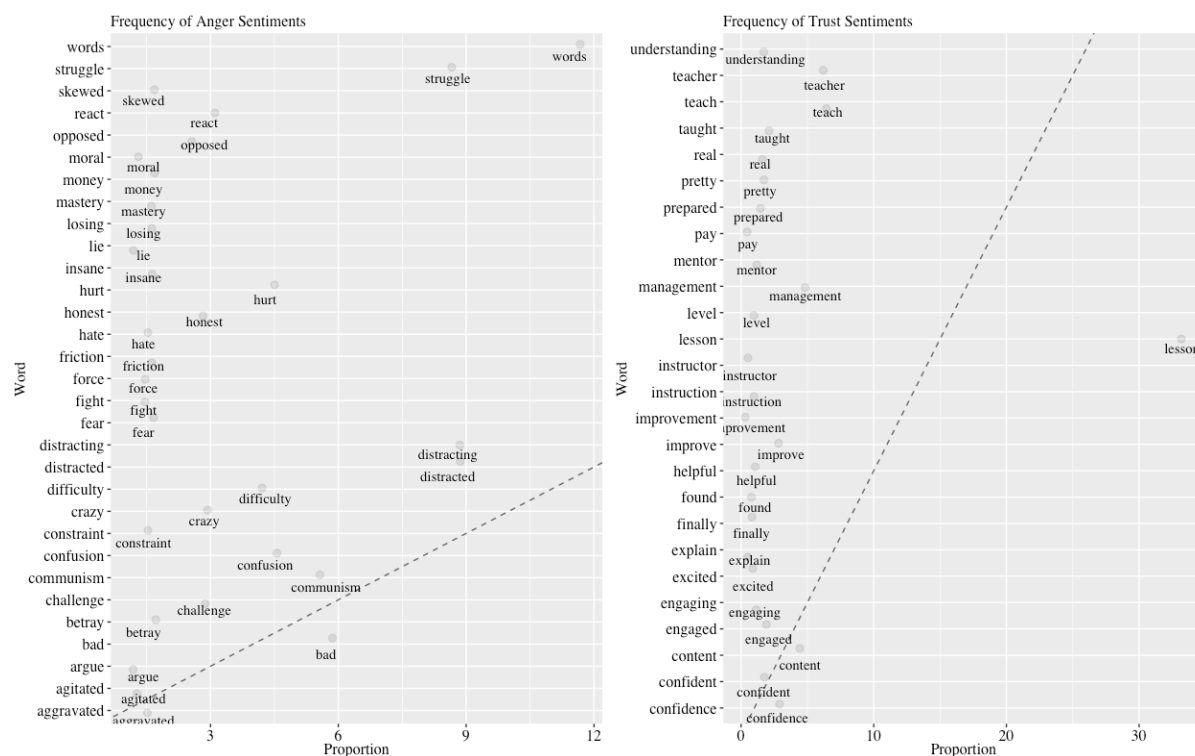


Figure 2: Proportion of Anger and Trust Sentiments Within Candidates' Reflections

Anticipation and surprise were two additional sentiments coded. While anticipation paralleled with the code *difficult to watch* from inductive analysis, surprise was a repetition of a code within the category *Sentiments towards XR*. Many participants used words such as their lesson or preparation, as well as the overall experience, in association with anticipation. Words associated with surprise in reflections included their instruction ("teach"), their success in teaching, their ability to "catch" more through the 360° video, and their overall enjoyment with the experience.

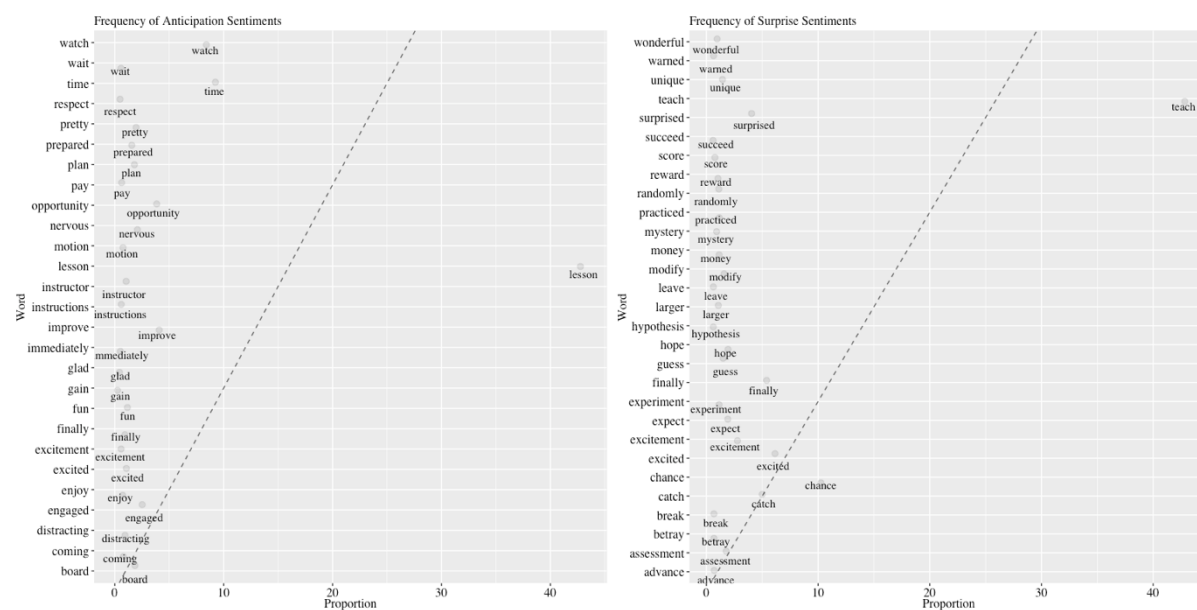


Figure 3: Proportion of Anticipation and Surprise Sentiments Within Candidates' Reflections

Word Clouds

Word clouds were generated by the researchers using EdWordle.net and reflected preservice teacher reflections through visual representations of the highest frequencies of words within each analyzed document. Across word clouds, many commonalities emerged in the visual summaries. Keywords and terms that parallel codes and categories from both inductive analysis and sentiment analysis were observed throughout the results of the visual tool and gave insight into the thoughts and reflections of the preservice teachers. Prominent themes which emerged in the word clouds included reflections on the classroom, video, students, and behavior (see Figures 4 and 5).



Figure 4: Generated Word Cloud of Teacher Candidates' Reflections



Figure 5: Generated Word Cloud of Teacher Candidates' Reflections

Discussion

The first research question aimed to understand how preservice teachers perceived the use of 360° cameras and virtual reality to video record, review, and critique their own teaching. The themes which emerged from inductive analysis indicated that most teacher candidates viewed their experience with watching their teaching through a 360° lens as a helpful self-reflection tool, which allowed them to review their classroom management, their presence, and their teaching style. While participants were anticipatory of rewatching their lesson and many felt nervous, the overall perception of the candidates towards the experience was positive and supports past findings of studies which examined candidates' perceptions of using XR (Ardisara & Fung, 2018; Coffey, 2014; Ferdig & Kosko, 2020; Feurstein, 2019; Kosko et al., 2021; Roche & Gal-Petitfaux, 2017; Seidel et al., 2011; Theelen et al., 2019; Walshe & Driver, 2019).

Many participants mentioned that the 360° video provided them with real-time feedback, which led them to brainstorm which instructional changes they could make in the future to better their teaching. The motivation to make instructional changes was also found in participants from Coffey's (2014) study, in which teacher candidates felt motivated to improve after watching themselves using a 360° video. Many participants also felt more confident after watching their video, which supports findings from Walshe and Driver (2019). The feeling of confidence as found in inductive analysis paralleled the sentiments of surprise within sentiment analysis, in which participants felt surprised by their success in teaching the lesson. Confidence gained from watching the video could also be attributed to a change in habitus, in which participants felt like their social habitus as teacher candidates increased as a result of watching their teaching abilities in action.

The second research question sought to explore how preservice teachers used 360° cameras and virtual reality to explore immersive learning experiences. Inductive analysis findings showed that teacher candidates found the experience to be immersive and innovative, making it more beneficial for their learning than a regular video would be. The comparison to regular video or other technological reflection tools, in favor of the 360° video, supports findings from other studies on the unique benefits of XR headsets for reflection (Ferdig & Kosko, 2020; Kosko et al., 2021). Additionally, teacher candidates reflected on how the video allowed them to change their perspectives, reflect from the students' shoes, and become more aware of their interactions with students in addition to students' behaviors. The immersive experience reflected by the current study's participants echoes findings of past research (Ardisara & Fung, 2018; Coffey, 2014; Feuerstein, 2019; Roche & Gal-Petitfaux, 2017; Seidel et al., 2011).

Teacher candidates did reflect on the potential disadvantages of the 360° experience, including how it could be distracting to students, expensive, and result in headaches or dizziness. These reflections were further supported within the frequencies of terms found in sentiment analysis with the sentiment *anger*. These disadvantages are supported by researchers Casono-Calle et al. (2022); however, the frequencies of positive sentiments towards XR were larger than those of a negative nature.

Limitations & Future Research

Limitations of the current study included the qualitative nature of the design, in which our main source of data were from self-written teacher candidate reflections. In other words, our findings represent the perceptions of participants, rather than any proven performance or improvement in teaching as a result of using the 360° video. Additionally, and through the lens of constructivism, we only present our interpretations of participants' reflections, rather than objective reality. While we triangulated our data analysis methods using inductive analysis, sentiment analysis, and word clouds, our main source of data were the reflections themselves, with no other data collected. Future research should additionally triangulate data sources, such as interviews, focus groups, or quantitative data like assessments. We also recommend that future research take into account improvements in teaching before and after using the 360° video for reflection, such as through pre- and post- assessments or evaluations.

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The Development of Inductive Thinking of Pedagogue Candidates

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Abstract

The study of inductive, and in particular abstract reasoning has a very extensive literature. However, putting these competencies into the context of dropout research is less typical. The focus of this research is therefore directed to this area. The main objective was to analyse the components of abstract reasoning in terms of students who achieved good results, and the overall sample, and its relationship to time was also examined. Based on the results of the 204 students participating in teacher training at J. Selye University, it can be stated that the time spent on the solution, the division, the course, and the parents' highest education can be formed three well-separable groups in the whole sample, while among the best-performing students, two distinct groups can be classified.

Keywords: Inductive Reasoning, Dropout, Teacher Training, Specific Performance

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Introduction

Inductive thinking can be interpreted from two perspectives. There is one approach that considers the ability of inductive conclusive thinking among the elements of intelligence, along with elements such as (1) the ability to learn from experiences and apply them, (2) the ability to adapt to the expectations of a changing and uncertain world, (3) the ability to motivate oneself and perform challenging tasks effectively.

The other approach interprets inductive thinking as an important method of human cognition. Through it, we are able to extract the essence from complex, abstract things and recognize connections.

Inductive thinking plays an important role in drawing conclusions, making judgments, recognizing laws and legality, that is, in logical thinking, as well as in conceptualization.

Brain imaging studies have provided new evidence that adolescence is a period of continuous neural development (Blakemore, 2012) that may last longer than Piaget's (1972) theory suggests. This has been proven in the study of students' ability to solve simple algebraic equations. The results showed that younger students are less accurate and slower in solving equations with letters and symbols than with numbers. Küchemann (1981) reported that the majority of those under the age of 15 do not know algebraic letters (symbols) as unknown or generalized numbers, which would be expected from official operational thinkers. This difference disappeared in older students (16–17 years), indicating that they reached an abstract level of argumentation (Markovits et al., 2015). A similar conclusion was reached by analysing strategies, suggesting that younger learners mostly used specific strategies, such as inserting numbers, while older students generally followed more abstract, rule-based strategies. Kusmaryono, Suyitno, Dwijanto, and Dwidayati (2018) report that none of the 14-15-year-old students participating in their research on mathematical problem solving has reached the quality stage of inductive, and especially abstract, thinking. These results indicate that the development of algebraic thinking is a process that develops over a long period of time (Susac, 2014).

It is evident from the above that abstract thinking skills play an important role in learning mathematics and natural science subjects. Lawson (1985), however, recommends delaying the teaching of abstract concepts until brain maturation allows for the transition to the stage of formal functioning, especially since the development of students' abstract thinking skills is hampered by cognitive, didactic, psychological, and epistemological barriers (Komala, 2018).

Abstract Reasoning and Logical Thinking

Abstraction means separating essential and irrelevant characteristics, highlighting the essential and ignoring the irrelevant ones. Thus, abstraction, the highlighting of essential features among the recognized general features, in other words differentiation, can be interpreted as one of the thinking operations.

Among other things, man differs from other living beings in that he is able to interpret and know the world around him in a way that goes beyond sensation and perception. Among the more important abstractions, thing (matter), property and relationship should be highlighted. The most common thinking operations are aimed at transforming them into each other. Things have properties, and it is on the basis of these properties that a relationship can be

established between things. The same relationship or the same property can occur in different things, and this forms the basis of analogical conclusion, thinking using analogies.

According to Adey Philip and Benő Csapó (2012), some forms of thinking can be characterized by property pairs. Except for one property pair, in the highest level of thinking, the two types appear complementary or depend on the given situation as to which can be applied more effectively. Such dichotomy can be observed in the following ways of thinking: quantitative-qualitative thinking, convergent-divergent thinking, holistic-analytic thinking, deductive-inductive thinking. The exception is concrete-abstract thinking, as the equivalence of the two members is not valid for this pair of concepts, as abstract thinking is more powerful than concrete.

Recently, it has been established (Lerner et al., 2014) that people's thinking style affects their risk-taking behaviour. Those who think abstractly have a higher propensity to take risks than those who think concretely. Later, it was also found (Lerner et al., 2016) that men are generally more willing to take risks than women. Other research findings seeking a link between the functioning of the brain and the thinking process have shown that abstraction is associated with activity in posterior regions associated with visual perception (Gilead, 2014) and concrete thinking is associated with activation in the prefrontal cortex (Giedd & Rapoport, 2010). Known, Lawson (2000) also found that some tests of prefrontal lobe activity are highly correlated with scientific reasoning ability and that of rejecting scientific misconceptions and accepting correct ideas.

Convergent thinking is applied to types of tasks that move towards a single good solution. It is characterized by the ability to draw logical conclusions, to abstract, and to recognize rules. During divergent thinking, creativity, ease and fluency of thinking, the possibility of raising as many ideas as possible, taking new aspects and methods into account, originality and sensing problems come to the forefront. Distinctive and multidirectional thinking is typical when solving tasks, which examines, takes into account and considers many options, but at the same time, the applied strategies play a significant role in problem solving.

According to Adey and Csapó (2012), the purpose of holistic thinking is to review the situation in its complexity and to form a conclusion based on the "whole picture" with details receiving less attention. In contrast, the analytical approach focuses on details and leads to solving the problem step by step.

While inductive thinking is one of the most important tools for acquiring new knowledge, deductive thinking leads to new ones from true knowledge as long as the rules of formal logic are followed. Inductive thinking is primarily needed when we want to use our observations and experiences in new (creative problem solving) or similar (analogous knowledge transfer) situations. In the former case, new knowledge always carries the possibility of uncertainty or error. While deductive thinking is characterized by performing operations and applying logical rules, inductive thinking is characterized by the trial-and-error method, the search for and recognition of rules. Bivalent logic cannot be equated with deductive thinking, but it is in any case of decisive importance in it.

Carroll (1993) refers to inductive and deductive thinking as the "sub-ability" of thinking ability. Sternberg (1986) draws a parallel between deductive and inductive thinking, and states that the difference is primarily in information processing procedures such as selective transcoding, selective comparison and selective combination. While the first two are

considered dominant in inductive thinking, the third procedure is considered dominant in deductive thinking.

According to Klauer (1989), inductive thinking means finding regularities and irregularities by recognizing similarities, differences, as well as similarities and differences that appear together by comparing properties and relations. The ability to recognize and use relational similarities between two situations or events is made possible by the ability to think analogously, which is a type of thinking that is applied between specific examples or cases when we know something about one example and use it to infer new information about the other example. Table 1 lists the scope of operations that can be interpreted in terms of properties and relations, the two large areas of inductive processes, and this table also forms the basis of the tests used in the research.

	Properties	Relations
Similarity	Generalization	Recognizing connections
Difference	Differentiation	Differentiation of connections
Similarity and difference together	Classification	System creation

Table 1: Inductive operations

The Goals, Methods and Tools of the Research

The most important goal of the research was to identify the competencies that can be associated with dropout, on the one hand, and predict dropout, on the other hand, and that is also important for standing up in the world of work.

As we have seen before, abstract thinking is an important form of human cognition. Through it, we are able to extract the essence from complex, abstract things and recognize connections. And this is essential for understanding. Abstract thinking plays an important role in drawing conclusions, making judgments, recognizing laws and legality, that is, in logical thinking, as well as in conceptualization. It is evident from the above that abstract thinking competence plays an important role in learning mathematics and natural science subjects. Since, unfortunately, these subjects are at the forefront of dropouts, we have focused our research on abstract thinking skills.

The question arises how to reliably measure the development of students' inductive, and especially abstract, thinking without specific subject knowledge (e.g. mathematics, physics). There are several available methods for this, from certain intelligence tests to inductive thinking tests to special measuring tools that focus on the given competence component.

In our research, we used the abstract thinking test, one of the measuring tools developed Psychometric Success WikiJob Ltd. (London, United Kingdom), which takes into account the labour market's expectations (Newton & Bristoll, wy). When compiling the test, they based their measurement on single and multi-factor intelligence theories.

Eductive skills refer to logical operations based on inference, through which new knowledge is created from the perceived information by recognizing and understanding the relationships and taking into account the contextual content. Understanding the problem as a whole requires a holistic competence, while solving it requires the ability to recognize the

relationships and connections between the parts. Interpreting the problem is more than a comprehensive pattern recognition (Gestalt), it is also necessary to emphasize what is essential and ignore anything that is irrelevant. These are mostly non-verbalizable, so geometric shapes (squares, polygons, circles, etc.) are mostly the measuring tools. The perception of these geometric shapes, the recognition of their characteristic features, and the understanding of the relations between them depends on the existing knowledge on the one hand and certain cultural influences on the other. However, one of the main advantages of the test is that it can be considered culture-independent to some extent.

Based on Raven's eductive ability test, Paul Newton and Helen Bristoll developed an abstract thinking test that takes more into account the aspects of the labour market (Newton & Bristoll, 1997). The difficulty of recognizing the logical connections behind the patterns in the tasks is the problem for the test subject to solve. The problems arise from the difficulty of recognizing the change or even repetition of the following characteristics: (1) shape, (2) size, (3) colour, (4) pattern.

The tasks consist of visual patterns that need to be continued by the subject after recognizing the logical connections behind them.

In the research, we used an online test that measured the development of the three components of inductive thinking: abstract, analogical and diagrammatic conclusive thinking. The task examining analogical thinking consisted of 6 items, while the other two of 12 items. Thus, the test consisted of the following types of tasks:

- Examination of abstract thinking: (1) continuation of a one-dimensional series (6 items); (2) recognition of an item that does not fit into a one-dimensional series ("odd one out") (6 items);
- Examination of analogical thinking (6 items);
- Diagrammatic thinking: (1) recognition of regularities – unknown action (6 items); recognition of regularities – known actions (6 items).

Participants in the Research

Approximately 400,000 of the citizens of Slovakia (8% of the total population) belong to the Hungarian ethnic minority. The only Hungarian-language university in the country is János Selye University. A total of 204 first-year pedagogue candidates from the University participated in the research. Below is a summary of the participants' demographic data:

- Distribution by gender: 17.6% (N=36) male, 82.4% (N=168) female;
- Age: M=25.10 years, MOD: 20 years, SD= 8.267 years, 76 people (37.2%) between the ages of 19 and 20, while 49 people (24.0%) between the ages of 21 and 22;
- The highest level of education of the father: primary school 9 people (4.4%), vocational training school 85 people (41.7%), vocational secondary school 72 people (35.3%), high school 18 people (8.8%), higher education 20 people (9.8%);
- The highest level of education of the mother: primary school 17 people (8.3%), vocational training school 47 people (23.0%), vocational secondary school 85 people (41.7%), high school 24 people (11.8%), higher education 31 people (18.2%);
- Residence: city 92 people (45.1%), municipality 112 (54.9%);
- Country of graduation: Slovakia 120 people (58.8%), Hungary 83 people (40.7%);
- Type of secondary school where they passed the graduation exam: 70 people in 4-grade high school (34.3%), 9 people in 8-grade high school (4.4%), 113 people in vocational high school (55.4%) and 12 people in adult education (5.9%);

- The language of education in the secondary school: Hungarian 182 people (89.2%), Slovak 12 people (5.9%), bilingual 10 people (4.9%);
- Training programme: 57 people (27.9%) applied for teacher training, 127 people (62.3%) for kindergarten training, 19 people (9.3%) for pedagogy and public education;
- Type of programme: 145 people full time (71.1%), 59 people correspondence programme (28.9%);
- Residence during the studies: 127 people (62.3%) commute from home, 71 people (34.8%) in dormitories, 6 people (2.9%) in rented apartments;
- Family circumstances: 160 people (78.4%) live with their families, 31 people (15.2%) with their partners and spouses, 7 people (3.4%) live alone, 6 people (2.9%) with their friends.

Based on the above, it can be stated that the majority of the participants in the training programme passed the graduation exam in Hungarian at a vocational secondary school, and the proportion of those who applied to the full-time kindergarten teacher program is high. Among the students, the proportion of graduates from Hungary is high. As for the qualifications of the parents, the proportion of those who graduated from vocational training is high.

Results

First, we compare the results of the students in relation to the tasks. There were 179 students who solved all five types of tasks. As shown in Figure 1, results were well below average. In particular, the students' diagrammatic thinking proved to be undeveloped. The best results were achieved in tasks that required analogical thinking, but the standard deviation was also the greatest here.

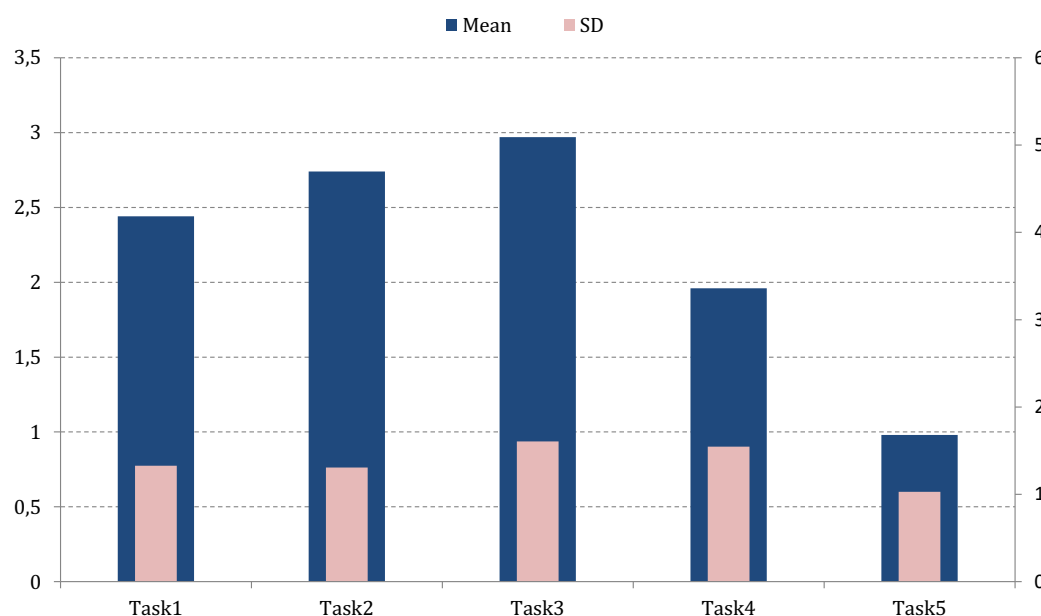


Figure 1: Averages and standard deviations of abstract thinking by task (Own figure)

According to Kolmogorov and Smirnov, the components of abstract thinking are not normally distributed, but due to the permissive conditions (the Kurtosis/Std error of Kurtosis

and the Skewness/Std. error of Skewness are less than 2.58) (Rumelhart, 1989), we still accept the first three variables as such.

During the test, the students had 25 minutes to solve the tasks, which in some cases proved to be insufficient. Items could only be solved one after the other. The online system was able to record the time students spent on each item. Analysing these data, two findings can be made.

- Figure 2 shows the average time spent per item, in relation to the students who started to solve the given task item. For task types 4 and 5, it can be clearly seen that the average amount of time spent on the first task is very high compared to the other items. In other words, understanding these two types and recognizing the relationships proved difficult. The high standard deviation value of the tasks also supports this hypothesis.
- We formed 3 categories per task type (low performer: 0-2 points, medium performer: 3-4 points, good performer: 5-6 points). In Figure 3, it can be clearly seen that the rate of those who achieved a low score increases in Task 4.

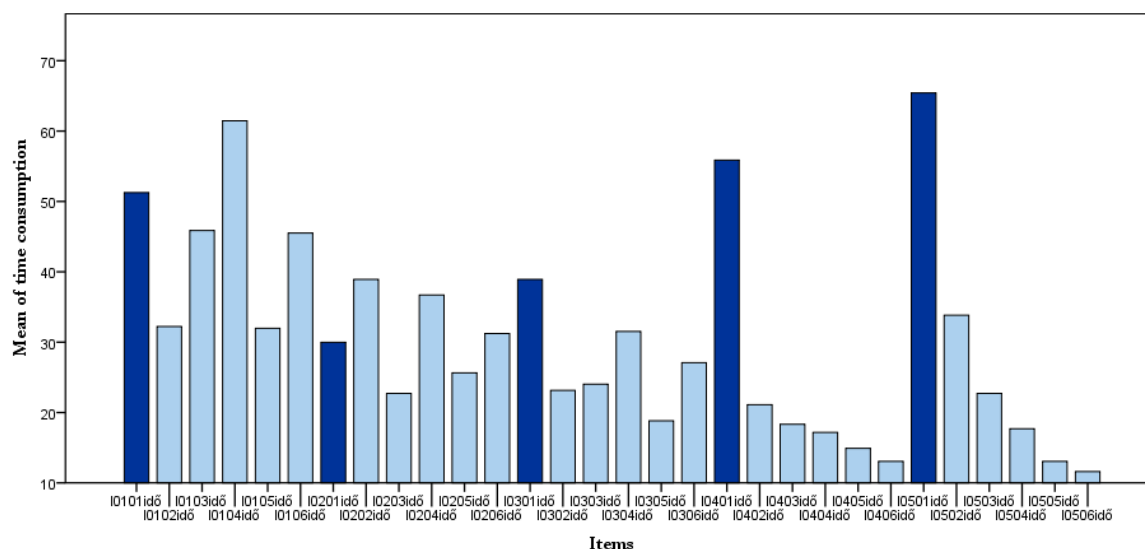


Figure 2: Time spent per item (Own figure)

Now let's focus our attention on those students who achieved a higher total score compared to the group as a whole, that is, they have more advanced abstract, inductive thinking. We found 27 such students. The scores (filled columns) and time spent (empty columns) of these students are given in Figure 4, in order from left to right according to the time spent. For the first six students, it can be clearly seen that even with a relatively low amount of time spent higher scores were obtained. These students reached a value between 16-20 in less than 16 minutes (superficial, but quick-minded). The next category also consists of six students who achieved a similar performance in less than 21 minutes (prudent, smart). The other students almost maximized the available time (24-25 minutes) and achieved a good result (slow, smart).

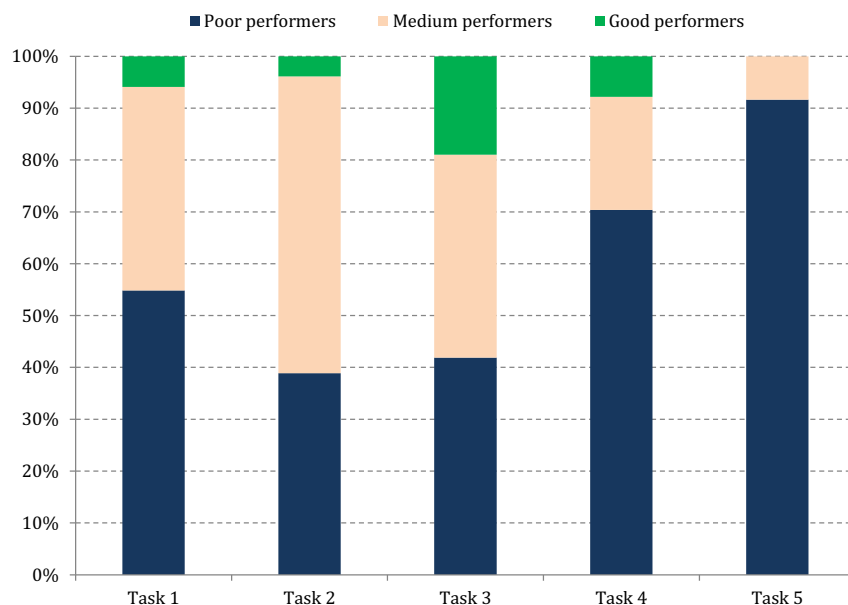
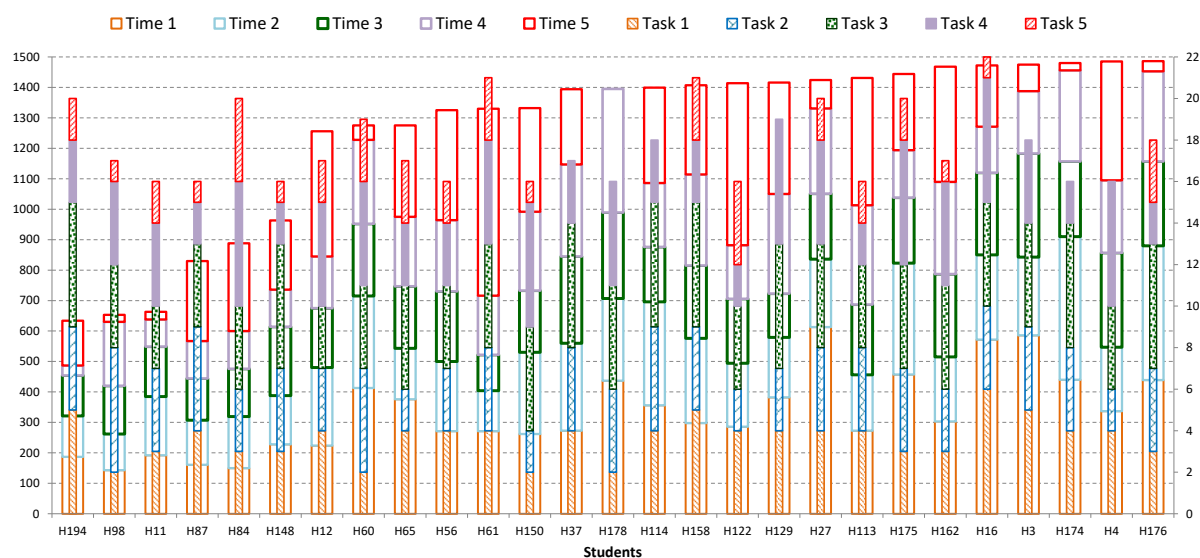


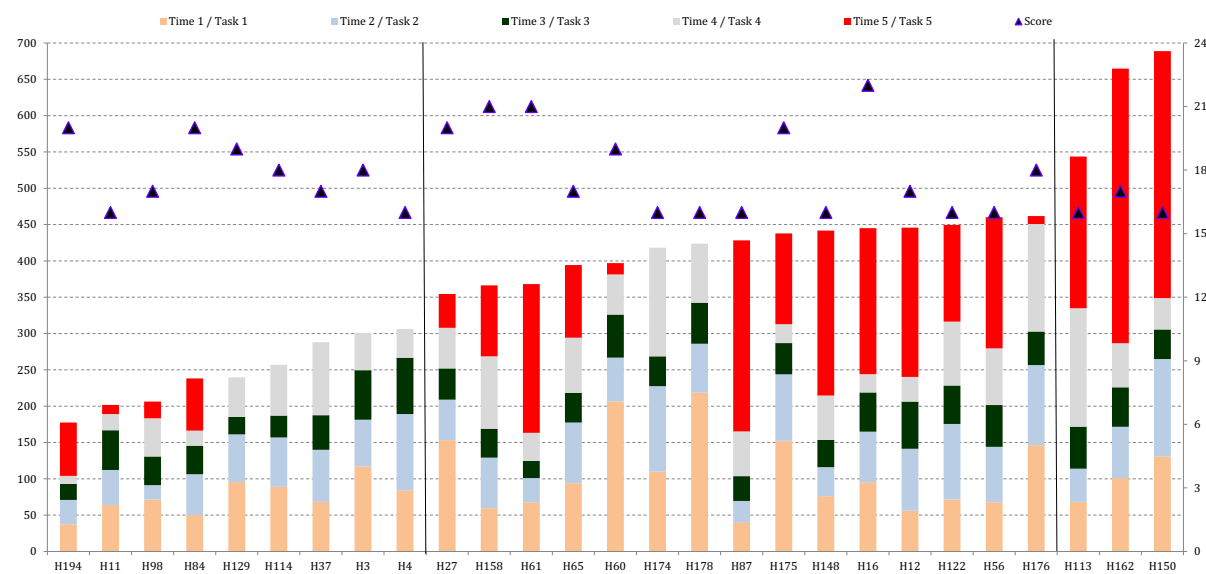
Figure 3: Averages and standard deviations of abstract thinking by task



Note: The left vertical axis indicates the time, and the one on the right the score.

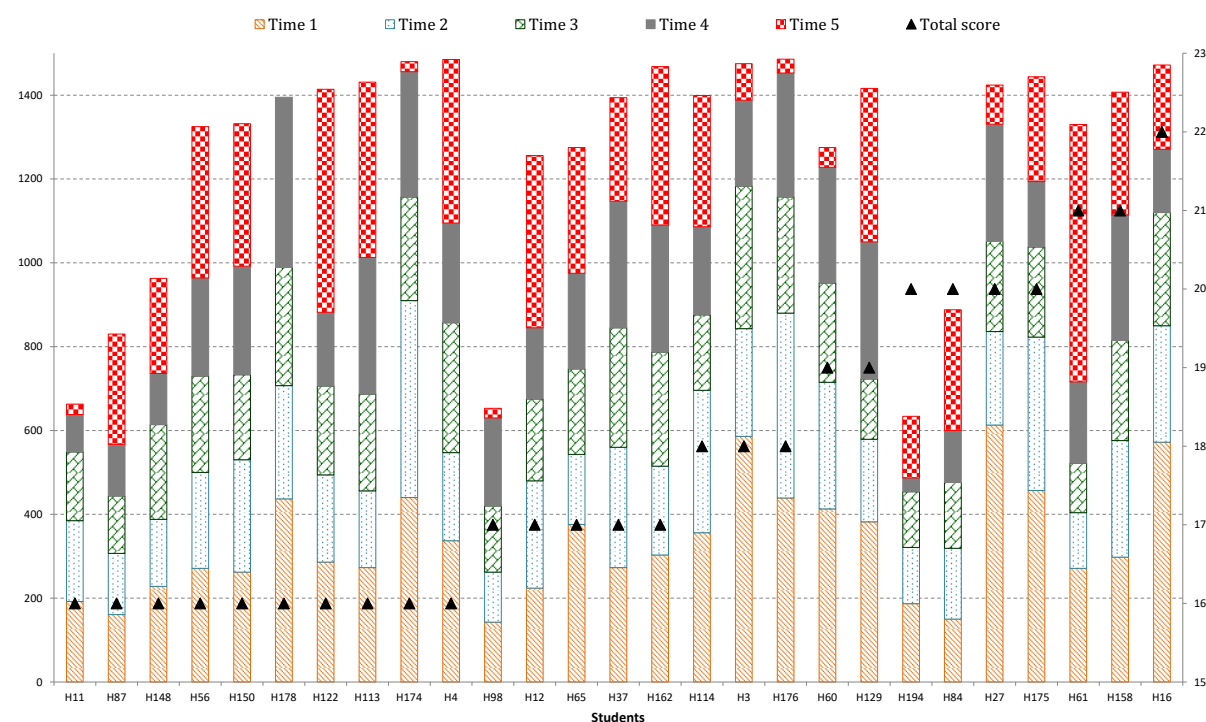
Figure 4: Scores of the 27 best-performing students and their time spent on the solution

In order to demonstrate effectiveness, the concept of specific performance has been introduced. *In the inductive test, the specific performance can be interpreted as the time required to reach the unit score*, which is defined as the ratio of the time spent and the score achieved, per task: $\text{time}_x / \text{score}_x$, where time_x indicates the time spent on the solution of task x (6 items) in seconds, while score_x indicates the score achieved during this time. We also ranked the students who achieved the highest scores this way (Figure 5). Here, the value of 300 sec/point was considered high specific performance, that is, students achieved a higher score with little time. The values of 300 and 450 sec/point are called medium specific performance, while above this is the low specific performance, that is, a lot of time was required to achieve a unit score.



Note: The left vertical axis indicates the time, and the one on the right the score.

Figure 5: Specific performance of the 27 students



Note: The left vertical axis indicates the time, and the one on the right the score.

Figure 6: Time spent and total score of the 27 students

It can also be clearly seen from Figure 5 that, almost without exception (H60, H174, H178, H176), the last task requiring diagrammatic thinking ruined specific performance.

We ranked the students based on the total score warned on the five task types (Figure 6). It can be clearly seen that the students generally used the available time, but there were one or two students in each score category who achieved a similar result with little time. For example, student H11 or H87 for the-16 point category, H98 for the 17-point, and H194 or H84 for the 20-point category.

In any case, it can be stated that the full use of the available time does not automatically result in a high score, but it can also be observed that all of the students who have achieved more than 20 points have almost fully used the 25 minutes available for the test.

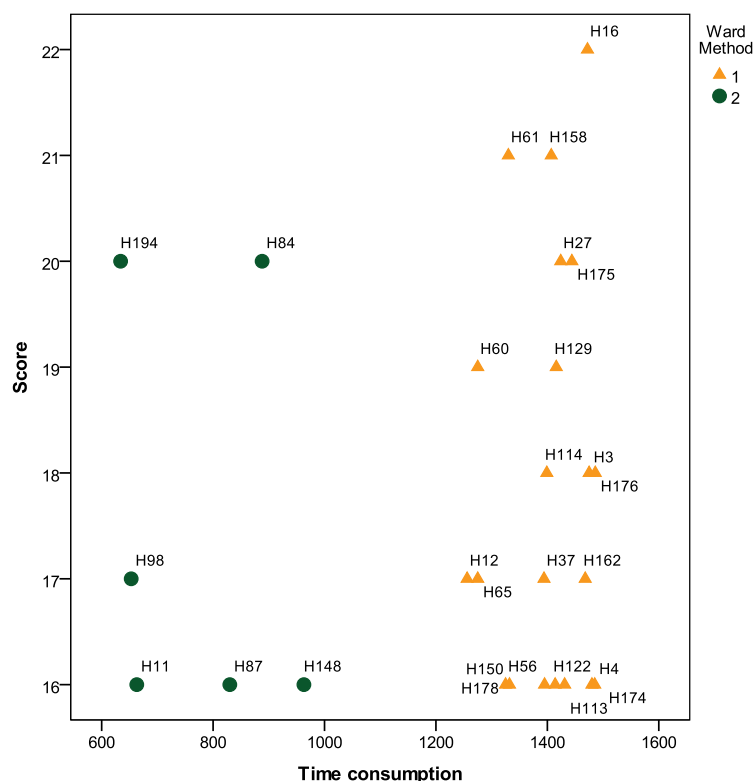


Figure 7: Time spent and total score of the top 27 students separated into 2 clusters

The results of the 27 students who performed well on the test were also examined using cluster analysis (Figure 7). The first group, marked with triangles, consists of the prudent who took advantage of all the available time, while the second group consists of those who are impatient and superficial. Clusters were analysed based on cluster centroids (Table 2). The means were subjected to variance analysis. Not in terms of the scores obtained, but in terms of time expenditure, a significant difference was found between the individual cluster centroids ($F=222.902$; $p<0.05$). The time spent explains 89.9% of the standard deviation. The reliability of the hierarchical cluster analysis was checked by the K-means procedure, but no significant difference was found between the results obtained.

K		Score on the test	Time spent on task solving
1	M	17.90	1399.19
	N	21	21
	SD	1.947	73.352
2	M	17.50	771.83
	N	6	6
	SD	1.975	140.276
Total	M	17.81	1259.78
	N	27	27
	SD	1.922	280.295

Table 2: Cluster centroids and standard deviations

Regarding the background variables of the 27 students with good results, the following findings can be made:

- their parents are graduates, especially the proportion of graduate mothers is significant compared to the participants in the research,
- the majority of them are kindergarten teachers, who
- graduated from Hungarian-language secondary schools,
- in the correspondence programme.

We separately studied the background variables of the 7 students who achieved the best results (≥ 20 points). They had a slightly modified (italicized) pattern to the background variables:

- their parents are graduates, especially the proportion of graduate mothers is significant compared to the participants in the research,
- the majority of them pursue their *teaching degree*,
- they graduated from Hungarian-language secondary schools,
- in the *full-time programme*.
- *These students live in the city and*
- *they have work experience, most of them as educators, despite the fact that five out of the seven people are full-time students.*

Regarding the time spent on task solving, two groups can be formed (Figure 7): superficial, but quick-minded (≤ 1000 sec), prudently thorough (> 1000 sec).

As for the superficial but quick-minded (6 people), the pattern features are as follows:

- their parents are not graduates,
- they live in municipalities,
- they studied in Hungarian-language secondary schools,
- they study in the full-time programme,
- pursuing a teaching degree.

Regarding the superficial but quick-minded, it should be noted that in the case of students H84 and H194, rather the latter adjective should be used because the little time spent is paired with a high score (Figure 8).

As for the prudent ones (21 people):

- the majority of parents are graduates, but the proportion of mothers without a high school diploma is high, while the proportion of fathers with a high school diploma is also high,
- they live in the city,
- significantly more of them study in the correspondence programme,
- they pursue a kindergarten teaching degree.

It is also possible to distinguish well among prudent students a group that achieved a good result during the significant time spent (Figure 8, upper right corner) and one that was lower, but the cluster analysis did not confirm this.

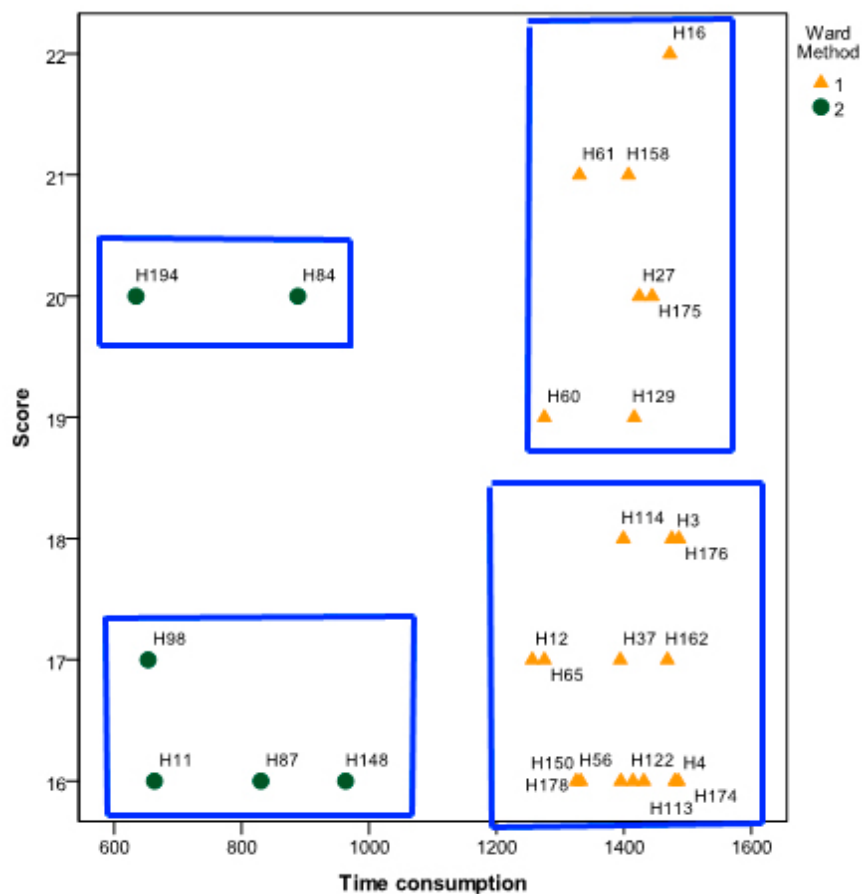


Figure 8: Time spent and total score of 27 students divided into 4 groups

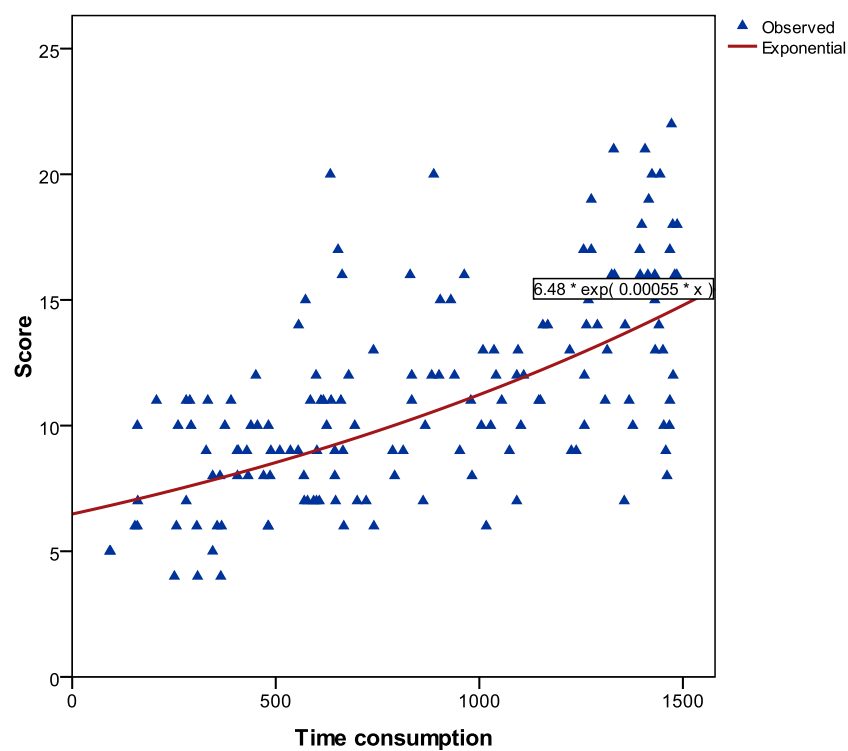


Figure 9: Relationship between the time spent on the whole sample and the total score

The relationship between the time spent and the score obtained was also examined for the whole sample (Figure 9). An exponential function describes the relationship in an acceptable way:

$$\text{Score} = 6.48 * \exp(0.00055 * \text{Time spent})$$

The model explains 39.9% of all variance. The ANOVA study indicates a significant regression relationship ($F=100.318$; $p<0.05$).

Finally, we performed the cluster analysis on the whole sample. We reached similar conclusions as those of the best-performing students, that is, clusters can be formed on the basis of the time spent on problem-solving. In this case, three groups can be formed (Figure 10):

- the careless, superficial,
- the prudent, but not persistent enough,
- the persistent, the diligent.

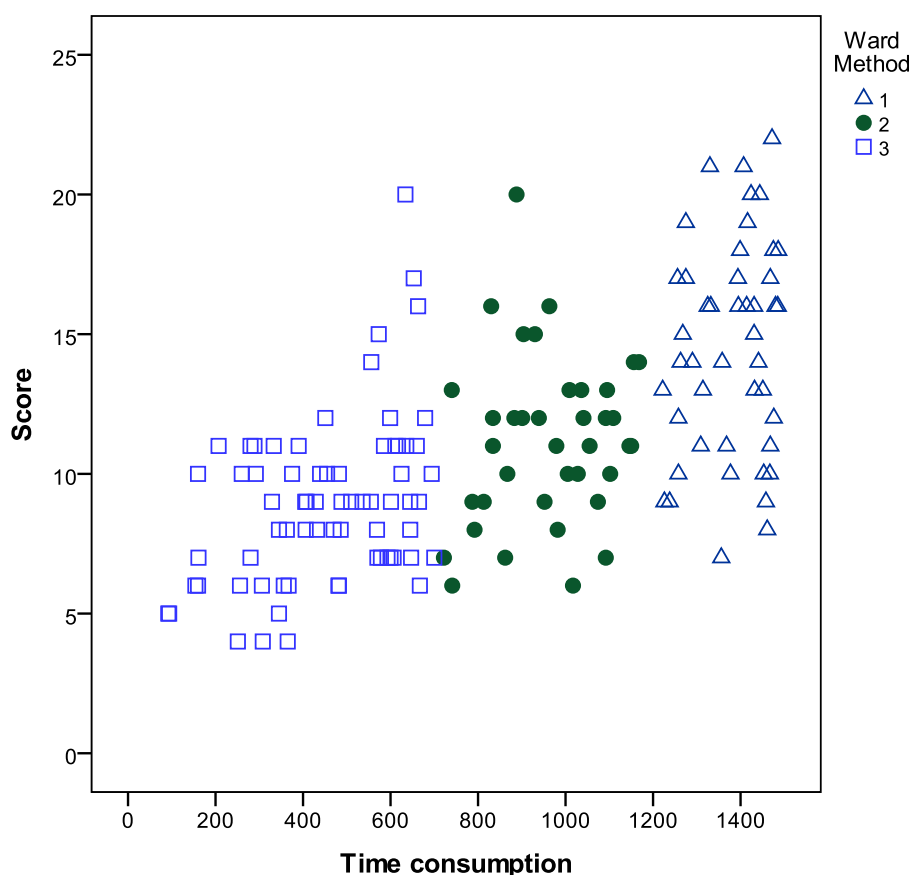


Figure 10: Clusters formed for the whole sample

There are also students with low and high scores in all three groups, but the trend is still what the regression study describes.

Reliability was checked by the K-means procedure here as well and found to be correct. The data for cluster centroids are summarized in Table 3.

K		Score on the test	Time spent on task solving
1	M	1378.36	14.51
	N	45	45
	SD	84.658	3.841
2	M	961.000	11.21
	N	38	38
	SD	128.830	3.024
3	M	455.79	8.93
	N	70	70
	SD	166.251	2.994
Total	M	852.61	11.14
	N	153	153
	SD	419.463	4.023

Table 3: Cluster centroids and standard deviations

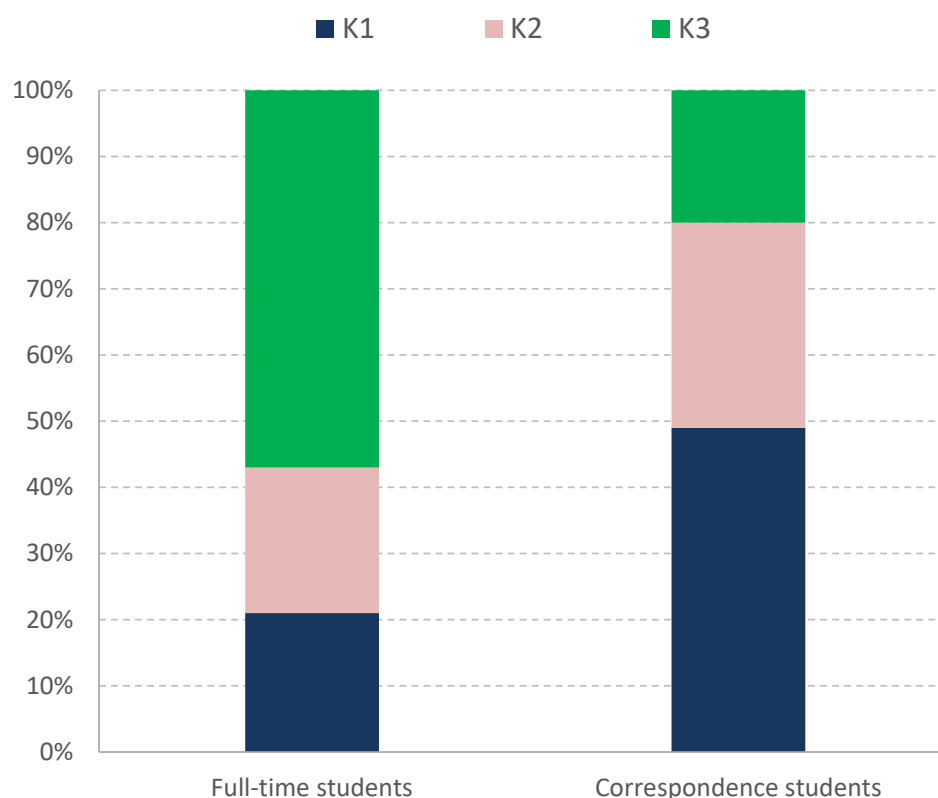


Figure 11: Belonging to clusters by programme type

We examined the composition of the clusters according to the background variables for the whole sample. A higher proportion of full-time students belong to the K3 cluster, while those in the correspondence programme belong to the K1 cluster (Figure 11). The majority of teaching majors are K3, pedagogy and public education majors are K2, while kindergarten teachers are mostly belong to K1 and K3 (Figure 12). Using the Chi-square test, we proved that there is a significant relationship between the programme type and cluster membership ($F= 18.473$; $p<0.05$), and between the major cluster membership ($F= 15.138$; $p<0.05$). Summarizing these, the interpretation of the clusters is shown in Table 4.

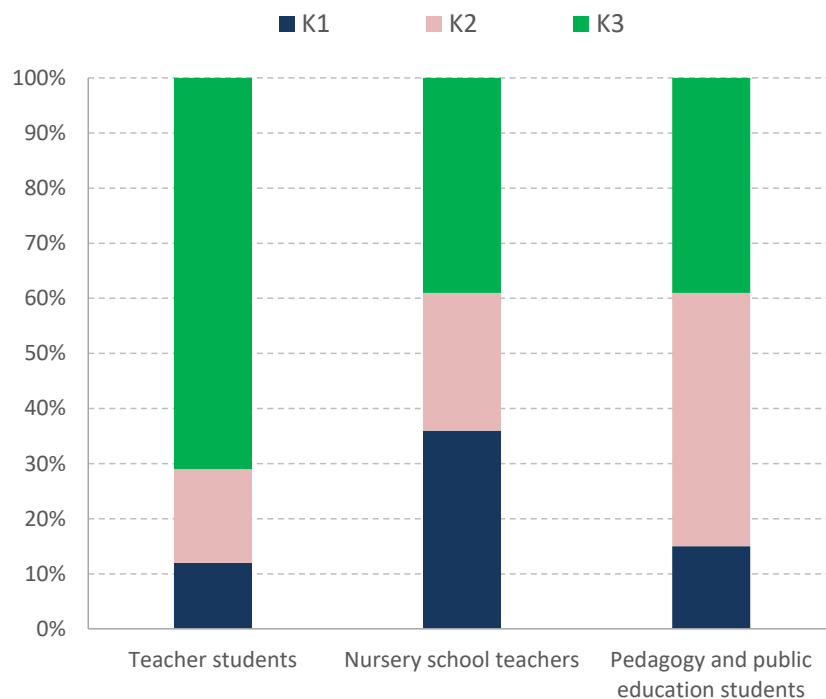


Figure 12: Cluster membership by major

	K1	K2	K3
Time spent on task solving	less	medium	more
Score	5-20 points	6-20 points	7-22 points
Programme type	correspondence	full-time and correspondence	full-time
Major	kindergarten pedagogy	pedagogy and public education	teaching, kindergarten pedagogy

Table 4: Interpretation of clusters

Conclusion

Our research goal was to analyse the components of inductive thinking, and especially abstract thinking in terms of students with good results and for the whole sample, and we also examined its relationship with time expenditure. In addition to descriptive statistics, cross-tabulation and cluster analysis, we used regression analysis to establish correlations. Summarizing the results, the following findings can be made:

- The students achieved the best result in the task of finding analogical and “odd one out” sequence elements, with the lowest average time expenditure, that is, they have more advanced analogical thinking and rule induction skills. At the same time, their diagrammatic thinking is less developed, which is not a particular problem in teacher training, compared to engineering, for example.
- We introduced the notion of specific performance, which was interpreted as the time required to reach the unit score on the inductive test. Using this concept, we found that the best-performing students are teaching majors, full-time students, city residents, and their parents are graduates.

- One of the prerequisites for a good result on the inductive test is to fully use the available time. However, it should be noted that high time expenditure does not automatically result in a high score, and also that some students achieved good results in less time.
- Regarding the entire sample and considering the task-solving time, three groups (the careless and superficial; the prudent but not persistent enough; the persistent and diligent) can be formed, while two groups (superficial and not persistent enough; persistent and diligent) can be formed among those who achieved good results.
- Knowing the student's programme type and major help to interpret the clusters.

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The Dark Triad in Relation to Teachers' Interaction Styles

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Abstract

The dark triad is a set of three personality traits, namely narcissism, machiavellianism, and psychopathy, which are associated with manipulative and exploitative behaviors in interpersonal relationships. This paper examines the relationship between the dark triad and teachers' interaction styles. Specifically, it explores how teachers with high levels of dark triad traits may interact with students in ways that are detrimental to the students' academic and social development.

Keywords: The Dark Triad, Narcissism, Machiavellianism, Psychopathy, Teacher, Interactional Styles, Leadership, Helpful, Understanding, Student-Teacher Responsibility, Uncertain, Dissatisfied, Objecting, Strict

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Introduction

The dark triad is a term used in psychology aimed at describing personality traits that include a combination of three factors: Narcissism, machiavellism and subclinical psychopathic behaviour. Persons with a high level of these traits are often perceived as manipulative and unemotional. In the context of helping professions, such as teachers, doctors, psychologists and social workers, the presence of the dark triad can be dangerous, mainly in relation to target groups of pupils, patients and clients. The collective of authors Jensen-Campbell et al. (2019) describes the individual elements of the dark triad in relation to the teacher profession as follows: Narcissism manifests as exaggerated confidence and a need to be admired. Teachers with a high level of narcissism can be overly confident and unable to accept criticism. This can lead to inappropriate decisions and behaviour towards the pupils. For example, a teacher with a high level of narcissism can be overly excited about a new teaching method and thus ignore the specific needs of a pupil. Machiavellism is characterised as manipulative behaviour and an empathy insufficiency. A teacher with a high level of machiavellism can use manipulative tactics to achieve their goals and ignore the consequences impacting pupils or colleagues. They can also be able to abuse the trust of a pupil or their parent or create conflict among colleagues in order to achieve their goals. The subclinical psychopathic trait manifests as an empathy and responsibility insufficiency. Teachers with a high level of a subclinical psychopathic trait can ignore the emotions and needs of pupils and colleagues and concentrate solely on their own interests and goals. The presence of the dark triad in helping professions is a high risk from the viewpoint of damage to the client, in the physical, emotional and social sense. Typical examples from practice are incorrect diagnosis, inadequate therapy, client trust abuse or discrimination. Several research works point this out. They target the identification of the presence of the dark triad in helping professions. Muris et al. (2017), Okruszek et al., (2018) have found that psychologists with a high level of the dark triad have a tendency to be less satisfied with their work and less engaged with their clients. They also tended to have a less positive therapeutic relationship and a lower level of the ability to handle conflicts. They are also less empathic and less able to identify and solve emotional problems in their clients. Research carried out by Furnham & Cheng, (2017) targeted the presence of the dark triad in healthcare workers and its influence on patient satisfaction. The results showed that healthcare professionals with a high level of the dark triad provided their patients with care of a lower quality and therefore had less satisfied patients. The presence of the dark triad in the case of teachers manifests in the decreased quality of their relationships to students. Research results by the author collective Jensen-Campbell et al., (2019) show that teachers with a high level of the dark triad had a tendency to have less positive relationships to their pupils and less successful results in teaching. The concept of the dark triad influences the interaction styles of teachers and has a significant effect on the relationships with students. Narcissistic teachers have a tendency to fulfill and prefer their own needs and desires. This mostly manifests by trying to direct attention to themselves and their successes, often to the detriment of the needs of pupils. Andreou (2004) and Márton (2023) bring attention to the notion that narcissistic teachers can be more susceptible to preferring students who admire them and give them positive feedback. On the other hand, less zealous pupils can be neglected. This can have a negative influence on the educational results of these pupils. Jonason et al. (2011) point out that teachers with machiavellistic traits can engage in manipulative behaviour in their relationship to pupils. They can be very tactical in reaching their goals. The work of Čopková (2022) hints that teachers with a higher score of machiavellism can lean towards the use of dishonorable tactics to reach their goals. This behaviour can cause mistrust and negative relationships between the pedagogue and students. Psychopathic traits cause an absence of conscience,

empathy and understanding of the needs and feelings of their pupils. Johnson and Murray (2018) state that psychopathic teachers are not able to perceive the emotional needs of students and can manifest a strict stance and rash behaviour which can cause the traumatising of students. Jonason et al., 2013). The interaction style of a teacher is a relatively permanent characteristic of their personality showing in behaviour, actions in and reactions to specific situations – in communication and relationships with pupils, other pedagogic and specialist employees, the management of the school and parents or legal guardians, in the choice of didactic activities and the way of examining, directing and controlling work. It stems from mutual interactions, wherein it should be considered that interaction is always bilateral or multilateral. It shows more markedly while exposed to stress and it is a typical characteristic of a teacher. To minimise the consequences of the presence of the dark triad in helping professions, it is important to have processes to control and evaluate professional behaviour. It is also important that helping professionals are trained to identify and control these risks. In relation to the above results, within this research we were interested in whether there are mutual relationships between the dimensions of the dark triad – Machiavellism, Psychopathy and Narcissism - and the individual interaction styles of teachers in our research sample - Leadership, Helpful, Understanding, Student-teacher responsibility, Uncertain, Dissatisfied, Objecting, Strict - and the polarity of these relationships.

Research Problem

The research problem could then be formulated as follows: Is there a negative relationship between the dimensions of the dark triad (Machiavellism, Psychopathy, Narcissism) and the individual interaction styles of a teacher (Leadership, Helpful, Understanding, Student-teacher responsibility, Uncertain, Dissatisfied, Objecting, Strict).

The research goals stemming from the above could then be formulated as follows:

- To identify the relationship between the dimension of the dark triad Machiavellism and the individual interaction styles of a teacher (Leadership, Helpful, Understanding, Student-teacher responsibility, Uncertain, Dissatisfied, Objecting, Strict)
- To identify the relationship between the dimension of the dark triad Psychopathy and the individual interaction styles of a teacher (Leadership, Helpful, Understanding, Student-teacher responsibility, Uncertain, Dissatisfied, Objecting, Strict)
- To identify the relationship between the dimension of the dark triad Narcissism and the individual interaction styles of a teacher (Leadership, Helpful, Understanding, Student-teacher responsibility, Uncertain, Dissatisfied, Objecting, Strict)

Research Hypotheses

Within the study at hand we verified the following hypotheses:

H1: We suppose that between the dimension of the dark triad Machiavellism and the interaction style of the teacher

H1.1 Leadership

H1.2 Helpful

H1.3 Understanding

H1.4 Student-teacher responsibility there is a negative relationship and the interaction style of the teacher

H1.5 Uncertain

- H1.6 Dissatisfied
- H1.7 Objecting
- H1.8 Strict there is a positive relationship

H2: We suppose that between the dimension of the dark triad Psychopathy and the interaction style of the teacher

- H2.1 Leadership
- H2.2 Helpful
- H2.3 Understanding
- H2.4 Student-teacher responsibility there is a negative relationship and the interaction style of the teacher
- H2.5 Uncertain
- H2.6 Dissatisfied
- H2.7 Objecting
- H2.8 Strict there is a positive relationship

H3: We suppose that between the dimension of the dark triad Narcissism and the interaction style of the teacher

- H3.1 Leadership
- H3.2 Helpful
- H3.3 Understanding
- H3.4 Student-teacher responsibility there is a negative relationship and the interaction style of the teacher
- H3.5 Uncertain
- H3.6 Dissatisfied
- H3.7 Objecting
- H3.8 Strict there is a positive relationship

Research Sample

The research sample consisted of pedagogical employees of schools, mainly teachers, part of the sample was made up of teaching assistants. Data were obtained from 591 respondents using the questionnaire method. The age ranged from 20 to 72 years old ($M=43.56$, $SD=10.92$). The structure of the research sample as regards gender and profession is stated in Table 1.

Table 1: Structure of research sample

Research sample	N	%
Men	66	10.7
Women	525	89.3
Teaching assistant	30	5.1
Preschool/Primary teacher	92	15.6
Grades 1 through 4 Primary teacher	80	13.5
Lower secondary education teacher	167	28.3
Higher secondary education teacher	167	28.3
Principal	55	9.3

Legend: N – count

The battery of questionnaires used contained demographic questions at the start, concerning age and gender, teaching profession (preschool/primary teacher, lower or higher secondary teacher, teaching assistant, school principal). The preferred interaction styles of teachers were measured via the Questionnaire of teacher interaction style – self-evaluation, which leans on the teacher interaction behaviour model according to Wubbels and coll. (1987) stemming from Leary's personality model (Leary, 1957) and it measures eight sectors of teacher behaviour: Leadership, helpful, understanding, student-teacher responsibility, uncertain, dissatisfied, objecting, strict. The amended version of the Questionnaire of teacher interaction style consists of 40 elements through which participants evaluated their behaviour on a five point scale (1 = Do not agree at all, 5 = Agree completely). For each interaction style sector there was an average score calculated – a higher score meant a stronger preference of a given style. More detailed information on the Questionnaire of teacher interaction style are at hand in the publication of Ballová Mikušková (2022). To measure the presence of the so-called dark triad in the personality of the participants we used the Dark Triad Dirty Dozen questionnaire (Jonason, Webster, 2010). The authors created a questionnaire consisting of 12 elements. As an element example, there is I have a tendency to manipulate others to reach my goals. The questionnaire is tridimensional, the individual dimensions measure machiavellism, psychopathy and narcissism. We translated the questionnaire into Slovak. Our version instructed the participants as follows: To which level do you agree with the following statements? The participants answered the individual questions of the questionnaire on a five point scale, where 1 meant do not agree at all and 5 meant agree completely. To process the data obtained, statistical procedures were used – descriptive statistic (arithmetic mean, standard deviation, minimum, maximum) and inferential statistics (Pearson's correlation coefficient) to discover the relationships among variables.

Conclusions

In the following text and tables we state the descriptive data of chosen professional competences first (interaction style), and the dark triad, of the participants of our research sample (Table 2), which were obtained using the Questionnaire of teacher interaction style – self evaluation and the Dark Triad Dirty Dozen questionnaire. The results are stated as average gross score, minimum, maximum and standard deviation of measured variables, as in, the individual interaction styles Leadership, Helpful, Understanding, Student-teacher responsibility, Uncertain, Dissatisfied, Objecting, Strict) and the dimensions of the dark triad (Machiavellism, Psychopathy and Narcissism) of participants.

Table 2: Descriptive data on interaction competences and dark triad in participants

		N	AM	SD	Min	Max
Interactional Styles	Leadership	590	4.27	.56	1.00	5.00
	Helpful	590	4.49	.57	1.00	5.00
	Understanding	590	4.27	.56	1.20	5.00
	Student-teacher responsibility	590	4.4	.56	1.00	5.00
	Uncertain	590	1.94	.69	1.00	4.60
	Dissatisfied	590	2.14	.60	1.00	4.60
	Objecting	590	1.72	.60	1.00	4.20
	Strict	590	3.9	.65	1.00	4.80
Dark Triad	Machiavellianism	590	1.43	.63	1.00	5.00
	Psychopathy	590	1.64	.66	1.00	4.50
	Narcissism	590	1.86	.86	1.00	5.00

Legenda: N - count; AM – arithmetic mean, SD – standard deviation, Min – minimum value, Max – maximum value.

The participants of our research reached an average gross score of 4.27 points in the Leadership interaction style, the minimum was 1 and the maximum was 5. In the Helpful style, they scored 4.49 on average, with a minimum of 1 and maximum of 5 points. The average gross score in the Understanding style was 4.27 points, with a minimum of 1.2 and maximum of 5 points. Within the Student-teacher responsibility interaction style, the average score was 4.4 with a minimum of 1 and maximum of 5 points. The interaction style Uncertain had an average gross score value of 1.94 points, with a minimum of 1 and a maximum of 4.6 points. The Dissatisfied interaction style exhibited an average gross score value of 2.14, minimum 1 and maximum 4.6 points. In the Objecting style, the participants reached an average score of 1.72 points, with a minimum of 1 and a maximum of 4.2 points. In the Strict interaction style, they reached an average score of 3.9 points, with a minimum of 1 and maximum of 4.8 points.

In the Machiavellism dimension of the dark triad the participants of our research sample reached an average gross score of 1.43 points, the minimum value reached was 1 and maximum 5 points. As far as the dark triad dimension Psychopathy goes, the participants reached an average gross score of 1.64 points, where the minimum reached was 1 and the maximum 4.5 points. In the Narcissism dimension of the dark triad, they reached an average gross score of 1.86 points, the minimum was 1 and the maximum 5 points. In our research, we looked at the mutual relationship (the strength and polarity) of the individual interaction styles of teachers and the dimensions of the dark triad. The results of the correlation analysis are listed in Table 3.

Table 3: Results of correlation analysis of interaction competence levels and dark triad in research sample participants

Interactional Styles		Dark Triad		
		Machiavellianism	Psychopathy	Narcissism
Leadership	r	-.205**	-.214**	-.139**
	p	<.001	<.001	<.001
	N	589	589	589
Helpful	r	-.202**	-.174**	-.124**
	p	<.001	<.001	.003
	N	589	589	589
Understanding	r	-.186**	-.187**	-.145**
	p	<.001	<.001	<.001
	N	589	589	589
Student-teacher responsibility	r	-.170**	-.167**	-.115**
	p	<.001	<.001	.005
	N	589	589	589
Uncertain	r	.231**	.199**	.229**
	p	<.001	<.001	<.001
	N	589	589	589
Dissatisfied	r	.260**	.209**	.174**
	p	<.001	<.001	<.001
	N	589	589	589

Objecting	r	.269**	.224**	.223**
	p	<.001	<.001	<.001
	N	589	589	589
Strict	r	.091*	.040	-.006
	p	.026	.334	.882
	N	589	589	589

Legenda: r – Pearson's correlation coefficient, p – significance, N – count,
 ** correlation is significant at the 0.01 level (2-tailed), * correlation is significant
 at the 0.05 level (2-tailed).

We found that all three dimensions of the dark triad – Machiavellism, Psychopathy and Narcissism show a medium strength negative relationship to the interaction styles Leadership, Helpful, Understanding and Student-teacher responsibility. Thus, hypotheses H1.1 – H1.4, H2.1 – H2.4, H3.1 – H3.4 were confirmed. We further found that all the dimensions of the dark triad – Machiavellism, Psychopathy and Narcissism had a medium strength positive relationship with the interaction styles Uncertain, Dissatisfied, Objecting. Thus, hypotheses H1.5 – H1.7, H2.5 – H2.7, H3.5 – H3.7 were confirmed. We also found a weak positive relationship between the dark triad dimension Machiavellism and the interaction style Strict. Thus, we confirmed hypothesis H1.8. Between the dark triad dimensions Psychopathy and Narcissism and the interaction style Strict, no relationship was found. Hypotheses H2.8 and H3.8 are thus unconfirmed. Research (e.g. Furnham et al. 2013, Furnham et al., 2014) hints that ways of behaving and experience of teachers with tendencies to the dark triad can influence the performance of students. Preference for some students, manipulation and unempathic behaviour can have a negative influence on motivation, engagement and results in students. In relation to this, researchers emphasise the importance of prevention and interventions aimed mainly at the development of emotional intelligence, communicational skills and the creation of positive relationships. This can help minimise the negative influence of the dark triad on teacher interactions and relationships to students. Questions of candidate choice for the teaching profession are also of importance.

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Navigating the Early Stages of Research – Practice Partnerships: Affordances and Challenges of a New University – School Project

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Abstract

Research-practice partnerships (RPP) are long-term collaborations between researchers and practitioners, organised to investigate current problems, engage in collaborative cycles of inquiry, generate findings, and communicate outcomes to key stakeholders. They are mutually beneficial and intentional and aim to produce original analyses of a problem or an issue. Advocates also claim that partnerships address the research-practice gap and challenge the roles of knowledge consumers and knowledge producers through sustainable and collaborative infrastructures. Ambiguity around the roles and responsibilities of everyone involved can arise and little is known regarding how roles are negotiated and with what consequence for the project outcomes. In addition, little is known about how post-COVID contexts impact the whole partnership project. In our conference paper, we have therefore focused on a post-COVID context that adds to the complexities of creating socially conscious models of working together. The paper is based on reflective pieces, vignettes, of individual academic members when exploring their key values, beliefs, and experiences when entering the RPP and how these shaped the steps undertaken when developing the partnership's identity.

Keywords: Research-Practice Partnership, Shared Aims and Mission, Roles and Responsibilities Negotiation

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Introduction

Negotiating and maintaining roles and responsibilities in a newly formed university and school research-practice partnership (RPP) requires ongoing effort, clear communication, and a commitment to collaboration and shared goals to ensure the partnership becomes successful. It is therefore paramount to commence negotiations with efforts to clarify expectations and address implicit assumptions about power imbalance and knowledge dominance. The clear understanding of collaborative partners' roles and responsibilities contributes to setting up a strong partnership identity that becomes a foundation for a successful and hopefully longitudinal relationship (Farrell Harrison and Coburn, 2019). In addition, partnerships with agreed knowledge co-production roles can contribute to 'a more democratised evidence system' (Sjölund, et al., 2022) and can address a perceived research-practice gap in educational research. However, as Farrell et al. (2019) suggest, though roles within an RPP between researchers and practitioners can be blurred and unclear, little is known about how these roles are negotiated and what the consequences are for collaborative efforts. This paper, therefore, examines the academic team members' experiences navigating the tricky terrain of roles and responsibility negotiations in the process of setting up a research-practice partnership between a university institution, the University of Bolton's School of Education (UoB) and Rumworth secondary special SEND school (RS) in Bolton, UK. Our experiences will be captured in autoethnographical vignettes aiming to reflect on our own values, beliefs, and experiences we bring to partnership and that underpin our decision-making processes, role negotiations, practical efforts, and accountability. The analysis from formal team meetings and 'away days' as well as from informal conversations between the members of both teams (the RS and the UoB), including reflections from the field visits to Rumworth School will also contribute to our interpretations of how the initial stages of RPP relies on careful planning and considerations of each participant's beliefs, experiences and values they bring to the project efforts. This paper can be considered a reflective piece that aims to contribute to discussions on how the initial process of role negotiation in research-practice partnerships should be understood, planned for, and executed.

RPP are defined as, "long-term, mutualistic collaboration between practitioners and researchers that are intentionally organized to investigate problems of practice and solutions for improving outcomes" (Tseng et al., 2017, p. 3).

They can be seen as strategies that build 'two-way streets of engagement' with research (Tseng et al., 2017, p. 3) in which research and practice inform each other in sustainable and mutually beneficial ways in the contexts of academia as well as school practice. RPPs are focused on challenging problems of practice, and they are less concerned with a theoretical or research gap as they incorporate multiple projects (Coburn and Penuel, 2016). They are believed to become promising ways for future educational research, having the capacity to bring 'research and practice closer together' (Sjölund et al. 2021, p. 1). However, it must be acknowledged that they present challenges due to assumptions about roles and responsibility distributions, financial needs and funding, the position of perceived power between researchers and practitioners, and sometimes due to deep epistemological differences (Marx and Saavedra, 2014).

The Context of the Study

The University of Bolton and Rumworth Special School are situated in the North West of England, in Bolton. Bolton belongs to one of the most deprived areas of the UK. Statistics

show, for example, that childhood poverty in Bolton exceeds the national average (Tooth, 2023). Rumworth School is a special secondary school that provides education for up to 340 pupils (11–19-year-old) who have a variety of learning difficulties and additional needs, autistic spectrum conditions, hearing and visual impairment, physical disability, and social, emotional, and mental health needs. The vision of the school is ‘Supporting young people to be more Confident, Resilient and Independent: *You can do it, we will help.*’ Rumworth School was also rated as ‘outstanding’ by OFSTED, (OFSTED stands for the Office for Standards in Education, Children's Services and Skills) which is a non-ministerial organisation that inspects services providing education and skills for learners of all ages in England. ‘Outstanding’ means that the school provides an exceptional level of care and education.

As literature suggests, partnerships can be initiated in diverse ways and can have several formats (Tseng et al., 2017). For example, a collaboration is already established between a university and local schools through teacher training programmes, or a university wishes to work with schools to demonstrate the research ‘impact’ that is part of the national research quality evaluation process via the Research Excellence Framework (REF) (Cain, 2019). Partnerships can also be short-term when focusing on a particular problem, or they can aspire to become longitudinal when collaborative knowledge co-production, and mutually beneficial relationships are aimed for. The School of Education & Rumworth School have already developed strong links with each other via the university-led initial teacher education programmes for secondary and further education vocational sectors (ITT). However, it can be said that the idea of developing a mutual research-based partnership has come to light incidentally, when a wider academic team (not directly engaged in ITT) met the Rumworth School’s lead link tutor, Gina Stafford, at a meeting they were asked to attend due to other staff member’s unavailability. At this meeting Gina presented us with an idea of organising a teaching and learning conference with a SEND focus. It is important to mention that this idea sprang from the context of Rumworth School as it had already established a strong culture of action research that was part of their school and teacher professional development strategy. This culture is reflective of the policy trajectory in England since 2010 which has promoted evidence-based (or more recently evidence-informed) practice in schools (Coldwell et al., 2017 and Coldwell, 2022).

After a prolonged conversation with Gina about the purpose and aims of the proposed conference, in which she indicated that Rumworth School can be proud of the quality of their teaching and care and the learner achievements, the academic team suggested a different direction of mutual collaboration. We argued that collaboration would be based on a partnership between researchers and practitioners who could engage in research relevant to their practice. Investigating their own classroom challenges and key dilemmas would help practitioners co-produce new knowledge that could be shared with other school communities and practitioners from a variety of educational contexts. In other words, the partnership would offer practitioners more agency and autonomy and hopefully, they would appreciate this type of professional development more than listening to experts, however inspirational they might be.

Methodology

As we have mentioned above, the data analysed here include minutes from formal meetings, notes from informal conversations (Swain and King, 2022) and observational field notes (Emmerson et al., 2011), that informed the academic team’s reflective vignettes. All these can be understood as steps that have helped us to start building our partnership. In our

conversations, as a university team, we identified the importance of addressing power imbalance and the potential tacit understanding teachers might bring to the project. Our concerns were entrenched in the wider societal rhetoric that academics typically possess; specialised knowledge and expertise in their academic fields, which is sometimes seen as more prestigious or authoritative than the practical experience of a teacher. We were conscious these biases might result in us as academics being perceived as the primary source of knowledge and decision making. For the success of the partnership and to further embed our guiding principle of equity, we felt we needed to work hard to avoid a culture of top-down decision-making that would marginalise the teacher's voice in the coming stages of the research. We have therefore designed an agenda for our first partnership 'away day' that addressed expectations and roles perceptions, and that would result in the agreed formulation of our partnership's mission, shared aims, and objectives.

Ethical Considerations for the Dissemination of the Partnership Outcomes

The RPP project has been through the ethical processes required by both the University of Bolton and Rumworth School. Gary Johnson, the then School Head, and Jennifer Dunne, incoming Head of RS, including Gina Stafford and the rest of the school leading collaborative research team were adamant in waiving their own and the School's right to anonymity in reporting on the outputs from the partnership. This was done in favour of promoting and celebrating the School's research initiative and facilitating their ability to share their outcomes with other schools and also with potential employers for their pupils. In support of this, UoB and the academic team have taken the same approach. At the later stages of the project when data is collected from other teaching staff, pupils and parents, a new ethical procedure will be agreed. This will result in personal data safely stored and fully anonymized, using pseudonyms and other strategies (Emmerson et al., 2011).

Academic Team – Autoethnographic Vignettes

To make RPPs successful, researchers point out that they should be built on three key principles which include "mutualism, commitment to long-term collaboration, and abiding efforts to build and maintain trusting relationships" (Tseng et al., 2017, p.4). These principles are evident in our own vignettes as values we are bringing to the partnership and therefore give us assurance of being able to set strong foundations for our collaborative efforts.

Lucy's Vignette

I reflect upon my contribution within the initial stages of the research practice partnership and perhaps the most valuable lesson from this experience has been the importance of building trust and rapport. Building and maintaining a successful RPP has not been a quick process and subsequently this has determined a more organic and careful arrangement. My involvement and the involvement of others have required patience, persistence, clear communication, and adjustments to what is possible and what is not. As such, it has been essential to acknowledge the difference in our professional roles and our responsibilities within and beyond the partnership that both enrich the process yet have the capacity to pull us in competing directions. What has aided navigating this tricky terrain of professional responsibilities outside of the partnership has been to set aside time to agree and establish a shared vision and purpose.

Equity is one of my professional and personal guiding principles. Therefore, I have started to explore the significance of social justice values within our partnership and the ways in which

they influence our work, experiences and decision making. During the first visit to the school, Gina Stafford, the lead school practitioner within the partnership, showed us around the grounds. As Gina showed us around the school, I took pictures using my mobile phone. My pictures documented the outdoor horticultural area, creative gardens and communal forest school, the working indoor restaurant and the kitchen, the spaces that were often utilised to develop the students' life-long learning skills delivered through the 'Preparation for Adulthood Programme'. The digital images have since served to elicit (Yamada-Rice et al., 2015) other ideas, memories and questions that were not apparent on the day but have organically manifested as the partnership has evolved.

What has become apparent is the School's commitment to tackling the longer-term life chances of its students. For some this has resulted in success in securing voluntary or paid employment. Through our ongoing engagement with the school, it has become clear that some teachers work in a more outward-facing role with local employers. The remit of these roles is better understanding of the additional challenges faced by SEND students in the workplace. We simultaneously gathered insights into the apprehensions of employers in making posts available for students with additional needs. These personal insights from my time at the school have made tangible the shared aims of the partnership, in how we can raise awareness and develop further understanding around supporting SEND learners as they navigate their way towards adulthood.

Rumworth School's commitment to equity and social justice serves as a powerful reminder where my drive for success has become much more than my own professional development and research interests. My experiences are grounded in real-world encounters with the teachers and students, where I have first-hand experience of being caught up in the hustle and bustle of a thriving and diverse school community. Moving forward, I will pay closer attention to my dalliances within what would seem the more 'insignificant' and 'mundane' encounters I experience within the school community. I suggest, in bringing the 'mundane' and 'pedestrian' into sharper focus, this will contribute to a more nuanced and humanistic methodology.

Georgia's Vignette

Looking back at the inception of the RPP project that we are forming with Rumworth school, the critical moment was the initial meeting with Gina Stafford on her visit to the University. We intended to share our ideas, drawn from our review of the literature and our existing experience, for how the partnership might work in practice to become a shared and equitable endeavour. Listening to Gina's talk about the school, it quickly became clear that it already had a strong basis for how it approached research. Having worked on RPPs in other contexts, I had expected to have to explain and justify the basic principles of research, but it soon became evident how much of a 'partnership of equals' we could be from the outset. This was reinforced by our first visit to the school. I had worked in the SEND sector early in my career and had visited special schools for research projects that I supported during my PhD studies, so I had a good understanding of how provision in the sector had developed and the different working cultures at play. I understood how critical staff were in responding to student needs and aspirations. What surprised and delighted me was the culture of enterprise that had been fostered in the School and how this played into their staff development and research strategies. As a team, we could see very clearly how we could provide support for and learn from their aspirations for a research culture.

This relates directly to Lucy's reflections about building and maintaining successful and trusting relationships. It seemed important to me, and I think to the whole academic team, that we recognise, respect, and applaud the work that had already been established and to envisage how we could fit into that, and enhance it with our academic experiences without losing the cultural gains that had already been made.

The second visit to the school, when we were asked to judge the previous cycle's research outputs, was critical to building these relationships and to giving this recognition and respect. It was also an opportunity for us to learn more about what drives the pedagogy of the School and to develop our understanding.

For me both visits were quite emotionally engaging, reminding me of how rewarding it could be to work in the sector and with SEND pupils. It was also inspiring to see how the pedagogic knowledge base had developed over time and encouraging to find that I still understood and related to the nature of teaching in the sector. This realization was invaluable in furthering communication between both the School and University teams and meant that we were able to develop a trusting relationship based on our shared understanding.

The 'away day' was invaluable in providing 'neutral territory' to build on that understanding to formulate aims and objectives for the partnership. It enabled us as a whole team to generate some aspirational values and to think in a more ambitious way than either would have been able to alone.

Daniela's Vignette

The values of collegiality, respect for practitioners' knowledge and professional autonomy as well as understanding of the importance of learning community with a shared vision are, I believe, at the core of my own professional behaviour, decision-making and personal agency within the RPP. Being incidentally present at the first meeting mentioned above with Gina, our conversation was underpinned by my previous experiences when working with school practitioners who wished to change or enrich their classroom pedagogical practice. Any teacher change, I suggested, would need to start with teachers' beliefs, values, and competencies they bring to this process, and that may tap into their emotional domain of teacher 'vulnerability' (Kelchtermans, 2009). Researching one's own practice, however, within a supportive learning community could help teachers critically review and reflect on their own personal theories of teaching (Cain, 2019) and thus, teachers could become more open to a change (Biesta, 2007). Equally central to this conversation was Rumworth School's aspirations to enhance the life chances and outcomes for SEND students and how we, through the partnership, could disseminate the successes the school is achieving.

Our later formal and informal conversations, as an academic team, led to more pragmatic decision-making steps, including securing internal funding for creating spaces for partnership meetings outside our educational institutions. These meetings carved-out uninterrupted time to be able to listen to each other's concerns, visions and aims. I was also keen to ensure the institutions' leadership agreement and ethical approval before starting to engage in any process of research dissemination (BERA, 2018).

The away day was carefully planned to take part in an environment that was conducive to collaboration, trust building and honest communication. We were conscious of the post-COVID contexts that developed efficient online meeting spaces; however, we were also aware

of the need to have a physical space for personal, face-to-face communication that can be informal when sharing refreshments and personal anecdotes. One of the outcomes of the away day was therefore an agreement that away days are to be strategically planned over the period of the academic year to ensure the longevity of our collaboration.

During the away day, when we started with the elicitation of the expectations and values for the partnership, the practitioners emphasised the impact on learners' independence and employability skills, on teachers' innovative practice, and on how the partnership would link with school and educational policy priorities. They also wanted the partnership to relate to the 'passion' they hold regarding SEND children's success in adulthood. The university team highlighted the value of 'curiosity' about where this partnership can lead to, we foregrounded equity and equality, reciprocity, collaboration, and sustainability. All these key values were often discussed in our formal and informal meetings and so we felt we needed to be transparent at this point of our partnership's identity formation (Farrell et al., 2019). This dialogue in turn led to a statement of the partnership's values embodied as the '5Cs': child-centredness, collegiality, collaboration, creativity, and continuous professional development.

Navigating the Early Stages of Roles and Responsibilities

As the partnership involves a cross section of professionals working within operational and strategic roles across the secondary and Higher Education sector, the academic team have identified the importance of addressing power imbalance and the potential tacit understanding teaching professionals might bring to the project. Our concerns are entrenched in the wider societal rhetoric that academics typically possess specialised knowledge and expertise in their academic fields which can be seen as more prestigious or authoritative than the practical experience of a teacher. We are conscious such biases can result in academics being perceived as the primary source of knowledge and / or decision makers. For the success of the partnership and to further embed our guiding principle of equity we are working hard to avoid a culture of top-down decision-making that marginalises the teacher's voice in the coming stages of the research.

A central concern has been to circumnavigate teachers' understanding around their roles that should not be regulated to mere data providers, nor must they see themselves as such. Instead, teachers have positioned themselves within the research as active agents within the design stage of the data collection process, which will lead to analysis and interpretation. They also defined their role as 'research champions' that enhances their research knowledge credibility and places them as research leaders and knowledge brokers in their school research strategy.

We (academics) are also conscious of our own evolving role. Cooper (2014) provides a cautionary note that knowledge brokers often remain stuck at the level of informing teachers about certain activities or describing the activities outcomes. He suggests hence knowledge sharing via active personal engagement. Moving forward, the partnership have agreed an itinerary of knowledge exchange activities that include attendance at the launch of the school wide 'teaching and learning' initiatives where dates have been planned by the senior leadership team over the academic calendar and where teachers are encouraged to work with colleagues to identify pedagogical and pastoral issues and undertake action research with tangible outcomes for evaluation. The university team plan to provide academic support and bring further credibility to research design, data collection and analysis whilst working closely with teaching colleagues to produce impactful outcomes.

We are conscious as an academic team we are imbued with more flexibility around our working schedules and have not been constrained by the daily demands of classroom teaching. Effectively navigating around our professional constraints and workloads remains high on the agenda for ongoing success and the common goal of continued mutual respect. We suggest that mutual respect continues to be fostered through the different professional experiences each member of the team brings to the project. For example, two members of the academic team possess prior experience of teaching in a SEND school setting and have a deep understanding of the terminologies and documentation used by SEND teachers in their daily practices. In this instance, our colleagues have served as effective knowledge brokers often by mediation, boundary-spanning and bridging (Ryecroft-Smith, 2022) communication and collaboration between the different stakeholders. For others within the academic team, we took the opportunity to position ourselves as novices within the SEND arena of educational provision. This has helped to flatten the hierarchy between the academic and teacher relationship and thereby encourage a culture of mutual learning, where academics learn from teachers' practical knowledge and teachers gain insights into the research methods and approaches.

Conclusion

In presenting the initial stages of the RPP, we are conscious that the voices of our school colleagues are missing from our narrative here. This has been a deliberate strategy to analyse our journey as academics into the partnership prior to supporting the teachers to capture their own reflections on their experiences. We will then endeavour to navigate a collegiate approach to co-write the different perspectives of the partnership's development, ensuring equity and mutual respect. Our aspiration is for our teaching colleagues to develop their researcher habitus (Bourdieu, 1977), constructing their dual identity as researcher and teacher. The skills accrued within this identity will support colleagues in gathering evidence to inform and support their outstanding practice and justify aspirations to contribute to policy development.

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Study Abroad Program Design From a Positive Psychology Perspective

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Abstract

Empirical research within the past several decades has established study abroad (SA) as a high impact practice for university students' academic development, retention, and global education skills development (Redden, 2012; Tillman, 2005, 2014). Five major theoretical frameworks have been identified (Ogden, 2015). However, current research evidence from a positive psychology perspective in study abroad program design appears to be limited. Database and archive searches yield few research articles utilizing a positive psychology theoretical framework, SA program build, or research-based assessment or validation from a strengths-based approach. Our research focuses on study abroad program design referring to students' study patterns of strengths and weaknesses with an eye towards program betterment and individual strengths development. We collected one set of data one year before and two years of two data sets after the Covid-19 epidemic. We report the results of the analysis of the first-year data set ($n = 546$) which featured variables related to study abroad. The results show student liking for English, attitudes towards learning English and study abroad interest. We also report the results of patterns amongst general motivation as measured by the hope construct (Snyder, et al., 2002), academic self-efficacy (Zimmerman, Bandura, & Martinez-Pons, 1992) and their relations with important academic skills such as time management versus academic procrastination and outcomes such as TOEIC® scores (ETS) from the second ($n = 110$) year of our research. Lastly, we will discuss the implications for future SA program development from a strengths based, positive psychology perspective.

Keywords: Study Abroad, Program Design, Positive Psychology, Academic Self-Efficacy, Hope Theory, Quantitative Research

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Introduction

Study Abroad Program Design and Positive Psychology

We begin with an overview of theories applied to study abroad program design and the importance of study abroad as a motivational factor in knowledge acquisition at the tertiary level. We then follow with a brief discussion of the historical background of positive psychology and two of the constructs that we are applying in our multiyear, longitudinal, research project. Namely, the academic self-efficacy construct (Zimmerman, Bandura, & Martinez-Pons, 1992) and the hope theory construct (Snyder, et al., 2002). Next, we discuss the analytic method of assessing simple correlations used as a means to gather evidence. This is followed by the quantitative results section and a discussion of the associations of the academic self-efficacy construct and hope construct with important academic skills such as time management, academic procrastination. We also discuss sample results pertaining to outcomes such as TOEIC® scores. Given the size and the amount of data created by this longitudinal research project, we necessarily present selected results. Specifically, we briefly discuss and highlight results from research conducted in 2021. We then conclude with a discussion of theoretical implications for future program design, limitations, future directions, and practical implications of our research project.

Study Abroad Program Design

Background

In Japan, tourism promotion has been positioned as one of the most crucial national policies, and various inbound strategies have been actively pursued since the Tourism-Oriented Country Declaration of 2003. The "Visit Japan Project" has especially contributed to a rapid increase in the number of foreign visitors since 2011. However, it has been frequently pointed out that there is insufficient development of tourism management professionals and individuals capable of globalizing tourism businesses, particularly in higher education institutes.

In response to this situation, we established the Tourism Business Department within the Faculty of Business Administration in 2018, aiming not only to impart business management skills but also to foster global talents proficient in English. However, the COVID-19 pandemic in 2020 resulted in unprecedented impacts on society. Simultaneously, the significance of tourism as a representative industry driving the economic recovery of our country, with its substantial economic ripple effect (approximately 27 trillion yen), was once again recognized.

While exploring new approaches to tourism, the government announced a strategy in December 2020 to prepare for inbound recovery. The concept of "new tourism" is expected to increase demand for "global talents" equipped with environmental responsiveness, digital transformation (DX) skills, international business acumen, problem-solving abilities, effective communication skills, and understanding and tolerance of diverse international societies.

Therefore, our university, which pioneered tourism studies in Japan with the establishment of the Tourism Department in 1967, has established the Faculty of Global Tourism and Business in 2022, aiming to contribute to the realization of sustainable tourism and business

development by nurturing professionals capable of engaging in international exchange and cooperation.

Faculty of Global Tourism and Management

In our faculty, there are three departments: International Tourism, Tourism Town Planning, and International Business. In the International Tourism Department, students learn about the management of the tourism industry and the importance of hospitality and service. In Tourism Town Planning, students study the planning and development of policies for municipalities that welcome tourists, as well as the revitalization of local industries. The International Business department offers a curriculum focused on practical learning, including the management of global enterprises and marketing strategies, aiming to prepare students for active careers both domestically and internationally.

One of the department's distinctive features is its strong collaboration with industry and government. The students have opportunities to attend classes held in collaboration with various organizations, including tourism agencies from around the world, ANA Comprehensive Research Institute, JTB, Daimaru-Matsuzakaya Department Stores, TV Osaka, Sakai, Takatsuki, and Sanda City.

Another significant feature is the study abroad program. In the first year, students have opportunities to participate in short-term overseas training (1-3 weeks), and in the third year, they have the option of long-term study abroad (4 to 8 months), with scholarships provided for both programs. For this purpose, English education is offered in small classes with individual guidance outside of regular classes, and the support is provided collaboratively by Japanese and native English professors and instructors from the English Education Center. Thus far, as a result, 100% of the students who graduate from our faculty have been able to secure their career paths, with many entering fields such as aviation, hotel management, travel industry, finance, manufacturing, retail, services, and public administration, depending on their aspirations.

The Importance of Study Abroad

Empirical research within the past several decades has established study abroad (SA) as a high impact practice for university students' academic development, retention, and global education skills development (Redden, 2012; Tillman, 2005, 2014). Five major theoretical research frameworks have been identified (Ogden, 2015). Ogden identified these research frameworks as student learning, intercultural learning, student development, student engagement, and communication. Our approach to study abroad program design includes drawing upon established, validated constructs from positive psychology (and the relevant data sets) to investigate a new theoretical approach to study abroad program design. It was felt by the researchers that recent advances made by researchers in the field of positive psychology would be useful in specifying the underlying mechanisms and processes relevant to learning, engagement, and communication as noted above and, perhaps, open up an entirely new line of research and further enhance SA as a high impact practice.

The Background of Positive Psychology

Positive psychology researchers make a deliberate effort to study human strengths and positive psychological constructs at the individual, group, and institutional level. Positive

psychology is the scientific approach of investigating optimal functioning and the best that our species is capable of achieving. In this regard, positive psychology has the potential to make important contributions to the field of education including second language acquisition and applied linguistics. Though the area of research is more than 30 years old now, it is still in the early phases of development for cross-cultural and cross-sample research at the international level (López & Snyder, 2003). Next, I address two phases specifically relevant to applied linguistics.

Dewaele et al., (2019) indicate that there are two distinct phases in the development of the relationship between positive psychology and applied linguistics. They believe that the first phase began in 2012 with the efforts of MacIntyre and Gregersen. They further indicated that the second phase of growth in positive psychology (PP) and applied linguistics is now underway with the “gradual recognition in applied linguistics, growing popularity of PP, and an exponential increase in publications in more mainstream journals” (p. 1). However, earlier examples of the attempt to bring awareness of the theories and practical applications of positive psychology to the field of applied linguistics do exist (Ring, 2009, 2010a, 2010b).

There have also been attempts to teach introductory short courses in Japan, relatively recently (Rombs, 2015). We believe that our own efforts at a positive psychology-based exchange program represent the first attempt to develop a high impact practice based on this approach. Finally, there is a Positive Psychology Association in Japan which was started in 2011 and there is also a positive Japan Positive Psychology Research Institute founded in 2018.

Academic Procrastination, Academic Self-Efficacy, and Hope Theory

Academic Procrastination

Academic procrastination has been defined in a variety of ways. Importantly, definitions indicate that the behavior is avoidable and that the procrastinator can suppose to suffer more for the actions of postponement. Two definitions are used in this research. The first comes from Solomon and Rothblum, who define procrastination as an “act of needlessly delaying tasks to the point of experiencing subjective discomfort” (1984, p. 503). The second definition comes from Steel who defines procrastination as a choice “... to voluntarily delay an intended course of action despite expecting to be worse off for the delay” (2007, p. 66).

Academic Self-Efficacy

The academic self-efficacy instrument was developed to measure “...students’ perceived capability to use a variety of self-regulated learning strategies such as planning and organizing their academic activities, ..., resisting distractions, motivating themselves to complete school work, structuring environments conducive to study, and participating in class” (Zimmerman et al., 1992, p. 665). Self-efficacy is a well-established construct in psychological and educational research. In fact, it has been described as “ubiquitous” in psychology (Maddux, 2002, p. 277). Given the construct’s well-established nature and evidence in relation to academic outcomes, it was chosen because it appeared to be likely to generate useful data and evidence in the application of positive psychology in study abroad program design.

Hope as General Motivation

Hope is also a well-established and well validated positive psychology instrument. It is used to measure general motivation levels for future goals (Snyder et al., 1991). According to the formal definition, hope is operationalized as “a positive motivational state that is based on an interactively derived sense of successful (a) agency (goal-directed energy) and (b) pathways (planning to meet goals)” (Snyder, 2000, pp. 8–9). That is to say, hope is a cognitive set developed by a person with a successful sense of *agency* for goal pursuits. Agency is one’s self-knowledge of “successful determination”. According to the theory, high hope individuals have established their mindset and thought patterns from successfully accomplishing goals in the past and present. Such individuals therefore anticipate being able to successfully continue to accomplish goals in the future. The second component of hope, *pathways*, comes from a sense of successful creation of plans and schedules in order to accomplish goals (Snyder et al., 1991). The pathways component is the hopeful individual’s ability to generate means to an end. High hope individuals therefore also have a well-developed sense of self-knowledge for their ability to generate a number of possible avenues to successful goal accomplishment. Though the construct used in this research measures general levels of hope filled motivation, it is the intention of the researchers to develop a language acquisition specific instrument as well as a study abroad specific instrument based on current endeavors. We will take this issue up again in the implications and conclusion section of this paper.

Method

Concerns With Student Motivation and Procrastination

Typically, students who enter this faculty and our university have a liking for English and have high hopes to improve their English. However, after a period of time a certain number of students avoid attending class, delay submitting their assignments, and avoid in-class presentations. This tendency is especially noticeable with recent first-year and second-year students who have had to take their first semester classes online and have had their study-abroad opportunities postponed.

Concerns and Issues

The following issues are based on observations gathered at the research site by the researchers. The first concern is that those students with weak basics struggle with maintaining motivation to study English for the time required to make proficiency advancements. The second concern is that a number of students are not self-regulated, independent learners.

Multiyear Research Project

Thus far we have conducted three years of research. In 2018, the members of the research team conducted pilot tests of their constructs and gathered evidence at separate research sites. In 2021 the researchers conducted validation studies of their instruments, continued to gather evidence, and conducted a pilot study of a positive psychology based academic intervention. They applied the Integrative Cognitive-Behavioral Coaching (ICBC, Dias, Palmer, Nardi, 2017) to assist students who were struggling with academic time management and developing proper study habits. In 2022 we continued to validate current forms and also to Validate new forms and gather evidence. In 2023 we have added further new forms to the validation

process. We are also piloting a positive psychology based academic intervention which will be a brief Hope one time intervention for long term study abroad students conducted in a single class time period based on Feldman & Dreher's 90 minute Hope intervention (2012).

Instrument Translations, Participant Selection, and Data Collection

After receiving approval from the Research Ethics Committee of the university research site responsible for ensuring ethical conduct in research involving human participants, we conducted the research using the academic self-efficacy and hope disposition scale instruments as translated by two of the researchers in this project. Both have extensive experience in translation. One is a native speaker of English and the other is a native speaker of Japanese. However, one weakness of this research is that these instruments have not been back-translated.

Participant Sample Characteristics

The Procrastination Assessment Scale-Students I (PASS I), the Procrastination Assessment Scale-Students II (PASS II), the Self-efficacy for self-regulated learning scale (ASE), the Hope Disposition Scale (HDS), and Test of English for International Communication (TOEIC®) which is an English language proficiency test were administered to a sample of 110 university undergraduates (demographic information such as gender and mean age were not collected). All students were members of the faculty of business at a mid-sized private university in the southern central part of Honshu, Japan.

Sampling Procedures and Data Screening

After receiving informed consent, all participants completed the PASS I and II, ASE, and HDS questions online via Google forms. There were 17 participants who did not answer all questions on the forms. The final sample for all instruments was 110 participants which was reduced to a final sample size of 102 after screening for outliers. The outliers were removed from the study based on patterns such as replying with contradictory response patterns the PASS I and PASS II, for academic self-efficacy and hope disposition instruments such as marking the lowest possible score for the highest possible score in all categories. Finally, 77 participants of the 110 self-reported their TOEIC® scores. It was decided to use the mean linear trend at point replacement function in SPSS (Version 28) for the missing 35 scores.

Quantitative Instruments

There were four quantitative survey instruments used in this study and the TOEIC® proficiency test. The Procrastination Assessment Scale-Students I (PASS I) was utilized to measure the frequency or prevalence of academic procrastination on the part of university students. It consists of a 5-point Likert scale. It is designed to measure six areas of academic procrastination: writing a term paper, studying for an exam, keeping up with weekly reading assignments, performing administrative tasks, attending meetings, and performing academic tasks in general. In our version of the PASS I we changed the items that measure meeting attendance to class attendance. The Procrastination Assessment Scale-Students II (PASS II) was utilized to measure the self-reported reasons for academic procrastination. It also consists of a 5-point Likert scale. Only the results of the PASS I analysis will be reported. The statistically significant PASS II results will not be reported due to space limitations.

Furthermore, the Self-efficacy for self-regulated learning scale (ASE), and the Hope Disposition Scale (HDS) were applied to measure motivation. The TOEIC® test was applied in order to examine the patterns between procrastination, motivation, and English proficiency, a necessarily important skill for students who will study abroad.

The procrastination assessment scales, PASS I and PASS II, were developed by the researchers Solomon and Rothblum (1984). The PASS I consists of items such as *Writing a Term Paper: To what degree do you procrastinate on this task?; To what degree is procrastination on this task a problem for you?; To what extent do you want to decrease your tendency to procrastinate on this task?* and the PASS II consists of items such as: *You were concerned the professor wouldn't like your work; You didn't have enough energy to begin the task; and You were concerned you wouldn't meet your own expectations.* The PASS I and PASS II instruments were chosen given the high prevalence of disregard by students for conducting homework according to national self-report statistics in Japan.

In Japan, approximately 85% of university students in Japan self-report that they spend less than 10 hours a week on independent study according to research done in 2007 by the The Department of University Management and Policy Studies at Tokyo University with the support of the Japanese Ministry of Education (政策研究センターCRUMP, 全国大学生調査, 2007).

Furthermore, according to that report, it would appear that 10% of students do not do homework at all. This is an intriguing conundrum given that according to the most recent report available (2010) Japan had a 93% graduation rate (OECD, 2010).

Next, the subscale Self-Efficacy for self-regulated learning (ASE) was used to investigate individual levels of self-efficacy within the university environment for self-regulated learning. The ASE was developed to investigate the relationship between students' self-efficacy beliefs and academic goal achievement (Zimmerman et al., 1992). The ASE has two subscales. The first subscale is designed to measure self-efficacy for self-regulated learning. Only this component was used in this research. The second subscale is designed to measure self-efficacy for academic achievement in nine different domains such as mathematics, algebra, and science. It was not utilized in this stage of the study. The original 7-point Likert scale was converted to a 6-point scale. The instrument used in this study consists of items such as, *How well can you: Finish homework assignments by deadlines?; Study when there are other interesting things to do?; Arrange a place to study without distractions?; and Motivate yourself to do schoolwork?*

Finally, the Hope Disposition Scale (HDS), is a general motivation measure designed to assess an individual's enduring goal-setting architecture across time and place. It is composed of agency and strategies cognitions for goal accomplishment. The original 4-point Likert scale was converted to a 6-point scale. The HDS consists of agency items such as *I energetically pursue my goals;* and pathways items such as *Even when others get discouraged, I know I can find a way to solve the problem.* Prior research has established the validity and reliability of these instruments with the sample (Kunieda, Sakai, Ring, 2022).

Results

The PASS I instrument detected the same pattern of delay and avoidance for all six areas of academic procrastination. These patterns of nearly always or always avoiding academic tasks

(19.1% – 41.8%), considering it a problem (38.2 % – 59.1%), and wanting to decrease procrastination (56.3 % – 66.3%) were prevalent in all six areas.

In the case of writing a term paper, 30% nearly always or always avoid writing tasks, 55.5% nearly always or always consider procrastination on writing tasks a problem, and 65.5% very much or definitely want to decrease their tendency to procrastinate on this task.

Second, in the case of studying for an exam, 41.8 % nearly always or always avoid studying for an exam, 55.4 % nearly always or always consider procrastination on studying for an exam a problem, 60 % very much or definitely want to decrease their tendency to procrastinate on this task.

Third, in terms of keeping up with weekly reading assignments, 25.5 % nearly always or always avoid weekly reading assignments, 40 % nearly always or always consider procrastination on weekly reading assignments a problem, 66.3 % very much or definitely want to decrease their tendency to procrastinate on this task.

Fourth, when considering the performance of administrative tasks, 24.7 % nearly always or always avoid administrative tasks, 50.3 % nearly always or always consider procrastination on administrative tasks a problem, 66.3 % very much or definitely want to decrease their tendency to procrastinate on this task.

Fifth, when students self-report attendance, 33.6 % nearly always or always avoid attendance, 50.9 % nearly always or always consider procrastination on attendance a problem, 60.9 % very much or definitely want to decrease their tendency to avoid attendance.

Finally in terms of performing academic tasks in general, 19.1 % nearly always or always avoid general academic tasks, 49.1 % nearly always or always consider procrastination on general academic tasks a problem, 58.2 % very much or definitely want to decrease their tendency to procrastinate on general academic tasks. Next, we report the results of the correlation analyses for the academic self-efficacy construct and TOEIC® scores and conclude the results section with a discussion of the relationship between Hope disposition and TOEIC® scores.

As shown in Table 1, self-efficacy and TOEIC® Scores were positively correlated, $r = .28$, $p = .002$, one-tailed. The moderately weak relationship accounts for 08% of the variance in scores.

Table 1: *Pearson Correlation for TOEIC® Scores and Perceived Academic Self-Efficacy for Self-Regulated Learning*

		TOEIC Score	Academic Self-efficacy
TOEIC Score	Pearson Correlation	--	
	Sum of Squares and Cross-products	707095.524	
	Covariance	7000.946	
	N	102	
Academic Self-efficacy	Pearson Correlation	.284**	--
	Sig. (1-tailed)	.002	
	Sum of Squares and Cross-products	21259.539	7899.814
	Covariance	210.490	78.216
	N	102	102

** . Correlation is significant at the 0.01 level (1-tailed).

Note. Perceived Academic Self-efficacy for Self-regulated Learning Subscale consisted of 11 items ($\alpha = .869$), and measures students' perceived ability to apply self-regulated learning strategies. Original 7-point Likert scale converted to 6-point scale.

Next, as shown in Table 2, Hope Disposition Scores and TOEIC® Scores had a positive, weak correlation, $r = .17$, $p = .045$, one-tailed. The correlation accounts for 03% of variance in scores,

Table 2: *Pearson Correlation for TOEIC® Scores and Hope Disposition*

		TOEIC Score	Hope Disposition Score
TOEIC Score	Pearson Correlation	--	
	Sum of Squares and Cross-products	707095.524	
	Covariance	7000.946	
	N	102	
Hope Disposition Score	Pearson Correlation	.169*	--
	Sig. (1-tailed)	.045	
	Sum of Squares and Cross-products	7402.508	2726.667
	Covariance	73.292	26.997
	N	102	102

*. Correlation is significant at the 0.05 level (1-tailed).

Note. Hope Disposition Scale (HDS) measures an individual's goal-creating architecture. Original 4-point Likert scale converted to 6-point. Consisted of 8 items, one item removed to improve reliability ($\alpha = .861$).

Conclusion

Discussion

In the following section, we examine the limitations and future directions of study abroad program design. We give a brief overview of our own next steps in gathering evidence as part of our multiyear research project. Finally, we conclude with a discussion of the implications for future SA program development from a strengths based, positive psychology perspective that we hope will be beneficial for the field.

Limitations and Future Directions

As this is a correlational research endeavor, care must be taken in assigning causation to the shared variance found. Though higher levels of both academic self-efficacy and hope appear to be positively associated with higher TOEIC® scores, the opposite may very well be the case. Correlational, cross-sectional studies cannot ascribe causality.

The long-term implications must include, in the opinion of the authors, development and testing of hope and self-efficacy interventions for those who have low levels of the aforementioned in preparation for study abroad, especially in university programs (such as ours) where the general expectation is that all students will have an opportunity to study abroad. Further, curriculum that supports maintenance and promotes increases for the higher levels of self-efficacy and hopeful goal-focused motivation might also prove beneficial for students who wish to challenge themselves by spending a year abroad or eventually working overseas. Our research team is currently working on such a program based on efforts conducted by Feldman and Dreher (2012). The program will be an intervention study specifically aimed at third year students studying abroad for 3 to 6 months. This is scheduled to begin in the autumn of 2023 and will include a 90-minute hope intervention as modeled on Feldman and Dreher. However, our study will include periodic follow-up and maintenance sessions with the students while they are studying abroad.

Finally, future research questions for the field may include: can second language acquisition (SLA) domain specific self-efficacy and/or hope scales more accurately predict SLA outcomes and expectancies? Can a study abroad domain specific self-efficacy and/or hope scale more accurately predict study abroad attrition and outcomes? We hope to bring further insight into these relationships between strengths-based motivation, study abroad, and second language acquisition as we continue our research program.

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A New Didactic-Andragogical Tool to Consolidate Knowledge Applied to the Active Methodology PBL

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Abstract

Literature and teaching experience show the need to reflect upon teaching-learning strategies that take advantage of students' prior knowledge and that promote opportunities to develop autonomy, especially when teaching adults. This work aims to present the strategy named Circle of Knowledge (CK) and contextualizes it in the light of andragogy by demonstrating two practical applications in the Phonographic Production course at FATEC Tatuí, a Public Technology College in Brazil. The study comprises of a bibliographic review on teaching-learning theory, andragogy, and didactic tools. Furthermore, the dynamics of CKs involving two project-based learning (PBL) groups, the Plug-ins League and the Events League, are described and discussed. The CKs were carried out after the projects were accomplished in order to register the learning obtained as well as to deepen the discussions. Two behaviors were observed among the students - free speech and active participation (at a high level) in the discussion with the guests, and silence. Those who remained silent reported that they were able to follow and understand everything that was being discussed despite the high level of the discussion specially for a topic that had been far beyond their level of knowledge before their participation in the PBL which gave them a great sense of satisfaction. This promoted transdisciplinarity and was efficient in reinforcing learning by allowing more space for speech, active listening and time for students to lead the construction of knowledge both individually and collectively.

Keywords: Education for Adults, Project Based Learning, Didactics

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Introduction

The teaching practice, especially in higher education, is often a solitary endeavor, and learning occurs with each professor in an individualized manner, in most cases. Despite the high potential of each educator, whether due to a solid academic background or experience gained from working in the industry, or arising from daily classroom activities, individual improvements are often modest when it could be possible to share knowledge and experiences in more opportunities and in a more organized and systematic way. On the other hand, the university professor often ends up dedicating the majority of their time to research, to the pursuit of expanding the frontiers of knowledge. Consequently, concerns related to the act of teaching and didactic issues take a back seat, even though everyone, in essence, was hired to fulfill the role of a teacher, that is, to teach.

Similarly, literature and teaching practice point to the need for reflection on teaching and learning practices, especially when it comes to adult education. Knowles (1973) emphasizes the difference in the learning process for adults and criticizes the scarcity of knowledge on the subject in his time, stating that more is known about the learning of animals than about children, and more about how children learn than how adults do. The term "andragogy" was first introduced by Alexander Kapp in his 1833 book. Although not presenting a theory at that time, he already emphasized the need for adult education to occur differently from the methods employed by pedagogy, introducing the concept of business education. Exploring andragogy and the evolution of teaching and learning theory and practice is of interest to educators, administrators, and anyone involved in the field of education.

This article focuses on the teaching activity within the higher education program in Sound Engineering Technology at FATEC Tatuí, located in the interior of the State of São Paulo, Brazil. This program, outlined in its pedagogical design, aims to shape not only a sound production equipment operator but an operator with refined auditory and musical skills to comprehend the entire intricate process of recording and subsequent actions leading to the completion of a project with the expected quality. The education provided includes both technical and scientific aspects, empowering individuals to work on and generate new technologies and tools, enhancing the quality of recording in listening rooms across the country. The theoretical knowledge acquired enables the generation of innovative solutions at every stage of sound production.

Objective

This paper aims to present the strategy known as the Knowledge Circle, conceived in light of andragogy, through the demonstration of two practical activities in the Sound Engineering Technology program at Fatec Tatuí, a higher education course in Brazil.

Literature Review

Andragogy and the Theory of Teaching and Learning

Some of the key points of the theory that guided the construction of the Knowledge Circle, as it was structured at the end of the year, are briefly presented to contextualize the research effort on andragogy and theories of teaching and learning.

Bellan (2018, p. 17) notes that, according to Knowles' perspective on pedagogy, the science that studies how to teach children, "the teacher decides what will be taught to the students, how this content will be addressed, and determines how to assess whether the content has been learned." In contrast, andragogy positions the adult as the subject of education, not its object. Adults expect to have responsibilities and to direct their own learning.

Adults prefer to learn in order to solve problems and face challenges rather than simply mastering a subject. The idea of spending hours, months, or years studying before reaching a goal doesn't appeal to most adults. It seems like a waste of time to them. (BELLAN, 2018, p. 23)

Balzan (2014) and Bellan (2018) argue that educational research should contribute to new alternatives for teaching methods, given that education professionals advocate for innovations but often end up using traditional methods in the classroom. Emphasizing the importance of didactic improvement in higher education, Brum and Schumacher (2012) highlight the significance of actions in the classroom to prioritize meaningful learning over mechanical learning. Additionally, Lüdke (2014, p. 82) adds that research in the field of education and didactics should explore new methodologies, stating that research in this field is scarce, "even in countries where educational research activity is more intense." Tavolaro (2019) underscores that teaching practice, especially for adults, often becomes a mere repetition of the teaching and learning processes that the educator experienced. This is further complicated because, in many cases, the educator's experience as a student occurred some time ago, with technologies and resources vastly different from those available today.

Teaching for adults should focus more on the process than on the content because adults, first and foremost, want to understand the reasons behind learning something and need to know that the learning will help them solve their problems, preferably immediate ones. The author, concerned with how students assimilate information, found in the studied sample that learning retention occurs: 50% from what they see and hear, 70% from what they discuss with others, and 90% from what they say as they do it (Bellan, 2018). De Oliveira (1990) asserts that adult learners, after mastering a subject, should demonstrate in some way that they have a command of the material.

Andragogy delineates some key points to maximize the possibility of adult learning, namely: (1) presenting the student with content or activities that they perceive as immediately applicable, not in the future, whether in the medium or long term; (2) after completing a learning process, adult learners need to articulate what they have learned to others; (3) whenever possible, the student should put into practice the learned content; (4) adults have the need to be self-directed (De Oliveira, 1990; Libâneo, 2017; Bellan, 2018).

Ausubel (1968) and Ferreira (2020), in discussing the teaching-learning process, introduce the concept of "subsensors": the need for prior knowledge on a subject for the student to recognize and attribute meaning to it, enabling the assimilation and structural reorganization. This conditions the student to use the acquired knowledge in their life. When subsensors are absent, Ausubel (1968) and Buchweitz (2016) recommend introductory work on the concept to create recognition for the effective realization of learning.

Carvalho and Ching (2016), reflecting on the evolution of teaching-learning methodologies, acknowledge that education remained unchanged for centuries. When educators are introduced to innovative methods, they need to understand and select them appropriately for their own

context. According to the authors, it is naive to believe that everyone can adapt to new processes in just a few years. They also mention a workshop at the Brazilian Congress on Engineering Education (Cobenge) in 2015, led by Professor Maria Weurlander, who demonstrated, with data from her research, that participatory classes result in fewer occurrences of student distractions compared to traditional classes.

Libâneo (2017) recommends a variety of teaching activities, including various types of expository lectures, student assignments that place them as protagonists, and working with smaller groups, always under the guidance of the teacher. The author also acknowledges the importance of students grappling with the subject matter using their cognitive abilities but directed and guided by the teacher to achieve learning. He believes that the confrontation between the content presented by the teacher and the concrete experience of students—what they bring from their environment, the knowledge they already possess, their expectations, and motivations—can (and should) facilitate learning.

Tavolaro (2019) and Ferreira (2020) emphasize that even the use of new tools, such as active methodologies, without context, may not yield the expected results. This context, advocated by andragogy, poses a challenge for the teacher, even in theoretical subjects, to understand how that learning could be applied in the day-to-day life and professional endeavors of adult students (Libâneo, 2017; Bellan, 2018). In his final considerations, Ferreira (2020) mentions the difficulty of implementing structured practical and motivating activities, a solution he deems crucial for university education.

Libâneo (2017) advises that the choice and organization of methods used in a class should be based on the triad "objective-content-method." He asserts that methods should be connected to the immediate objective of the class and linked to the teaching plan of the discipline. The selection of the appropriate method should consider knowledge about the students, including their assimilation capacity, age, and sociocultural and individual characteristics. He also defines methods as the sequence of activities for both the teacher and students, considering their objectives for the specific class to be planned and executed.

An interesting tool for directing the objectives of a class, guiding teaching practice, is Bloom's taxonomy, presented by Shabatura (2020), as shown in Figure 1. Depending on the student's stage of knowledge, whether in content or the competency addressed in the class to be conducted, the teacher can use Bloom to assess what they intend to achieve in terms of the student's development after the didactic activity.



Figure 1: Bloom Taxonomy. (Shabatura, 2020)

According to Masson, Miranda, Munhoz, and Castanheira (2012), the active methodology Project-Based Learning (PBL) has been not only an important practice in active methodology that demands greater commitment from students and teachers. The teacher needs to change the posture of delivering content to guiding students in their learning. Similarly, students also take on greater responsibility for their learning, characterized by a challenge where small groups actively seek the necessary knowledge to solve the proposed problem, typically divided into phases. In their study, a literature review on the active methodology Project-Based Learning, Pasqualetto, Veit, and Araujo (2017) express concern that many PBL initiatives occur without those in charge reflecting on how students learn.

Methodology

The group of teachers, authors of this article, met weekly throughout the year 2022 to discuss students' difficulties in their disciplines: Introduction to Acoustics, Applied Computing to Phonographic Production, and Applied Acoustics to Phonographic Production. In the initial phase of the project, they concluded that the main challenges were in physics and mathematics, specifically with algebra and functions, and in understanding how these concepts are related to the areas in which a phonographic producer works in their professional life. The discussions about the applications of physics and mathematics within the group were extremely interesting. Replicating a space for such debates, as experienced and supported by the teaching and learning theory presented in this article and stemming from Professor Fernandes's research project, guided the dynamics presented here.

The group understood that the topic which covered all the concepts that students found challenging and, at the same time, had a connection with the professional's daily life would be the understanding of the use of basic concepts for building a plugin. Plugins are applications and functions used by musicians, producers, and audio professionals to achieve desired effects in their compositions and music productions (Escolas de Andromeda, 2019).

The characteristics that sparked the group's interest in the dynamics experienced during the weekly meetings, grounded in the andragogical and teaching-learning theories discussed and presented here, are highlighted below:

- a) Absolutely practical nature, allowing the identification of the connection between each theoretical aspect, whether in mathematics, physics, or programming languages, and professional practice.
- b) Multidisciplinary profile, characterized by the background of each member of the teaching group: architect, computer scientist, naval engineer, physicist, musician.
- c) Fluid dynamics of conversation without academic constraints.

Therefore, it was decided to replicate this dynamic, with the possibility of student participation. This action was initially called the "Knowledge Circle" and was conducted, at the end of the pandemic, in a virtual environment, and later, in person, in the college auditorium, as seen in Figure 2.



Figure 2: Second Knowledge Circle, in-person at the college auditorium
Developed by the authors (2023)

On both occasions, the low participation of students was evident. While observing the discussion can provide learning, andragogy advocates for the active participation of adult students in the discussion. Several authors also see the need for students to actively participate for knowledge construction to be more effective. The consensus within the group was that the discussed topic was challenging for most students (mathematics, physics, and programming language). Despite the clear interest demonstrated by everyone in understanding the real-world application of concepts, students lacked the theoretical or practical foundation to actively participate in the discussion. Additionally, the crowded environment may have been intimidating for those who felt insecure about their knowledge, discouraging them from asking questions in public.

Thus, to ensure that the tool could be fully developed, similar to the experience among the group of teachers, it was decided to create an action using the PBL methodology, Project-Based Learning. This was aimed at providing students with a broader foundation, both theoretically and practically, in mathematics (functions and algebraic operations) and physics (acoustics and wave phenomena).

In this way, the Plugin League was created—a group that aimed to bring together students from all semesters of the phonographic production course to study one to two plugins, selected by the students themselves, who were familiar with them. The goal was to work on reverse engineering, understanding the main parameters used by the app, how they were related, and how the application could perform operations based on input data. Table 1 shows the students and their respective semesters in the course.

Course Semester	Quantity of Students
1o semester	3
2o semester	1
3o semester	4
4o semester	0
5o semester	1
6o semester	3
Total	12

Table 1: Distribution of students who started the Plugin League project in 2022
(Own elaboration)

Fundamental to the entire didactic process is understanding the objectives of the action. For this, Bloom's taxonomy was used for each phase of the PBL. Overall, the project aimed to seek the perception and understanding of learning mathematics and physics as an important resource for the professional, a phonographic producer who aims to be not only an operator of audio equipment but also capable of proposing new technologies and processes. Hence, the importance of the basic foundations brought by mathematics and physics.

The meetings, actions, and discussions of the Plugin League core can be seen in Figure 3.



Figure 3: Activities (PBL) of the Plugin League core
Developed by the authors (2023)

During the first semester of 2022, the group of teachers, to test the Knowledge Circle dynamics, found it interesting to create another core with a simpler and more playful theme, according to the perspective of the students themselves. Thus, the Events League core was created to also conduct a PBL and, in the end, hold the Knowledge Circle. This core was responsible for celebrating Halloween at the college, working on concepts such as projects, teamwork, sound engineering, media, among others. As the central organizing team was small, students had to invite more from other courses to help, totaling 20 students in addition to the 6 in the core. The meetings and preparations for the event for this second core, also coordinated by the authors of this article, can be seen in Figure 4.



Figure 4: Meetings and preparation of the Events League for the college Halloween event

Results and Discussion

The PBL core, Plugin League, developed a reverse engineering project for two plugins, seeking to understand how input parameters and each user action directed the presented results. Based on this qualitative evaluation, students were invited to think about which functions could describe the observed behavior. Since it was not possible to have the original source code of the plugin, but following Bloom's taxonomy, the objectives were to understand and apply the observed behaviors, even if they did not exactly reproduce the application's result. Analyses were conducted, even by students in the early semesters, despite presenting more difficulties. This activity stimulated on-site research, peer discussions, and the search for consensus among the groups.

The evolution of the project, as expected by the authors of this article, brought significant difficulties among students due to the more arduous nature of the analyses. It was distant from the central axis of the course, which is recording music in the studio and understanding the artistic processes involving mixing and mastering operations. Thus, there was a depletion of the student group, with six out of the twelve students who started the program, justifying the initiative to create another events core.

The Knowledge Circle took place after the completion of the Plugin League's work, with the presence of 4 students and 4 teachers, lasting for two hours. For this KC, the traditional seating arrangement was preferred, as seen in Figure 5. The aim was to create a space of complete freedom of speech, allowing everyone to converse equally with the teachers without any concern for hierarchy or worries about grades and evaluations. This way, they could freely

express their opinions. At the end of the dynamics, a questionnaire was submitted to the participating students to understand some aspects of the observed dynamics.



Figure 5: Knowledge Circle of the Plugin League

Similarly, the Knowledge Circle for the Events League took place after the project's completion, which can be seen in Figure 6—the Halloween celebration organized by the Events League team, with the help of additional students invited to work as volunteers on the day of the event.



Figure 6: Halloween 2022 organized by the Events League

For the Knowledge Carousel held after the Events League, there were 6 students participating, along with 4 teachers and a former student invited to join because of extensive experience in event organization, lasting one and a half hours. The questions to assess the dynamics were the same as those applied to the students of the Plugins League, with the answers presented in table 2. It is important to note that for each question, the criterion ranged from 1.0 for the worst value to 5.0 for the highest value for each response.

Number	Question for the participating students	The average for the League of Plugins	The average for the League of Events
1	Did you feel confident in expressing your views? Or did you feel intimidated in any way to share them?	4,0	4,2
2	Do you consider that the Ciranda provided enough time for you to express your views on the project or the discussed points?	3,5	3,8
3	Did your participation in the Liga provide enough foundation to participate in a discussion on the presented topic?	3,5	4,4
4	Do you believe that the discussion improved your understanding of the topic?	4,8	4,4
5	Sobre o número de alunos participando, sua opinião é?	3,3	2,0
Média geral		3,8	3,8

Table 2: Students' responses to the questionnaires for both Leagues. (Own elaboration)

The proposal of free speech, one of the foundations of the KC, allowed students to feel reasonably comfortable expressing their ideas and points of view for the discussions proposed in the Circle. To identify this point, in the questionnaire, question 1, using the Likert scale, where 1.0 would be very uncomfortable, and 5.0 would be very comfortable, the average responses of the students were 4.0 (comfortable) for the Plugin League and 3.8 for the Events League, showing that the proposed goal was achieved, but there is room for improvement in the process.

One of the variables to be measured was the available time for the activity (question 2). Both actions took place at the end of the academic period, making it difficult to coordinate the schedules of the professors and guests. Additionally, some students who participated in the leagues could not attend due to year-end exams. Thus, the scores of 3.5 and 3.8 indicate that this is an aspect to be improved. However, it is worth noting that the depth of the debate in the Plugin League was greater, with more time for speaking and discussion between some students and the professors. As for the Events League, everyone expressed their opinions but with less time available for the activity. It can be concluded that the debates could have been more thoroughly explored with additional time.

The survey also inquired about how the entire league project provided the minimum knowledge necessary to participate and discuss with the group in the Knowledge Carousel (question 3). Using the same scale (1.0 to 5.0, where 1.0 would be no foundation to more than sufficient foundation), the average responses from the students were 3.5 (from reasonable to sufficient)

for the Plugin League. This result was significantly lower than the score for the Events League, as expected due to the historical recognition of the difficulty of the treated theme and the higher dropout rate of students from the first league compared to the second.

Regarding the effectiveness of the Knowledge Carousel dynamic in the learning process, question 4 (using the same 1 to 5 scale) yielded an average response of 4.75 (from quite to yes, it was amazing) for the Plugin League. This point deserves special attention as it is the central objective of the project described in this article—creating a space to provide a real learning environment for a historically difficult and challenging topic, as assessed by students throughout the course. The PBL project, structured with a practical theme addressing concepts considered very complicated, brought tangible learning, even with the presence of students from all semesters of the course. For the Events League, the result was satisfactory, with room for improvement, especially since it had less real-time available.

Another point of assessment for the dynamic was the number of participants, addressed in question 5. Possible responses ranged from 1.0 (It was very few; if there were more, other students could benefit) to 5.0 (It was excellent; more students could have been disruptive). The average was 3.25 for the Plugin League. One student gave a score of 1.0 and justified it as follows: "The number of students was low, but due to the lack of interest of students in attending the League meetings, which I think is nonsense because it was a very good opportunity." Slightly above the average value, contrary to the initial expectation that they might find few students, it was understood that for a deeper discussion, as occurred, a room with more people would have limited the depth and space for each to speak. It is worth noting that in few moments of academic life, it is possible to have a discussion, after a long period of study in a project, with few students and several professors, in a 1:1 relationship. It is known that it is not feasible on a large scale due to time constraints on the part of teachers, but it became evident that it was a very rich space in terms of learning for the students who participated until the end. For the Events League, the score was even lower (2.0), which ends up being a contradiction since there was a limitation of discussions due to the shorter available time. Further dynamics need to be carried out to explore this issue more thoroughly.

In the open space for considerations about future Cirandas, the following comment from a student stands out: "I think it would be really cool if other teachers did this in their subjects too because it would help a lot with studies and mainly encourage people to participate in other Cirandas; it's a unique experience." Two main types of student behaviors can also be highlighted: participation in discussions to a greater or lesser extent and, in some cases, silence. For students who remained silent for much of the time, a question was asked about the effectiveness of the dynamic, and the feedback was that they felt able to follow and understand everything that was being discussed, even with the high level of discussion, especially for a topic that was much, much above the student's knowledge level at the beginning of the project, giving the student a great sense of satisfaction.

Conclusion

The experiences reported here from the Circle of Knowledge dynamics were based on the pillars of andragogy: (1) preparing didactic activities to bring them closer to professional practice; (2) having adult learners apply knowledge in practice using the active methodology PBL; (3) providing a space for organized speech and discussion to elevate the level of discussion with more teachers and guests present; (4) creating a space for free speech without pressure for grades or evaluations. Regarding the two presented actions, some points proved

interesting in the methodology, meeting the adult learner's learning process. The PBL methodology was important for developing the knowledge necessary to enable students to discuss among peers, teachers, and guests. Creating a pressure-free environment facilitated student exposure, but it was still observed that some students remained silent for most of the activity. For future Circle of Knowledge dynamics, it is recommended to (a) hold them slightly before final exams to allow the participation of all students, as they may be overshadowed by a more challenging exam since they do not count for grades, (b) find a way to enable more reserved students to express themselves without fear, (c) evaluate the average speaking time of each participant, and (d) consider the number of participants, which is directly related to point (c). Based on the results, the Circle of Knowledge activity is considered an important tool to be used in PBL projects.

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Participation of Families in Inclusive Education in the First Cycle of Basic Education: A Systematic Review

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Abstract

Family participation in school has proven to benefit a child's self-esteem, equality in inclusive education, and a more enriching and equitable educational environment. The present study aims to deepen the understanding of the participation of families in the process of Inclusive Education in the first cycle of Basic Education, intending to conceptualize participation, involvement, and the barriers and facilitators of this process. Based on a Systematic Literature Review methodology, a search was conducted in the Scopus and ERIC databases using the keywords: participation, school, family, and inclusion. The eligible criteria for the inclusion of studies were articles or book chapters (blogs, whole books and abstracts were excluded); open access; published between 2017 and 2022; written in Portuguese, Spanish or English; addressing the points of Inclusion Education, family, participation, involvement, and school. The selected studies were analyzed according to the PRISMA Statement. Studies showed that family participation is essential for school success and the inclusion process to facilitate children's cognitive, and socio-emotional development. To encourage collaboration and participation of families in inclusive education processes, teachers promote extracurricular activities and interaction, create inclusive spaces, and seek resources that foster participation. Inclusion is more successful when there is good communication between family and school. Among the barriers hindering this participation are: prejudice, socioeconomic difficulties, lack of time and family interest, lack of communication and the perception of the education profession.

Keywords: Inclusive Education, Family, Inclusion, Participation, Special Educational Needs (SEN)

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Introduction

Inclusive education (IE) is a process that aims to ensure the right to education for all individuals, regardless of their diversities, disabilities, or socioeconomic and cultural disadvantages. As Ainscow and Miles (2009, p.1) point out, IE aims “to eliminate social exclusion, which is a consequence of attitudes and responses to diversity of race, social class, ethnicity, religion, gender and ability”. Therefore, the goal of IE extends beyond school inclusion and encompasses the social inclusion of every person, promoting their overall development and the development of society as a whole. Implementing interventions that focus on individuals' and groups' life projects is essential, allowing for their development within the school and the social context (DGCS, 2015). In addition to providing equal access and participation, schools should provide educational opportunities that enable all students to realize their full potential and become valuable about the importance of this partnership (Arce, 2019; Odongo, 2018).

Over the last few years, several studies have shown the importance of family participation in IE projects. Family participation is one of the fundamental dimensions that enrich the student's school and social experience. Besides establishing a strong and positive relationship between school and family (Bellido-Calla, 2021; Sousa & Pereira, 2014), this relationship is also associated with equal communication values (Garcia & Rios, 2014).

Family participation refers to the multidirectional interaction and communication between the school and the family, to support family members both socially and emotionally, teaching them the necessary skills and contributing to children's development in various ways (Kahraman, 2018). Family participation is essential for improving school cultures, policies, and practices. Family participation in the educational environment helps develop children's self-esteem, improves school performance, and develops positive attitudes towards other families (Gondoya, Navasa & Duchia, 2020).

In addition, family participation entails the involvement of families in the planning, implementation, and evaluation of their children's education in collaboration with educators and other stakeholders. It is based on the recognition that families are essential partners in their children's education and have a unique understanding of their needs and strengths (Arce, 2019). This participation in school becomes more relevant in IE, fundamentally linked to social equity, justice and freedom, central components of democratic societies (Stavroussia, Didaskaloua & Green, 2021).

The United Nations Convention on the Rights of Persons with Disabilities (2006) recognizes that families are the primary caregivers of children with disabilities and that they have the right to participate in their children's education. UNESCO (2009, p.15) defends "the participation of families in all aspects of their children's education, including planning, implementation, and evaluation."

IE represented a radical change in the way we think about education, not only concerning students with some difficulty or Special Educational Needs (SEN), but to everyone. This includes not only the school as an institution for teaching and sharing knowledge, but also the families, as it is in this context that children develop their concept of diversity. So, supporting and including families is one of the responsibilities of the inclusive school (Doménech & Moliner, 2014).

Families can provide important information to facilitate the work of education professionals. Therefore, establishing constant contact between the family and the school is of great interest. Family-school relationship requires effective communication and a high level of educational involvement, which allows for positive results in the child's learning (Bagceli, 2018). Moreover, connecting school and family builds a solid relationship between the two environments, promoting trust, mutual knowledge and information exchange, providing opportunities and developing new skills. It is important to emphasize that a child's first social and cognitive learning takes place in the family context, being the first school of human and social values of relationship and coexistence (Acre, 2019; Gondoya, Navasa & Duchia, 2020).

Families can play an essential role in school meetings, activities and projects. However, family participation should go beyond attending meetings, activities, or school groups. School leaders must ensure that families have an active voice, more effective participation and establish a cooperative partnership (Erol & Turhan, 2018).

On the other hand, school is seen as a place of learning and socialization, so the close relationship between family and school is essential. In this way, family participation is important in the educational process of their children and, consequently, to the establishment of harmonious relationships and promoting the interconnection between both (Bellido-Cala, 2021).

This systematic literature review presents studies that describe family participation in IE. We also aim to analyze which barriers and facilitators education professionals identify in implementing inclusion, and to what extent, and how, family participation in IE can be promoted. We also intend to discuss the concept of participation and IE, understand the barriers/benefits to those processes, and identify facilitators of good practices in IE.

Methodology

Despite the increasing recognition of the importance of IE, there is still limited scientific literature on strategies to promote family participation in this process. This literature review aims to fill this gap by providing a deeper understanding of family participation in the context of primary education. The review seeks to identify barriers, benefits, and examples of good practice in this setting.

Based on the literature review findings, this study aims also to develop family participation strategies specifically tailored to the context of the first cycle of basic education. These recommendations aim to fill the literature gap and provide practical tools for effectively promoting inclusion in school projects in Portugal and Brazil.

The project team searched the Scopus and Education Resources Information Centre (ERIC) databases using the keywords listed in Table 1. The selection criteria for the studies were as follows: (i) articles or book chapters (excluding blogs, full books, and abstracts); (ii) open-access articles/book chapters; (iii) published between 2017 and 2022; (iv) written in Portuguese, Spanish, or English; (v) addressing the topics of inclusive education, family, participation, involvement, and school (Table 1). The research also conducted searches in English, Portuguese, and Spanish. However, keyword combinations were only searched in English. The article survey was carried out between September and October 2022.

Involvement (AND) school (AND) inclusion (AND) family
participation (AND) parents (AND) inclusive (AND) school
education (AND) family (AND) inclusive (AND) school,
participation (AND) inclusion (AND) school (AND) family
involvement (AND) family (AND) school (AND) inclusion
inclusion (AND) involvement (AND) family (AND) school.

Table 1: Search string in English.

The researchers defined the following inclusion criteria: i) addressing the concept of participation; ii) discussing the school-family relationship in IE; iii) examining facilitators for family participation; iv) identifying barriers to or benefits of family participation.

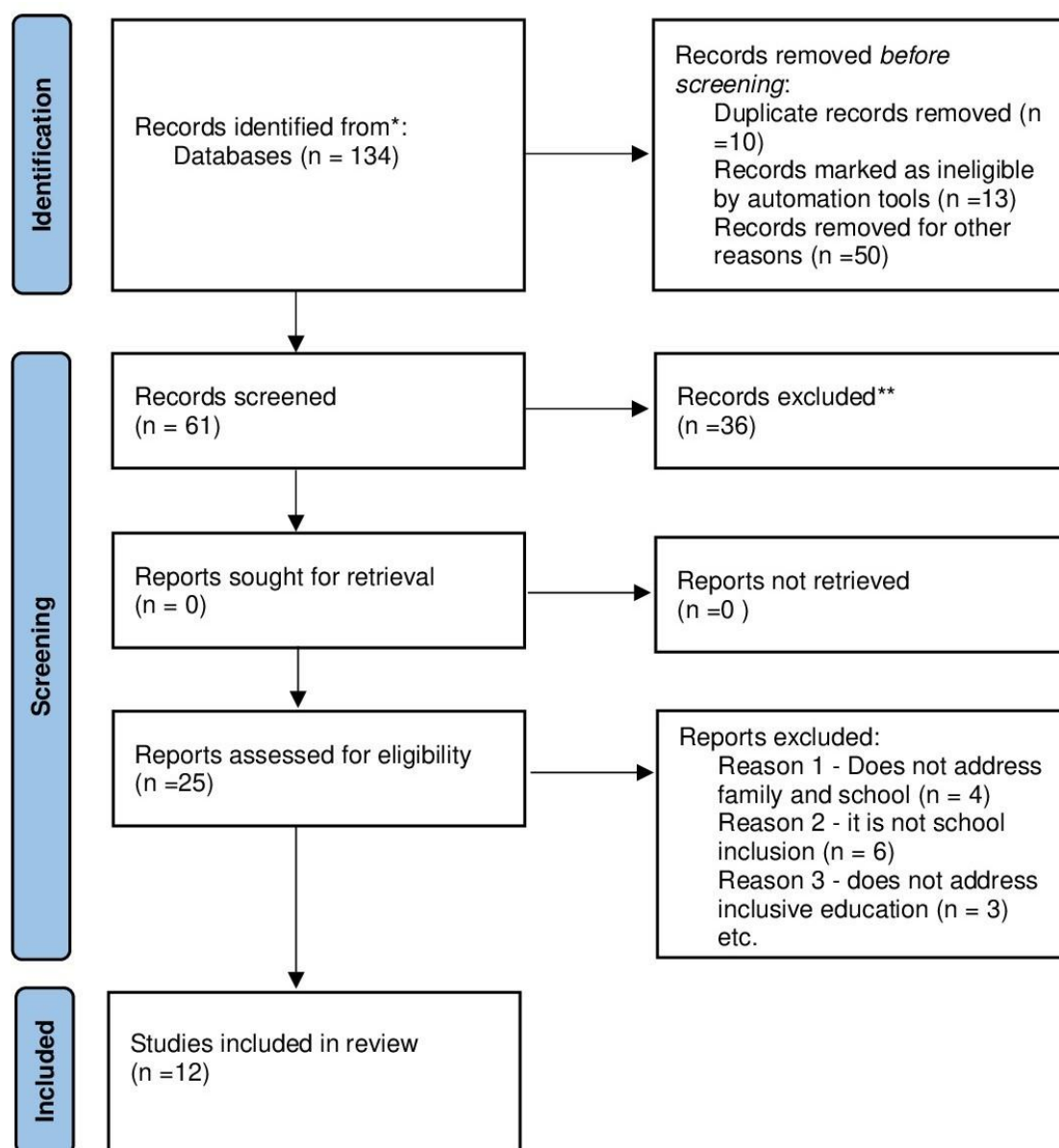


Figure 1: Flow diagram showing the decision process that led to included studies.

A total of 134 titles were retrieved (76 from the Scopus database and 58 from ERIC). After removing duplicates, title and abstract screening, we could identify 61 studies potentially relevant to the topic. The full-text screening of such articles led to excluding 36 studies that did not match the inclusion criteria. The remaining 12 articles were comprehensively read, analyzing their objectives, methodology, and results.

Results

Appendix 1 summarizes the 12 articles in this review, showing the following data: title, keywords, link, objectives, methodology, instruments, and main results of each study (Appendix 1: <https://doi.org/10.5281/zenodo.10028438>). Ten studies were written in English and two in Spanish.

Regarding geographical diversity, the studies were conducted in various parts of the world, particularly in countries such as Turkey (3 out of 12) and Spain (2 out of 12). Three studies were conducted on the African continent, specifically in Ghana, Kenya, and Ethiopia. Two studies were conducted in the United States of America, one in Ecuador, and one in China. Despite this geographical diversity, most articles analyzed were written in English, with two in Spanish.

The eligible studies demonstrated a predominance of qualitative methodology (4 out of 12 articles). Only two studies used documentary analysis, reports, or observations, and one employed action research as its methodology. Regarding instruments, most studies employed questionnaires (7 out of 12) and semi-structured interviews (3 out of 12).

Concerning the sample, the studies analyzed involved the participation of parents (2 out of 12), teachers (4 out of 12), and both teachers and families (5 out of 12).

Concepts of Participation

The studies define participation as a multidirectional interaction and communication between the school and the family (Assefa & Sintayehu, 2019; Kahraman, 2018). The goal is to provide social and emotional support to family members, teach them necessary skills, and contribute to children's development in various ways (Kahraman, 2018).

Active family participation is intrinsically linked to school activities and tasks, as well as to the academic success of each child. It involves how families interact with, facilitate, and contribute to their children's academic success. As Na et al., (2018) highlighted, family participation plays a crucial role in children's academic, cognitive, social, and emotional development. These authors categorize participation into four distinct types: family discussion, family supervision, communication with the school, and school involvement.

Family participation can be improved through two different approaches. The first involves activities or tasks carried out by parents at home related to their children's education, such as helping a child with homework or supervising their reading. Additionally, parents can get involved in activities at their children's school, such as participating in Parents Association programs or volunteering at the school (Appiah-Kubi & One, 2019).

Furthermore, this participation also encompasses actions such as being responsive to the child's needs, using assertive and affectionate communication, demonstrating the value of

education, participating in parent-teacher meetings, or volunteering. Therefore, family participation is not limited to the behavior and actions of families in schools but also includes partnerships and interactions with families to benefit students' learning and development (Arce, 2019).

Recent studies (Hacıibrahimoglu, 2022; Schuck, Simpson & Golloher, 2022) also highlight the importance of family participation as a significant social resource for children to cope with stress during the transition from pre-school. It is a strong and reliable determinant of school adaptation. This involvement is positively correlated with school performance and family satisfaction (Table 2).

Interestingly, one study uses the word "involvement" in the article's title (Assefa & Sintayehu, 2019); however, the authors address parents' involvement and participation in their children's education throughout the article. These authors define parental involvement as the family's collaboration in their children's educational processes and experiences, which includes activities associated with school, such as parent-teacher meetings, volunteering at school, and activities carried out at home, such as helping with homework and encouraging the child to improve performance (Assefa & Sintayehu, 2019).

Using concepts	Articles
Participation	6
Involvement	4
Participation and Involvement	2

Table 2: Using concepts.

The study by Rueda and Fernández (2018) presents a scale of family participation that consists of four levels:

- **At Level 0**, family participation is limited to receiving simple information. At this stage, families are only informed of the decisions made by the school, with little opportunity to express their own opinions. Family participation is essentially superficial, as there are no spaces, channels, or mechanisms for them to make their voices heard.
- **At Level 1**, participation involves consulting families. At this stage, families are informed and consulted, but have limited influence on decisions related to the school's actions. Therefore, family participation is mainly symbolic.
- **At Level 2**, there is a collaboration between the school and families. Families' voices are considered when planning actions, but their participation is directed by the school and guided by its objectives. In this scenario, family participation is considered partial.
- **At Level 3**, participation evolves into true school-family collaboration. At this level, the school and families act as co-responsible parties, mutually promoting and collaborating to overcome barriers and transform the school into a more inclusive environment. Families feel empowered and significantly involved. Therefore, family participation is characterized as full, representing true co-responsibility.

Benefits of Family Participation

Studies show that family participation is crucial for improving school cultures, policies, and practices promoting inclusion and enhancing children's self-esteem, performance, relationships, and development (Gondoya, Navasa & Duchia, 2020; Rueda & Fernández, 2019). The analyzed studies highlight the importance of active family participation in IE, to ensure that every student gets the necessary support to reach their full potential (Belido-Cala, 2021; Hacıbrahimoglu, 2022). This participation promotes equal opportunities, diversity, and inclusion and creates a more enriching and equitable educational environment.

It is essential to emphasize that establishing effective collaboration and communication between parents and the school positively impacts the academic success of all students (Erol & Turhan, 2018). When education professionals value family participation, they gain a crucial educational partner. Family involvement provides valuable information that enhances the work of educators, allowing a deeper understanding of students' talents, challenges, expectations, and perspectives, as well as those of their families. Thus, family participation is crucial for optimizing students' learning and performance, regardless of their SEN (Rueda & Fernández, 2019). Moreover, collaboration between the school and families ensures consistent support in various environments, such as the classroom and the home, and promotes a more unified and effective learning experience (Hacıbrahimoglu, 2022). This cooperation, with sharing information, strategies, and resources, directly benefits the development and learning of students with SEN.

Therefore, the active participation of families in IE is crucial for the academic success and well-being of students with SEN and enhances the educational experience of the entire school community. It promotes equality, inclusion, and quality of life for students, families, and education professionals while also improving the academic performance of all students, regardless of their specific needs.

Barriers

Regarding barriers to family participation in education, some studies have shown that certain schools have asymmetrical family-school relationships (Appiah-Kubi & Amoako, 2020; Bellido-Cala, 2021; Erol & Turhan, 2018). Teachers have all the professional information in these relationships, while parents are passive recipients. Consequently, communication between schools and families is often limited, maintaining a predominantly one-way flow of information (Erol & Turhan, 2018). Parents are frequently seen as helpers in occasional activities, like Halloween, rather than being regarded as equal partners in the planning and implementation of educational projects (Bellido-Cala, 2021).

This power imbalance restricts family participation, placing them in a passive role of receiving information and adjusting their behavior to meet the school's demands (Erol & Turhan, 2018). It is worth noting that this trend towards "traditional education," which grants the school unilateral power, has been consistently observed in multiple studies conducted in various world countries. Specifically, studies have been conducted in countries such as Spain, Turkey, and Kenya, highlighting the prevalence of this trend across different cultural and geographical contexts (Appiah-Kubi & Amoako, 2020; Bellido-Cala, 2021; Erol & Turhan, 2018).

Eight studies addressed families' barriers faced when engaging in their children's school activities effectively (Table 3). The main barrier highlighted is related to the financial difficulties that many families face. Acre (2019) points out that these financial difficulties can generate various inequalities, which, in turn, jeopardize families' participation in their children's education. Additionally, these families often struggle to access essential services for their children's well-being due to social stigma, poverty, and a lack of knowledge about available resources and services. These economic difficulties unconsciously hinder their children's education (Appiah-Kubi & One, 2019; Odongo, 2018).

Barriers cited	Articles	Number of citations
Socio-economic status	7	17
Autocratic leadership	3	9
Lack of communication	2	5
Prejudice stigma	3	9
Teacher Attitude	4	4
Family perceptions	2	3
School administration	1	1

Table 3: Barriers cited in the articles.

Another barrier mentioned in the three studies (Arce, 2019; Belido-Cala, 2021; Odongo, 2018) is related to implicit or explicit prejudices. These prejudices unconsciously influence school staff and parents' understanding, actions, and decisions. Odongo (2018) points out that beliefs and prejudices constitute barriers when the school, teachers, and community do not recognize the value of IE for children with SEN and when family members have low expectations about the potential of their children with disabilities. The school's administrative side and bureaucratic structure are also seen as barriers, as they can make families feel undervalued, hindering their participation (Erol & Turhan, 2018).

Appiah-Kubi and One (2020) note that families' negative perception of the school and education professionals, who are primarily responsible for their children's education, is also a significant barrier. Families may sometimes feel unwelcome or limited due to their socio-economic situation. Teachers' attitudes are also mentioned as a relevant barrier, as on certain occasions, they do not consider families valuable educational resources, do not incorporate appropriate participation activities, or do not recognize families' experiences and knowledge (Rueda & Fernandez, 2019).

Another barrier is the lack of effective communication between the school and families. Erol and Turhan (2018) point out that when analyzing the averages of the dimensions of school-family cooperation and school involvement, parents were often not sufficiently involved due to a lack of effective communication with the school. However, when it comes to inclusion, these barriers are even more intense, involving issues of equity, access to education, attitude, stigma, discrimination, taboos, and poverty. This makes it difficult for families to participate in educating their children with SEN (Odongo, 2018).

In the context of families with children with SEN, these barriers become even more pronounced. These families often rely on specialized teaching professionals to solve specific challenges. According to various studies (Schuck et al, 2022; Odongo, 2018), parents often report having to devote significantly more time to funding their children's therapies, which

considerably limits the time they can actively participate in school activities. Some parents also express concerns about undue pressure from professionals to become more involved. One parent shared, "School and therapists expect too much from parents. I have more than one child with SEN, and my husband and I both work full time to pay for therapies for all three kids!" (Schuck et al., 2022, p.214).

Another barrier for parents of children with SEN mentioned is the lack of effective communication between different professionals involved in the child's care, as well as difficulties in establishing direct communication with service providers. These communication difficulties often lead to situations where families with children with SEN feel anxious due to a lack of information, disappointed by the inadequate interventions, or find themselves alone when facing the challenges related to their children's education (Appiah-Kubi & Amoako, 2020; Chadwick & Kemp, 2002).

Participation Facilitators/Promoters

Numerous studies emphasize the importance of establishing a relationship where families are regarded as equal educational community members (Arce, 2019; Hacıbrahimoğlu, 2022; Rueda & Fernández, 2019). This enables collaborative efforts between the school and families as co-responsible parties, promoters, and collaborators in overcoming barriers and transforming the school into a more inclusive environment. As facilitators in promoting family participation, the studies highlight the following:

- i) **Valuing Diversity and Family Well-Being:** It is crucial to value and celebrate diversity, including the diversity of families, recognizing it as a valuable resource for learning. Additionally, it is essential to prevent parents from feeling insecure, undervalued, or neglected (Assefa & Sintayehu, 2019; Kahraman, 2018).
- ii) **Welcoming Environment and Sense of Community:** Ensure that all families, the school administration, and students feel welcome and foster a sense of community within the school (Rueda & Fernández, 2019).
- iii) **Accessibility to Information:** Guarantee that information about the school and the community is accessible to families, including translating important documents into the main languages of the local community and providing interpreters at family meetings if necessary (Rueda & Fernández, 2019).
- iv) **Recognizing the Strengths of Families:** Value and promote the participation of families as partners in their children's education. It is also essential to involve all educational community members in decision-making to promote equity in the school (Hacıbrahimoğlu, 2022; Kahraman, 2018).
- v) **Collaboration in Learning and Student Involvement:** Promote collaboration between professionals and families to support student success. This helps families feel welcome in the school as experts on their children, and equal partners in supporting learning and development (Gondoya, Navasa & Duchia, 2020; Hacıbrahimoğlu, 2022).
- vi) **Collaboration in School Improvement and Innovation Processes:** Encourage all educational community members to evaluate the school environment, offer suggestions,

and create joint improvement plans. This promotes distributed leadership (Erol & Turhan, 2018; Rueda & Fernández, 2019).

vii) Creating Support Networks for and between Families: Organize meetings where families can share ideas and support one another (Rueda & Fernández, 2019); Ensuring that parents' associations play a significant role in decision-making related to students and promoting IE is extremely important. This strengthens the relationship between the school and the families and empowers them to be active and influential participants in this crucial process rather than just symbolic communities (Erol & Turhan, 2018).

viii) Creating Support Networks for and between Families: Organize meetings where families can share ideas and support one another (Rueda & Fernández, 2019); Ensuring that parents' associations play a significant role in decision-making related to students and promoting IE is extremely important. This strengthens the relationship between the school and the families and empowers them to be active and influential participants in this crucial process rather than just symbolic communities (Erol & Turhan, 2018).

ix) Building Inclusive Learning Environments: Foster a collaborative relationship based on communication, trust, commitment, and equality between professionals and families. The goal is to create inclusive learning experiences for all students (Hacıbrahimoglu, 2022; Rueda & Fernández, 2019).

By promoting family participation in inclusion, education professionals can better understand students' cultural differences and act as facilitators (Appiah-Kubi & One, 2020).

Good Practices for Promoting Family Participation in Inclusive Education

The studies analyzed provide practical insights into implementing effective strategies for promoting the active participation of families in IE. These practices have proven to foster a supportive and inclusive learning environment. These practices include:

- Organizing an “Open House” day where families and future students can learn about the school's facilities and projects (Hacıbrahimoglu, 2022). This is particularly important for families of children with SEN as it allows them to address accessibility concerns and prepare their children for the new school (Odongo, 2018).
- Conducting home visits is especially beneficial for children with autism (Schuck, Simpson & Golloher, 2022). These visits help teachers understand the child's routines and assist families in creating a suitable study environment at home. Additionally, it allows the school to adapt to the needs of these children, fostering inclusivity in the classroom and playground (Odongo, 2018).
- Establishing open communication channels between school, parents, and other special education and health professionals, such as regular meetings, emails, and messaging apps. These channels facilitate the collection of parental concerns and suggestions, fostering dialogue and mutual respect (Condoya, Navaza, & Duchia, 2020; Kahraman, 2018; Na, Wang, Yang & Du, 2018).
- Encouraging family participation in school events like parties, science fairs, and extracurricular activities (Bellido-Cala, 2022; Kahraman, 2018). These events significantly

impact when promoted in partnership with the parents' associations, highlighting its importance in the school. Additionally, they provided opportunities for parents to volunteer and participate in IE.

- Providing orientation, training, and sensitization sessions for parents, addressing relevant family issues. These sessions offer resources and information on supporting learning at home, such as reading tips, math practice, and other educational activities (Erol & Turhan, 2018; Kahraman, 2018). For families of children with SEN, these sessions play a critical role in enhancing their understanding of their child's specific requirements, enabling them to overcome existing obstacles in the educational and socialization processes (Odongo, 2018; Rueda & Fernández, 2019).
- Assessing parental satisfaction and implementing improvements based on their feedback (Na, Wang, Yang & Du, 2018; Rueda & Fernández, 2019).
- Recognizing families' diverse circumstances, backgrounds, traditions, and needs and adapting educational practices and parental involvement accordingly. This approach fosters a sense of belonging and promotes a more inclusive and harmonious learning atmosphere (Appiah-Kubi & Amoako, 2020; Arce, 2019; Odongo, 2018).

Implementing these practices showcases a commitment to IE and emphasizes families' vital role in their children's educational journey. By actively involving families, schools can create an environment that supports the diverse needs of students and cultivates a sense of community and collaboration.

Conclusions

This systematic review comprehensively explains how different studies aim to promote effective family participation in IE. The research strategy employed in this study enhances our understanding of the various definitions of participation and involvement within the context of IE. It identifies barriers and facilitators, good practices, and the benefits of promoting family participation in the school environment.

Family participation in IE was found to have a positive impact on children's cognitive, social, and emotional development. Benefits include creating an inclusive educational environment and improving self-esteem, performance, relationships, and development. Effective collaboration and communication between parents and schools have been shown to enhance students' academic success.

However, the review also identifies several barriers to family participation. These barriers include financial difficulties, prejudice, administrative and bureaucratic obstacles, negative perceptions of schools and teachers, and ineffective communication between schools and families. These barriers are particularly pronounced in the context of families with children with SEN, where parents often face additional challenges in accessing resources and therapies.

Key facilitators for promoting family participation were identified: valuing family diversity and well-being, creating a welcoming environment, ensuring accessible information, recognizing family strengths, promoting collaboration and student engagement, encouraging

participation in school improvement processes, creating supportive networks, and building inclusive learning environments.

Limitations arose during the realization of this systematic review that may affect the understanding of the study. These limitations include restrictions on selecting articles that focus on empirical evidence and the limited availability of studies in free databases. Additionally, this research excluded books, master's dissertations, and doctoral thesis.

These limitations should be considered when interpreting this systematic review's results. They highlight the need for further research on family participation/parental involvement in children's learning, participation, family, inclusion, and school.

The results of this study emphasize the importance of developing strategies and resources to promote inclusion in primary schools. Despite barriers, the identified facilitators and strategies provide a roadmap for promoting family involvement in primary education. The goal is to develop a toolkit for primary school teachers to enhance parental involvement and create a more inclusive and equitable educational environment in Portugal and Brazil. These strategies will enable schools to collaborate with families in meeting the needs of children and fostering the inclusion of all students.

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Chat GPT Challenges in Higher Education Assessment Methodologies

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Abstract

We are currently experiencing one of the most challenging revolutions, the technological one, in which universities, traditionally seen as the center of innovation, have difficulty keeping up. Chat GPT (Generative Pre-Trained Transformer) is based on a language model based on deep learning, one of the branches of artificial intelligence (AI). This platform uses an algorithm based on neural networks, which allows computers to be taught to process data in a way that is “analogous” to the human brain, enabling conversations with the user by processing a large volume of data. In this context, there are several challenges that (Chat GPT) poses to higher education. We will certainly have to reinvent ourselves in teaching and assessment methodologies. We intend to carry out a reflection on the use of this technology in Higher Education in Law, seeking to understand the performance of this tool in “teaching to learn” and in the assessment of the skills that are intended to be acquired. We will take a look at the main uses of GPT Chat in Higher Education, namely as a “learning assistant”, allowing us to understand concepts and answer specific questions, helping to consolidate knowledge; as a “writing tool”, improving writing skills; as a “source of information” enhancing research and, consequently, the expansion of knowledge on a given subject; and as a “translation tool”.

Keywords: Learn, GPT Chat, Skills, University Education, Technology

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1. Introduction

The aim of this work is to alert the legal scientific community and society in general to the role of law schools in the context of globalization and the changes implemented in the last two decades. It is a provocative, opinion paper, based mostly in anecdotal experience by its authors.

The teacher's vision can no longer be anchored in the discourse of “eloquence”, closed to reality and centered on the teacher's unilateral, supposedly knowledgeable vision.

The world has changed, and the development of technology has provided and accelerated profound changes in the Higher Education landscape.

The current tools available to everyone have caused and continue to cause a change in teaching, in the way it unfolds, in teaching methodologies and, inevitably, in assessment methodologies.

The autism of Law teaching in the face of this “Copernican” revolution is somewhat frightening, which is why we believe that a reflection on the Portuguese reality would be extraordinarily timely.

We intend to highlight new ways of teaching how to learn, taking advantage of technology tools and the positive aspects they present, appealing to a critical spirit and learning focused on reality and solving problems.

The assessment must be student-centered, taking into account the various aspects of their work, their personal performance and their pace.

Universities must, naturally, adapt, restructuring their educational policies, their goals and even their logistics.

2. The Legal Education Context

2.1 The Case of Law Teaching/Learning Programs

The Legal Scholars

The traditional lecture in law teaching still plays a preponderant role in law faculties, particularly in Portuguese universities. Protagoras, not Socrates, is in fact the raw model most Law Schools faculty tend to follow, in Portugal and pretty much in most of the world (Heffernan, 1980): as Heffernan puts it, the basis of legal education is Sophistic, not Socratic. This was certainly true in the eighties, when the Heffernan's article was published and, to a too large extent, remains true to this day.

There is a strong focus of the class around the Teacher's speech. He plays the role of a speaker, rejoicing in reading the law out loud, in a rhythmic tone, alerting to its interpretative details.

Students are required to master, singularly, all the details, knowing the dominant doctrinal opinions.

The goal is to create dogmatic legal professionals who promote and perpetuate the status quo by extolling the legal minds of the past.

From this perspective, only a few will reach the level of “a great legal mind of the future” developed and improved through completing a doctorate, which will also undergo endless laudatory reviews.

These are the eternal “Old People of Restelo”. This expression intends to emphasize one of Luis de Camões' most important characters, in song IV of “*Os Lusíadas*” due to its symbolism. For the Poet it means the demonstration against the expedition of Portuguese ships to India, the implementation of Portuguese expansionist policy – the symbol of pessimism. Currently, this expression, and in the context in question, reflects resistance to change.

The traditional method is also known as expository or lecture (Sophistic we would say), focusing the learning process on the Teacher. The latter is recognized as having an active role, in the capacity of speaker/lecturer, while its recipients appear as passive agents, participating, sporadically, in what would be a dialogue, but which presents itself as a monologue. This type of class does not take into account student participation, nor their characteristics in the learning process, nor their knowledge and/or skills, and does not contribute to the teaching/learning that the Bologna process implemented, centered above all on the student (Mimoso et al., 2018). This method is used to “teach” in amphitheaters with a large number of students, beneficial for institutions, as it does not require large didactic investments. Students are expected to become followers of a chosen star or demi-god, in waiting for their turn to become, hopefully, stars and demi-gods when their time comes. This is the culture rooted in legal courses for centuries, if not millennia (Protagoras lived and worked during the 5th century BC), (Curd, 2007) and, although some denouncing and repudiation, reality shows that little has really changed in the Kingdom of Denmark.

We are currently witnessing a struggle for a paradigm shift, seeking to implement an understanding of the legal world based on reality, exalting rational and critical thinking. The agents of change are Type 2 Legal Scholars (Table below). Seen as radicals, outsiders, or “dissidents”, questioning the system, dogmas, the law, in short, almost everything, in fact by their Type 1 Sophistic colleagues, they use the Socratic teaching method, aiming to stimulate critical thinking in students, future legal professionals, cultivating the interpretation and application of Law in accordance with the canons of social reality and its evolution.

Table 1: The case of Law teaching/learning programs. (The Legal Scholars [anecdotal])

Type	Preferred Teaching method	Preferred Assessment method
Type 1	Magister dixit, authority style lectures	Written exams and Viva voce
Type 2	Socratic method and case study	Written papers and participation

The revolution brought about by the Bologna process, and the model centered on student learning, naturally led to a change in teaching methodologies, aiming to overcome the traditional methodology, known as expository.

Methodologies are called for that focus on the promotion and development of learning, appealing to student participation, confronting them with real issues. This will necessarily have

repercussions on the assessment models implemented, seeking to ensure that they consider the student's journey, their development, that assessment is not limited to a single moment, disintegrated from any real, dialoguing contact, between teacher/student (Borrallho, n/a).

2.2 What are the Objectives of Teaching/Learning Law?

Globalization required Universities to rethink their role in the education landscape. Law faculties did not escape this restructuring. These must be able, through their agents, to meet the ever-increasing demands of society.

Legal education plays a fundamental role in raising social awareness of certain realities. We speak, in particular, of respect for elementary principles of social justice.

It is necessary to provide future legal professionals with operative capacity, whether in the field of substantive law, as a set of norms that regulate legal facts, events, or in the procedural domain, with this regard to the principles and norms that regulate judicial procedures, the activity of the courts.

In short, the aim is for the student to acquire knowledge and understanding of substantive and procedural law and the national, international and transnational institutions that develop and apply Law.

It is crucial that the Law student, future professional, is able to link legal facts with the consequence that the Law establishes for the situation, also taking as a reference the positions of doctrine and jurisprudence.

The legal agent must know how to interpret the facts and qualify them from the perspective of positive law, as legal norms in force at a given time and place or even according to flexible law (soft law).

The training of legal professionals must also seek to develop the values and responsibilities specific to the professional community. This will involve respect for diversity and inclusion, social and corporate responsibility, interpersonal relationships and the implementation of ethical values.

Only in this way can the acquisition of professional skills be achieved, going through the vectors of legal and factual research, communication, presentation and problem solving.

2.3 What are the Objectives of Teaching/Learning Law (The Portuguese/Southern European Way)

The Degree in Law aims to provide the Graduate with a broad and robust theoretical base, which allows him to identify and understand the principles that inform the legal system of a Rule of Law, without neglecting the acquisition of the skills necessary for the practical application of the theoretical knowledge taught.

Hence, the essential objectives focus on developing the student's ability and argumentative power, cultivating a critical spirit, regarding legislation, doctrine and jurisprudence.

To respond to the growing specialization of the job market and the challenges of new branches of Law, the Graduate will be able to successfully continue subsequent professional legal training, to be developed in a 2nd cycle, as well as acquire specific skills in specialized training. (University of Harvard, Harvard Law School, 2023-2024 Handbook of Academic Policies)

2.4 Short Version of the Objectives of Teaching/Learning Law

(Based on University of Washington School of Law, Law program aims and objectives).

The graduate will be able to:

1. *Legal Reasoning*
Reach a solution to a dispute, through the application of standards, without neglecting the necessary reasons and justification.
2. *Legal Research*
Develop legal arguments. The objective of legal research is to find support for a given legal question or decision, going beyond the blind application of the law, anchored in the traditional legal syllogism.
3. *Written Communication*
Know how to prepare a written document, be it a procedural document, a contract or a simple letter to a client. Clarity, synthesis and assertiveness must be a hallmark of legal culture when conveyed to reality.
4. *Oral Communication*
Express yourself through legal language, seeking clarity, coherence and objectivity of expression, as you will communicate with others who do not have legal knowledge, nor master the language of Law.
5. *Problem Solving*
Be able to solve the questions asked through the models acquired throughout the training. Such instruments will facilitate the search for solutions, including structuring the strategy to be adopted in favor of a result that is desired to be achieved.
6. *Ethical Conduct*
Guarantee the dignity of the legal profession, observing individual, social and professional ethical and moral duties towards society and, especially, towards those who seek it.
7. *Collaborate Effectively*
Possess social and human skills, communication and relationships with others.
8. *Contextualize Law*
Have a global perception of the Law, as the application of Law requires this global knowledge and understanding.

Law schools must reflect and re-analyze their curricula in order to open up to other areas of knowledge, given the multidisciplinary nature that Law encompasses, as a normative and regulatory system of social conduct.

2.5 What are the Objectives of Teaching/Learning Law (The Portuguese/Southern European Way)

The Degree in Law aims to provide the Graduate with a broad and robust theoretical basis that allows him to identify and understand the principles that inform the legal system of a Rule of Law, without neglecting the acquisition of the skills necessary for the practical application of the theoretical knowledge taught.

Graduates from Universidade Portucalense will be able to exercise, with competence and ethics, any of the professional opportunities in which legal training is relevant.

The scientific and technical quality of the legal training offered will allow the Graduate to achieve a competitive position in the job market.

To respond to the increasing specialization of the job market and the challenges of new branches of Law, the Graduate will be able to successfully continue subsequent professional legal training, to be developed in the 2nd cycle, as well as acquiring specific skills in specialized training.¹

3. Artificial Intelligence, Present and Si-Fi (Courtesy of ChatGPT)

3.1 Artificial Intelligence Concept

Simulation of Human Intelligence in Computer Systems

Narrow or Weak AI: performs specific tasks or solve problems. It operates within a limited domain and doesn't possess general intelligence or consciousness.

General or Strong AI: General AI refers to a theoretical form of AI that possesses human-like intelligence and can perform a wide variety of tasks that a human being can do. It will possess consciousness. This level of AI has not been achieved yet, and it remains a subject of ongoing research and speculation. (CHat GPT)

Artificial Intelligence Fundamental Concept

"Neural computing" typically refers to the field of neural networks and artificial neural networks, which are a fundamental concept within the broader field of artificial intelligence and machine learning. Neural networks are computational models inspired by the structure and functioning of the human brain. They are composed of interconnected nodes, or "neurons," organized in layers. Neural computing is a subset of AI and machine learning that focuses on these neural network models. Here are some key aspects of neural computing:

¹ Universidade Portucalense. www.upt.pt

Neurons: In artificial neural networks, each neuron is a mathematical function that takes input data, applies weights and biases to it, and produces an output. These artificial neurons are loosely inspired by the biological neurons in the human brain.

Layers: Neural networks typically consist of multiple layers of neurons. The first layer is the input layer, where data is fed into the network. The intermediate layers are called hidden layers, and the final layer is the output layer, which produces the network's predictions or classifications.

Activation Functions: Activation functions introduce non-linearity into the network, allowing it to model complex relationships in data. Common activation functions include sigmoid, ReLU (Rectified Linear Unit), and tanh (hyperbolic tangent).

Training: Neural networks learn from data through a process called training. During training, the network adjusts its weights and biases based on the error between its predictions and the actual target values. Techniques like backpropagation and gradient descent are commonly used for this purpose.

Deep Learning: Neural networks with multiple hidden layers are referred to as deep neural networks, and the field that focuses on them is called deep learning. Deep learning has been particularly successful in tasks such as image recognition, natural language processing, and reinforcement learning.

Applications: Neural computing has found applications in a wide range of fields, including computer vision, speech recognition, natural language processing, recommendation systems, autonomous vehicles, and many more. Neural networks have achieved state-of-the-art results in numerous AI tasks.

Neuroscience Inspiration: While artificial neural networks are inspired by the brain's structure, they are highly simplified models. Advances in neural computing often draw inspiration from neuroscience, but they don't fully replicate biological processes.

(CHat GPT)

3.2 Artificial Intelligence Techniques and Approaches

Machine Learning: A subset of AI that involves training algorithms on data to improve their performance. This includes supervised learning, unsupervised learning, and reinforcement learning.

Deep Learning: A subset of machine learning that uses neural networks with multiple layers to analyse and process data, particularly useful for tasks like image and speech recognition.

Natural Language Processing (NLP): The field of AI that focuses on enabling machines to understand, interpret, and generate human language. NLP is used in chatbots, language translation, and sentiment analysis.

Computer Vision: The application of AI and deep learning to process and interpret visual information from images and videos, allowing machines to "see" and understand the visual world.

(CHat GPT)

3.3 General Artificial Intelligence Hardware Requirements (An Educated Guess by Chatgpt)

Processing Power: AGI would require massively parallel processing capabilities to handle complex computations and deep learning tasks. This might involve custom-designed hardware optimized for AI workloads, such as advanced GPUs or TPUs (Tensor Processing Units).

Memory: AGI systems would need a vast amount of memory to store knowledge, models, and data. This could involve large-scale RAM and storage solutions.

Data Storage: AGI would need access to extensive datasets for learning and knowledge acquisition. High-capacity, high-speed storage solutions would be essential.

Connectivity: AGI would benefit from high-speed internet connectivity to access and exchange information with other AI systems and databases globally.

Energy Efficiency: Considering the immense computational demands of AGI, energy-efficient hardware solutions would be crucial to make such systems practical and sustainable.

Parallelism: AGI systems may require the ability to process information in parallel across a vast number of cores or nodes to simulate human-like cognitive processes effectively.

3.4 Disruptive Computing Technologies Being Researched

Quantum Computing: Quantum computing holds the promise of solving complex problems exponentially faster than classical computers. Researchers are working on building more stable and scalable quantum hardware and developing quantum algorithms for applications in cryptography, optimization, and material science.

Neuromorphic Computing: Neuromorphic computing seeks to mimic the architecture and function of the human brain in hardware. This technology has the potential to revolutionize AI and machine learning by enabling more energy-efficient and brain-like processing.

Photonic Computing: Photonic or optical computing leverages light instead of electrical signals for computation. It has the potential to dramatically increase processing speed and reduce energy consumption, especially in data centers and high-performance computing.

DNA Data Storage: Research into DNA-based data storage is ongoing. DNA molecules can store vast amounts of data in a compact and durable form, potentially addressing long-term data storage challenges.

3.5 Expected Impact of Disruptive Computing Technologies in General AI

Acceleration of Research: Advanced computing technologies, such as quantum computing and high-performance AI accelerators, can speed up the training and development of complex AGI models. This acceleration can lead to faster progress in AGI research.

Enhanced Model Training: Quantum computing's ability to handle complex mathematical operations and simulations may enable the training of larger and more sophisticated AGI models. This could result in AGI systems with improved cognitive abilities.

Improved Neural Network Architectures: Neuromorphic computing, which mimics the brain's architecture, could inspire more biologically inspired neural network architectures. These architectures might better capture the complexity of human cognition and lead to more human-like AGI.

Real-time Processing: Edge computing and photonic computing can provide real-time processing capabilities, allowing AGI systems to make decisions and adapt to their environments with minimal latency. This is crucial for applications like autonomous vehicles and robotics.

Data Efficiency: Advanced computing technologies can enable AGI models to process and learn from data more efficiently, potentially reducing the need for massive datasets and accelerating learning and adaptation.

Security and Privacy: Blockchain and quantum-resistant cryptography can enhance the security and privacy of AGI systems. These technologies can protect AGI models from adversarial attacks and ensure data privacy.

Energy Efficiency: Energy-efficient computing technologies, such as graphene-based components and neuromorphic hardware, can reduce the energy consumption of AGI systems, making them more sustainable and practical.

Scalability: Scalable quantum computing and distributed ledger technologies can support AGI systems that can grow and adapt to handle increasing complexity and scale.

Interconnectivity: 5G, 6G, and quantum internet technologies can provide AGI systems with high-speed, low-latency communication capabilities, enabling collaboration and information exchange across a network of AGI agents.

Biological Inspiration: Research into bio-inspired computing, including DNA-based computing and cellular automata, can provide insights into new AGI models that take inspiration from natural biological processes.

3.6 Back to Reality: Legal Professions Tasks Most Affected by Narrow (Weak) IA

Legal Research: AI-powered legal research tools, such as Westlaw and LexisNexis, can quickly search and analyze vast databases of legal documents, statutes, case law, and regulations. This assists legal professionals in finding relevant precedents and legal information efficiently.

Document Review: AI-based document review platforms use natural language processing (NLP) and machine learning algorithms to review and categorize documents for relevance to legal cases, significantly reducing the time and effort required for manual document review.

Contract Analysis: AI can extract key information from contracts and legal agreements, flagging important clauses, dates, obligations, and potential risks. This is valuable for due diligence, compliance, and contract management.

Legal Writing Assistance: AI-powered writing assistants help lawyers and legal professionals draft legal documents, such as contracts, briefs, and legal memos. These tools can check for grammar, style, and legal writing conventions.

Predictive Analytics: AI can be used to predict case outcomes and assess the probability of success in litigation. Legal professionals can make more informed decisions based on data-driven insights.

E-Discovery: AI-driven e-discovery platforms can quickly identify and extract electronically stored information (ESI) relevant to legal cases, reducing the time and cost associated with e-discovery processes.

Due Diligence: AI can assist in due diligence investigations for mergers and acquisitions by analyzing financial documents, corporate records, and other data sources to identify potential risks and opportunities.

Legal Analytics: AI-powered legal analytics tools can help lawyers and law firms track case law trends, judge rulings, and litigation strategies to inform legal strategies and decisions.

Intellectual Property (IP) Management: AI is used in IP law to automate patent searches, trademark monitoring, and copyright enforcement, helping legal professionals protect intellectual property.

Legal Chatbots: Chatbots and virtual assistants can provide answers to frequently asked legal questions, assist with intake forms, and offer basic legal guidance to clients and the public.

Compliance and Regulatory Analysis: AI can assist in monitoring changes in regulations, identifying compliance issues, and providing guidance on adhering to evolving legal requirements.

Legal Market Research: Legal professionals can use AI to gather market intelligence, analyze competitors, and assess potential opportunities for their practice areas.

Mediation and Alternative Dispute Resolution (ADR): AI-powered tools can help streamline dispute resolution processes, facilitating negotiation and settlement in legal disputes.

Legal Education: AI can enhance legal education through virtual simulations, automated grading, and personalized learning tools.

4. Where Two Worlds Collide

4.1 The Teaching/Learning of Law

In traditional Law teaching, two discourses are intertwined: legal hegemony and conservative pedagogical discourse.

This conservative approach implies for the student a high absorption of information, concentrated on collecting notes in Magister dixit classes, a predisposition towards the cult of memorization, motivating student passivity, with a total absence of critical spirit, nurturing absolute respect for the sources (unquestionable).

It also reveals a lack of articulation between theory and practice. Even though there are practical classes, these are limited to the application of the knowledge acquired in theoretical classes to purely academic practical cases, often out of step with practical (social) reality.

Traditional, conservative teaching is based on the individualistic rationalism with which the Magister dixit is imbued, with a strong focus on speculation/investigation, predominantly theoretical, with a total absence of problematization of reality.

In this way, “cultural agency” combined with pedagogical authority is emphasized (Hagino, 2017).

4.2 Narrow AI and Teaching/Learning Law

As stated, artificial intelligence concerns computing systems that perform tasks, which usually require human knowledge.

The learning process in higher education can currently be challenging, thanks to the advancement of technology, especially artificial intelligence (AI), making it possible to create more interesting and appealing content for students.

AI already plays an important role in personalizing content as it caters to students’ individual needs.

Through the use of algorithms, artificial intelligence can capture information about the student's learning level, weaknesses, interests and likes. AI can, in this way, personalize materials, making them more attractive to each student.

AI through virtual reality and augmented reality technologies will provide experiences, respectively in a fictional and mixed environment. In the latter, augmented reality takes as a basis the material environment and combines it with virtual elements to create a mixed reality (e.g. video game):

Technologies linked to teaching will allow students to explore complex situations from a practical and visually attractive perspective. This will undoubtedly spark greater interest and dynamism in the learning process.

AI also uses “educational chatbots” allowing certain content to become more appealing. Such virtual assistants can identify questions and provide accurate and objective answers. Immediate and personalized interaction will facilitate access to content, facilitating learning.

It is important to explore the full potential of AI in a learning environment, which will contribute to greater student training.

Such a relationship requires proficiency in “knowing how to ask” and will be useful for the Law student to develop legal reasoning, carry out legal research, improve written and oral communication, facilitating a preview of problem solutions and a better contextualization of Law.

4.3 Chat GPT Challenges in Higher Education Assessment Methodologies

With AI, nothing will be the same in the learning process, whether in terms of teaching methodologies or assessment methodologies.

Access to technology, the personalization operated, will certainly contribute to the evolution of teaching and learning.

The application of artificial intelligence and the Chat GPT model in education is a growing and promising trend with the potential to significantly transform how we teach and learn.

The Chat GPT model, in particular, has stood out for its ability to understand and produce natural language, facilitating interaction with users.

There are countless benefits that can be observed through the use of this type of technology in education.

However, in addition to the benefits already highlighted, there are a series of challenges and ethical and technical issues that must be considered before the wide application of this type of tool in school organizations and other educational institutions.

Furthermore, it is essential that technology is seen as a tool to complement and improve teaching and learning.

However, a concerted effort is needed to ensure that technology is used ethically, responsibly, and accessible to all students.

5. Conclusions

On the positive side:

- The use of technologies can provide access to a large amount of information and educational resources, which can enrich the teaching and learning process.
- The use of interactive technologies can make classes more dynamic and engaging, increasing student involvement and participation.
- Technologies can be used to personalize learning, allowing students to learn at their own pace and learning style.
- Technologies can be used to stimulate students' creativity and innovation, allowing them to create projects and work using different digital resources and tools.
- Technologies can be used to promote collaborative learning, allowing students to work as a team and share ideas and resources to achieve a common goal.

On the negative side:

- Excessive dependence on technologies can hinder the development of skills and competencies that are important for the learning process, e.g., reading, writing and oral communication.
- Excessive use of technology can lead to a reduction in human contact and social isolation, which can have a negative impact on students' social and emotional development.

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Revealing History Through Design: An Exploration of Pedagogy in Projects Rooted in Reconciliation and Remembrance

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Abstract

A broader historical narrative of the colonization of the southern United States is being told by historians such as Ric Murphy who in his book “The Arrival of the First Africans in Virginia”, aims to recognize them and to “... ensure that their contributions and legacy no longer remain unknown in American History.” At the geographical seam between the North and South, Virginia is currently reconciling its history through writing and research but also through design. Design projects at Virginia universities such as The Hearth at the College of William & Mary, and the Memorial to Enslaved Laborers at The University of Virginia have presented a vehicle for communities to discuss and reflect upon the uncovering and celebrating of hidden histories of people and place. Students have been at the core of these initiatives. Through ongoing research, this sensitive but important issue is explored through the eyes of educators and design students who share a robust commitment to move beyond mere building into the realm of history and humanities. Reconciliation and remembrance may be both an emotionally laden theme for design students, and a catalyst for moments of revelation, or a newly realized self-awareness that brings a sense of peace, or even perhaps – joy.

Keywords: Empathic Design, Community-Based Design, Reconciliation and Remembrance

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Introduction

Two completed reconciliation and remembrance projects – the Memorial to Enslaved Laborers at the University of Virginia and the Hearth at the College of William & Mary – serve as examples of how design can be a catalyst for the unveiling of hidden histories. They also tell a story of essential student engagement, providing design students an opportunity to learn a methodology rooted in an empathic and community-engaged design approach.

Much has been documented about the details of the projects in the form of articles, videos, and public presentations. Although it is important to re-state some of those facts, focusing on personal reflections of those involved, has allowed me to understand the outcomes more intimately. Through interviews, some of which were conducted at the memorial sites themselves, designers and educators involved shed light on the importance of empathic design and community-engaged design in their work. The role that students played in the memorials is woven throughout the discussions, offering educators a methodology for successfully employing projects of Reconciliation and Remembrance in the classroom. I recognize that this research is not exhaustive as there are hundreds of people who have been involved in the making of these two memorials, and there are many voices that contribute to each story. Instead of interviewing everyone, I chose to interview those educators and designers still working and connected with the Virginia universities with which the memorials are now a part, learning insight into the role that empathy and community played in their making.

The paper is composed of three parts: 1. Background information presenting a historical and cultural context specific to the Commonwealth of Virginia and which identifies the definitions of empathic design and community-based design used as a datum to measure outcomes, 2. Research obtained through personal interviews conducted with academicians involved in the design of the memorials, and 3. Conclusions reached from interviewing students involved in an academic project of reconciliation and remembrance.

Background: Historical and Cultural Context

With current debates about teaching history in the Commonwealth of Virginia, Virginians are witnessing the fact that historical narratives vary depending on one's biases or beliefs, but there is much to be uncovered if we take the opportunity to look deeper. Design is a powerful way to do that. At the end of the Civil War, Virginians, like many others residing in the South, were taught to believe in the Lost Cause narrative, which painted a picture of benevolent Southern slave owners and the Confederate heroes who quote-unquote "bravely defended their way of life" (American Battlefield Trust, 2020). This narrative was written into grade school history books and physically displayed in prominent monuments throughout Virginian cities and landscapes.



Figure 1: Picture of 'Confederate Monument'

(Retrieved from <https://encyclopediavirginia.org/entries/lost-cause-the/>)

A broader historical narrative of the colonization of the southern United States is now being told by historians such as Ric Murphy who in his book “The Arrival of the First Africans in Virginia,” aims to fully recognize African Americans and to “... ensure that their contributions and legacy no longer remain unknown in American History.” Similar historical narratives that acknowledge the role of institutional slavery have prompted discussions of Reconciliation and Remembrance within Virginia’s colleges and universities and their adjacent communities. Two preeminent public universities and their memorial projects of reconciliation and remembrance - the Memorial to the Enslaved Laborers at the University of Virginia, and the Hearth: Memorial to the Enslaved at the College of William and Mary – serve as examples. Built on prominent locations on each campus (UVA’s memorial is built on the UNESCO Heritage Site part of campus; W&M’s memorial is built on the Historic Campus which is a Historic National Landmark), they boldly offer each University and their surrounding communities a place to reflect upon the history of slavery, and to remember the hundreds of enslaved African Americans who labored tirelessly to physically build each of these universities and to maintain the grounds as hallowed places of learning. Each memorial has resulted in two different designs: The Memorial for the Enslaved Laborers at UVA is a horizontal circular form in the landscape situated adjacent to the university’s famous open lawn and academic village. At the same time, William & Mary’s monument is a vertical structure that rises adjacent to the famous Wren building on what is known as the Historic Campus. One is made of stone while the other is composed of brick. One incorporates water as a symbolic element that evokes an idea of re-birth, while the other introduces the warmth of a central fire as a device to encourage remembrance by invoking ‘gathering’. As different as the two places are, they share numerous similarities, one of which is the importance of student involvement in the long and multifaceted process that preceded each design.



Figure 2: Photograph of the 'UVA Memorial to Enslaved Laborers'

(Retrieved from <https://news.virginia.edu/content/uvas-memorial-enslaved-laborerswins-top-design-award>)



Figure 3: Photograph of the 'W&M Hearth'

(Retrieved from <https://www.wm.edu/about/visiting/campusmap/location/hearth.php>)

Background: Empathic Design

Two pedagogical models that emerge as essential are Empathic Design and Community-Engaged Design. Both approaches understand the relationship between designer and user as critical to producing a memorial that is reflective of, and sensitive to, the users' desires and aspirations. Although Empathic Design can be viewed through a phenomenological lens deriving from an imaginative and sensorial understanding of space, as written about in *Empathic and Embodied Imagination: Intuiting Experience and Life in Architecture* by Juhani Pallasmaa (Pallasmaa, 2015), it is the practical techniques outlined by Leonard & Rayport in 1997, that offer substantive methods for building this relationship. Using these principles in a series of real projects, they argue for a qualitative approach to product design outlined by a series of 5 steps: Observation, Capturing Data, Reflection and Analysis, Brainstorming for Solutions, and Developing Prototypes for Possible Solutions (Leonard and Rayport, 1997), steps which will be referenced in the example projects presented. Originally conceived as a methodology for product design (the design of objects, or things), arguably it can be applied to the design of spaces as well, specifically the places of memorial and reflection.

Background: Community-Engaged Design

Engaging the community in the design process is promoted as a human-centered and ethical approach in practice as well as in academia. Written into the executive summary of their Engaging Community Guide (2019), the Washington American Institute of Architects states that "Architects have a responsibility for making a positive impact on society. Equitable and inclusive community engagement builds trust between designers and community members, sustains communities, undoes past damage, and helps create functional, affordable, safe spaces" (AIAW, 2019). As a teaching tool, Angotti et al. states that "the intersection of design practice and community engagement provides students with new opportunities to interact with people who will be users of the designs." Furthermore, he states, "Design education is founded in teaching students a process of critical thinking to execute a project addressing the needs of users. The initial challenge of addressing the needs of users is to understand 'the other'" (Angotti et al., 2011). It seems undeniable that projects of Reconciliation and Remembrance must at their core be engaged with the community they intend to reconcile with. In fact, the National Summit on Teaching Slavery developed an entire rubric (2018) for engaging with descendant communities so that museums and historic sites would create a "more honest and equitable version of history for future generations" (Montpelier Descendants Committee, 2018). Many methodologies for practicing Community-engaged design have been formulated. For the purposes of this paper, the approaches listed in the *AIA Washington Guide for Equitable Practice* are referenced: Engaging with Community Members as Partners; Understanding community Values; Promoting and prioritizing

equitable Outcomes; and Being an Active Community Member Outside of Work (AIAW, 2019).

Research: The Memorial to the Enslaved Laborers at the University of Virginia

Jane Fulton Suri in her chapter in *Empathic Design: Informed and Inspired by Other People's Experience*, states that making sense of other people's experience, which is often "divorced from our own," can be achieved if we "use our ability to learn about, and identify with, their experience" (Suri, 2003, p.52). Reconciliation and Remembrance projects pose an interesting dilemma for those who are not descendants of slaves. Kirt Von Daacke's own story reflects how his experience in understanding others is rooted in empathy. Von Daacke was the head researcher for the Memorial to the Enslaved Laborers at UVA. He has written extensively on slavery in Virginia and teaches courses on Slavery and the University. Wondering about Von Daacke's journey to UVA in Charlottesville I asked, "Did Virginia's controversial history, or current racial tensions draw you here?" "Not directly," he answered but instead told the story of one man – Reginald Butler (former UVA African American Studies Director) – who inspired his life's work. He was hooked when Reginald Butler delivered a lecture about slavery and how the past IS the present, and very real. Von Daacke stated that "the next three years were shaped by his mentorship" as he began a lifelong journey to understand that "the local and particular is a powerful window for a broader history of slavery" (Von Daacke, 2023).

Mattelmäki writes that, "Design empathy is not only information and facts but also inspiration and food for ideas. It requires a specific attitude and methods to support it. Design empathy calls for direct contact or connection between users and the designers – studying potential customers in their own context" (Mattelmäki, 2003, p119-120). Von Daacke's sensitivity is evident in the way he engaged community members throughout the design process as co-director of UVA President's Commission on Slavery and the President's Commission on the University in the Age of Segregation. When it comes to collecting community history and stories (or what one might see as 'data'), he stated that his primary role was one of "listening, and of 'creating space for conversation' allowing for the efforts and goals of each to be a 'shared' project with the community" (Von Daacke, 2023). Although not a direct correlation to Mattelmäki's techniques, Von Daacke's empathic approach created an environment where participants moved away from assumptions and instead worked toward inclusion and understanding.

Adjacent to Mattelmäki's approach, Leonard and Rayport write of the importance of sharing results during the 'Reflection and Analysis' step. This step in their empathic design approach calls for team members to "reflect on what they have observed and to review their visual data with other colleagues" (Leonard and Rayport, p. 112, 2003) which is evidenced in the work at UVA through Von Daack's sharing of results. He is a founding member of UVA's University Studying Slavery, a consortium of over 90 institutions focused on "sharing best practices and guiding principles as they engage in truth-telling educational projects focused on human bondage and the legacies of racism in their histories" (Scholar's Lab, 2013). I have since learned, through new projects such as the Roberson Project at Sewanee University (Sewanee, 2017), how the consortium has been an important tool for sharing knowledge and best practices, engaging in a collective effort to reconcile and remember.

Community-engaged design also played a significant role in the design of the UVA memorial, specifically in the efforts of Frank E. Dukes who seemed to have touched on all

aspects of its definition outlined in the AIA's Guide for Equitable Practice. This mode of working was not only evident in the community work but in the classroom as well, directly linking students with the issues of reconciliation and remembrance. Lecturer and Co-Director of the Institute of Engagement and Negotiation at UVA, Dukes talked specifically about how intersections of students and community were a common thread throughout the design process (Dukes, 2023).

Frank Dukes told a story about the initial idea for a memorial that began with student outrage over a 2007 Board of Visitors installation of a plaque. This plaque was installed at the foot of the Rotunda as an “expression of regret” soon after the Virginia General Assembly passed its own statement reflecting regret for the state’s role in the slave trade (Wolfe, 2013). According to Dukes, students in his class *Writing Unwritable Wrongs* found the plaque to lack authenticity and prominence. After he asked his students to find the marker that acknowledged slavery at UVA, he reflected that “All of the students undoubtedly had walked right over it, or on it, without noticing it. Students were dismayed at the limits of this recognition, that it was underfoot, not only nearly hidden but trampled upon, that it barely mentioned the enslaved, and ignored their role in the nearly 40 years after UVA opened, and that it so directly centered Jefferson.” (Columbia GSAPP, 2020). The students in Dukes’ class were subsequently adamant about the need for what they thought was a more suitable memorial to honor the thousands of slaves at the university. It was this initial outrage over the 2007 plaque that sparked further momentum inspiring a new university and community organization – University and Community Action for Racial Equity (UCARE) – which aimed to study reconciliation and remembrance, and a robust student organization – Memorial to Enslaved Laborers (MEL) which sponsored the original design competition for a memorial in 2011.

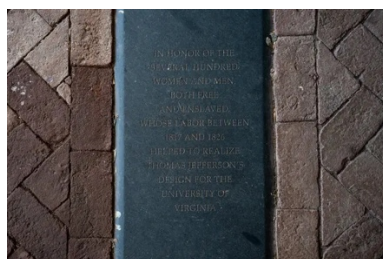


Figure 4: Personal photo of UVA Plaque

Parallel to Frank’s work as an educator, he played the role of community mediator, relying heavily on empathic design methodology. Leonard and Rayport’s description of the foundational step of *observation* in empathic design stresses that observation needs to be “conducted in the customer’s own environment” and should “employ multiple team members with different training – researchers, mediators and students” (Leonard and Rayport, p.103, 1997), Frank’s initial community outreach efforts involved both. He developed a multi-layered approach which included sending “community ambassadors” out into the surrounding neighborhoods. Many of these ambassadors were students who with a friendly and unassuming tone, were able to connect with those who were skeptical of the project. Insights into others’ viewpoints were made clear by this “reaching out” effort: for years many community members referred to the University of Virginia as “The Plantation” highlighting the invisible but very real divide between those of privilege and those without, or more bluntly understood as a reflection of superiority and inferiority (Dukes, 2023).

Frank was involved in teaching a course on “Race + Repair” which blended architectural history, planning, and US history. Taught in the community, and not on the University Grounds, this course was for both students and community members who through engagement in discussion became receptive to each other’s ideas. Through a constant commitment to equitable engagement, Frank and the design team were able to uncover truths within Charlottesville’s black communities giving insight into how the university was viewed. It became clear, after listening to Frank describe his work as a mediator and educator that empathic approaches in the classroom translated directly to community-engaged work, and that the community inspired empathic responses from his students; the two were inextricably linked.

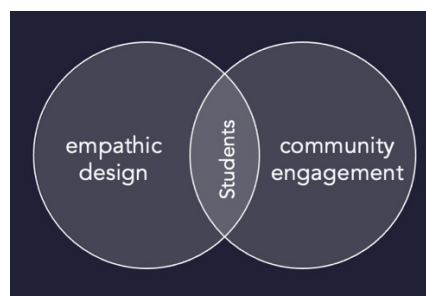


Figure 5: Diagram of Empathic Design and Community Engagement (personal research)

Another community-engaged example was told by Gregg Bleam, landscape architect for the memorial. As an award-winning designer, Gregg Bleam’s work, up until the UVA Memorial design, consisted of thoughtfully modernist landscape designs primarily for residential clientele. During his interview, he described working on the memorial as something completely different involving community meetings and working with the public as partners. In contrast to other project work, he would go into these meetings without any preconceived notions of what the design should be stating he had “no idea” and that it felt like it was “everyone’s project, yet no one’s project” at the same time (Bleam, 2023).

The final siting for the memorial design stands as a testament to a robust community-engaged approach. Gregg stated that numerous sites for the memorial were explored, including locating it on the famous lawn within Jefferson’s academic village; but the final location was based upon feedback from the members of the community who were afraid that the university might try to hide it. They desired the memorial to be “visible and accessible to the city of Charlottesville” (Bleam, 2023).

Research: Hearth: Memorial to the Enslaved at the College of William and Mary

Interviews with three educators reveal much about students being at the core of the empathic and community-engaged effort to unveil the hidden history of slavery at the College of William and Mary in Williamsburg, Virginia. Jody Allen, Assistant Professor of History, and the director of The Lemon Project, described the beginnings of their work. Although not widely known, students were the ones who initially called for a resolution to 1. study William & Mary’s history with slavery, 2. make that history public, and 3. establish a memorial. Allen explained that “There was one student who heard in passing, that William & Mary had been an enslaver, was surprised by that news, and wanted to learn more.” She brought her concern to friends, one of whom was the president of the NAACP student chapter at the time. Afterward, they approached the student assembly with the 3-part resolution, which was swiftly passed (Allen, 2023). The Board of Visitors then

established the Lemon Project: A Journey of Reconciliation, which aimed to “uncover much about the university’s enslaved men, women, and children, sharing findings through annual symposia, courses, special events, and other programming” (College of William and Mary, 2019).

Reflecting on the significance of student initiative at the beginning of the project, Susan Kerns, then Associate Professor and Director of the W&M Historic Campus, stated how important it was that Jody Allen continually reminded everyone throughout the process that it began with students, and the 2007 resolution they enacted. She stated in the interview, “I think **that** fact has given this a credibility, a deep credibility that would have been lost at certain administrative levels” (Kerns, 2023). Allen explained that keeping the memorial’s roots tied to students has had a positive effect on the current student body because it teaches them that they have the power to enact positive change. She reminds them “Students started this; you too can make a change on this campus” (Allen, 2023).

Like the process undertaken at UVA, the design for the final memorial – the Hearth – came after years of empathic and community-engaged research to uncover real stories about the enslaved people who worked at the university, their descendants, and the black community in Williamsburg. Referencing IDEO’s research team finding value in research conducted “in the customer’s own environment” (IDEO I, 2020), researchers at both UVA and W&M found immense insight by stepping outside of the university and into the neighborhoods. Much of the history about the enslaved is vague or undiscoverable. As in the case of one enslaved man named Lemon, whom the reconciliation project was named after, very little was uncovered besides his name, and as such, he represents “the known and the unknown enslaved people at William & Mary” according to Allen (Allen, 2023). Community meetings held in neighborhood churches and on front porches provided invaluable insight into the perceptions of many in the black community. Just as researchers at UVA learned of the university’s stigma (the lawn being understood as “the plantation”), researchers at W&M learned some hard lessons as well. Researchers at W&M discovered how members of the community understood the brick wall that surrounded the historic campus as symbolic of exclusion. Allen explained, “It said to them, YOU’RE NOT WELCOME.” Through oral history, she learned that as a black community member, the consensus was that “you couldn’t be here (on campus) unless you were pushing a broom” (Allen, 2023). Revelations like that were powerful reminders of the significance of using an empathic approach to their work.

Through my interview sessions, I learned how empathic and community-engaged design was central to the initial research but was also essential to the memorial’s formation. Years prior to the international call for a memorial design, Ed Pease, now Emeritus Senior Lecturer at William & Mary, began employing memorial design in his architectural design class. Ironically, the idea for a memorial design project came from one of his students. He explained that previously his annual Historic Campus tour on the first day of class was devoid of historical references until one of his students asked about something she had heard: “Didn’t there used to be an auction block here in these woods across the street?” Pease didn’t know the answer and still doesn’t but said that her innocent question raised awareness of the “casual cruelty” that existed in Williamsburg and the College of William and Mary when it came to the history of slavery (Pease, 2023). That same student asked that their final class project be a memorial. From that day forward, Pease employed an academic project prompting the students to design a memorial, located on the historic campus, which memorialized the enslaved at the College of William and Mary. His class developed into a community-based and multi-

discipline endeavor, in collaboration with Jody Allen and Susan Kerns. Inviting the community and administration to provide feedback, the class eventually became a model for the final design “ideas” competition for the Memorial project.

William and Mary’s “ideas” competition for the memorial references the empathic design techniques described in the article, 7 Simple rules for brainstorming. When in the “brainstorming stage”, managers at IDEO, an organization steeped in Empathic and Human-Centered Design ethos, tell their employees to heed 5 rules: defer judgment, build on the ideas of others, hold one conversation at a time, stay focused on the topic, and encourage wild ideas (IDEO U, 2020). W&M did all of this through the employment of an international design competition.

The competition itself was a way to “defer judgment, build on the ideas of others, and encourage wild ideas.” According to the competition proposal, the chosen concept will be a “physical memorial that establishes a new place of community and contemplation within or directly engaging with the setting of William & Mary's Historic Campus” (Zagursky, 2018). Not to be dismissed is the fact that the brief called for a new site on the hallowed ground of the Historic Campus, a National Historic Landmark. Prior to this decision, the students pushed back on the administration who initially thought the memorial could be a simple statue put “off in a corner”. Demonstrating the importance of this specific location through their academic research and design ideas, they insisted that it be located on the Historic Campus, in the actual location where the enslaved worked. The siting suggests that W&M engaged at that moment in a “loss of control”, or a “deferring of judgment”. Pease, in fact, described the entirety of the competition, and the uncertainty of its outcome, as a “hard pill to swallow” for the college’s leadership, and the surprise he felt when the administration ended up swallowing it [Pease, 2023]).

My interviewees, in telling the story, still marveled at the fact that it was finally there, on the historic campus, on a beautiful day this past summer. Families with young children bustled around us, and campus tour guides explained its relevance to future students, as we sat there talking. When asked about what they most appreciated about the project, each interviewee turned to the other and stated, “Working with you”. I suspect that their shared purpose, their humility, and their friendship bound them together, in empathy and community.



Figure 6: Personal Photo Susan Kerns, Jody Allen, Ed Pease

Conclusions

Parallel to my research, ‘Place of Jubilation for the Weyanoke’ is a sophomore studio project that provided an opportunity to test how projects of reconciliation and remembrance can foster empathic and community-engaged design learning (The Weyanoke are a group of people in Eastern Virginia who share “Red-Black” history and culture, and a desire to restore “that which has been dispersed and shattered within us.”) Stages of the project included: Interpretive Mapping, Reflections on the influence of People and Place, A Study of Light and form, Sensorial Site Analysis, Client Storytelling, and final Design.

To introduce our students to the idea of reconciliation and remembrance, my colleague Tim Hamnett and I, asked them to design an interpretive map based on their understanding of the Hearth project at William & Mary - interpretations were based on individual research & visits to the sites. One student - Nour Mahmoud – emphasized the importance of the unknown laborers by carving the words in her map. She spent time at the memorial, stating that being on-site influenced her decisions: “When I was sitting at the hearth, it was creating a harsh shadow reminding me that the memorial was built for people we do not know” (Mahmoud, 2023).

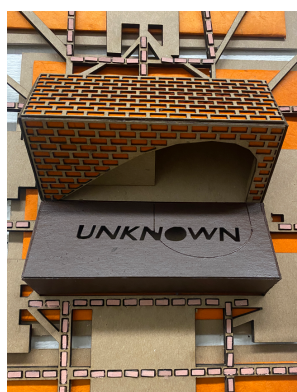


Figure 7: Personal Photo Nour Mahmoud model

The project continued with self-reflection. As a precursor to dialogue with members of the Weyanoke, and a way to help students empathize with one another, this stage required that each student contemplate their own life story and present it to the class as a kind of “show and tell”: three slides representing PEOPLE, 3 representing PLACE, and 1 concluding HAIKU. Afterward, many students reported a deeper sense of connection with their classmates and a new sense of inclusion.

Tectonic approaches to making walls and ceiling planes were then studied to understand patterns and forms using natural light. Students were asked to study the histories of both ‘red’ and ‘black’ cultures for insight into incorporating symbolism in their designs. Symbolism resonated deeply with the students because of the connection to aspects of Weyanoke culture and heritage. Andrew Grider, for instance, stated that his space was inspired by the ritual W. African dance of “heart to ground, heart to drummer, and heart to sky”, and considered those aspects in his final design (Grider, 2023).

Focusing on sensorial analysis added an emotional layer to analytical site analysis, touching on aspects that were central to the ethos of the Wyanoke such as light, materiality, and landscape. It is also tied to their diasporic heritage. The site for this project was our own building’s ground-floor courtyard on the campus of VCU. It represented what Weyanoke

called the perfect place for a community of people who make **wherever** they are their sacred home. The significance of this place was brought to light when one student – Zahra Jalajel - found resonance stating, “I know VCU was built on tribal land, and at the end of the day, this land was theirs” (Zahra, 2023).

Storytelling played an essential empathic role in the process. Members of the Weyanoke graciously answered our myriad of questions and provided foundational insight into their work to find intersections in their cultural heritage. Zahra recalled, “I identify with these people. I am removed from my great-grandmother – and it was almost as if I was able to hear her perspective” (Zahra, 2023).



Figure 8: Personal photo Anita Harrell and VCU students

The final design – a Weyanoke Place of Jubilation – offered an outdoor gathering space for performances, lectures, and other cultural events on the ground floor of the Pollak building on the campus of VCU. It was presented to reviewers with confidence and grace, and celebrated with joy at a Weyanoke Association potluck lunch where we shared dreams of building it someday. This lunch with the Weyanoke, intended as a fun celebration, also exemplified empathic and community-engaged design in our desire for engagement and a shared experience.



Figure 9: Personal photo Weyanoke and VCU students

Student interviews were given at the end of the project to gauge the success of these project phases as well as the overall results of the project. Although not exhaustive, student comments confirmed positive engagement with specific aspects of empathic and community-engaged design, and that overall, the project provided the students with a sense of purpose. One student Christian Galindo Torres stated that this type of project, “reminded me to remain humble and solemn as I designed. It’s very easy to get caught up in becoming a star designer – this project was a reminder that the client comes first” (Torres, 2023).

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Kinetic Environmental Graphic Design and Its Impact on the Interactive Interior Space of University Educational Environments

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Abstract

The interior design of spaces requires the presence of many standards and design and functional requirements without compromising aesthetic values. Environmental graphic design is an important aspect in the design of interior spaces, as it depends on the interaction of the brand with the design of the interior space and the identity of the place. When environmental graphic design is associated with the interior spaces and the element of movement, it is converted into an interactive environment, leading to the creation of dynamic spaces capable of performing sustainable interactive human functions. Since the design of internal spaces for educational environments requires an interactive environment between students and their spaces, the kinetic environmental graphic design was the link between educational spaces and individuals, it plays an important role in directing within educational spaces along with other architectural elements. The research problem appears due to the lack of clarity of the design and functional requirements and standards for educational internal spaces, as well as the weakness of guidance, counseling, and interaction systems within the spaces. The study followed the descriptive analytical approach in analyzing the impact of kinetic environmental graphic design on the interactive internal space of the university educational environment as a model, and the result of the research was to develop principles for designing the internal space derived from the university educational environment, which achieved the aesthetic, functional and interactive dimension.

Keywords: Kinetic Environmental Graphic Design, Interactive Design, Interactive Interior Space, University Educational Space

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1. Introduction

In the ever-evolving landscape of education, the design and ambiance of university environments play a pivotal role in shaping the learning experience. Beyond traditional pedagogical methods, today's educational institutions are increasingly focused on creating immersive and engaging spaces that foster creativity, collaboration, and knowledge acquisition. This shift has spurred innovations in the field of environmental design, and one such innovation is Kinetic Environmental Graphic Design (KEGD). This introduction sets the stage for a comprehensive exploration of how KEGD influences the interactive interior spaces of university educational environments.

Kinetic Environmental Graphic Design, a relatively novel concept in the realm of environmental design, introduces motion, interactivity, and technology as integral components of the design language. It has already found applications in various sectors, from corporate settings to public spaces, and is now increasingly permeating university campuses. Its potential to transform static spaces into dynamic and interactive environments presents an exciting opportunity to enhance the educational experience.

This research aims to explore the concept of KEGD and its integration within the university educational environment. The primary objectives are as follows:

1. To examine the principles and elements of kinetic environmental graphic design.
2. To offer practical insights and recommendations for designing interactive interior spaces in higher education institutions.

In sum, this research endeavors to shed light on the potential of kinetic environmental graphic design to transform the static interiors of universities into dynamic, interactive spaces that can significantly enhance the educational experience. As the educational landscape continues to evolve, it is imperative to explore innovative approaches that foster creativity, engagement, and effective learning, and KEGD emerges as a promising avenue in this pursuit.

2. Material and Methods

The study deals with two basic aspects: first, kinetic environmental graphic design, and second, interactive interior design for the educational environment. The foundations that have been addressed are divided into several elements, namely:

2.1. Environmental Graphic Design (EGD)

Information conveyed graphically in the built environment It is a cross-disciplinary specialization area that incorporates elements of the fields of industrial, interior, and graphic design. The convergence of graphic design, architecture, industrial design, interior design, landscape architecture, city planning, and urban design makes it the pinnacle of multidisciplinary design. The design process, often known as design thinking, is a feature shared by all of these design disciplines, including EGD.

2.2. Applications of Environmental Graphic Design (EGD) in Educational Spaces

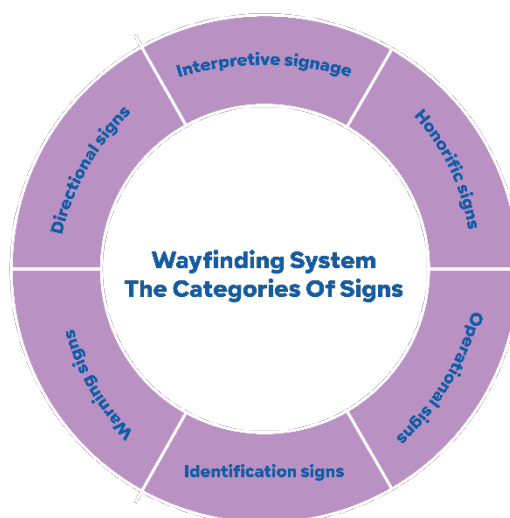


Figure 1: wayfinding System the Categories of Signs

2.2.1. Wayfinding System

The idea or structure that directs the creation of a signage program. A strategy could help define the categories into which signs are divided in addition to the lines of a public transportation system, the wings of a building, the neighbourhoods of a city, or the precincts of an academic institution.

- Identification signs:** Identification signs are the cornerstones of wayfinding and frequently provide travellers their first impression of a location. These signs serve as visual cues that identify a location or space, whether it be a room, a specific building, or a campus entrance, by displaying its name and purpose. They mark the entrances and exits to both primary and secondary destinations and are visible at the beginning and conclusion of routes. Although identifying markers clearly indicate the change from one type of area to another, they serve more than just utilitarian purposes. They convey a place's individuality, character, and even its historical context when styled properly. These signs can expressly convey a location's identity by displaying a real logo or, more generically, by conjuring an image.

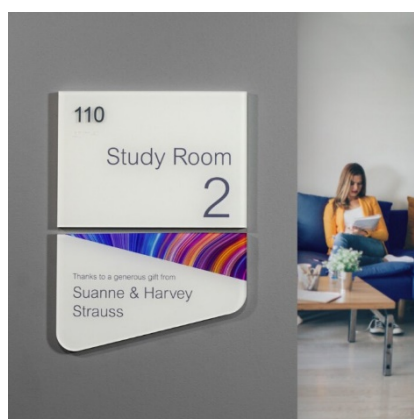


Figure 2: Identification signs

- **Directional signs:** To guide individuals to the numerous destinations within a given area, directional signs are placed far from destinations. Because they assist people in finding their way to destinations, directional signs are also frequently referred to as wayfinding signs. Arrows are generally always shown on directional signs to indicate specific routes to destinations, such as left, right, and straight ahead.

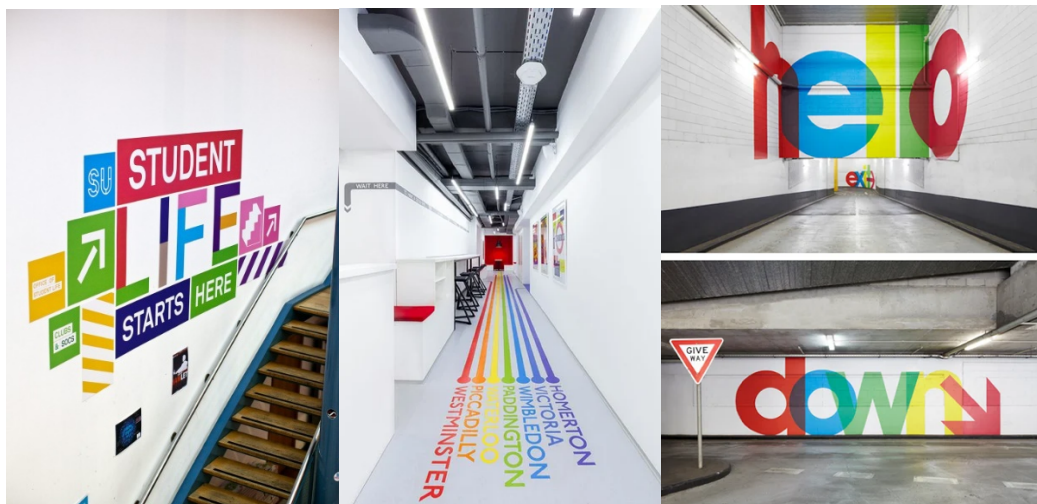


Figure 3: Directional signs

- **Warning signs:** Signs that warn of dangers or safety precautions in the surroundings. In an environment, regulatory and prohibitor signs are used to control how people behave or forbid specific behaviours.

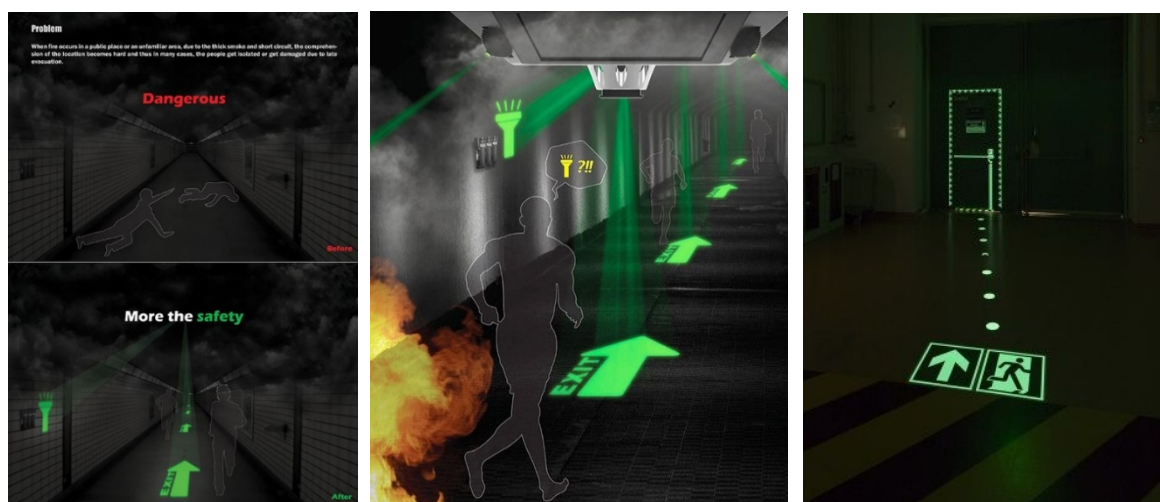


Figure 4: Warning signs

- **Orientation signs:** (also known as operation signs) explain how an area is used and operated, hence they are frequently complex and take some time to read and comprehend. One illustration is directory signs, sometimes known as directories, which indicate tenants' locations within a setting and frequently come with a locator map. Other examples include the All Visitors Must Be Announced signs, which are common in Manhattan apartment buildings, and signs showing days and hours of operation, such as for a retail business.



Figure 5: Orientation signs

- **Honorific signs:** Symbols of honour bestow honour on those connected to an environment. Donor signage, which lists the donors who have provided money to a location or building, is a good example. Another illustration is a cornerstone on a building, which usually lists the date of construction as well as the names of the building's creators, architects, and other notables. Most honorific signage is seen in public and institutional locations.



Figure 6: Honorific signs

- **Interpretive signage:** By offering details about a location's history, geography, people who once lived there, artifacts, and other information, interpretive signage aids in the interpretation of an environment or specific locations within it. Examples are signs that convey information about the animals at a zoo or aquarium and plaques that honour the occasion(s) that occurred at a historical location, such a battlefield. Research—often quite academic.



Figure 7: Interpretive signage

2.2.2. Interactive Experience

Take advantage of modern interactive systems and methods in interactive wall technology that allows the user to distance education:

Where there is a difference between the large traditional screens and the interactive walls, the interactive walls represent a very special case of screens equipped with special sensors and capacity for energy that would recognize the user and interact with him and respond with programmed reactions to them because of his actions, some walls allow people to play at the wall and others interact educational or functional.

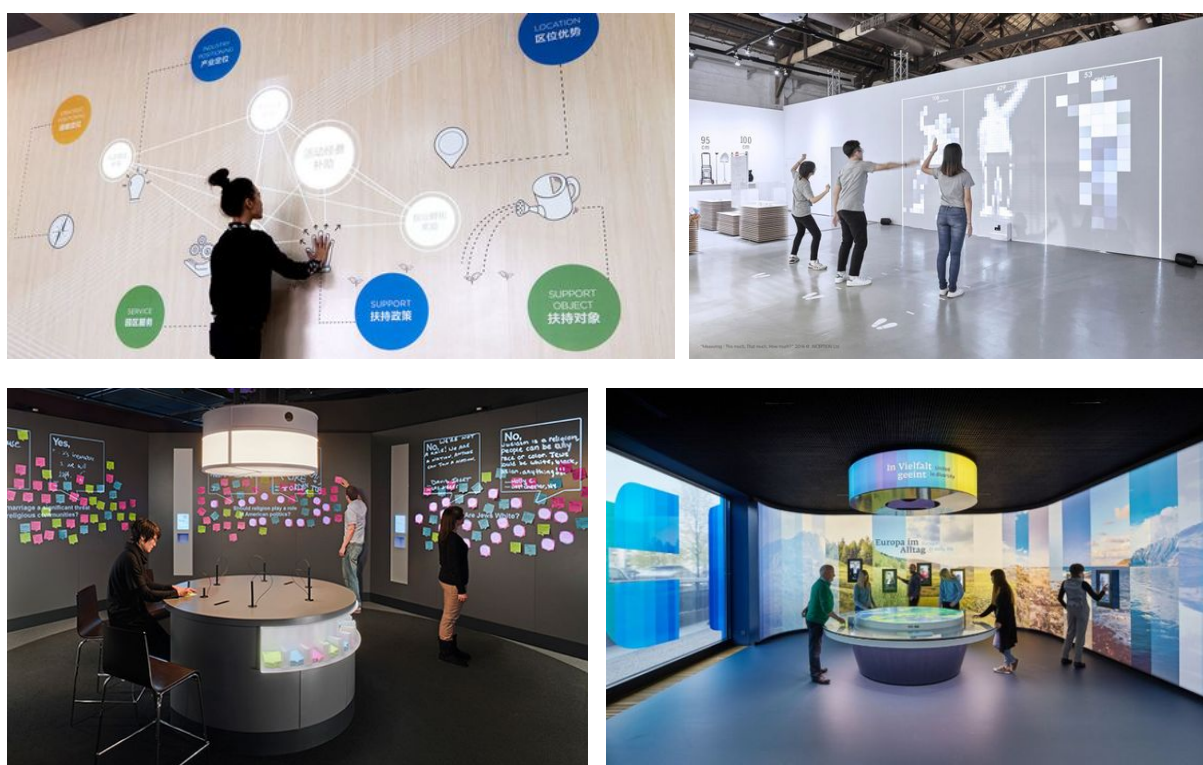


Figure 8: Interactive Experience

2.2.3. Floor Graphics

This technology provides light shows, which provide a fun interactive experience and effective interactive participation, as it is considered one of the technologies.

Modern technological means, as this technology consists of external cameras installed and attached to infrared connected to a computer and connected to a projected display that interacts with the images expected of a person. The cameras capture the individual's movement path through position trackers.

Then the illusion of remote presence is created (or telepresence), or its presence is affected through position tracking devices. Position trackers (which contain motion sensors) are based on capturing the user's movements.

He accurately adjusts his vision through the screen and then transfers it to the computer, which in turn adjusts and adjusts the images to make them look like a reaction to the person's movement in real time, that is, when the same thing happens and at the same speed as the real responses.

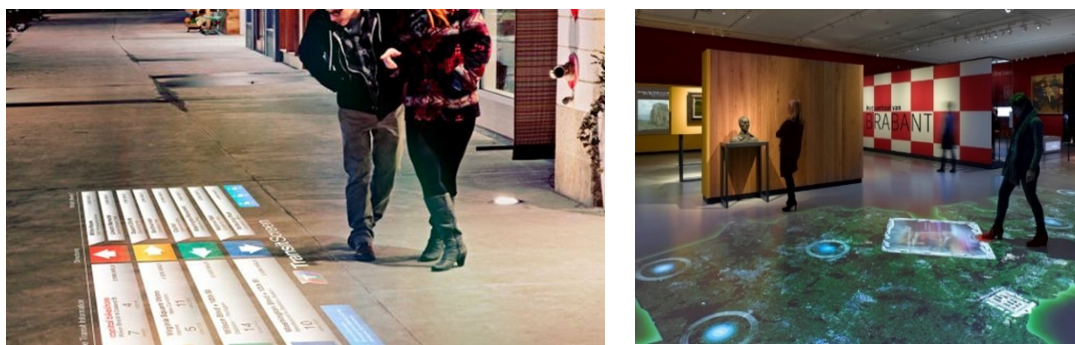


Figure 9: Floor graphics

2.2.4. Window Graphics

Allows the user to control the interfaces Smart via Interactive buildings via mobile applications.

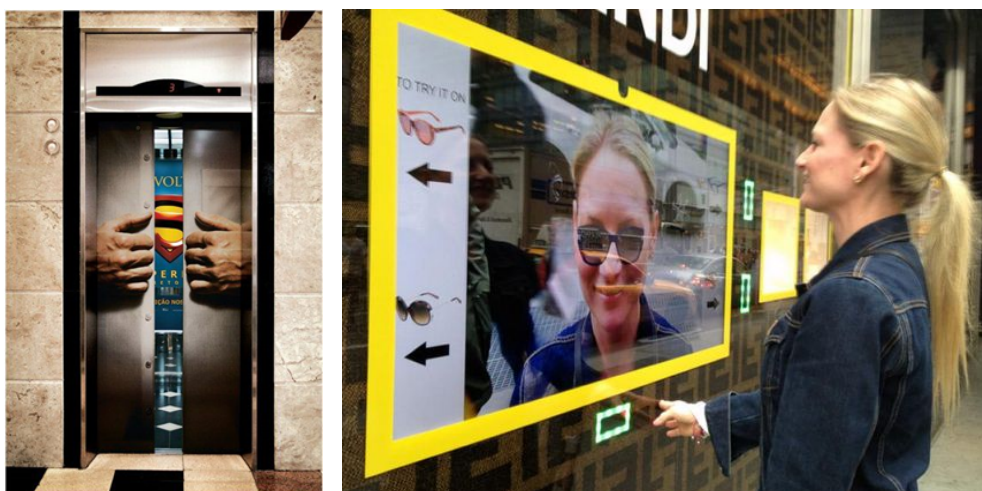


Figure 10: Window graphics

2.3. Kinetic Graphic Design (Motion Graphic)

Motion design is a discipline that combines movement with other media. These other media include animation, film, sound, typographic texts, graphic design, photography, and illustration. Since it is the change that takes place to the medium over time, we can think of motion design as time-based media.

Modern designers and producers refer to a broad range of design and production as motion graphics, which includes many different industries like cinematic video, digital media, animation, visual effects, movie intros, television breaks, commercials, multimedia presentations, more recently architecture, and increasingly digital gaming.

2.4. Immersive Environments

By bringing structure, ambiance, comfort, and understanding to a real-world or virtual setting, immersive environments help people develop a feeling of place. They are a singular synthesis of interior and exterior design, pictures, motion graphics, sound, and architecture that function together to foster social interaction and offer beautiful, meaningful experiences. By fusing tangible and physical spatial experiences with interactive digital technologies, they are also utilized to convey messages, products, or services. Immersive environments are those created today that combine real and imagined realms that allow moving pictures, text, and audio to interact with users. Animation's artistic and expressive features are increasingly seen in hotel lobbies, trade exhibitions, retail locations, and museums, as well as in challenging public venues like amusement parks and airports.

2.5. Motion Graphic in Interior Design

Motion graphics are increasingly being incorporated into interior design as a key element in creating atmosphere and mood. They can be utilized, for instance, in corporate lobbies or waiting areas to maintain the design integrity of the space while reinforcing a brand, changing content to promote different messages, and defining an atmosphere that may not be possible with other mediums. Motion graphics in retail and event spaces can give the area a special depth, provide drama and suspense in entranceways, draw passing people by displaying the content in storefront windows, and complement a brand or product theme. Motion graphics have also been employed by casinos, eateries, and hotels to produce captivating immersive experiences for customers, offer conversation starters to encourage guest involvement, and deliver original material.

2.6. Educational Installations

In recent years, motion graphics have played a significant role in interactive educational installations. For example, in Goldman Sachs' new Learning Center in New York City, multidimensional forms and patterns move and change in size and color in response to people's traffic patterns. Unified Field created a dynamic media installation that simulates the patterns and fluctuations of twenty-first-century market environments using an advanced 4D visualization program and Intelligent Recognition Inference System (I.R.I.S.), like Goldman Sachs, operate. Data on the history of the stocks in the world's capital markets is layered with information, such as days of the week and historical events, giving visitors a visceral experience and inviting them to extrapolate their own conclusions on the markets. Goldman Sachs, a global investment banking leader, wanted to create an inspiring learning

environment while communicating their commitment to developing skills, changing attitudes, and encouraging new thought and behavioral patterns. This complex installation used Unified Field's 4D visualization software on an SGI supercomputer and Windows NT server. Four curved, frosted panels and a 42" plasma screen are mounted on four wing-shaped aluminum poles. Ten feet in front of the panels and embedded in the ceiling is a tracking video camera that monitors the motion of viewers and interfaces with a high-speed image processing board containing gesture recognition software.

2.7. Educational Environmental Graphic Design

Environmental graphic design depends mainly on the cooperation of graphic design with interior design in determining the directions of human movement within the space, and therefore this is determined in a basic element, which is wayfinding design.

And Successful wayfinding design depends on understanding three variables:

- the nature of the client organization.
- the people with whom the organization communicates.
- the type of environment in which the system will be installed.

It is critical to thoroughly research and define all three of these variables at the start of a project. The designer must create a family of sign types that not only addresses primary information and wayfinding needs but also recognizes secondary issues and audiences with an appropriate information hierarchy and sign-messaging protocols when developing the wayfinding strategy and designing the sign system.

At the top of the places that need informative design are educational and cultural institutions, hospitals, sports and entertainment institutions, airports, and commercial and government institutions.

The Wayfinding Handbook: Information Design for Public Places

By identifying the three elements, we can reach the identification of educational environmental graphic design, as it is from this direction the design that concerns the educational institution as a structural structure, considering the target group of students and teachers, in addition to the surrounding environment in which the design is implemented.

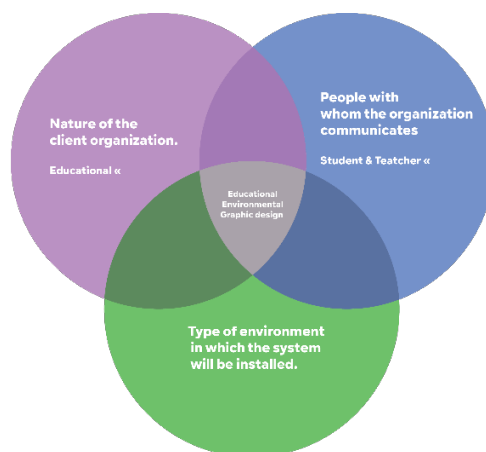


Figure 11: Educational environmental graphic design

2.8. The Learning Environment

Learning environment is the space allocated for learning and teaching and it is an important aspect that needs to be addressed to ensure effectiveness and to improve learning outcomes. Quality learning environment may promote intellectual activities, interaction, generation of ideas, friendship, cooperation and encourage learning, growth, and personal development of students. In the learning environment, there are various aspects that interact and affect the students. Many studies conducted show the learning environment can affect learning outcomes and student development. As a result, the classroom learning environment should be well designed and carefully planned to allow students to learn comfortably, actively collect learning information, gain appropriate experiences, assess their own learning, and respond to personal experiences in a variety of contexts.

2.9. The Structure of the Interactive Interior Space

To understand the dimension of interactivity in interior design, a hypothesis must be established that it is possible to reach a space in which the physical dimensions of the space and the electronic dimensions are integrated without one cancelling out the other.

Many of these mutual interactions and influences between the physical and electronic dimensions can be limited, embodied in a new virtual dimension with two complementary and overlapping aspects. They are the physical and electronic destination.

We can call this new model of internal space the interactive model, which is merely a nominal metaphor in which the new complementary results are gathered resulting from the mutual interaction between the dimensions of the space structure, which is divided into:

The physical structure of the space: It includes the walls, ceilings, and floors, including the furnishing units for each activity separately.

The electronic structure: of the space, which is divided into: Physical components: which are the wires, equipment, and communication units responsible for the transfer of information, and electronic components: which are a set of laws and “Software and Protocols” that complete the interaction process, the movement process, and receiving orders.

2.10. Interactive Interior Design

This concept arose as a result of the intimate relationship between man and computer, which is developing day after day, where the basic idea of interaction between man and space depends on creating scenarios for the various activities practiced by man within the internal spaces and programming them inside the computer through advanced programs where the sensors that operate through rays Infrared is to recognize a person when he enters the space, and these spaces and internal devices are controlled to interact with him and meet his requirements.

2.10.1 Interactive Design Can Be Divided Into Three Main Parts

1. Design Information: It is the starting point in designing any interactive space, and it relies on knowing the needs and goals of users through the functions and objectives behind the internal space and organizing those contents within a diagram or curve to illustrate the functions of the different groups through a hierarchy of commands.

2. **Design Interactive:** It aims primarily to make the internal space capable of following the user's activities and trends. Therefore, it transforms an information diagram or graphic design curve into a scenario or design of events, describing or clarifying the user's movement within the space and the way he uses it. Thus, the process of moving from information design to interaction design is complete. It means transforming information into user experience.
3. **Design Sensorial:** for the user depends on creating multiple means of input and output that are compatible with human feelings. To create a good interactive experience, the designer must try to understand more the feelings and observe the goals of the users. He must also think about how to design the feelings of the different functions of the interior spaces and the extent of the relationship of these feelings to each other and how to design them.

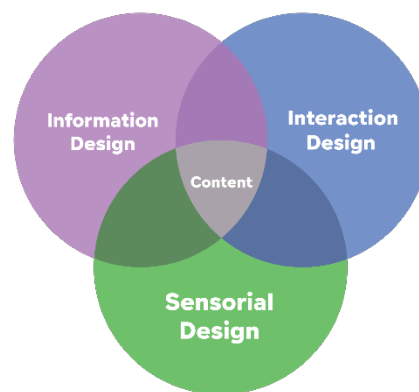


Figure 12: Interactive design

2.10.2 Interactive Educational Interior Design

Interactive architecture is about creating new types of interactive relationships between people and the educational built environment.

Interactive spaces allow building bridges between the physical and digital world. Integrating interactive spaces in learning environments combines the benefits of computer aided learning and tangible interaction; they combine the richness of multimedia content with the concreteness and natural user experience of tangible interaction.

2.10.3. Design Requirements in Interactive Spaces

- 1- Providing an experience that ensures attraction and engagement.
- 2- Dealing with a diverse audience in size.
- 3- Dealing with a different audience in the way of learning.
- 4- Stimulating social communication among participants and providing a participatory leisure experience.
- 5- Obtaining opinions and comments from users and responding to them.
- 6- Security and safety issues.

2.11. Visual Perception

Visual perception is the main means for understanding the characteristics of the visual formation of the architectural form, the elements of the internal space, and the plastic artworks within the architecture. A person's realization of these characteristics is his ability to imagine the work he saw as a visual impression to turn into a complete and stable image in his mind. The vision process aims to identify the elements of space, the interior, realizing its identity, and completing the visual image of the space by recognizing its constituent features such as its shape, color, surface properties, and its own level of illumination.

Space, distance, tactile gradation, lighting quality, color, shape, and the degree of tactile gradation variation all influence visual perception.

2.12. Interactivity as an Element of Integration Between Environmental Graphic Design and Interior Spaces

The integration of interactivity within Environmental Graphic Design represents a paradigm shift in designing interactive interior spaces. By fostering engagement, personalization, and adaptability, interactivity transforms environments into dynamic, participatory experiences. As technology continues to advance, the potential for interactivity to redefine the boundaries of EGD and interior spaces is boundless, offering new avenues for creative expression and user-centric design.

This is where interactive design is one of the most important mechanisms for self-learning, in which the learner practices self-experience in forming educational experience through touching, understanding, and convincing, as it is important that the learner learns how to learn, and it is not important to give the information and test its ability to retrieve it, but positive education must be emphasized. Change the stereotypes that rely on comprehension and persuasion by experimenting and observing, encouraging thought, self-learning, deduction, and conclusion, until the student arrives at the information himself and has his educational experiences through positive participation rather than negative reception.

To analyse the impact of interactive design as a source for developing educational interior design elements and furniture by setting.

A design strategy to analyze interactive design elements includes:

1. General vision stage: "Achieving the visual identity of the interactive design" It depends on achieving visual vision through Forming a mental image with innovation and a specific concept through interactive elements
2. Interactive scenario stage: It includes the interactive idea in terms of choosing the appropriate interactive elements for the design.
3. Interactive task stage: The plan responsible for carrying out interactive tasks designed in the interactive scenario
4. The effect of interactive design as a source for developing interior design and furniture elements It includes:
 - a) Impact on the recipient:
 - Did the interactive design take this into account?
 - Did the interactive design help raise the recipient's awareness?
 - b) Impact on developing interior design elements and furniture.

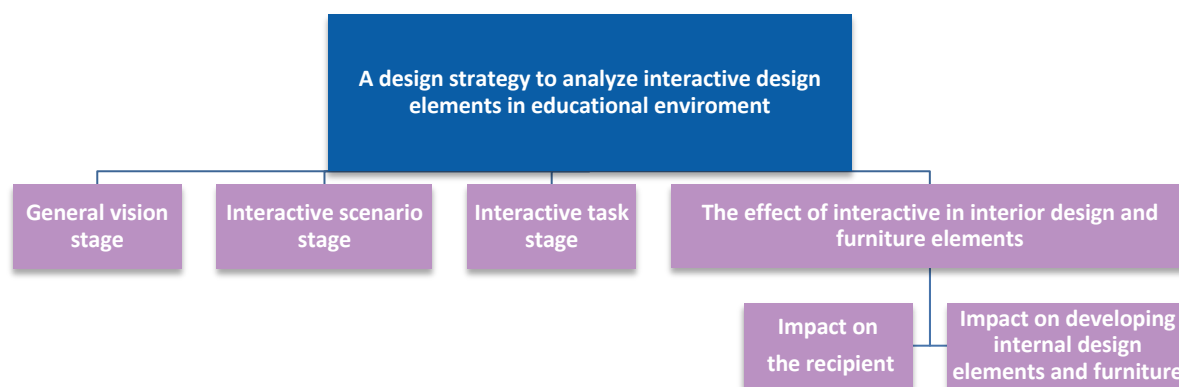


Figure 13: Interactivity as an element of integration between environmental graphic design and interior spaces

Discussion

Through the previous study, it was concluded that through the integration between the principles of kinetic environmental graphic design and the principles of interactive interior design of educational buildings, a Kinetic, interactive educational environment is obtained:

First: Fundamental Principles of Environmental Graphic Design

1. Organization for designs:
Information should be organized in a logical and transparent manner, with visual hierarchy directing the viewer's attention to the most relevant aspects.
2. User-Centered Design:
Designs should be adapted to the target audience's or users' needs, preferences, and behaviors.
3. Accessibility and Inclusivity:
Designs must be on hand to all individuals, together with people with disabilities, making sure that data is to be handed to everyone.
4. Adaptability and Flexibility:
Designs should have the capacity to adapt to changes in the environment or user needs over time.
5. Wayfinding:
EGD plays an important role in guiding people through space, providing clear guidance and navigational aids.
6. Emotional Impact and Engagement:
Designs should evoke emotions, create a sense of place, and engage the viewer on an experiential level.

Second: Principles of Interactive Interior Design for Educational Building

1. User-Centralized Design:
Design with consideration for the wants, tastes, and actions of faculty, staff, and students. Think about various age groups, learning preferences, and skill levels.
2. Flexibility and Adaptability:

Create areas that are flexible enough to accommodate a range of activities, group sizes, and instructional techniques. Modular components, movable walls, and adaptable furniture are necessary.

3. Merging physical dimensions and electronic dimensions
4. The various active scenarios that space users share and programming.
5. Technology Integration:
Utilize current and appropriate technologies to improve the learning process. This includes virtual reality, digital whiteboards, interactive displays, and collaborative tools.
6. Sensory Engagement: Consider all your senses, including smell, touch, sound, and vision. Create a welcoming and stimulating environment by using the right materials, lighting, and acoustics.

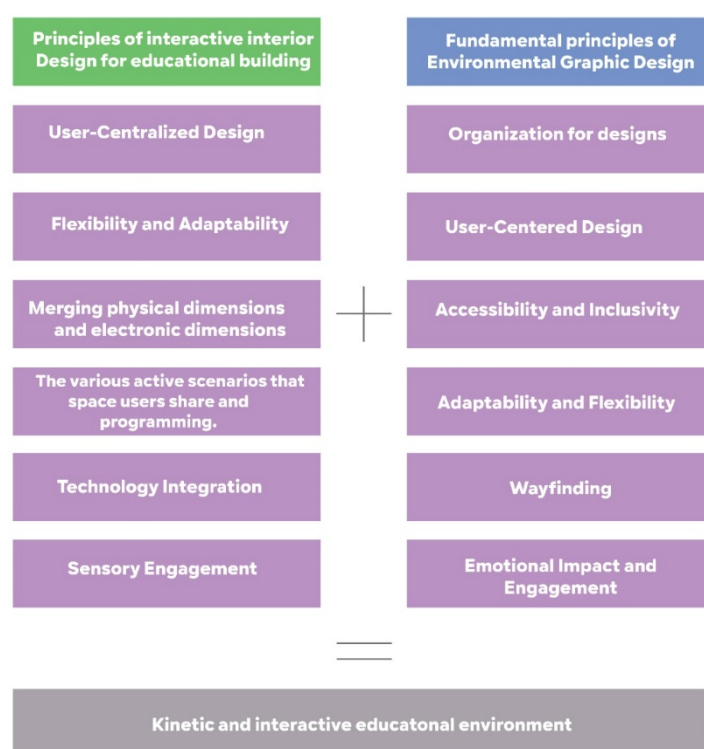


Figure 14: Kinetic and interactive educational environment

Conclusions of the Research

- Develop principles for designing the interior space derived from the university educational environment, which achieved the aesthetic, functional, and interactive dimensions.
- Kinetic environmental graphic design ("KEGD") uses dynamic visual elements that adapt to the interaction and response of students, which leads to a dynamic educational environment, and thus students are encouraged to explore, interact, and learn in a more practical and practical way due to this dynamic.

- This study will not only highlight the learning experience, but it will also prepare students for a more interactive and leadership-oriented future. It emphasizes the importance of interior and graphic design in forming the educational trip.

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Development of Competences for the Fashion Designer: A Scope Review

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Abstract

Authenticity presents itself as the warp that interweaves the fashion system and other sectors of society. This dynamic finds in contemporary society the "era of lightness", a system of inconsistency, change, personalization, and seduction that is related to the fashion system. The transition from a production-oriented (industrial) society to a post-industrial society, where knowledge becomes the main factor of production, makes education even more relevant as a means for individuals to occupy their space in society and act on social and environmental issues. In this perspective, the objective of this work is to map the themes that permeate the competencies of Fashion Design professionals through a scope review. This strategy allows for an analysis of evidence on a particular research area, synthesizing the main concepts, theories, and knowledge gaps. To support the process, the study makes use of the PRISMA-P (Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols), double-blind selection of works, and qualitative thematic analysis. This analysis is divided into five themes: employability; entrepreneurship and digital competencies; sustainability; research and development; production processes. The study's conclusion points to an interconnection of these themes in both the educational process and the professional life of the fashion designer, suggesting a trend toward interdisciplinarity or trans disciplinarity. Additionally, the study suggests a personalized education, with the development of curricula or other actions in coproduction between educational institutions and society sectors.

Keywords: Fashion Designer, Development of Competences, Scope Review

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Introduction

Social subjects express, day by day, through clothing, an appearance, or even an identity imbued with multiple meanings, constructed from images and symbols. In this somewhat communicative scene, there is a relationship of aesthetic pleasure between seeing and being seen. According to Sant'anna (2009, p. 49, our translation) "dressing is a dimension of communication in modern society" that is intrinsically related to what is consumed by this subject.

In a fashion-oriented society, consumption is at the heart of the current cultural system, where objects are presented as signs of an individual's personality (Sant'Anna, 2009). Fashion is thus a field of symbolic production with its respective centres of recognition and legitimacy, serving as an "expression of the values of modern culture," grounded in the notions of the new and individuality (Bergamo, 2007; Marques, 2014, p. 64). It is acknowledged that "the values and *cultural meanings of modernity*, particularly dignifying the *New* and the expression of human individuality, made the birth and establishment of the fashion system possible" (Lipovetsky, 2009, p. 7, our translation).

In this context, we will draw upon a historical overview of fashion, which, despite Lipovetsky (2009), presenting it in a linear fashion, hides a web of continuous and interconnected social transformations. This is presented in a didactic way in three phases: Aristocratic Fashion, Fashion of a Hundred Years, and Open Fashion (Marques, 2014). This historical perspective is valuable for understanding the context of the fashion designer.

The first phase occurs between the mid-14th century and the mid-19th century but is limited to a select group, the aristocracy, and is characterized by craftsmanship. During this period, artisans catered to their clients' requests, tailoring clothing to their tastes without innovative or proactive contributions from the artisan (Lipovetsky, 2009; Marques, 2014). Influenced by the Baroque era, fashion promoted the luxury of theatricality, emphasizing a narcissistic aesthetic, one of individualization.

Modern fashion only emerges in the second half of the 19th century. From this period until the 1960s, it's referred to as the "Fashion of a Hundred Years." The "first phase of modern fashion history" is led by Charles-Frédéric Worth, who founded his own house in Paris, where he prepared unique clothing items in advance, combining creative design with a promotional show, an initiative later known as *Haute Couture*¹ (Lipovetsky, 2009, p. 86). In this context, the simplification of women's attire by Chanel in the 1920s and the expansion of exports contributed to the rise of the power of the dressmaker/fashion designer.

From 1975 onwards, there was a decline in the production of custom-made clothing, altering the focus of *Haute Couture* from presenting new models to maintaining a tradition of luxury. This marked the rise of *prêt-à-porter*, characterized by industrial production with a focus on aesthetics and personalization (Lipovetsky, 2009, p. 148). *Prêt-à-porter*, with its professional creators, embodies a youthful, innovative spirit, increasing the democratization of fashion. It reduces mimetic subordination, brings fashion closer to advertising, allows for creative freedom, and offers a wider variety of models, enabling individuals to choose more

¹ We understand *Haute Couture* as a fashion established by artistic dressmakers who created signature, original clothing using the finest fabrics, technical innovations, and exquisite craftsmanship. These garments were produced exclusively and tailored to measure, undergoing numerous fittings until their completion (Marques, 2014, p. 67, our translation).

affordable options. The excitement for the new and youth culture contributes to hedonistic values and a blend of styles (Lipovetsky, 2009; Marques, 2014).

Throughout these phases, one key figure stands out: the fashion product creator². Initially, there was the craftsman, followed by the dressmaker/stylist, and ultimately a transition from stylist to fashion designer. The term stylist is associated with artistic recognition, innovative capabilities, authorship, and practical experience, as part of a field of "symbolic production" that links their name to the prestige that surrounds them, including the fashion objects they create. They are seen as artists "presumably free from economic pressures" but not without dependence on social mechanisms that "legitimize their understanding and acceptance" (Bergamo, 2007, pp. 49–53; Marques, 2014).

On the other hand, "the 'designer' is the solution - or verbalization - found for an effort to reconcile two fields: the artistic and the economic" (Bergamo, 2007, p. 49, our translation). This transition of terminology is supported by the emergence of the concept of the creative economy, which emphasizes uniqueness, symbolism, and intangibles, and thus requires a creative professional who integrates technology into this context (Marques, 2014).

This indicates a field in the process of consolidation. In addition to this, the impact of digital transformation suggests the development of new professional competencies. In this context, professionals are in a constant learning process to contribute to a sustainable and socially responsible society, leveraging technological advancements (Xu et al., 2021; Žižek et al., 2021). In this perspective, the objective of this work is to map the current themes that permeate the competencies of fashion design professionals through a scoping review.

Contextualization of the Environment

For a brief understanding of the context of professionals in the fashion area, with a focus on their education, we refer to the work of Batt et al. (2021). The authors present a model for the training of healthcare professionals with the patient at its core. Drawing a parallel, we propose a model where the consumer is at the centre. Furthermore, the model by Batt et al. (2021) is structured based on a systemic thinking approach, meaning: (i) it employs an adaptation of Bronfenbrenner's (1979) Ecological Systems Theory³, with a perspective on potential interactions between individuals and environmental systems (context), which are micro, meso, exo, and macro systems; (ii) it incorporates complexity thinking, with a focus on various heterogeneous elements that influence each other. In this sense, there is a quest for a representation that promotes a better understanding of the relationships between individuals, contexts, and elements, all of which are integral and influential in real-world professional practice.

In line with this, De Macedo (2022) discusses fashion education in the context of the epistemology of complexity, inspired by Morin (2015), where reality is multifaceted, and its fragmentation for didactic purposes tends to weaken its meaning. The challenge of complex thinking lies in "facing the entanglement (the endless inter-retroactions, the solidarity of phenomena among themselves, the haze, uncertainty, contradiction)," integrating the whole in which contemporary reality presents itself (Morin, 2015, p. 14). It deals with incompleteness and uncertainty, while recognizing the relational ties between various

² In the case of this research, a limitation is applied to the subject of clothing.

³ "A set of nested structures, each within the other, like a set of Russian nesting Dolls" (Bronfenbrenner, 1979, p. 3)

elements. Thus, "complex thinking is directly related to transversality, as it understands that no knowledge is isolated and therefore conceives a [professional] education based on non-disciplinarity" (De Macedo, 2022, p. 298, our translation).

By applying the systemic map of Batt et al. (2021) to fashion design education, we can see Figure 1, in which the consumer subject is at the centre, interacting with professionals in the field and their respective systems.

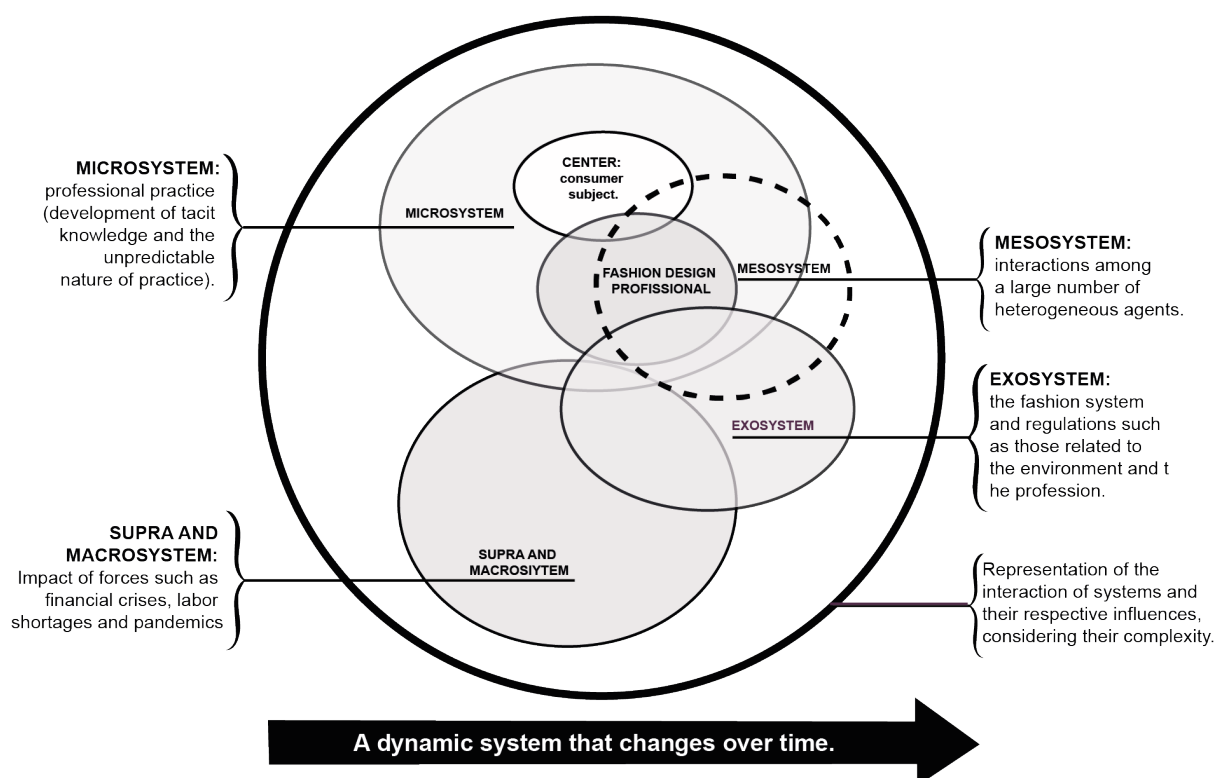


Figure 1: System map related to the fashion area
Source: adapted from Batt *et al.* (2021)

The microsystem is the professional practice, involving the development of tacit knowledge. The competencies required for this professional, the fashion designer, are interconnected and demand the interrelation of diverse knowledge and diverse solutions related to the surrounding context and the consumer subject.

With a broad range of applications, the term "competence" is found in proposals for professional training and development in the business environment and the school system (Zabala & Arnau, 2014). According to Zabala and Arnau (2014, p. 13, our translation), in the school environment, competence is related to "attitudinal, procedural, and conceptual components" that will contribute to the individual in solving problems in different spheres of life. In a more general sense, the concept focuses on the essential skills or attributes necessary for successful work (Boahin & Hofman, 2013). The term represents a challenge to the disconnect between theory and practice, in a movement that aims for a holistic development process for the individual in all its aspects, from the professional, personal, and social dimensions (Zabala & Arnau, 2014).

In the mesosystem, interactions between heterogeneous agents who are part of the fashion system are encompassed. Beyond clothing renewal, fashion carries "the renewal of distinctive

traits among individuals, the renewal of the relationships they establish with each other, and the renewal of the vision they have of themselves" (Bergamo, 2007, p. 24, our translation; Marques, 2014). In this complexity, there is an intrinsic relationship between individual and social experiences. Therefore, the work of a fashion designer is complex both in social and technical terms, requiring critical and reflective thinking in the face of the multitude of possibilities in a liquid society (Lipovetsky, 2020). In the exosystem layer, the system of the field and regulations, such as environmental and profession-related regulations, are considered (Batt et al., 2021).

Finally, it is worth noting that the illustration represents a dynamic system that will certainly undergo changes over time within its context.

Methodological Procedure

In this research, a scoping review methodology is employed, which allows for an analysis of the evidence in a specific research area, synthesizing key concepts, theories, and knowledge gaps (PETERS et al., 2015). To support the process, the PRISMA-P⁴ guidelines are used, which were developed by a group of international experts with the aim of improving the accuracy and transparency of reviews (SHAMSEER, 2015).

The search strategy outlined in the research protocol was then utilized, drawing from the following databases: Scopus, Web of Science, ERIC, and SciELO. In Table 1, a summary of the results from each of the selected databases is provided.

SEARCH STRATEGY	SCOPUS	WEB OF SCIENCE	ERIC	SciELO
Search with terms related to "competency-based education," "instructional design," and "fashion"	4	0	0	0
Search with terms related to "competency-based education" and "fashion"	20	9	8	0
Search with terms related to "instructional design" and "fashion"	120	68	231	1

Table 1: Search results in databases

A total of 461 works were found, as shown in the diagram in Figure 2. Using EndNote and Rayan, as well as manual analysis, duplicate works were excluded, resulting in a total of 350 works to be submitted to Phase 2 of the scoping review. This phase involves a double-blind review by two researchers in the field of fashion, using the abstracts of the works as reference, as indicated by Peters *et al.* (2020).

⁴ The research protocol is published at the link: <https://zenodo.org/records/10059132>

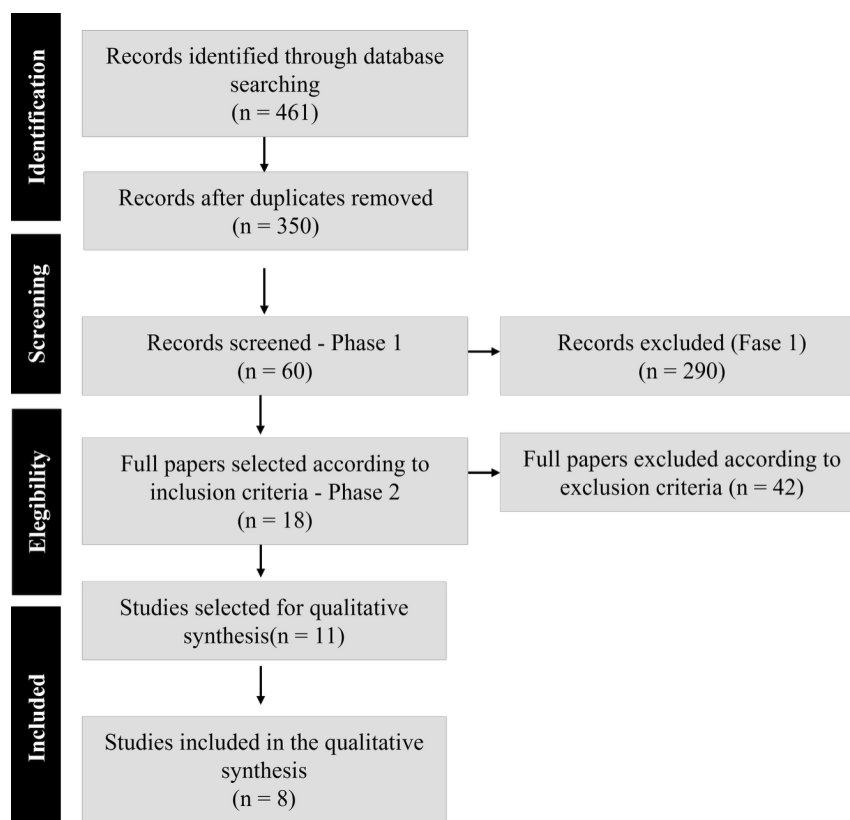


Figure 2: Literature Search Flow Diagram and Selection Criteria for the Scoping Review
Source: adapted from Moher et al. (2009)

For the double-blind selection process conducted by two researchers, a meeting was held to validate eligibility criteria, as outlined in Table 2.

EXCLUSION CRITERIA	INCLUSION CRITERIA
<ul style="list-style-type: none"> • Conference proceedings; • Books or handbooks; • Articles published before 2012; • Works specifically focused on Instructional Design courses; • Works specific to faculty development and training; • Analysis of online courses; • Works that address a specific strategy analysis unrelated to the research objectives; • Works not directly related to the field of Design; • Works related to primary and secondary education; • Works unrelated to professional development. 	<ul style="list-style-type: none"> • Journal articles; • Works specifically related to courses in the field of Fashion Design; • Articles proposing competencies for professionals in the field, including both general competencies and specific technical competencies in the field; • Suggestions related to curriculum development for the field, as well as personalization models; • Articles from databases limited to the last 10 years (2012 to 2022).

Table 2: Exclusion and inclusion criteria

In case of difficulty reaching a consensus on work selection, a third researcher was brought in for tie breaking. The Kappa coefficient was applied to measure agreement between the two researchers who participated in Phases 1 and 2 of the selection process. Regarding the analysed variables, the Kappa value between the examiners was 0.646, demonstrating substantial agreement.

After a meeting to analyse articles with conflicting decisions, 60 papers were selected and advanced to Phase 2 of the scoping review, which involves reading the full texts. As a result, 18 works from the field of fashion were selected, and a critical analysis of individual sources of evidence was conducted using the CASP checklist (Critical Appraisal Skills Programme), resulting in a total of 11 selected works.

The synthesis was performed through qualitative analysis, specifically thematic analysis, as presented in the theoretical framework chapter. The thematic analysis process consists of the following steps:

- 1) Familiarization with data: Transcribing and reviewing the data, noting initial ideas during the process.
- 2) Generating initial codes: Systematically coding interesting aspects of the data throughout the dataset.
- 3) Searching for themes: Identifying potential themes by grouping codes that are related.
- 4) Reviewing themes: Ensuring that themes work in relation to the extracts and the dataset, creating a thematic map.
- 5) Defining and naming themes: Refining the details of each theme, providing clear definitions and names.
- 6) Producing the report: Offering vivid examples, conducting a final analysis of selected extracts in relation to the research question and literature, and presenting the scientific account of the analysis (De Souza, 2019, pt. 56, our translation).

Using the software, Atlas TI, a thematic analysis of the scoping review material was conducted based on these six steps. The following section delves deeper into the theoretical framework through a scoping review that relates the constructs of fashion design and competency development, to provide an updated overview of the subject.

A Closer Look at the Competencies of the Fashion Designer

From the analysis of the selected works for the scoping review, the presentation of the defined themes follows with an introduction to employability and digital skills, followed by the themes: 1) entrepreneurship; 2) sustainability; 3) research, development, and production processes. It is worth noting that these themes are intertwined in both the teaching and learning process and the professional life of the fashion designer, indicating a trend towards interdisciplinary or transdisciplinary approaches (Boahin & Hofman, 2013).

The development of competencies, skills, and attitudes related to employability provides individuals with flexibility and adaptability to meet the constant changes in the world of work (Boahin & Hofman, 2013). Higher education curricula have increasingly focused on the development of competencies, especially professional competencies (Hodges et al., 2015), offering a possible solution to bridge the gap between graduates' qualifications and the demands of the workforce (Muzenda & Duku, 2014). Competencies in this context include proactivity, creativity, problem-solving, teamwork, interpersonal, social and critical thinking, communication, and networking (Boahin & Hofman, 2013). "The increased interest in

employability skills reflects the development of human capital to meet the demands of a knowledge-based economy" (Boahin & Hofman, 2013, p. 3).

In this regard, the relationship between educational institutions, students, and external sectors is an important collaboration opportunity for building relevant curricula for a diverse society and preparing professionals for the world of work. However, in many cases, there seems to be insufficient integration between educational institutions and external sectors when it comes to focusing on competency development (Muzenda & Duku, 2014).

Yamada & Otchia (2021) highlight the perceptions of teachers and students in Ethiopia regarding technical skills for clothing production and workplace-related attitudes. Both groups - teachers and students - emphasize the importance of skills specifically related to the fashion field, such as body measurement, pattern making, fabric preparation, and sewing. However, these technical skills in the fashion field were more highly valued by the participating teaching staff, which the authors interpret as a tendency for the group to prepare students to work as collaborators in the industry. On the other hand, variables related to entrepreneurship, leadership, and work plans received more emphasis from students, indicating their interest in starting their own businesses (Yamada & Otchia, 2021).

Among the competencies that contribute to employability, in addition to entrepreneurship, are digital competencies. In the field of fashion design, digital technologies contribute to process improvement with software for creation, modelling, support for the production process, and virtual reality environments (Lee, 2022).

Building on the themes of employability and digital competencies, there are examples of strategies for their development, including student-centred learning, problem-based learning, reflective learning, work experience (internships), virtual reality environments, and collaborative learning approaches. The focus is on making the teaching and learning process experiential, moving away from the traditional transmission of knowledge from the teacher to the student. The following section explores the theme of entrepreneurship.

Entrepreneurship

Hodges et al. (2015) emphasize the large number of small businesses in the textile and clothing sector in the United States and the possibility for graduates to work in this sector or partner with these businesses through their ventures. Many companies in this sector have various departments located in different countries or even opt for outsourcing certain processes. Therefore, future fashion design professionals need to understand the challenges of a global supply chain (Hodges et al., 2015).

Entrepreneurship also intersects with other themes such as sustainability and production processes. Since 2016, the 2030 Agenda, which includes the United Nations' Sustainable Development Goals (SDGs), has been adopted by 193 countries. Among the 17 SDGs is Goal 12: Sustainable production and consumption, which must integrate the management and strategies of the fashion sector, whether in an educational, organizational, or individual context (BCSD PortugaL, 2022). The Fashion Revolution movement has been at the forefront of bringing these SDGs and related topics into industry and academia for more than a decade, aiming to promote "a global fashion industry that conserves and restores the environment and values people over growth and profit" (Vision & Aims, 2013, p. 1).

In line with this, Hall and Velez-Colby (2018) bring the circular economy together with entrepreneurship in the fashion industry. Students are tasked with creating a business plan from a sustainability perspective, considering possible social and environmental impacts. This activity invites companies and organizations aligned with this theme to participate and places the student as the protagonist (Hall & Velez-Colby, 2018).

The competencies required for success in entrepreneurship include social, financial, communication, problem-solving, self-management, creative thinking, innovation, and cultural awareness (Hodges et al., 2015). As mentioned by students interviewed in Hodges et al.'s research (2015), networking plays a significant role in the success of entrepreneurs by providing support, encouragement, and opportunities. Networking can also develop through global experiences, such as exchanges or other activities that allow students to gain insights into different cultures and knowledge beyond their geographical boundaries (Abner et al., 2019; Hodges et al., 2015). Hodges et al. (2015) emphasize the importance of fostering entrepreneurial knowledge in small textile and clothing businesses from a global perspective.

There is a considerable variety of teaching approaches for entrepreneurship, including real-world examples, active learning, and student-centred learning that allows students to take a more proactive role in their development (Hodges et al., 2015; Mawonedzo et al., 2021; Yamada & Otchia, 2021). One example in this field is the Junior Enterprises, which connect theory and practice of entrepreneurship by executing projects for real clients under faculty supervision, enabling the development of not only technical skills but also soft skills, including communication, people management, problem-solving, and resource management (Mawonedzo et al., 2021).

Another teaching strategy used in fashion programs is internships with companies, which provides students with exposure to various stages of the production process, from design to clothing production. However, research among students conducted by Mawonedzo et al. (2021) revealed that internships do not necessarily expose students to entrepreneurship and management practices. As introduced in this section, the discussion proceeds to the theme of sustainability.

Sustainability

The concept of the circular economy is gaining traction as it provides a connective and interdisciplinary framework for addressing ethical and sustainable standards in the fashion industry (Hall & Velez-Colby, 2018). The challenge lies both in the reengineering of how products are designed and in the focus on building and sharing knowledge to put circular economic principles into practice (Hall & Velez-Colby, 2018).

Abner, Baytar e Kreiner (2019) introduce Education for Sustainable Development in the textile and clothing sector, using a student-centred approach, making students agents of knowledge creation. The study describes an experience where students are treated as consumers, aiming to raise awareness not only to influence their actions as professionals in the field but also to encourage them to take responsibility for preserving natural resources (Abner et al., 2019). Addressing sustainable processes in textile and clothing courses equips students with a toolkit to reflect on principles, tools, and strategies to be applied in their field creatively and sustainably, meeting the demands of both consumers and businesses (Rana & Ha-Brookshire, 2019).

Knowledge about sustainability is interdisciplinary, stimulating creative and critical thinking, and is supported by interpersonal skills and elements such as people and resource management, communication, and collaboration (Rana & Ha-Brookshire, 2019). Now, let's move on to the theme of research and development.

Research, Development, and Production Processes

For fashion professionals, knowledge of the market and, most importantly, an understanding of the contemporary diversity in consumer behaviour are essential. Consumers seek a good experience with clothing products (Christel, 2016). An example of this is presented by Christel (2016) in the context of the plus-size clothing segment. In this segment, individuals' body measurements have particularities that lend themselves to customization of garment patterns. The author expands the scope of the modelling challenge to other segments, such as the elderly, pregnant women, children, and people with disabilities.

In this context, data collection activities and practical project execution can be conducted in fashion programs, training students to have a keen eye for consumer diversity, as well as research trends and a global understanding of the fashion supply chain (Christel, 2016; Muzenda & Duku, 2014).

Within the production processes, technical sewing knowledge is a critical component. Ramasamy e Pilz (2019) introduce an alternative employment opportunity for agricultural communities in India. The authors present a model of sewing professional competence involving four main components: cognitive, functional, behavioural, and ethical. "Cognitive competence includes underlying theory, conceptual understanding, and tacit knowledge acquired through experience or the execution of specific tasks" (Ramasamy & Pilz, 2019, pp. 10–12).

The functional component is related to specific professional tasks, while the behavioural component refers to personal attributes and decision-making capacity within the work context. The ethical component pertains to professional and personal values related to the work context (Ramasamy & Pilz, 2019). The profession involves various activities, such as measuring, preparing, cutting clothing pieces, and making patterns according to each customer's body measurements (Ramasamy & Pilz, 2019, p. 14).

Sewing is just one element of the textile and clothing industry's supply chain. As mentioned earlier, there is a global dimension that requires innovative business processes and solutions to address the inherent challenges. This also necessitates professionals with intercultural competencies (Hodges et al., 2015).

Discussion

The sections presented expose the fashion system associated with the values of ephemerality and individualism, where the central focus is the consumer (Lipovetsky, 2009; Sant'Anna, 2009). In this scenario, the acceleration of trend launches and the seduction of the new constitute a "culture of lightness" that pervades all sectors, including fashion (Lipovetsky, 2016). The convergence of these factors intensifies pressures for obsolescence and disposal in the fashion industry, which already has significant social and environmental impacts.

In this sense, new competencies are required for fashion designers to guide aesthetic choices and means of production towards sustainability, diversity respect, and the valorisation of local production. In other words, it is necessary to combine the transformative potential of technology with a humanistic and ethical education.

The development of competencies for fashion designers is suggested to start from a systemic perspective, based on the adaptation proposed in the work of Batt et al. (2021), which is grounded in Bronfenbrenner's Ecological Systems Theory (1979). This approach involves considering the complex interactions between various actors involved in the education and professional practice of fashion designers, including students, faculty, educational institutions, employers, suppliers, consumers, and the broader socio-economic context. In this sense, the view of complexity advocated by Morin (2015) and explored by De Macedo (2022) is applicable to the field of fashion, demanding interdisciplinary and transdisciplinary solutions.

In addition to the mastery of specific technical skills such as pattern making, sewing, and drawing, authors highlight the need for employability competencies. This includes teamwork, communication, solving complex problems, self-management, and lifelong learning, as emphasized by Boahin and Hofman (2013), Muzenda and Duku (2014), and Yamada and Otchia (2021).

Entrepreneurship is also mentioned, encompassing creativity, strategic vision, project management, marketing, finance, and intercultural competencies, given the globalized value chains. The works of Hodges et al. (2020), Mawonedzo et al. (2021) and Hall and Velez-Colby (2018) emphasize the importance of involving students in real projects, junior enterprises, and international exchanges for practical professional experience.

Socio-environmental sustainability is another cross-cutting theme that should guide all design choices in production processes, considering the life cycle of products. Abner, Baytar, and Kreiner (2019), and Rana and Ha-Brookshire (2019) emphasize visions such as the circular economy and Sustainable Development Goals (SDGs), complemented by the *Fashion Revolution Movement* to contribute to a more ethical and regenerative sector.

Market research and trend analysis are crucial for understanding the diversity of contemporary consumers, including gender, age, body type, and special needs, as exposed by Christel (2016). This requires data collection and interpretation skills for user-centred design.

The text also highlights the importance of mastering traditional production processes and emerging technologies such as virtual modeling, 3D printing, and virtual reality simulations, as explained by Ramasamy and Pilz (2019). Finally, digital competencies involve not only the use of industry-specific software but also a critical relationship with technologies like artificial intelligence, respecting ethical concerns and human values.

Figure 3 is derived from the information that composed the scope review report presented and is showed in a network format that deviates from a linear and progressive structure. In this sense, competencies require an interdisciplinary or even transdisciplinary learning process that approaches the reality of a fashion designer in the working world.

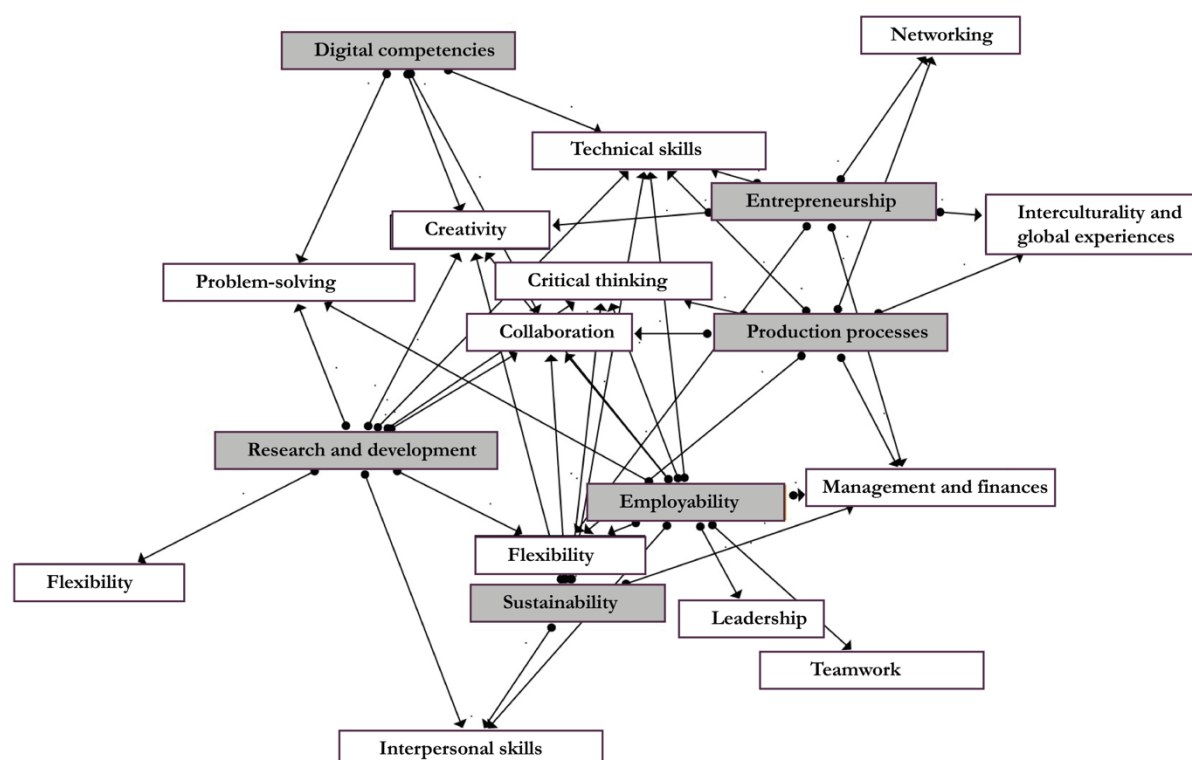


Figure 3: Developments related to the competencies of future fashion professionals

In summary, the text provides an updated overview of the competencies required for fashion designers, considering a systemic, integrated, and ethical perspective.

Conclusions

This scope review mapped the main themes and competencies required of fashion designers in contemporary times. It revealed the need for a comprehensive education that develops specific technical skills alongside ethical, reflective, and intercultural competencies.

It also emphasized the importance of interdisciplinary and transdisciplinary approaches in the curriculum to reflect the complexity and dynamism of the working world. In this scenario of acceleration and volatility, it is crucial for designers to cultivate creativity and innovation with a purpose, guiding aesthetic choices and means of production toward sustainability, the appreciation of human diversity, and respect for local cultures. Their education should enable them to consciously harness the transformative potential of digital technology without sacrificing critical reflection and a humanistic perspective.

As described by Bauman (2001) as "liquid," contemporary society questions previously unquestioned beliefs, including the educational system. Among its challenges are the allure of knowledge for immediate use, contrasting with a "solid and structured education," and the unpredictability of events that further reinforce the questioning of inflexible study programs. Thus, there is a convergence towards professional education that supports lifelong development, personalized educational paths, and flexibility in designing curricula that adapt to individual and socio-economic needs.

The study can further support in-depth reflections on curricula and educational approaches that encompass these multiple dimensions. Considering eligibility criteria, for an expanded

study on the topic, it is suggested to conduct a literature review that goes beyond scientific articles, including institutional documents from fashion design programs, theses, dissertations in the field, or grey literature.

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***‘Accept This Change’: Corrections to English Academic Writing of Advance
Non-native Graduate Students by English Native-Speaking Editors***

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Abstract

Native-speaking (NS) editors' amendments and corrections to texts written by non-native-speaking (NNS) graduate students were analyzed considering two theoretical stances: error correction and editor's role. Proofreading and editing studies have given much attention to editors' role in detecting and correcting flaws in NNS scholarly writing against a set of conventions and standards. However, the native-speaking editor's role in providing idealized versions of text, even when there are none or few language errors, has often been overlooked. NS editors' changes to a corpus of about 14000 words of academic writing by NNS Saudi graduate students were analyzed. The analysis was informed by parameters set by previous studies on corrections and editing, yet using a taxonomy specifically developed for the purpose of this research. The analysis resulted in categorizing most revisions as mechanic, syntactic, semantic and discourse. However, the analysis detected revisions that do not fit into any of these categories. More than one third of the revisions made were classified as restating grammatically correct English sentences or parts of sentences. These changes were found to be related to ideas and meaning, or organization. Editors' amendments to grammatically correct texts were thus classified into two categories: reorganizing content and modifying meaning. Findings of this study call for revisiting the long existing debate on correctness, and appropriateness of scholarly texts written by NNS academics. More importantly, however, this study aims to highlight the issue of the NS editor's authority and raise questions on how dependent NNS scholars are on NS editors.

Keywords: ESL/EFL/EAP Writing, Revision Analysis, Editing, Editors' Role, Corrective Feedback

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Introduction

L2 writing is challenging, and writers need help to perfect it, for accuracy and readability. The process of reviewing or correcting English academic writing by nonnative speakers (NNS) has been investigated by researchers within different theoretical frameworks including error analysis, revision studies, corrective feedback and editors' role and practices. The topic is wide and versatile, ranging from typologies of corrective feedback in pedagogical settings to editors' changes to research papers submitted for publishing in different fields of knowledge. The concern of this paper is to examine the nature and types of corrections and changes made by native speaking (NS) editors to understand and analyze their scope, linguistic level, and effect on meaning and coherence, and to shed light on changes that are not direct corrections of linguistic forms.

Error analysis is a methodological approach that, in the 70s and 80s, provided parameters in classifying NNS writing errors and the corrections of these errors. Error analysis is often investigated within second language acquisition theories and linked to constructs of SLA such as interlanguage, intralanguage and transfer (e.g., Corder, 1975, Chan 2010, Andrian, 2015, Chan, 2010). Chan (2010) identified errors at four linguistic levels in the writing of Cantonese ESL learners: morphological, lexical, syntactic and discourse. These levels included 32 types of errors that were compiled based on the data obtained, including misuse of conjunctions and prepositions: incorrect word order, missing subjects, and misuse of relative clauses and independent clauses. Moreover, Kaplan and Baldauf (2005) put forward a fundamental classification that would account for revisions of texts written by NNSs, namely language management and organization management. "One finding shows that it is difficult, in practice, to differentiate between simple language management issues and organized language management issues" (p 47).

Another major approach to error detection and amendment in NNE writing is corrective feedback in the context of EFL/ESL writing. Ellis (2009), for example, looked at the nature of corrective feedback and attempted to develop a typology of written corrective feedback in order to investigate the effect of different types of feedback. Ferris (1999) argues for the usefulness of corrective feedback in acquiring linguistic competence. Other studies (e.g., Bitchener, Young & Cameron, 2005) provided evidence of grammar improvement with corrected feedback but the improvement was not consistent across different writing tasks and a long time.

Problems and response to flaws in academic writing, and EFL writing in general, have also been observed and investigated from editing to scholarly writing. Editors' responses or amendments to research articles submitted for publication provided bases for much debate on the topic (e.g., Flowerdew, 2000; Burrough-Boenisch, 2003; Kaplan and Baldauf, 2005; Harwood 2019). Such research has often pinpointed areas of difficulties NNS face when writing scholarly articles.

Similar to the versatility of the purposes of corrective feedback (Ellis, 2009), the role of the editor has often been discussed in different contexts with debates on the extent to which an editor alters the text. Research that was conducted in the context of editing of texts submitted for publication has often emphasized the dominant role of editors and questioned it ethically, in other words: to what extent can a proofreader/editor ethically amend NNE texts (Harwood, 2019). Burrough-Boenisch (2003) distinguished the role of a reviewer as opposed to a copy editor. Burrough-Boenisch (2003) went further on to raise awareness of the relevance of

editors' work to ESP training. Willey and Tanimoto (2015) used the term "convenience editors", which refers to NS English teachers, who perform editing without training specialized knowledge about. The advantages of convenience editing is that editor's unfamiliarity with the topic will yield more focus on the clarity of the message. They would be more able to grasp the intuition of the authors. Burrough-Boenisch (2003) distinguished the role of a reviewer as opposed to a copy editor. Burrough-Boenisch (2003) went further on to raise awareness of the relevance of editors' work to ESP training and advocated that EAP/ESP teachers could contribute to training people for "this emerging profession".

Participants, Data and Analysis

The participants of this study are two NS editors and four female students. The NS editors, members of an institutional academic support team, have 10+ years' experience in English language teaching as well in dealing with NNE writing and/or editing/proofreading research papers. The four students are all NNS but possess high level of mastery of English language. They are enrolled in an MA program (on the field of teaching English as a second/foreign language) in a Saudi university. The researcher obtained the students' consent to get their writing edited for the purpose of this research. The written texts were submitted in fulfillment of assignments or term papers in two of the MA courses taught by the researcher.

The corpus on which this study draws comprises 13922 words from eight edited subject related writing tasks. The texts are in the 'Track Changes' Review format, and so the original writing is easily detectable. The data to be analyzed are all the edits to these texts referred to in this study as "corrections," "changes" or "modifications." All the corrections/changes were put in a templet table with two columns indicating the before and after text, three more columns indicating the effect of the correction being on form or meaning, the scope of the correction, and level of the correction. A sixth column was devoted to comments or further classifications, especially for the edits that were done on accurate text.

The researcher-coder worked on finding the changes in the documents, extracting them, and putting them in the before-and-after templet, and analyzing them on three dimensions: (i) Formal vs Conceptual, (ii) Scope, (iii) Level (Table 1). The **goal of analysis is to** characterize editors' modifications, with reference to their categories and frequencies. Each correction/change was categorized at the three following dimensions.

1. Effect of modification: if the modification resulted in a change to the **form** (language) or **concept** (meaning).
2. Scope of modification: the physical stretch of text covered by a change.
 - Word: Changes within the single word or morphemes within the word
 - Phrase: Phrase-level revisions are done to noun phrases, verb phrases, adverbial phrases, adjective phrases, and prepositional phrases in a way that is acting within the phrase without affecting the structure of the sentence.
 - Sentence: Including revisions within a clause or at close boundary, e.g., combining clauses or integrating a clause into sentence. It also includes changes to relationships between clauses.
 - Text: moving, deleting, and adding a minimum of one sentence or a clause around text. It also includes adding a title or an introduction, or revisions to paragraphing.

3. Level of modification: the linguistic component influenced by the change:

- Orthographic and mechanics: include spelling, punctuation, capitalization, punctuation, indentation, and re-paragraphing (splitting or combining paragraphs).
- Syntactic/ morpho-syntactic: changes to sentence structure; or changes within morphemes (words, etc.) because of their grammatical function/location or relation to the surrounding elements.
- Semantic: changes or modifications made to the meaning of a word or an utterance.
- Discourse: changes that affect the text beyond the sentence, including cohesion, changes to the structure of text, sequencing and linking. (How elements of the discourse fit together, e.g., adding or deleting discourse marker, such as “because”).

Table 1: Dimensions of the analysis and possible intersection amongst them

Scope	Morpheme/Word (W)		Phrase (NP/VP/PP/AP/ADJP)		Sentence (S)		Text (D)	
Effect Level	Form	Concept	Form	Concept	Form	Concept	Form	Concept
Orthographic/ Mechanic	Capitalization/ Spelling	X	apostrophe in possessive 's, word order	X	punctuation	X	joining or splitting sentences and paragraphs	
Syntactic/ morpho-syntactic	(go, goes)	Verb tense	Articles, plural vs singular	Modifiers; quantifiers; determiners	Verb subject agreement	Within sentence	X	X
Semantic	Word category	Word choice	X	Modification to meaning Articles*	X	Modification to proposition	X	X
Discourse	X	X	X	X	X	X	Restructuring, rearranging, adding, deleting, moving.	

Findings and Discussion

As the researcher coder extracted corrections and analyzed them at the three dimensions, a number of issues appeared. The first is the complexity of editors' changes. There would be multiple changes to a sentence or more, and it would be difficult to decide if the editor corrected the mistakes one by one or had decided to rewrite the whole segment in another way. Sometimes the researcher would mark these instances and get back to the editor for clarification. Table 2 shows an example of multiple corrections.

Table 2: Sample coding templet showing multiple corrections

R#	Before	After	F/C	Scope	Level
11	Most important term was a term presented by Holec (1981) whom is considered the father and the founder of individual and autonomous language learning. . . . “to say of a learner that he is autonomous is to say that he is capable of taking charge of his own learning” (As cited in Schmenk, 2005, p. 4).	Holec (1980), largely regarded as the father of autonomous language learning theory, defines autonomous learning as the learner being “capable of taking charge of his own learning” (As cited in Schmenk, 2005, p. 4).	F	text	discourse
12	considered	regarded as	F	W	semantic
13	considered the father and the founder	regarded as the father and the founder	C	NP	semantic
14		[the relative clause is restated instead of correcting ‘whom’]	F	S	discourse
15		[the quoted definition is moved from the end of the paragraph to this place.]	F	text	discourse
16		[moving this chunk of text to the next paragraph]	F	text	discourse

The editor made a number of changes to the above text while reorganizing the content. The first impression is that the editor chose rephrasing instead of correcting (R#11). However, a closed look at the changes reveals smaller corrections: replacing a lexical item with another (R#12), removing similar adjective (R#13), reorganizing the definition for clarity (R#14), synthesizing content by combining the introduction of Holec and his quoted definition (R#15), and finally moving the modified text about Holec to the next paragraph to join other scholars’ opinions and definitions (R#16).

Another issue was determining Scope. For some feedback modifications, it is often difficult, based on the Before/After excerpts listed in the coding sheet, to determine the Scope of the error: phrase, clause, sentence, text. To assist in this determination, the first two columns of the coding sheets were expanded to show more extensive chunks of text in the Before/After columns. When needed, larger chunks of text were put in the before/after columns at their first analysis, even if they contain multiple corrections, and subsequent corrections were characterized in the following rows without repeating the text chances again (e.g., rows 12-16 in Table 2).

Coding changes in verb tense from present simple to past simple, e.g. rows 48 and 49 (Table 3), there was uncertainty about whether such correction should be coded as having the level “Discourse” rather than “Syntactic.” The student writer is most likely able to distinguish between present and past, but she has consistently used the present tense throughout the text, which means that it is her decision about the whole discourse. The editor, as well, seems to be consistent in correcting the tenses based on her knowledge about academic discourse conventions (i.e., reporting research procedure).

Table 3: Sample coding of verb tense correction

R#	Before	After	F/C	Scope	Level
48	The steps are clear	The steps were clear	F	VP	Discourse
49	and directs	and directed	F	VP	Discourse

Likewise, the semantic level of correction wasn’t always easy to define as form or concept. While semantic level denotes meaning, and meaning is inherently relevant to concept, the semantic corrections in rows 56 and 57 (Table 4) of the sample were coded differently.

Table 4: Sample coding of Form/Concept coding

R#	Before	After	F/C	Scope	Level
56	The writer	The <u>authors</u>	C	W	Semantic
57	The writer	The <u>authors</u>	F	W	Semantic

The analysis yielded data on categories of changes that are not direct corrections of mistakes or writing flows. The editors often added words and phrases to clarify or enhance meaning, or even to modify meaning. Some of these changes were words or phrases and some of them extend beyond the sentence and influenced a larger scope of text. These types of modifications accounted for more than a third of the total number of revisions. The best way to look at them was probably to analyze the underlying reasons for these changes. The editors seem to have taken authority to change students’ text to clarify meaning. In row 83 (Table 5) for example, the adjectives ‘overall’ and ‘language’ add clarification to the word ‘proficiency’, while in row 105, the adverb ‘specifically’ enhanced the meaning and purpose of the following sentence. Also, there have been changes to text based on academic discourse conventions (row 119), and discourse coherence (121).

Table 5: Some occurrences of changes to grammatically correct text

R#	Before	After	F/C	Scope	Level	Possible purpose of editors' changes
83	The proficiency level of the learners was low.	The <u>overall language</u> proficiency level of the learners was low.	C	NP	Semantic	MC*
105	Learners in each session would	<u>Specifically</u> , learners in each session would	C	S	Discourse	ME**
119	Two major points, {nothing}	Two major points; first ...	F	S	Discourse	AD***
121	scaffolding through the essay cycle.	scaffolding through the essay cycle and second, ...	F	T	Discourse	DC****

*Meaning clarification, ** Meaning Enhancement, ***Academic discourse, ****Discourse coherence.

The total number of tracked changes made by the editors was 1570. That is about 11.3 change per hundred words (total word count of the sample texts was 13922). 52.65% (n=725) of these changes had an effect on form, and 46.75 (n=734) affected meaning of the modified text. The scope of text affected by editors' corrections was mostly within a word, with almost 30% of the changes, and the least was on Text (Table 6).

Table 6 Occurrences of different Scope of modification

	Word	Phrase	Sentence	Text
N	469	428	346	244
%	29.88	27.27	22.08	15.58

As for the linguistic level of changes, almost half of the changes were made at the level of semantics 45.45%, with the minimum changes made at the syntactic level (Table 7).

Table 7 Occurrences of modifications at different linguistic levels

	Semantic	Mechanic	Syntactic	discourse
N	714	387	142	326
%	45.45	24.68	9.09	20.78

Conclusion and Implications

Identifying and categorizing corrections made to NNS academic writing by NS editors is a complex process. The categories employed in this research might be useful in distinguishing formal and conceptual corrections, as well as the linguistic level of the treated error. However, and more importantly, editors were found to go beyond the correction of language to changing, enhancing, and correcting meaning. Moreover, sometimes the editors would go

beyond meaning modifications, to modify longer stretches of text synthesizing and reorganizing content. In doing so editors make use of their knowledge about the writing tasks, academic writing conventions and about the real world. In doing so, English native speaking editors seem to take a great deal of authority in correcting and modifying graduate students' academic texts.

The high number of amendments to language, to academic discourse conventions and to content and organization enhance the long existing debates on correctness, and appropriateness of scholarly texts written by NNS academics. Such a debate could highlight the issue of the native speaker authority and raise questions on how dependent nonnative speaking emerging scholars are on native-speaking editors. In fact, the action 'Accept this Change', which is often the action taken by the student writers when they get their edited work back, denotes the passive role of the student writers, especially under the constraints of time.

Methodologically, research with such large data and multiple-dimension analysis demonstrated the difficulty and complexity of capturing feedback modifications, and analyzing their scope and effect, as well as the difficulty of assessing editors' role.

The categorizations proposed in this paper have potential for further research and investigation. Since the language proficiency level of the participants here is quite high, perhaps studying samples from language levels will yield significant findings relevant to English language learning and teaching.

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Language Learning Motivation Among Vietnamese EFL Students

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Abstract

This study investigated the degrees of language learning motivation among Vietnamese EFL full-time and part-time students, focusing on their instrumental and integrative motivations. The study's results, involving 271 students from a public higher education institution, revealed that Vietnamese students have high levels of language learning motivation. Full-time students, particularly, have higher levels of integrative motivation, whereas part-time students have higher levels of instrumental motivation. Furthermore, the current study's qualitative data reveals EFL students' intuitive understanding of the term 'language learning motivation' was rather close to that of the literature. Upon their consideration of the importance of English, EFL students in Vietnam have positive attitudes toward learning a second language and disclose numerous approaches to sustain their learning process. Finally, based on the study's findings, suggestions and recommendations for teachers have been highlighted.

Keywords: Language Learning Motivation, Instrumental Motivation, Integrative Motivation, Vietnamese Students

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Introduction

Upon the effects of ongoing globalization worldwide, the need for the cultivation of English as a global language has been rising, especially when it is believed that undergraduate students should enter the 21st century's workforce with the 4Cs (Critical thinking, Collaboration, Creativity, and Communication) (Halvorsen, 2018). As commonly recognized as a lingua franca, English plays a significant role in the promotion of the process of globalization and internationalization (Altbach & Knight, 2007; Duong & Chua, 2016) occurring in most of the world's corners, including developing nations (Hoang, 2013; Q. A. Le, 2016; T. T. N. Le, 2016). Having been considered one of the most dynamically emerging economies (Tung, 2018), Vietnam has a rising demand for high-quality human resources (Kieu, 2010; Van & Phuong, 2021), and proficiency in English is one of the necessary requirements (Nguyen, 2016) because of its importance in promoting the country's economy (Vu & Peters, 2021). In this context, EFL graduates who possess a good command of English can have advantages in future employment. Since exchanging ideas and information is the main purpose of language (Deveci et al., 2021; Koch & Takashima, 2021; Vieluf & Göbel, 2019), the main goal of English language teaching (ELT) is evidently to assist students in improving their language skills and competence. Motivation to learn English, in this case, seems to be the key to any possible success or failure (Brown, 2000) of difficult tasks, including acquiring language content (e.g. grammar, structure, vocabulary), or language skills (e.g. listening comprehension, pronunciation), developing some degree of fluency, and so forth (Guan, 2019; Pinillos, 2021; Rost, 2013). Also, other aspects of the language (e.g. intercultural communication) should be cultivated to achieve higher levels of competence so that the effectiveness of communication across cultures can be facilitated (Bennett & Bennett, 2004; Byram, 2021; Deardorff, 2014). Nonetheless, it is widely agreed that learning a foreign language is a difficult, time-consuming process (Robert C Gardner, 2001), and the success of second language (L2) learners depends on the extent of their desire and efforts in goal achievement (Gilakjani et al., 2012). Therefore, it is believed that motivation is responsible for the determination of human behavior as it helps energize and give concentrated directions during the learning process (Dörnyei, 1998). In this context, the focal point of the present study, therefore, is to quantitatively and qualitatively explore Vietnamese EFL students' language learning motivation and pertinent approaches EFL students have been strategizing to sustain their learning aspirations.

Research Questions

Based on the research aims, this study sought answers to the following research questions:

Research question 1: What is the language learning motivation level of EFL students?

Research question 2: How is language learning motivation defined by Vietnamese EFL students?

Research question 3: At what level do students evaluate their language learning motivation? Why?

Research question 4: How do EFL students think about the importance of language learning motivation?

Research question 5: How does EFL students' language learning motivation develop?

Literature Review

There are a variety of studies and experiments that support the importance of motivation in learning and teaching a second language, such as Alizadeh (2016), Mirzaei and Forouzandeh (2013), Oga-Baldwin et al. (2017), Peng and Fu (2021), Tsai (2012), or Vaezi (2008); and theories and models are also offered to investigate motivation in the second language acquisition, e.g. Clément et al. (1994), Dörnyei (1998), or Gardner (2004). Researchers and teachers seem to agree that motivation plays a crucial factor as it influences the degrees of rate and success of L2 learners. Gardner (2001, p. 2) defines that “motivation is a central element along with language aptitude in determining success in learning another language in the classroom setting”. In consideration of the emotions of L2 learners, Dörnyei (1998) states that motivation plays the primary impetus to initiate the learning of L2, and becomes the driving force to sustain the long and tedious process. Such perspectives place a significant emphasis on the important role of motivation to any L2 learner. An individual, accordingly, who only has language aptitude, might not become a successful learner without sufficient motivation regardless of her/his remarkable abilities (Dörnyei, 2001). In contrast, a learner who has language deficiencies can still manage to be successful thanks to high levels of motivation. Being considered a socio-cultural aspect involved in the process of language learning (Gardner, 2001), studies attempted to explore motivation in numerous constructs, of which the integrative motivation and instrumental motivation appear to be mostly analyzed. The two types of motivation were offered by Robert Gardner and Wallace Lambert in 1972, categorizing L2 learners into two groups (Mehrpour & Vojdani, 2012). L2 learners with the instrumental motivation acquire a language to obtain specific goals, such as advancing professions or careers, reading technical documents, having job promotion, or earning higher salary, and so forth, whereas ones with the integrative motivation would like to integrate into a (new) culture “of a second language group and become involved in social interchange in that group” (Brown 2000, p. 162). Accordingly, an instrumentally motivated L2 learner has pragmatic considerations, while an integratively motivated learner is more interested in learning and understanding the target language’s culture and people (Vaezi, 2008).

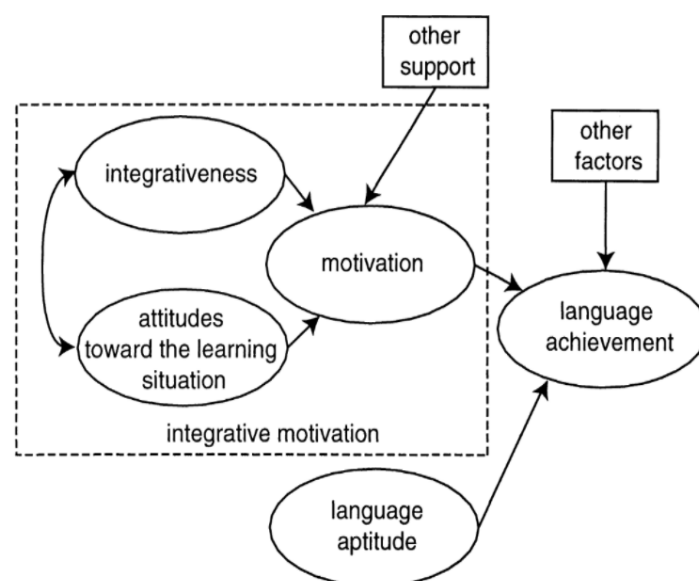


Figure 1: A simple representation of the socio-educational model
 Source: Gardner (2001)

The socio-psychological model divides students' language learning purposes into two categories: integrative and instrumental (Vakilifard & Khaleghizadeh, 2021). Similarly, Gardner (2001) explained that the variable 'Integrativeness' shows the reflection of L2 learners' interest to get closer to an alien community. In other words, students may have a positive attitude toward the target language speakers and culture when having integrative orientation; this orientation, in reality, encourages L2 learners to seek culture-oriented resources, such as movies, songs, and literature, or stimulates them to communicate in the target language with people from the target community; all these goals are considered invisible (Robert C Gardner, 2001; Vakilifard & Khaleghizadeh, 2021). To illustrate the connection between the two variables *integrativeness* and *attitude* of L2 learners, Gardner (2001, p. 5) explained that it involves "emotional identification with another cultural group", which means that L2 learners' favorable attitude toward the community can be established, resulting in an integrative orientation toward learning the second language. The instrumental orientation, nevertheless, encourages learners to be proficient in the target language, aiming to achieve their visible purposes, such as completion of academic results or accomplishment of professional career. The variable Attitudes Toward the Learning Situation involve affects and attitudes toward "any aspect of the situation in which the language is learned" (Gardner 2001, p. 5). The variable Motivation, which is a result of integrativeness and attitudes toward the learning situation, refers to the driving force in any situation and has three elements: efforts to learn the language, achievement of the goal, and enjoyment of the L2 learning task (Gardner, 2001).

In the field of education, there is a seemingly common agreement that students who do not have motivation are not willing to learn. It is metaphorically described that one can lead a horse to water, but cannot make it drink. In foreign language learning, motivation is a critical variable as it can help to bring driving forces to learners, and make them become self-motivation (Nunan & Lamb, 1996). Discussing the role of motivation, Kikuchi (2009) stated that it is crucial and necessary for a learner to acquire and be proficient in a second or foreign language. Therefore, there have been a variety of scholarly studies on motivation, which reveal that demotivation is an attribute to learners' lack of success in L2 acquisition (Badrkoohi, 2018; Kim, 2009). As a result, many scholars and researchers conducted studies on demotivation and language learning motivation among learners such as Alizadeh (2016), Ebata (2008), and Wu (2003). It is believed that if learners' motivation can be measured and understood, the motivational aspects could be encouraged. This study, therefore, explores the degree of L2 learners' motivation, inclines of their motivation types during the learning process, and investigate students' perceptions of motivation.

It seems an uneasy task to decide which one is more important, the instrumental motivation or the integrative motivation, because both are obviously significant to L2 learning. According to Vaezi (2008), because the success of L2 learning can be foreseen, integrative motivation is somehow considered superior to instrumental motivation. Accordingly, when students appreciate culture of the target language, they have dynamics to acquire and practice the language on daily basis to learn the language and its culture. On the other hand, instrumental motivation is important and meaningful to learners who do not have much access to the L2 culture or native settings. Vaezi (2008) points out the opposition between Gardner and Lambert's research versus Dörnyei's study. The former places emphasis on importance of integrative motivation other than instrumental motivation in a formal learning environment, whereas the latter claimed that what learners could achieve for what they need is more meaningful and significant than the integrative motivation.

According to Dörnyei (1998), there are two main motivation components: intrinsic and extrinsic. Intrinsic motivation refers to the enjoyable engagement, which drives an individual into doing an action, whereas extrinsic motivation refers to a force that makes one take an action because there are external rewards of doing so, such as possessing a bachelor's degree, or getting promotion at work. Brown (2000) considered intrinsically motivated behaviors are aimed at bringing about "internally rewarding consequences" (p. 164), such as feelings of competence, achievement, and self-determination. Extrinsically motivated behaviors, on the other hand, are conducted with anticipation of a reward from outside (Brown, 2000), such as bonus, prizes and positive feedback.

Brown (2000) also analyzes to show the relationship between intrinsic and extrinsic motivation by arguing which one is more superior. An intrinsic motivation may be integrative motivation when one learns a foreign language because of integrative purposes, whereas an extrinsic motivation becomes instrumental motivation if an individual would like to achieve external rewards. It is seemingly agreed that intrinsic motivation is more powerful than extrinsic motivation, because one can still succeed even without existence of any external rewards. Instead, that individual strives for self-esteem and fulfilment (Brown, 2000). According to Bruner (1966, as cited by Brown, 2000), the "autonomy of self-reward" should be promoted, being free from the control of rewards and punishments is considered the most effective approach to young and adult learners.

The construct of motivation types, however, are not entirely similar, intrinsic motivation is not the same of integrative motivation, and extrinsic motivation cannot be another word for instrumental motivation. Brown (2000) highlights the difference between the intrinsic-extrinsic construct from Gardner's integrative-instrumental orientation. For instance, one could learn a foreign language with intrinsic purposes so that future career (such as becoming an interpreter) can possibly be advanced and earn good incomes. Similarly, a prize gained from a foreign language contest can become a powerful force that develops an L2 learner's positive affect toward speakers of a second language. Bailey (1986, as cited by Brown, 2000) produces a diagram to show the relationship between the four components of motivation.

Table 1 : Motivation Dichotomies

	Intrinsic	Extrinsic
Integrative	L2 learner wishes to integrate with the L2 culture (e.g., for immigration or marriage)	Someone else wishes the L2 learner to know the L2 for integrative reasons (e.g., Japanese parents send kids to Japanese-language school).
Instrumental	L2 learner wishes to achieve goals utilizing L2 (e.g., for a career)	External power wants L2 learner to learn L2 (e.g., corporation sends Japanese businessman to U.S. for language training)

Note. From Principles of language learning and teaching (Vol. 4), by H. D. Brown, 2000, Longman.

Overall, there are four main types of motivation: instrumental motivation, integrative motivation, intrinsic motivation, and extrinsic motivation. They are somehow in common, as ones refer to L2 learners' self-determination (integrative and intrinsic motivations) regardless of any rewards, whereas the others refer to learners' specific achievements and purposes. Some researchers may think that the *integrative and intrinsic motivations* are superior because of their attributes to internal forces of learners and develop learners' autonomy; nevertheless, other scholars suppose that the *instrumental and extrinsic motivations* might be more powerful as learners' success can be anticipated. Even so, there is no doubt to affirm

that motivation is crucial to any L2 learners regardless of their language aptitude. Their motivation can be instrumental or integrative, and then be changed into extrinsic or intrinsic.

Methods

Research Procedures

The research was conducted at a public higher education institution in Hanoi, Vietnam. The institution has 20 faculties and departments, including the English Department (ED), which offers the four-year full-time and part-time programs of English Studies in two vocational orientations: ELT and Interpreting-Translation. Upon agreement of the Dean of the English Department, Hanoi University, the researcher contacted 550 EFL students studying the second, third, and fourth years and invited them to participate in the study. The questionnaire was completed by 274 participants anonymously and submitted online. The data collected were then analyzed with deployment of the SPSS software.

Data Collection and Analysis

The present study used the survey questionnaire to collect quantitative data in the first phase to answer the RQ1. Semi-structured interviews were conducted in the second phase, adding depth to the answers of the RQ2, RQ3, RQ4, and RQ5.

The questionnaire included 25 items assessing the level of motivation of EFL students. The Integrative and Instrumental motivation scale were mainly adapted from the previous research instruments (Gardner, 2004; Vaezi, 2008). The measure of the items was scored on a five-point Likert scale, with 1 indicating *strongly disagree* and 5 referring to *strongly agree* (Table 2). The questionnaire had two parts; part I included 25 items that measure L2 learners' motivation. The Cronbach's alpha reliability coefficient was 0.931, which means the items are reliable (Cohen et al., 2007). Part II collected participants' background information such as age, gender, educational level, and agreement on interview participation.

Table 2: Constructs of the Questionnaire

Constructs		Items	Total
Language learning motivation	Integrativeness	From 1 to 12	25
	Instrumentality	From 13 to 25	

The quantitative data collected via questionnaire survey were analyzed statistically under the guidelines of Pallant (2013). The procedure included three steps: (1) screening and cleaning the data, (2) preparing the variables for analysis, and (3) choosing and using the statistical techniques for analysis. In order to seek the proper answers to the research questions, descriptive and inferential statistics analysis were employed.

To explore the level of language learning motivation among EFL students, the respondents were asked to rate their level of agreement with the five-point Likert scale; in details, the highest mean score (=5) indicated the most agreeable items, and the lowest mean score (=1) indicated the least agreeable ones. Paige et al. (2003) noted the Likert scale technique score statement could indicate the degree of agreement. Five-point Likert scale, hence, was adapted and summarized in Table 3:

Table 3: Interpretation of Five-Point Likert Scale

Rating	Mean	Agreement level
5	4.51 – 5.00	Very high
4	3.51 – 4.50	High
3	2.51 – 3.50	Not sure
2	1.51 – 2.50	Low
1	1.00 – 1.50	Very low

Note. From “Culture learning in language education: A review of the literature,” R. M. Paige, H. L. Jorstad, L. Siaya, F. Klein, & J. Colby, in D. L. Lange & R. M. Paige (Vol. Eds.), & J. H. Sullivan (Series Ed.), *Culture as the core: Perspectives on culture in second language learning* (pp. 173-236), 2003, Information Age Publishing.

Participants

The present study had the participation of 274 EFL students (specified in Table 4), who were full-time and part-time students at the English Department, Hanoi University, Hanoi, Vietnam. In this study, full-time students, averagely aged 20, were the ones spending most of their daytime for study, while part-time students, averagely aged 31, were the ones being able to study after work hours only (mainly in the evenings). Furthermore, part-time students of the present study possessed at least one Bachelor’s Degree, which serves as one of the admission requirements for the program; hence, they did have professional experience prior to participating in the present study.

In the second phase of the study, semi-structured interviews were conducted with participation of twelve students (specified in Table 6), open-ended questions were asked for them to elicit their perceptions of language learning motivation as shown in the following table.

Table 4: Participants of the two research phases

Phase	Instrument	No. of students invited	No. of students participated
1	Questionnaire	550	274
2	Semi-structured interview	30	12

Table 5: Survey participants

Student group	Number of Participants				Total	Gender of Participants		
	1 st year	2 nd year	3 rd year	4 th year		Female	Male	Rather not say
Full-time	-	75	77	72	224	202	21	1
Part-time	32	7	6	2	47	35	10	2
					271			

Table 6: Participants of the interview

No.	Participants (Pseudonym)	Abbreviation of names	Gender	Education level	Group
1	Lien	L	Female	3 rd	Full-time
2	Thanh	T	Female	3 rd	Full-time
3	Mai	M	Female	4 th	Full-time
4	Nhan	N	Female	4 th	Full-time
5	Phuong	P	Female	3 rd	Full-time
6	An	A	Female	2 nd	Full-time
7	Binh	B	Female	2 nd	Full-time
8	Khanh	K	Female	2 nd	Full-time
9	Oanh	O	Female	3 rd	Full-time
10	Quyen	Q	Female	1 st	Part-time
11	Vy	V	Female	1 st	Part-time
12	Chi	C	Female	1 st	Part-time

Summary of Findings

RQ1: What is the language learning motivation level of EFL students?

Integrative motivation

Table 7: Descriptive results of Integrative Motivation

Item	I study English ...	Full-time students			Part-time students		
		M	SD	Label	M	SD	Label
1	To be more at ease with other people who speak English	4.58	.593	Very high	4.66	.522	Very high
2	To meet and converse with more and varied people	4.59	.600	Very high	4.55	.686	Very high
3	To better understand and appreciate English art and literature	4.40	.726	High	4.19	.970	High
4	To participate more freely in the activities of other cultural groups	4.39	.756	High	4.28	.826	High
5	To know the life of the English-speaking nations	4.37	.741	High	4.13	.711	High
6	To understand English pop music	4.00	.876	High	3.79	.977	High
7	The more I get to know native English speakers, the more I like them	3.86	.849	High	3.68	1.002	High
8	To know various cultures and peoples	4.39	.674	High	4.43	.773	Very high
9	To keep in touch with foreign friends and acquaintances	4.20	.752	High	4.06	.870	High
10	To know more about native English speakers	4.22	.754	High	4.00	.860	High
11	The British are kind and friendly	3.59	.775	High	3.36	.673	Not sure
12	The Americans are kind and cheerful	3.62	.754	High	3.38	.709	Not sure
Overall mean score		4.18		High	4.04		High

Note: M = Mean (N=224), SD = Standard Deviation, N = Number

Table 8: Descriptive results of Instrumental Motivation

Item	I study English ...	Full-time students			Part-time students		
		M	SD	Label	M	SD	Label
13	I'll need it for my future career	4.65	.609	Very high	4.74	.530	Very high
14	It will make me a more knowledgeable person	4.48	.669	High	4.60	.681	Very high
15	It will someday be useful in getting a good job	4.61	.604	Very high	4.85	.360	Very high
16	Other people will respect me more if I know English	3.62	1.004	High	3.83	1.028	High
17	I will be able to search for information and materials in English on the Internet	4.53	.627	Very high	4.64	.605	Very high
18	I will learn more about what's happening in the world	4.33	.702	High	4.45	.880	High
19	Language learning often gives me a feeling of success	3.95	.851	High	4.15	.932	High
20	Language learning often makes me happy	3.99	.836	High	3.98	.872	High
21	An educated person is supposed to be able to speak English	3.41	1.125	Not sure	3.68	.935	High
22	I can understand English-speaking films, videos, TV or radio	4.38	.658	High	4.38	.644	High
23	I can read English book	4.33	.696	High	4.53	.620	Very high
24	To know new people from different parts of the world	4.34	.644	High	4.32	.663	High
25	Without it one cannot be successful in any field	3.12	1.192	Not sure	3.30	1.082	Not sure
Overall mean score		4.13		High	4.27		High

Comparison between the mean scores of the questions in integrative part illustrated that students were strongly motivated in questions 1, 2, 3, 4, 5, and 8, with the mean scores from 4.37 to 4.59, followed by the other questions 6, 9, and 10, ranging from 4.00 to 4.22. Three items (Q7: The more I get to know native English speakers, the more I like them; Q11: The British are kind and friendly; Q12: The Americans are kind and cheerful) had the lowest mean scores in the integrative part.

Generally, respondents agreed that studying English was important as they could interact with other English speakers, meet and be exposed to various cultures, understand and appreciate art and literature, and join a variety of culture-related activities, resulting in their understanding of other people and their background. However, they are more neutral in considering British and Americans as kind and friendly speakers. With an overall mean score of 4.18 and 4.04, it could be concluded that most students have high integrative motivation toward learning English.

Instrumental Motivation

An examination of the frequency distribution and mean scores of the instrumental part shows that items 13 (M = 4.65 & 4.74), 15 (M = 4.61 & 4.85), and 17 (M = 4.53 & 4.64) had 'very high' scores for both student groups and items 14 and 23 had 'very high' scores for part-time students, revealing that English learners would like to be good at English for future jobs. Most of the other items had 'high' scores, indicating students agreed with most of the other statements, including the fact that they could be more knowledgeable thanks to being

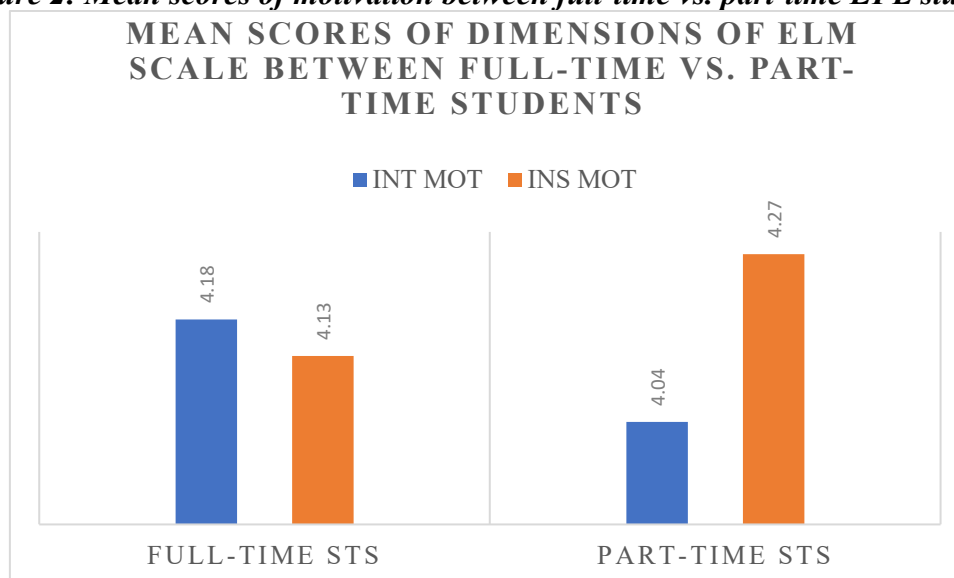
proficient in English; they could receive respect from others because of their ability to communicate in English, get updated of news, have feelings of success, understand English-speaking resources, know more people from other nations and cultures, and after all, feel happy.

On the other hand, participants were ‘not sure’ about items 21 and 25, indicating that it is not necessary to possess good English ability to be considered an educated person, and English is not essential to success in any field. With an overall mean score of 4.13 and 4.27, it could be concluded that most students have high instrumental motivation toward learning English.

Table 9: Comparison of motivation between full-time vs. part-time EFL students

Dimensions	Mean	
	Full-time STs	Part-time STs
INT MOT	4.18	4.04
INS MOT	4.13	4.27

Figure 2: Mean scores of motivation between full-time vs. part-time EFL students



RQ2: How can language learning motivation be defined by Vietnamese EFL students?

The full-time second-year students seemed to have similar ideas on the way the concept could be defined, as they emphasized some keywords such as “encouraging”, “motivating”, or “stimulating”.

Moreover, the full-time third-year students and part-time first-year students highlighted the definition of language learning motivation with some words such as “purpose”, “goals”, and “determination” when shaping their own ideas. For example, Lien (L1) said that it was until you realize your purpose and goals for study, such as for a career or for pleasure. Similarly, Oanh (O9) embraced the efforts of the process and stated that it was about someone’s own identification of her/his goals, with utmost determination to achieve what an individual wanted. This opinion was quite similar to a fourth-year student’s idea, Nhan (N4), as she stated, “It will be the reason why you want to study that language,” or Phuong (P5) mentioned that any realistic reason leading you to the goal one wants to. Another similar perspective shared by part-time students including Quyen (Q10), Vy (V11) and Chi (C12)

was because of personal purposes of an individual that drives one to learn a second language for specific goals, such as a job so that prospective opportunities could be brought and blossom their employment chances.

RQ3: At what level do students evaluate their language learning motivation? Why?

Most interviewees gave themselves a score of 8 or 8.5 (out of ten) even though their reasons were not the same. Lien (L1) said that she used to learn for pleasure, but now she had to learn for her future career. Other eight-point students, such as Binh (B7), Khanh (K8), Oanh (O9), Quyen (Q10), and Vy (V11) also shared the same idea; they were in need of English for future jobs; all envisioned their job prospects which could be involved with the high level of English language, hence explaining their current high learning motivation. One participant, Nga (#5) evaluated her motivation at the score of nine since she wanted to speak English as a native speaker. Only one participant, Chi (C12) stated that her motivation was worth ten because she had set up and known specific goals for learning English.

On the other hand, Thanh (T2) and Nhan (N4) gave six and seven respectively to their motivation even though they were aware that English is a lingua franca, and they got an advantage to communicate with many people in the world; however, their motivation was not stable.

RQ4: What do EFL students think about the importance of language learning motivation?

One hundred percent of the interviewees agreed that motivation to learn a language is important, with the use of adverbs “very” or “extremely” to emphasize their opinions. Students believe that thanks to motivation, they will be more active in learning and have better results. Participants were aware that the learning process required patience and stability, and hence they could increase their personal language ability thanks to motivation. Besides, motivation could be helpful in nurturing and maintaining interests – the important factor that they are in need of during the process of learning, otherwise, “if you do not have motivation in doing anything, you cannot go along with it” stated Nhan (N4/15).

To emphasize the points, Chi (C12) explained that “whenever I feel demotivated, I always recall the reason why I chose to learn English, then I will feel better and retain motivation” (C12/16). Finally, Binh (B7) supposed motivation helped learners acquire more knowledge and expand their network while learning English.

RQ5: How does EFL students’ language learning motivation develop?

Regardless of various reasons, all participants stated that their motivation level is now higher than when they were high school students. Some of the participants confided their motivation to learn English had been increasing since the commencement of their study at the University, partly because they realized other friends and classmates were much better at English than theirs. With the fear of being “left behind” as confided by An (A6), the student had her own internal motivation to overcome difficulties during the learning process and kept moving forward with the learning and practicing. A little more different, Binh (B7) felt positively overwhelmed when entering the university where things were so new to her; however, that fresh, initial feeling turned out to become a motivation to the student, stimulating her own eagerness and interest in learning the language major as she chose.

Quyen (Q10) also admitted that overwhelming feelings made her sometimes anxious at the beginning; nevertheless, thanks to communicating with teachers and classmates about her worries, she could manage to overcome such a difficult time and got back to study more effectively.

On the other hand, most of the other participants stated that their motivation could be developed because of easy and redundant access to the Internet and media, where all kinds of resources could be found, such as videos, movies, songs, talks, speeches, stories, dramas, animations, etc. The basic reason for students' access to such resources is that they are in love with the native culture.

Furthermore, the study environment plays an important role in facilitating and inspiring learners to increase their learning motivation. Nhan (N4) used to feel demotivated sometimes during her learning process; nevertheless, opportunities to meet foreign friends gradually changed her mind and attitude, bringing back her aspiration to learn English now. Khanh (K8) also got a similar situation, when occasional meetings and communication with foreign friends could motivate the student to learn English. Thanh (T2) had a specific result thanks to her motivation to learn English when she got a chance to work with a foreign professor on an international project during her first-year study, which then turned out to become her new motivation to learn the language.

Sometimes, the vision of self in the future could help learners to increase their motivation, and Oanh (O9) was an example of this circumstance. Having admitted that the learning process sometimes had been tedious and boring, Oanh (O9) often pictured her future jobs doing some specific tasks. Thanks to this imagination, the student could have intrinsic motivation and move on with their study. Most of the participants interviewed confirmed that their motivation to learn English was higher than when they were in high schools.

Discussion and Recommendation

First, the students of the current study have a high level of both integrative and instrumental motivations. Nevertheless, full-time students have a higher level of integrative motivation, while part-time students have a greater level of instrumental motivation. Even so, most participants interviewed emphasized their motivation to learn English was because of their concern for prospective employment opportunities, which can be labeled 'instrumental motivation'. Meanwhile, only three (out of ten) participants would like to communicate as well as native speakers, which can be considered 'integrative motivation'. The findings of the study reveal the pragmatic goals of most EFL students in L2 learning.

Second, students' personal definition for the concept of motivation can be considered quite close to that of the literature when most of them emphasized the two main motivation orientations proposed by Gardner (2001). By emphasizing some ideas of attempts to embrace learning instead of giving up or endeavors to have more intensive and effective learning approaches so that visible goals relating to prospective jobs can be realized, this group of EFL students seems to highlight the importance of instrumental motivation that can stimulate their learning process. Furthermore, this implies their enjoyment of the L2 learning task as Gardner (2001) coined in the socio-educational model, which is considered an important factor that sustains the long and sometimes tedious learning process (Dörnyei, 1998).

Third, most students of the current study are aware of their level of language learning motivation. This was basically built on the students' goals for employment prospective, at which high proficiency of English would be highly demanded, resulting in personal stimulation to learn the second chosen language. They, hence, could shape their own understanding on the meaning of language learning motivation, which generally was described as individual goals or self-motivation recommended by Nunan and Lamb (1996), coupling with determination of L2 learners that encourage ones to embrace continual learning processes until specific achievements could be realized. Reflecting this into the literature, this proposed definition is close to those of Dörnyei (1998) and Gardner (2001), who asserted that one might not succeed without appropriate levels of motivation. Even though some of the participants of the study may not have stable motivation during the L2 process, they are aware of the fact that they will have advantages once possessing English proficiency. Their perceptions fit the contemporary trend of globalization and internationalization occurring worldwide, which fosters increasing needs for good English competence so that furtherance of the process can be facilitated thanks to better cultural understanding among people from different cultural backgrounds. This situation can benefit Vietnam, a fast-developing nation in need of highly qualified human resources who can acquire English language and culture thanks to their high learning motivation. This reveals the fact that EFL students' intuitive perspectives in the definition of motivation are quite comprehensive and close to concepts scholarly proposed by researchers.

Fourth, students of the current study have a common agreement on the importance of language learning motivation because motivation triggers off their interest in the native language and culture, and it keeps them moving forward within the pathway of learning instead of giving up halfway. Another value-added factor of motivation is that the knowledge and network of learners will grow up as the snowballs during the progress. This result should be taken into account when considering elements of language learning motivation proposed by Gardner (2001), which includes 'integrativeness' and 'attitudes toward the learning situation'. Evidently, the high scores on students' self-evaluation reveal that the students of the study have positive thoughts on the reasons why they should acquire a second language.

Fifth, the students of the current study have approaches to maintain and enhance their driving forces. One of the most popular 'supports' many of them have utilized is abundant, free-of-charge, and easy-to-get-access Internet and media. All kinds of resources could be found, such as videos, movies, songs, talks, speeches, stories, dramas, animations, etc., which became attractive factors to students. This result, again, consolidates the findings of the study, confirming the high level of 'integrativeness' and 'attitudes toward the learning situation' among full-time EFL students as it is often stated that integrative orientation encourages L2 learners to seek invisible, culture-oriented resources, and stimulates them to communicate in the target language with people from the target community (Vakilifard & Khaleghizadeh, 2021). In addition, the use of Internet and media can be categorized 'other support' as the model of Gardner (2001) proposed, contributing to achievement of learning the second language as the desirable result among EFL students. On the other hand, for part-time EFL students, the 'other support' included peer discussion in the classroom and teachers' professional advice in approaches and methods of learning, which then became a significant driving force for students to sustain their learning process. This two different motivation approaches between the two groups of EFL students consolidates the quantitative findings of the present study when evidently, full-time students whose integrative motivation is higher seek culture-related sources for acquisition, whereas part-time students whose

instrumental motivation is higher make use of their learning opportunities to serve or support (future) employment, resulting in their personal reasons for English learning.

Another common approach the students of the current study often utilize to foster their motivation is to envision their prospective career. Dörnyei (1998) anticipated that the learning process is often long and tedious sometimes; to sustain it, L2 learners are in need of the primary impetus which can initiate learning the L2 and become the driving force to them. In this case, the students have their self-stimulus as personal internal strengths to overcome occasional ups and downs during the process. This special item can be categorized as ‘other factor’ as Gardner’s model (2001) introduced.

Finally, most of the students in the current study are more motivated to learn English than when they were high school students. The first outstanding reason is that they would like to seek good job opportunities after graduation. It is the fear of being dismissed that motivates students to keep themselves stimulated in English learning. Reviewing the literature, this can be labeled an ‘instrumental motivation’ as it relates to career perspective. Meanwhile, the other reason is that full-time EFL students have interests in the native language and culture; the more they learn in depth about the language studies and cultural backgrounds, the more they are engaged with the program and feel more motivated to acquire as much as they can. As the literature suggests, this can be labelled an ‘integrative motivation’ since it relates to a desire to identify with culture or community that speaks the language as explained by Dörnyei (2001, 2009), Gardner (1985), and Vaezi (2008). On the other hand, part-time students, who have experience in the accomplishment of their first degree, emphasize the fact that their motivation can be sustained thanks to direct interactions with their teachers and classmates, which can be considered ‘other factors’ (Robert C Gardner, 2001) that facilitate and stimulate students’ language achievement as the desired result. It can be seen that this finding matches the quantitative data of the current study, so it obviously supports and consolidates the findings of the two main motivation trends of EFL students.

Conclusion

This study explored EFL students’ motivation to learn a second language and their perceptions of language learning motivation at a public higher education institution in Hanoi, Vietnam. Through the quantitative data collected, the study reveals that EFL students in Vietnam have high levels of both integrative and instrumental motivation, but the patterns for full-time students versus part-time students are different. It evidently shows that full-time EFL students have a slightly higher rate of integrative motivation, while part-time EFL students have a higher level of instrumental motivation. Even so, the qualitative data collected shows that EFL students have a strong emphasis on prospective employment. Furthermore, EFL students’ intuitive perception of language learning motivation was rather close to that of the literature. From the perceptive foundation, EFL students are aware of their own level of motivation, showing that EFL students in Vietnam have positive thoughts and attitudes toward their learning process. They have various approaches to enhancement of the language skills, aiming to sustain motivation, leading to the fact that they are (much) more motivated to learn English than when they were high school students. The main findings of the study are considered useful to the university’s managers in planning essential talks and discussions on the importance of English in the modern world, and employment opportunities that can be opened up thanks to good English proficiency. These are expected to inspire EFL students to sustain their learning process and maintain personal motivation to continually enhance their language skills. In this light, more studies on these with the employment of

other data collection instruments (e.g., class observation) may answer more questions and yield further findings to the literature.

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APPENDIX 1 : INTERVIEW PROTOCOL

Time of interview: from eight to ten minutes

Date:

Place:

Interviewer: Huyen-Thanh Nguyen

Interviewee:

Interview number:

Good morning/afternoon.

Thank you for your participation today. I am Huyen-Thanh Nguyen, a researcher who is conducting a study on EFL Students' Perception of Intercultural Sensitivity, the English Department, Hanoi University. The goal of this project is to explore and analyze students' understanding and perspectives on intercultural sensitivity relating to the language learning process.

You were selected through a voluntary response to a previously administered mail survey, at which you were offered to participate in an interview and share your contact information if you had agreed to join. Prior to today's interview, you were sent an introductory letter and a consent form via email, then your reply was sent accordingly to confirm today's participation.

The interview takes from eight to ten minutes and will follow a designed interview protocol. If you have no further comments, let's get started with the first question.

[Note: the researcher will use phrases such as "Tell me more", "Could you give me an example?", "Could you explain that?" as prompts to solicit more detailed information when needed.]

No	Questions
1	In your opinion, how can intercultural sensitivity be defined/understood?
2	What level do you evaluate your intercultural sensitivity? Why?
3	What do you think about the importance of intercultural sensitivity? Explain in detail.
4	How does your intercultural sensitivity develop?
5	Are you more or less sensitive in intercultural communication than when you were a high school student? Why?

Thank you for your cooperation!

APPENDIX 2: INTERVIEW TRANSCRIPTION CONVENTIONS

1. Heading of the transcript is indicated with initials of pseudonyms of participants, and the number of the interview, e.g., Interview IL1.
2. Names of the participants in conventions are replaced with pseudonyms.
3. Initial I for interviewer and S for student are used.
4. Page numbers, Times New Roman, and 1.5 spacing are used.
5. Turns are numbered.
6. Tab is inserted after each speaker initial.

E.g. 10 S : Actually, I made opinion... Intercultural communicative competence means...the communication among different culture or language. And it tries to convey cultural meaning...like that.
7. Transcripts are labeled with an indication of total length in minute and second (e.g. 17.41 minutes).
8. Literal transcribing is used.
9. Capital letters for proper names are used.
10. Punctuation: Only question mark and quotation mark are used.
11. Long pauses are indicated with a full stop.

APPENDIX 3: SAMPLE OF INTERVIEW TRANSCRIPT

Interview IL1

Date: 29 December 2022

Total length: 10.51 minutes

Interviewer: Huyen-Thanh Nguyen

Student: Lien

- 1 I Good afternoon.
- 2 L Good afternoon.
- 3 I Let us get started with the first question. In your opinion, what can language-learning motivation be defined?
- 4 L For me LLM is something like when you have your purpose, and your purpose to study, and something like learn for what, for career or for something like, for pleasure.
- 5 I Okay. So, what is your type? Your type is about career or pleasure?
- 6 L I learn...by now I'm majoring in English linguistic, so it's my...In the past, it's my pleasure, for my pleasure, but now, it's for my career.
- 7 I I see. Please share: What level do you evaluate your language learning motivation?
- 8 L It's about 8 out of 10.
- 9 I How come you think that it should be 8 out of 10?
- 10 L I think my English is a little bit...not strong enough to help me to have a good career right now. So I work my best more and more to improve it.
- 11 I I see. Would you please share your opinion about the next question: What do you think about the importance of language learning motivation?
- 12 L I think it something like...When you have motivation, you will be more active in learning, and it would give you better result than when you do not any motivation.
- 13 I Please talk about: How does your language learning motivation develop?
- 14 L In the past, I think my language is quite good. But when I study in university, I see that many people have better English than me, so I feel confused and be overwhelmed. So, this made me try to learn more and improve as much as possible my English skill for my career and have better study results.
- 15 I Are you more or less motivated to learn English than when you were a high school student?

- 16 L I think so. I think my language learning motivation is higher, greater than it is in the past.
- 17 I Can you please explain why?
- 18 L In the past, it only for...helps me to train for university. But now it's for my whole life and my career. If I don't learn English well enough, I will not get any chances.
- 19 I Well. we are almost at the final part today's interview. So let me just ask you a very last question: What do you think about the relationship between intercultural sensitivity and language learning motivation?
- 20 L The relationship between intercultural communicative competence and language learning motivation, it's extremely close. 'Cause, when you know you have enough knowledge about intercultural communication or intercultural sensitivity, you will be eager and have more motivation to learn the language because you know well, so its easier for you to learn and communicate and you have more interest in it.
- 21 I I see. Very interesting, Le. So, this is the final question already. So before we just finish today's interview, is there anything that you would like to share with me rather than the questions I have asked you?
- 22 L No...It's all and I have nothing to share.

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University Halls of Residence: Welcoming, Interculturality and Belonging

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Abstract

In this paper, we argue for the strategic role of university halls of residence in welcoming students. We emphasize the added importance of a comprehensive welcome for international students, given their need to build a support network in the destination country to prosper in their studies and adapt to the new reality. Furthermore, we found that the interaction between local and international students is beneficial for both groups. We consider the university halls of residence as an extension of the university environment, which, as such, should reflect the concern for the student's well-being and exceed the institution's welcoming and integration practices. At the same time, the residences should exude a homeliness rather than an institutional atmosphere. Based on the benchmarking of five different student housing facilities within the European context, in Dublin, Toulouse, Paris, Macerata, and Bologna, we list the best practices for student welcoming in university residences. Research findings point to the need for convivial environments in the residences; promotion of integration initiatives among students; staff who speak an alternative language to the local one, usually English; attentive management; positive information and communication strategies, extensive online service and information, student inclusion and participation in residence life.

Keywords: University Halls of Residence, Student Well-Being, International Student Support, Design for Social Innovation, Best Practices in Student Welcoming

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Introduction

Higher education institutions from all continents are welcoming unprecedented numbers of international students (Nada & Araújo, 2019:1591) who face added difficulty adapting to the university experience in a different language. Among the welcoming strategies adopted by universities is the housing available to their students, in different formats, including halls of residence. Although university courses sometimes adopt English as an international language inside classrooms, the residence staff is not necessarily prepared to communicate with the international students.

Considering the current housing crisis faced by different countries around the globe, there is an increased importance on university housing given students' difficulty in finding and paying for suitable accommodation in the private market, either due to financial restraints, inflated prices, availability, environments suitability for academic success or document bureaucracy.

Given the substantial impact housing has on student's educational performance and personal development, there is a vast number of studies regarding student accommodation carried out all over the world, such as in Finland (Karna & Julin, 2015), Norway (Thomsen, 2007), United Kingdom (Vytniorgu et al., 2023), United States (Safizadeh, 2023; Foste & Irwin, 2023), Hong Kong (Hou, Lai & Edwards, 2020), Malaysia (Ulyani, Nor Aini & Zulkifli, 2011), Saudi Arabia (Hassanain, 2008), Nigeria (Adewunmi et al., 2011), Ghana (Nimako & Bondinuba, 2012), Brazil (Garrido & Mercure, 2013), and others.

Dominant perspective regarding student residence halls centers them as valuable sites for learning about and interacting across differences (Foste & Irwin, 2023:741) seeing student housing not merely as a living space but as a series of facilities to enable students to adapt to campus life (Hou, Lai & Edwards, 2020; Ulyani, Nor Aini & Zulkifli, 2011; Adewunmi et al., 2011). As stated by Hassanain (2008:212-4) campus housing is an integral component of the university and its contribution to improving the performance of students should not be underestimated, as it plays a major role in supporting three important goals: helping students attain intellectual competence, enliven personal character and aid in forming patterns of behavior, thought and imagination.

On the other hand, negative aspects of life inside student housing have been investigated lately, shedding light in dense problems of power dynamics regarding interracial relations, such as microaggressions, racism and black loneliness (Foste & Irwin, 2023; Hotchkins & Dancy (2017); Howard & Kerr (2019)) and intercultural exchanges such as cultural shock, loneliness, physical, psychological, and social decline (Moore & Popadiuk, 2011; Mori, 2000; Poyrazli, Kavanaugh, Baker, & Al-Timimi, 2004). In Howard and Kerr's (2019) study they stated that "positioning residence halls as home can minimize how residence halls function as sites of oppression and harm, especially for minoritized students".

Historically, student housing has been a place that encourages students to build community networks (McCartney & Rosenvasser, 2023:15), however in the last years there has been a significant growth in the need for student housing which led to a search for other accommodation solutions, including small cells of convivence such as apartments. In contrast, that presents a different atmosphere to students where "increasingly privatized living units can create feelings of isolation that can negatively affect grade point average and

deter social connection, possible friendship, and overall well-being” (McCartney & Rosenvasser, 2023:15).

That is in accordance with Foste and Irwin’s (2023:735) description of campus residence halls as “consequential spaces where students learn, build relationships, study, eat, and rest”, and when adequately planned these residential facilities can foster mutual interests and desirable educational outcomes (Hassanain, 2008:212).

The architectural aspect of the house and context are important for student housing satisfaction and play an important role in terms of accepting or not a student residence as a home (Thomsen, 2007:593). Also, the design and configuration of the living space can significantly affect the social condition of students (Safizadeh, 2023), since the chance for social interaction increases within circulation spaces (Huang, 2006). Convivial spaces like kitchens, laundry rooms, and common areas are also keen to promote social interaction, be them intentional or unintentional – or active and passive, as defined by Safizadeh (2023:3). As stated by the author “Student residences are among the most critical facilities to design, which should significantly consider the links between circulation spaces’ visibility, spatial complexity, anticipated wayfinding difficulties, and visual appeal” (Safizadeh, 2023:16).

Therefore, it is important to consider the strategic role of university housing both for universities and for the development of students and the upbringing of citizens. To maximize this opportunity, it is necessary to think of student housing as a complex ecosystem and offer students more than just a roof and a bed. This paper focus on university halls of residence and their potential to welcome and promote a sense of belonging in their inhabitants. The aim is to list the best welcoming practices in university residences based on the benchmarking analysis of five residences in the European context, supported by existing literature on the theme.

Theoretical Framing: Welcoming, Belonging, and Emotional Security

We commonly accept one of the goals of student residences is to create a community and sense of belonging in its residents. Although many institutions administratively perceive student halls of residence as a means to foster support to its students, some tend to believe community and belonging will form themselves (Foste & Irwin, 2023) by students’ action and without any extra endeavor from the University side besides the availability of space. It is important to remember that “not all students arrive to campus with positive associations with the word home, and it is dishonest for administrators to assume that all students have unfettered access to safety, comfort, and refuge within residence halls” (Howard & Kerr, 2019).

In this sense, studies encourage universities to build communities, practices, and systems that are inclusive, safe, and responsive to student’s needs (Howard & Kerr, 2019), where staff consider home and community as aspirations rather than presumed realities and both students and staff can reflect and self-define on their meaning, or potential meaning, and what would be required for residence halls to be home for students (Foste & Irwin, 2023:763).

Paradoxically university residences are perceived both as a “home away from home” that can provide comfort, safety, and rest after a long day, and as a place for growth and learning where students are exposed to differences and must learn to find a middle ground to co-exist with different people, representing a great learning opportunity for life (Foste & Irwin, 2023).

That indicates that when students arrive at the residence they still face uncomfortable situations and require an effort to navigate, with the possible outcome of learning and growth, which showcase common spaces, and even private spaces in cases of shared bedrooms do not offer rest and relief and are not necessarily refugees or sanctuaries from other aspects of student life.

Although residence halls are an extension of university they should not be perceived as such if the goal is to instill a feeling of home in its inhabitants. In Thomsen's (2007:594) study regarding student housing in Norway, the author found that "a perceived institutional character of accommodation inhibits the generation of a feeling of home" and "buildings expressing an institutional character caused students to be less appreciative of these buildings than buildings not perceived as institutional". Thomsen (2007:593) also showed that students' desire to redecorate their space is usually in conflict with the administration's interest in keeping standardized conditions and low expenses, which results in 'impermanent' changes of personalization (eg.: posters) to communicate self-identity. In addition, the author found that the need for personalization was low when the students appreciated the apartment's design and its furnishings (Thomsen, 2007:593).

There must exist a middle ground between none and excessive administrative intervention from universities in their halls of residence. Foste and Irwin (2023) showed in their study how tolerance to any kind of self-expression inside the residence can generate severe problems such as students feeling unsafe inside their halls and bedrooms, being targeted, or commonly hearing racist expressions, and being forced to self-evict from their bedrooms to avoid escalating conflict with roommates and their colleagues.

As Vytniorgu et. al, (2023:6) say, "Students are never simply 'students'" – they are from a specific locality, university, and background with their personal narrative environments "that foster emotional experiences of belonging or contribute to feelings of loneliness". Institutions also have narrative environments that enable them to communicate a chosen narrative through the physical environment (Vytniorgu et. al, 2023:2).

Authors highlight the place where students live during their studies influences their overall experience of the university's broader narrative environment, and that in any discussion of the connection between the built environment and feelings of loneliness and belonging "it is crucial to be attentive to how this environment [student residences] can be experienced by people as more than simply bricks and mortar" and not just a place students pass through (Vytniorgu et. al, 2023:4).

Vytniorgu et. al (2023:3) continue: "Emotional experiences of loneliness and belonging are not simply caused by the physical or architectural shape of an environment, but through the way an environment constructs and circulates narratives that offer or inhibit qualitative affordances for experiences such as belonging". That does not mean physical environmental aspects (e.g.: adequate light and ventilation, colors of floors and walls, room size, among others) do not affect students' wellbeing or perception of wellbeing, but that the people factor is a strong point of connection with the residence life and belonging.

Holton & Riley (2016) echo this argument as they state student accommodation, and its collective and cultural affordances are an example of university narrative that impacts students' physical and psychological experience of place and their feelings of loneliness and belonging. Especially regarding differences among students in terms of class, international

student status, and age, the university infrastructure plays a key role in shaping how the university narrative environment affords or constrains opportunities, perceptions, and motivations to belong (Vytiniorgu et. Al, 2023:5). For instance, many European universities (eg.: Austria, France, Finland) are implementing a program to par local and international students as studies show the interaction between them benefits both groups.

We must remember the ways administrators construct and attach meaning to notions of diversity and inclusion have powerful implications for the broader campus community (e.g.: Thomas, 2018). In this sense, let's not lose sight of international students' added adaptation difficulties, and remember Moores & Popadiuk, (2011:296) findings that when students have support from peers inside the residence, they perceive it as a kind of sanctuary from outside problems.

Benchmarking

In this session we will present five cases of different university residence management located in Dublin, Ireland, Toulouse and Paris, in France, and Macerata and Bologna, in Italy. The benchmarking was conducted from May 2022 to February 2023. Data were collected by scheduled interviews for up to 30 min, e-mail, onsite visits, guided tours for up to two and a half hours, virtual tour, and websites of universities and their partners.

Case 1: University College of Dublin

Ireland has been facing a severe housing crisis since the 2000s (BORGEN PROJECT, 2022), while at the same time, welcomes almost 32,000 international students (IUA, 2022) annually. International students have reported poor housing conditions to ICOS (Irish Council for International Students) with students living in dilapidated buildings, overcrowded housing or even having to sleep on the street or pay to sleep on an acquaintance's sofa (E-Dublin, 2022). Amid this severe crisis, the University College of Dublin (UCD) offers around 4,000 places to its students and, although the number does not cover all the university's international students, it offers security in this serious housing crisis. UCD is Ireland's largest and most internationalized university, with more than 37,000 students, almost 10,000 (27%) of whom are international and come from 152 countries, according to the institution's website.

In May 2022 we contacted UCD by email to present this research and request a visit to their student residences. Unfortunately, it wasn't possible due to the full occupancy of the rooms and unavailability of students because of the exams period, thus directing us to take the virtual tour available on their website (Figure 1).

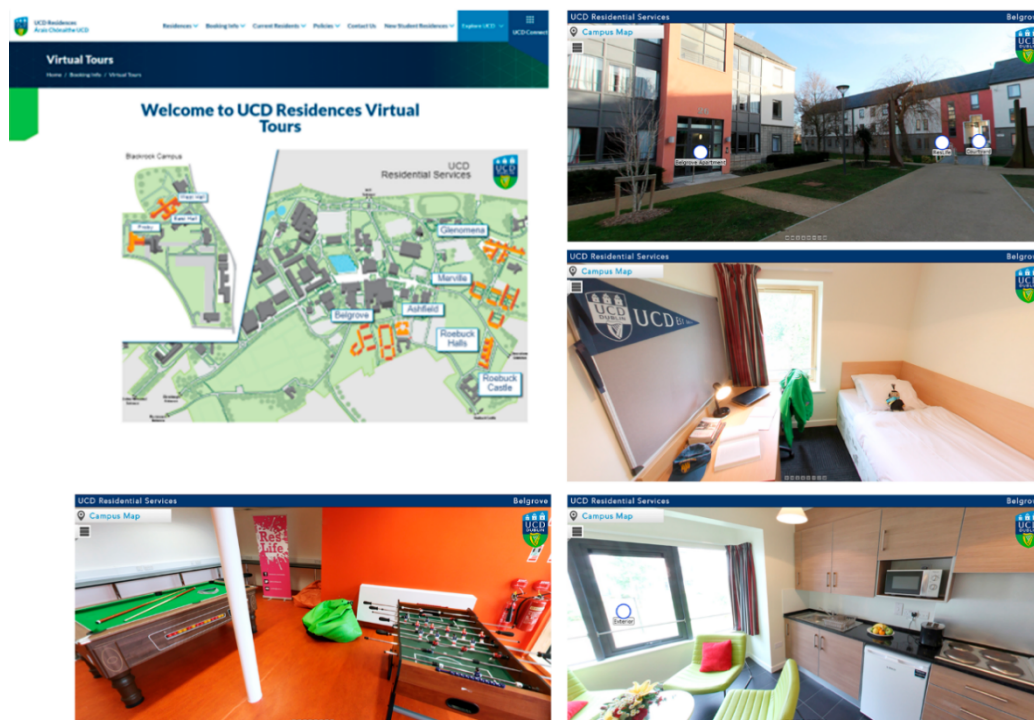


Figure 1: UCD residences virtual tour

(Source: www.ucd.ie/residences/bookinginfo/virtualtours/. Access November 02, 2022)

UCD has six residences on the Belfield campus and three on the Blackrock campus, totaling nine residences with a capacity for more than 4,000 residents. Their website gives a fair idea of what students will find when they move in, presenting informative content that range from basic essential information to a complete guide on all the relevant aspects and rules to be respected during campus life.

UCD also offers a comprehensive welcome for residents, in the words of the institution "The UCD RESLIFE Program aims to build a community here in UCD residences through sports teams, activity days, outdoor fairs, quiz games, cooking classes and information on safety and awareness" (UCD, 2022:2). In fact, the activities calendar is full of events, and residents can take part in many social groups (e.g.: arts, reading, swimming, etc.). There is also the possibility of reserving one of the residences' spaces to hold a private event, such as birthdays or movie nights.

Another interesting idea UCD applies is residents are part of the residence's support system. The organizational model employs students who live on campus to act as Residence Assistants (RAs), at night and on weekends, available to help with other residents' needs. Each residence has its team of RAs, and interested students apply via a form during a specific selection period. In return, RAs receive discounts on accommodation fees and develop their communication and problem-solving skills.

At UCD, we see several positive approaches to managing the residence and integrating students into the internal environment. Positive points include a complete and integrated online system that allows access to different services and requests in a single portal; a good maintenance service; the integration of students as part of the residence team; the UCD RESLIFE program; a detailed guide to campus life available online; and the possibility of a virtual visit.

Case 2: CROUS Toulouse

Toulouse is situated in the south of France and is its fourth largest metropolitan area, behind Paris, Lyon, and Marseille. The city is home to over 100,000 international students, with 11,000 new students every year (Université de Toulouse, n.d.). The University of Toulouse was founded in 1229 and has mobility agreements with more than 200 global institutions and 378 in Europe under the Erasmus program, totaling around 4,000 (40%) international students under its tutelage (Université Toulouse Jean Jaurès).

In France since 1955 student residences are managed by CROUS, a network of public institutions responsible for student housing, food, social support, and access to culture. Crous Toulouse manages 45 residences with almost 11,000 beds, 34 of which are in Toulouse, with over 9,700 beds. Their website lists all the residences and their contact emails, as well as basic information about each one, including the number of places, type of accommodation, location, services included, photos, and link to take a virtual tour (Figure 2).



Figure 2: Notre Dame Residence virtual tour

(Source: <https://www.crous-toulouse.fr/logement/notre-dame/>. Access November 04, 2022)

On November 4, 2022, we contacted CROUS Toulouse through their website but were directed to select one residence and contact them directly. We found it difficult to know which residence to contact, as the intention was to deal with broader issues covering several residences, but we selected one - Arsenal. We received a quick reply and exchanged a few emails, but the administrative assistant was unable to answer any questions about that residence or the Crous Toulouse residences in general.

On November 30, 2022, we visited the University of Toulouse's west campus and Notre Dame residence. We did the virtual visit and, in person, checked out the centrality of the building, close to nursery schools, colleges and with easy access to transport. The building is identified with the CROUS brand at the top, visible from a distance, and has 92 apartments, 78 of which are singles, 11 doubles, and 3 for people with reduced mobility.

After visiting the campus, we contacted the Notre Dame residence by email for follow-up questions but received no response. Although we were unable to communicate with a representative of the Residence and had no means of contacting CROUS Toulouse as a regional body, we chose to keep this case study because of the insights it facilitated.

At first, the sectorization seemed excellent, radiating an image of organization and efficiency. However, in our experience, the absence of a direct regional e-mail makes it difficult to contact the administration and obtain certain information. For example, the contact is initiated via a form on the CROUS Toulouse website with limited characters and pre-established topics. Questions that deviate from the most common topics are more difficult to be answered. So, improving points are the user needs to know in advance who to contact; uncertain or broad questions have more difficulty being answered through the available means of contact; and the lack of a general e-mail contact for dealing with questions beyond the scope of one residence.

As for positive points, they include the mailing list for all residences in the region on the same site; separate email contacts facilitate the management of residences and allow for faster responses; virtual visits to residences; Notre Dame residence location, singing, and visibility; and an explanatory video for the accommodation application process *Demande de bourses et de logement*.

Case 3: CIUP – *Cité Internationale Universitaire de Paris*

The International University City of Paris (CIUP) is the largest student housing area in the Île-de-France region, with the capacity to house around 12,000 students from 150 nationalities distributed among the 6,800 rooms of the 43 on-site residences (CIUP), identified by green dots in Figure 3 below.

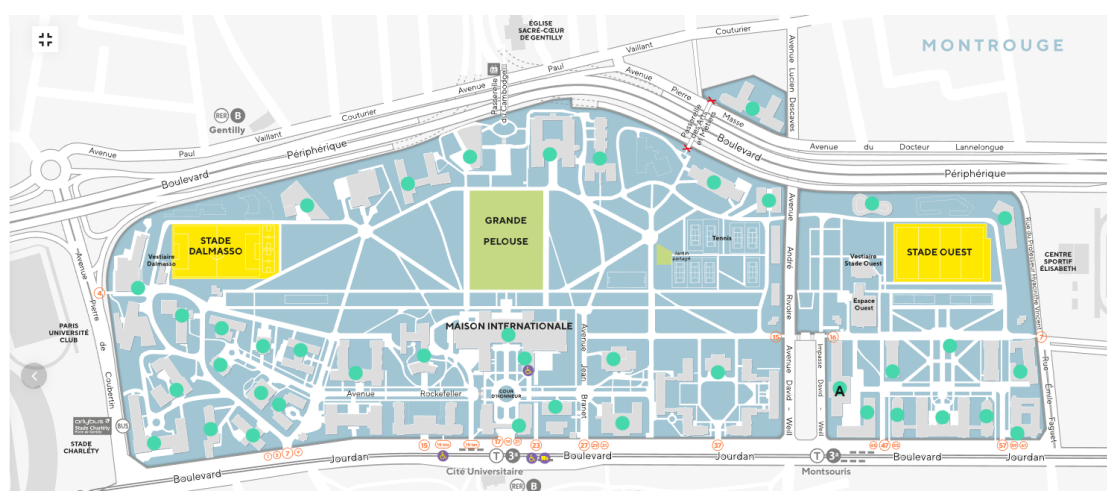


Figure 3: CIUP residences Map (Source: <https://www.ciup.fr/plan/>)

The CIUP is managed by the *Fondation Nationale Cité Internationale Universitaire de Paris*, a French foundation of private law and public utility. This public-private partnership includes members of the Foundation, representatives of the countries with houses on campus, and the chancellor of the universities of Paris. It also receives donations from private companies and patrons.

On the CIUP website one can consult details of each residence, such as the inauguration year, the resident's lodgment, from how many nationalities, its history, and other interesting facts. It also presents all the pertinent secondary links for specific themes, including the online platform The Buddy System, that pairs international and local students and stakeholders, responsible for coordinating the integration of new students, and the Citescope site – a portal

dedicated to organizing the thousand events held by CIUP in an annual calendar. The events are also advertised in posters around campus and students' newsletters.

CIUP organizes a welcome event in September with various stands set up by different organizations to publicize and inform about existing activities and services, such as health, the university restaurant, sports clubs, music, research, theater, architecture, and others. Students also receive a welcome kit with a map of CIUP, an information pamphlet, a tote bag, and some gifts, and food and drinks are offered to make it easier for students to integrate.

We contacted CIUP on December 12, 2022, but they could not provide any additional information to that listed on their website. As a complement, we informally interviewed a former international student who lived in one of CIUP's residences in 2014, who corroborated the above information and praised CIUP's organization and excellent communication with residents, stressing how "lucky a student is to live at CIUP when they arrive in Paris" and listing as the only negative point the low number of French students on site, given that it is an international community and only French people from outside Paris live at CIUP.

Positive points observed at CIUP include the existence of a central reception to answer questions, the structure of the residences and student support being very well organized, the vast events calendar during the academic year, especially the welcome event in September, and overall clear communication.

Case 4: University of Macerata

Data from 2021 showcased that 68% of Italian students live with their parents and only 5% live in student accommodation, compared to a European average of 17% (Eurostudent, 2022). Furthermore, in 2022 Italy welcomed 58,508 (2.9%) international students (UIS, 2023) that also needed accommodation. The public administration of each region (*Azienda Regionale per il Diritto agli Studi Superiori*) manages most of the beds available in student residences, although there are also residences managed by the universities and private market. We selected two cases, one of which, that exemplifies the Italian management approach.

The *Università degli Studi di Macerata* (UNIMC), founded in 1290, is one of the oldest universities in the world (UNIMC, 2023b). Set in a small town of approximately 42,000 inhabitants in the Marche region, the institution focuses solely on teaching humanities and social sciences. Nevertheless, it presents a strong internationalization with several courses taught partially or completely in English, exchange programs, and foreign visiting professors.

UNIMC's total student population is 11,000, of which 3,000 are international (27.3%) (UNIMC, 2023a). In addition, there are 67 current agreements with international institutions beyond the Erasmus program, in 22 countries, (UNIMC, 2023a) and more than 200 partnerships with universities under the Erasmus+ program, (UNIMC, 2022b). For the university, "Internationalization is a priority" (UNIMC, 2023a).

In Italy, there is public housing available for students who meet pre-established academic and socio-economic criteria, and in Macerata there are eleven apartments with over 322 vacancies¹ available for them (ERDIS). In addition, UNIMC has its accommodation

¹ One residence was closed for refurbishment during the 2022/2023 academic year and was not accounted for.

organized as four residences (84 beds), six apartments (35 beds), and three campus residences (134 beds), refurbished and furnished in 2014 and managed by an external entity via public tender. There is also work in progress to build another residence and a sports complex on the land (Figure 4). Some of the beds are reserved by the International Office for international and Erasmus mobility students.



Figure 4: Campus Padre *Matteo Ricci* (Source: Archive, February 2023)

On February 3, 2023, we contacted the coordinator of UNIMC accommodation and arranged for a guided tour. Four days later we met him and his associate, responsible for welcoming students and teachers into the residences. The tour took just over two hours to visit the three residences on campus and the largest off-campus residence: Villa Lauri.

We observed in detail the management approach and practices and noticed a close relation with the students, welcoming every new student in person and talking to a few from different nationalities during the tour; the care taken with the facilities, all clean, with new furniture and several convivial spaces; and the well-being of the residents, organizing a welcome event at the beginning of the academic year and improving service based on their feedback.

In summary, the outsourced management model works well. Students and the administration have frequent and direct contact, with close communication, and residents seem satisfied with the housing conditions. The personal welcome to every new resident is a very positive and personal first impact, the welcome event is a fruitful occasion to get to know your neighbors, the online maintenance system is well thought out, as records the history of breakdowns and the order of requests, the residence's website has great usability and presents all relevant information on the same place, a customer satisfaction survey is applied and used to improve service, both groups seem to care for the space and the administration seems committed to implementing improvements to students' daily lives after observing the actual use of the space beyond what was envisioned (e.g.: a community kitchen with a capacity for 150 people is underway and scheduled for completion in 2025).

Case 5: ER.GO Bologna

Founded in 1088, the *Università di Bologna* (UNIBO) is the oldest university in the Western world and is recognized as such by the *Magna Charta Universitatum*, signed by 94 countries and 960 universities (Magna-charta, s/d). UNIBO currently has five campuses (Bologna, Cesena, Forlì, Ravenna, and Rimini) and advanced study centers in Buenos Aires, New York,

Brussels, and Shanghai. It has more than 90,000 students enrolled, among whom more than 7,000 are international students (7.8%), making it one of the largest universities in Italy (UNIBO, 2023).

In Italy, until the 1980s the university managed student residences, but in 1983 the government passed a law that transferred this competence to each region (Mondin, 2023, personal communication). In Bologna, the student residence is managed by the Regional Authority for the Right to Higher Education - ER.GO (*Azienda Regionale per il Diritto agli Studi Superiori dell'Emilia Romagna*), which also offers assistance with financial matters, food, advice and support on work and career issues.

Bologna has a very old tradition of student residences, most of which date back to the year 900, although there are three units from the 1950s and a few new units opened in the 2000s and 2022 (Mondin, 2023, personal communication). ER.GO manages around 3,800 beds spread over 48 residences in the region, with 1,700 beds and 19 residences in Bologna (Mondin, 2023, personal communication). General information about each residence can be found on the institution's website.

On February 16 we visited ER.GO's office in Bologna and scheduled a meeting with its director Patrizia Mondin and the coordinator of Bologna welcome service. The interview lasted 30 minutes. They explained the many support mechanisms in place, especially the existence of a sector dedicated to assist international students, the students' possibility to make individual appointments to help with inclusion struggles, integration, study or other support matters, ER.GO's role in contacting students and the vast socialization actions in place, such as a program where senior students assist new students adapting; a volunteer program to help disabled students in the residences; artistic workshops; organization of events by international student communities; an initiative to sponsor students proposals to improve residence life; a regional talent festival organized by students with the support of ER.GO; a reception program for new residents called the Freshmen Welcome Project; the initiative 'Adopt a Residence', in which ER.GO employees could select residences to visit more often and strengthen ties with student residents; among others (Mondin, 2023).

ER.GO has a good communication strategy in place, using virtual communication channels with students, face-to-face visits, direct communication with the residence halls, and anonymous surveys to collect students' impressions of the residence's habitability, comfort, and services. But the most positive aspect of this case is the extent of social programs, through which we see that residents can participate in volunteer, artistic, study, counseling, and career activities; the management commitment to maintaining close contact with students and communicating frequently; meeting their requests when possible; providing support in adapting students to their new life in residence; and integrating students into their new homes.

Results

We observed the best practices present in the five benchmarking cases above and perceived each one of these universities focused on a different point: positive approaches to student integration and residence management, attentive management and infrastructure, positive information and communication strategies, extensive online service and information, student inclusion and participation in residence life, and extensive social agenda and welcoming events. Table 1 summarizes all points.

	Case 1	Case 2	Case 3	Case 4	Case 5
Location	Dublin, Ireland	Toulouse, France	Paris, France	Macerata, Italy	Bologna, Italy
Institution	University College of Dublin	Université de Toulouse	CIUP	Università degli Studi di Macerata	Università di Bologna
Enrolled students	+37.000	~10.000		+11.000	+90,000
Housing capacity	+4.000	9.700	12.000	253	~1.700
Virtual guide	Yes	Yes	No	No	No
Guided tour	No	No	Yes	Yes	Yes
Number of residences	9	34	43	13	19
Welcome event	Yes	Yes	Yes	Yes	Yes
Welcome guide	Yes	Yes	Yes	No	No
Format	Online	Online	Printed	-	-
Pages	64	24	4	-	-
Best practices	Approaches to student integration and residence management	Information and communication strategies	Extensive social agenda and welcoming events	Attentive management and infrastructure	Management commitment in community building

Table 1: Summary of benchmarking welcoming mechanisms (Source: Marcela Rosa, 2023)

We also retrieved some practices from the literature review, such as collectively defining the meaning of home and community, not disregarding prior student experiences regarding their homes, choosing the adequate university narrative, balancing institutional presence in the building to try to exude homeliness, the need for convivial spaces in student residences, among others. Our additional input is to prepare staff to speak an alternative language to the local one, usually English, and pay attention to minimally comfortable room sizes.

All this effort is also beneficial to the universities as a major selling point offering security, comfort, community, and a wholesome experience presenting a safe harbor midst of a turbulent housing market worldwide.

Conclusion

We have presented a brief review of the current literature regarding students' sense of belonging in university halls of residence, presented five benchmarking case studies of residence welcoming practices in three different countries: Ireland, France, and Italy, and summarized findings.

Halls of residences are a complex ecosystem with different young adults (mostly) from diverse cultural backgrounds and convivence should be considered when managing this space. Some students will be more social, others more reclusive, some will benefit from institutional support to bring people together, and some will do it on their initiative. Some will be more individualist and need to learn about collective living and sharing of space, some can't handle different opinions and don't know how to compromise. Among others, these are common profiles found inside students' residences.

A possible way for institutions to intervene without retrieving students' autonomy would be to promote certain events helpful to communal life inside halls of residence. Induction week is a good start, a valuable opportunity to welcome all students and install a good atmosphere through the university narrative, presenting the facilities, services, safety regulations, staff, and an occasion for students to meet each other. It can also be an opportunity for students and staff to come together to collectively reflect and self-define the meaning – or potential meaning – of home and community and what would be required for residence halls to be home for students (Foste & Irwin, 2023:763). With initial guidance to the desired positive direction students will have a north to follow and an understanding of what is expected from their behavior in that space.

We argue findings here present relevant welcoming practices that contribute to students' sense of belonging and creation/integration with the community, being a good directional guide to follow. It is important to emphasize the added importance of a comprehensive welcome and support for all students, especially international ones, when the interaction with local students is beneficial for both groups.

Bringing all these practices together in the same institution would have a powerful impact on the residence community, with strong communication, services, social agenda, management, and integral student participation. For the future, we propose the creation of a guide to present the best practices of student welcoming into university residences.

Acknowledgments

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Project-Based Learning in a Collaborative Environment: A Math Study

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Abstract

One of the concerns of higher education institutions is to provide students with a wide range of skills. Whether they are basic, cognitive, and professional skills, or social, problem-solving and teamwork skills. Project-Based Learning (PBL) is a teaching methodology that involves students designing, developing, and building practical solutions to a problem. And, if associated with a collaborative environment (CE), which promotes group work, the student becomes actively involved in an enriched learning process, allowing them to acquire hard and soft skills. This paper analyzes the interest in applying PBL-CE to first-year Electrical and Computer Engineering students to learn Mathematics. To motivate students' learning, acquire skills and verify the effectiveness of the PBL-CE method, an experiment was developed as a case study. The students, in groups, lived this experience, counting on the support of teachers, as advisors, helping them in the construction of knowledge. To assess the interest of the experience, two questionnaires were carried out, one before and one after the experience. 26 students indicated that their contributions were valuable and that they were a fundamental element for the group. That cooperation (80.0%), responsibility (69.2%) and commitment (61.5%) define their performance in the experience and that they are confident in what they learned (88.5%). All students enjoyed using PBL-CE and 92.5% stated that it contributed to the development of skills inherent to the engineering course and professionals. With this experience it is recognized that it is possible to develop a wide range of soft and hard skills in students.

Keywords: Project-Based Learning, Collaborative Environment, Case Study, GeoGebra, Trapezoidal and Simpson Rules

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Introduction

Currently, one of the concerns of higher education institutions is to provide students with a wide range of skills. Both hard skills, such as cognitive knowledge skills and professional skills (Vogler et al., 2018), and soft skills, such as problem solving and teamwork (Casner-Lotto & Barington, 2006).

Project-Based Learning (PBL) is a learning model that uses projects as a first step in integrating new knowledge and skills based on real experiences (Loyens et al., 2023). Students engage in designing, developing, and building practical solutions to a problem. PBL makes use of groups of people and, therefore, requires constant communication, collaboration, and management of activities, with the collaborative environment considered as a support tool (Guo et al., 2020, Chistyakov et al., 2023, Uden et al., 2023).

The Collaborative Environment (CE) of learning promotes group work to enrich student learning (Caridade, 2021). A group of students work together to solve problems, complete assignments, or learn new concepts (Ng, Chan, & Lit, 2022). This approach actively involves students in processing and synthesizing information and concepts, rather than using rote memorization of facts and figures (Bjelobaba et al., 2022).

This paper intends to analyze the interest in applying PBL-CE to students of the first year of the Degree in Electrical and Computer Engineering for learning Mathematics. To motivate students' learning, the acquisition of skills and to verify the effectiveness of the PBL-CE method, an experience was developed in the classroom, as a case study, where the technologies allied to the PBL-CE were worked on. One of the syllabus contents of the discipline was chosen and the experience was carried out during two blocks of 1h30m in the last week of classes. The students, in groups, lived this experience, with the support of the teachers, as advisors, helping them in the construction of knowledge. To assess the interest of the experience, two questionnaires were carried out, one before and the other after the experience. The main results of these surveys are presented, analyzed, and discussed.

Methodology

The PBL-CE was implemented in Mathematical Analysis, one curricular unit of the first year in Electrical and Computer Engineering degree. With about 35 students spread over two theoretical-practical (1h30) and practical (1h30) classes during the last week of classes in the 1st semester of 2022/2023. It was elaborated and planned by the 2 teachers of the discipline on the application of the Trapezoidal rule and Simpson's rule for the calculation of numerical integration, one of the contents to be taught to these students, following the flowchart shown in Figure 1. The PBL-CE experience flowchart is divided into three moments "Before experience", "Classroom experience" and "After experience".

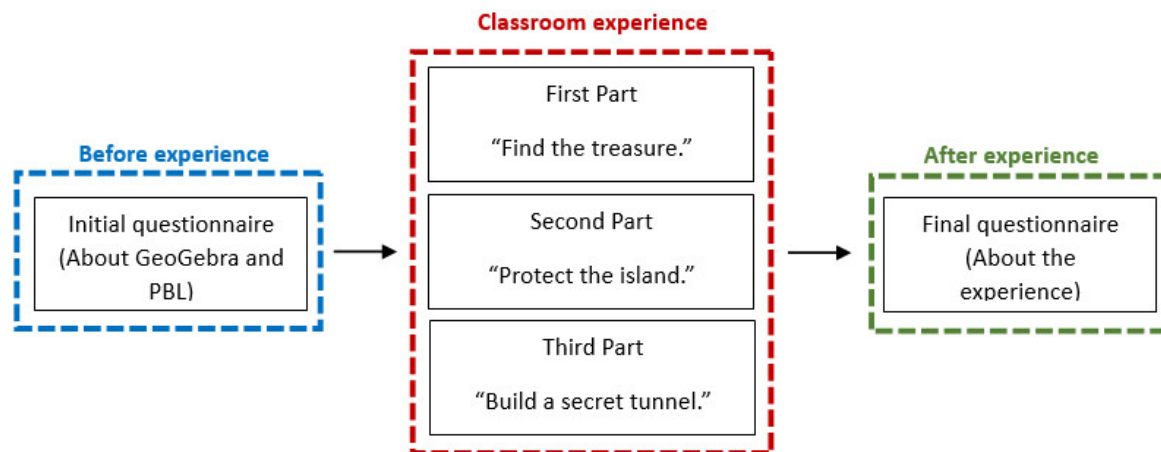


Figure 1: Implemented PBL-CE flowchart.

“Before the experience”, students responded individually to a questionnaire to check their knowledge about GeoGebra and PBL-CE. In the “Classroom Experience”, students, in groups of 2 or 3 elements, were integrated and led through a story where they had to solve problems about the applications of the defined integral. The story involved the students in three distinct parts: “Find the treasure”, “Protect the Island” and “Build a secret tunnel”, according to the support of a guide presented to them. The use of technologies and mathematical tools to solve problems was necessary and encouraged. In the final moment, “After the experience”, students responded individually to a questionnaire, to evaluate their experience.

Experience in Class

Numerical integration is one of the important contents of Mathematical Analysis in engineering courses. Many engineering problems need to solve integrals that are impossible to solve analytically, or the analytical expression of the function is not known, only values of that function in a set of points. The PBL-CE proposed in this paper and entitled “A treasure island adventure” is a new experiment on numerical integration, programmed to be used in a classroom context. The experience consists of a story where each group of students is inserted and invited to participate according to a set of tasks described in a small guide composed of three parts: “Find a treasure”, “Protect the island” and “Build a secret tunnel”.

Each group of students is included in the story “A treasure island adventure”.

First Part – “Find a treasure”

Story: “Your team of pirates, traveling by boat, discovers the missing treasure island. To find the treasure more easily, the pirates decide to assign a region with the same area to each one. Therefore, it is necessary to determine the total area of the island (Figure 2) and divide it by the number of pirates in your team.”

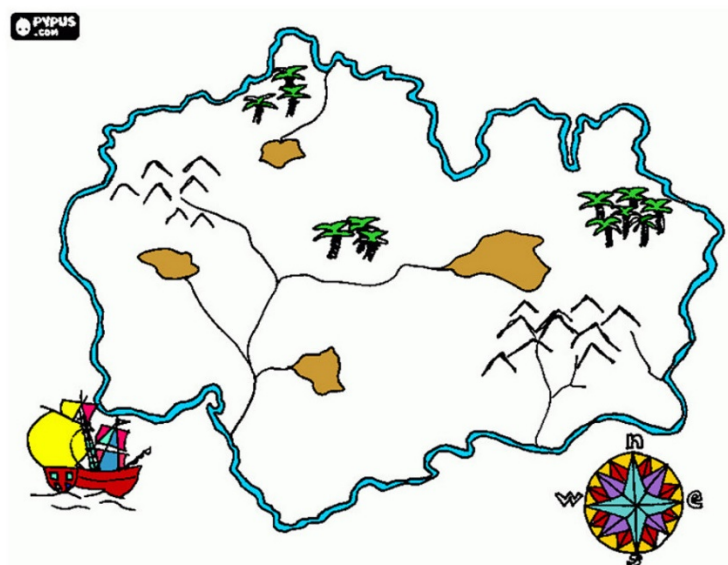


Figure 2: Treasure map

(https://www.colorirgratis.com/colorir-de-mapa-de-ilha-do-tesouro_115421.html).

To calculate the total area of the island, the group has a set of tasks to perform. It is necessary to load the image of the island in GeoGebra and adjust it to the coordinate axes, rotating it, if necessary, so that it is centered on the X -axis with a length of 12 units. Then they will have to define a set of 13 points equally spaced along the upper contour of the island, build the functions that interpolate these points and define the contour of the island, as can be seen in Figure 3. In this example, the northern part of the island is defined by two functions, one that interpolates points A to G (red) and the other the points from G to M (blue). The same process will be carried out to calculate the area of the southern part of the island, in the example also using two functions, one defined by points M to U (red) and another by points U to A (blue).

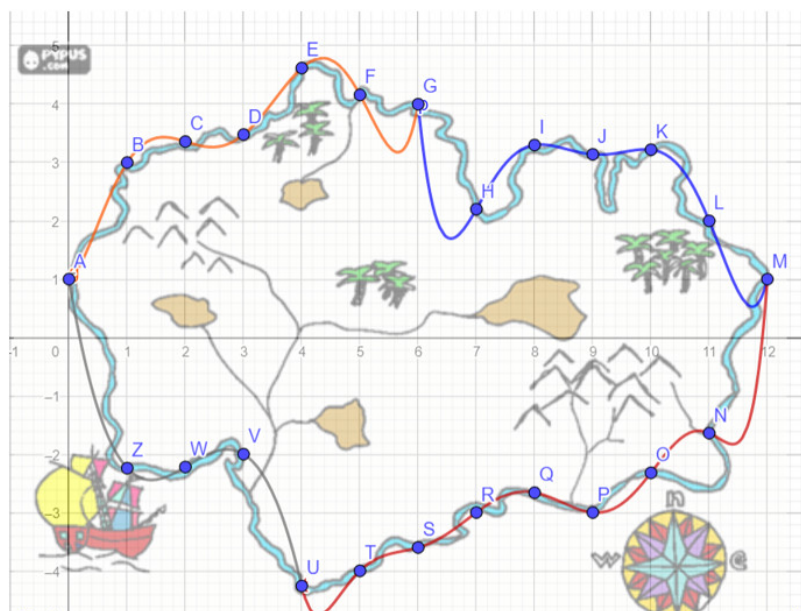


Figure 3: Definition of the points and functions that define the contour of the island (northern part and southern part).

Finally, using a scale of $1:100$, the area will be calculated using the Trapezoidal rule and Simpson's rule. Calculations are carried out using the technologies available in the classroom,

such as the calculating machine and computers. Also here, the variety of options chosen by the students was immense, from the use of GeoGebra itself, to the use of applications available on the internet for mathematical calculations, such as Wolfram alpha, Symbolab, Math calculator, QuickMath, and so one. In Figure 4, it can be seeing an example of solving these calculations using Trapezoidal rule. The area of the northern part is 35.7 *units*, and the southern part is 29.87, so the total area is 65.57, which corresponds to 6557 *units* on the given scale.

Area - Trapezoidal rule

$$h = \frac{b-a}{n}$$

$$A = \int_a^b f(x) dx \approx \frac{h}{2} (f(x_1) + 2f(x_2) + 2f(x_3) + 2f(x_4) + 2f(x_5) + 2f(x_6) + 2f(x_7) + 2f(x_8) + 2f(x_9) + 2f(x_{10}) + 2f(x_{11}) + 2f(x_{12}) + f(x_{13}))$$

$$A_I = A_N + A_S$$

$A_N = 35,7 \text{ u.a.}$

northern part of the island

$A_I = 65,57 \text{ u.a.}$

Total area

$A_S = 29,87 \text{ u.a.}$

south part of the island

1:100

$$A_T = A_I \times 100 = 6557 \text{ u.a.}$$

Figure 4: Calculations of island's area using the Trapezoidal rule.

After the area of the island has been calculated, it is necessary to divide it by the number of pirates (group members) and identify the area assigned to each pirate to find the treasure.

Second Part - "Protect the island"

Story: "The northern part of Treasure Island is often attacked by pirates from other teams, so you need to build a wire fence along its entire border. If the fence is defined by the curves, you determined earlier, how much wire is needed?"

After the treasure is found, it is necessary to defend the island from the attack of other pirates (other groups of students) by building a wire fence along the island's border. Here, the students had to calculate the perimeter of the northern part of the island, using the previously created functions and again applying the Trapezoid rule with 4 equally spaced intervals in each of the functions. In the Figure 5 you can see the calculations made by a group of students. In this case, the students only defined 3 interpolating functions ($f(x)$, $g(x)$ and $h(x)$) and determined the perimeter of the North part of the island, applying the perimeter formula in the Trapezoidal rule.

Perimeter - Trapezoid Rule

$$f'(x) = -0.13x^3 + 1.5x^2 - 4.7x + 4.3$$

$$g'(x) = -0.7x^2 + 6.7x + 16.9$$

$$h'(x) = 0.3x^4 - 11.5x^3 + 161x^2 - 995x + 2288.5$$

$$\frac{1}{2} * \left(\sqrt{1^2 + (f'(0))^2} + 2 * \sqrt{1^2 + (f'(1))^2} + 2 * \sqrt{1^2 + (f'(2))^2} + 2 * \sqrt{1^2 + (f'(3))^2} + 2 * \sqrt{1^2 + (f'(4))^2} + 2 * \sqrt{1^2 + (g'(4))^2} + 2 * \sqrt{1^2 + (g'(5))^2} + 2 * \sqrt{1^2 + (g'(6))^2} + 2 * \sqrt{1^2 + (g'(7))^2} + 2 * \sqrt{1^2 + (h'(7))^2} + 2 * \sqrt{1^2 + (h'(8))^2} + 2 * \sqrt{1^2 + (h'(9))^2} + 2 * \sqrt{1^2 + (h'(10))^2} + 2 * \sqrt{1^2 + (h'(11))^2} + \sqrt{1^2 + (h'(12))^2} \right)$$

$$= 26.08$$

for the scale 1:100
26.08*100=2608

Figure 5: Calculations of the island's north perimeter using Trapezoid rule.

Finally, the perimeter of the northern part of the island found corresponds to the length of the wire fence needed to protect the island.

Third Part - “Build a secret tunnel”

Story: “In order to transport the wire fence and other materials invisibly, it is necessary to build an underwater tunnel that connects the treasure island to the mainland. The tunnel is 1860 units long and 13 equally spaced circular sections were collected with the following areas $S_0=214$, $S_1=250$, $S_2=280$, $S_3=300$, $S_4=330$, $S_5=365$, $S_6=395$, $S_7=415$, $S_8=435$, $S_9=455$, $S_{10}=475$, $S_{11}=490$ and $S_{12}=530$ length units. What is the volume of the tunnel?”

In the last part, it was necessary with the areas of the circular sections to determine their circumference radius (or diameters) so that, through the set of points, define the function that represents the tunnel. By defining the 13 circular sections (Figure 6) in GeoGebra, with the centres on the X-axis, it is possible to find the points that define the outer limits of the tunnel, so for example the point P_0 (represented in green) is calculated through the radius of the circumference S_0 , that is, $r_0 = \sqrt{\frac{S_0}{\pi}}$ with coordinates $(0, r_0)$. The same is done for the remaining points. After identifying the coordinates of the 13 points, it is possible to define the function $f(x)$ that interpolates these points (red function).

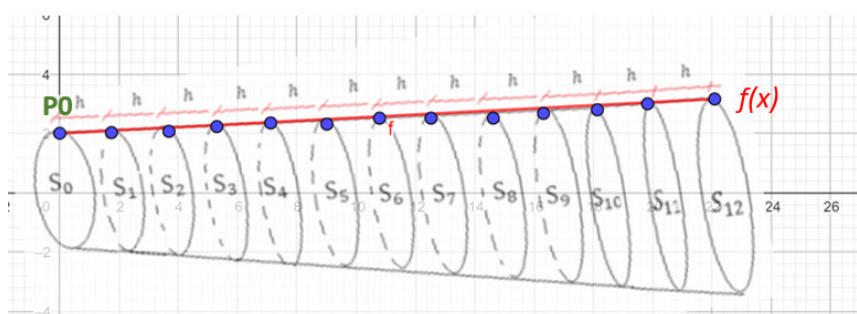


Figure 6: Equally spaced circular sections.

With the function $f(x)$, it was then possible to create a solid of revolution by rotating the plane region defined in GeoGebra around the X -axis. The solid created represents the tunnel. Figure 7 shows two examples 3D tunnel created in GeoGebra performed by two groups of students.

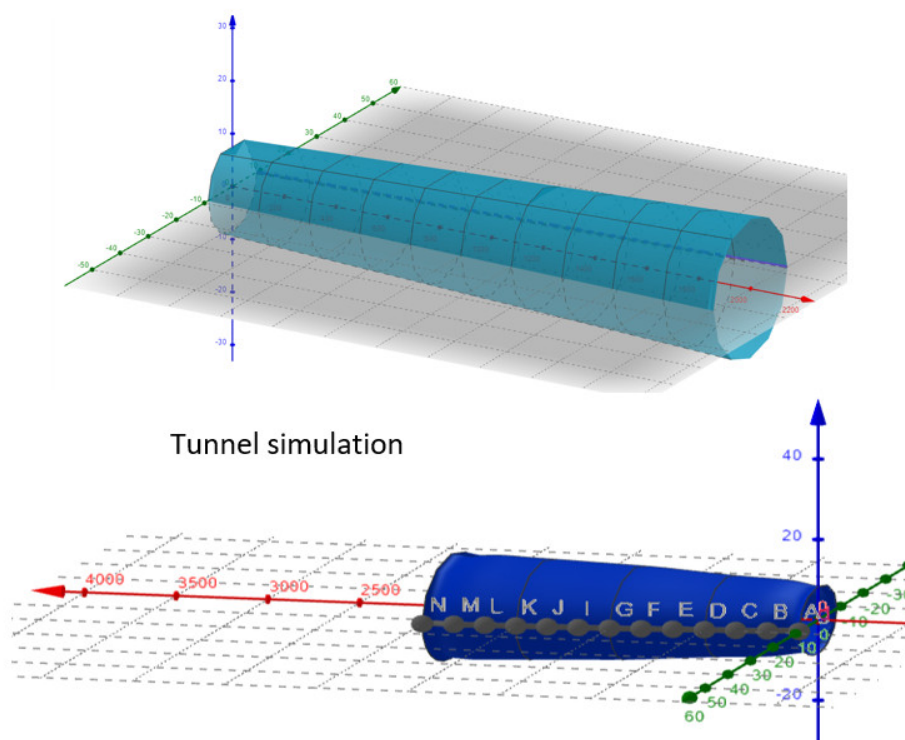


Figure 7: 3D representation of the tunnel in GeoGebra (2 examples).

Finally numerical integration was applied again through Simpson's rule to calculate the volume of this solid, as the example shown in Figure 8. In this example, the 13 points are spaced 154 *units* apart, the first point being $P0(12, f(12))$ and the last $P12(1860, f(1860))$, with a volume of 70135600 *units*.

Volume – Simpson's rule

$$V = \frac{154}{3} * (\pi * (f(12))^2 + 4 * \pi * (f(166))^2 + 2 * \pi * (f(320))^2 + 4 * \pi * (f(474))^2 + 2 * \pi * (f(628))^2 + 4 * \pi * (f(782))^2 + 2 * \pi * (f(936))^2 + 4 * \pi * (f(1090))^2 + 2 * \pi * (f(1244))^2 + 4 * \pi * (f(1398))^2 + 2 * \pi * (f(1552))^2 + 4 * \pi * (f(1706))^2 + \pi * (f(1860))^2) = 701356$$

for the scale 1:100

$$701356 * 100 = 70135600 \text{ units}$$

Figure 8: Calculations for the tunnel volume using Simpson's rule.

Results and Discussion

To verify the students' interest, motivation, and learning, two questionnaires were carried out, one before the classroom experience and the other at the end of the experience (Figure 1).

The initial questionnaire formed by only 4 questions intended to analyse the students' knowledge about GeoGebra, and the use of PBL-CE activities in the classroom. Of the 35 students who answered the questionnaire, 40% of the students had never carried out PBL activities in the classroom, 71.4% had never carried out activities in GeoGebra and 80% had never carried out PBL activities in GeoGebra. Regarding the content to be explored in the classroom, 85.7% of students have never used GeoGebra to apply the Trapezoidal rule or Simpson's rule. This reinforces the authors' view that PBL activities are still few implemented in higher education.

During the experience implemented in the classroom, it was found that students initially felt lost and not used to PBL-CE activities, where learning is carried out by solving the proposed problem, in this case a story. The CE improved as the class went on, since the interaction and learning between the group elements was being adjusted. The direct observation, made by the teachers, during supervision in the classroom, allowed the analysis of the students' reactions and the understanding and learning that they developed through the experience lived in the story. Doubts were frequent, at the beginning and in some situations questioning the teachers about the follow-up to give to the experience. Afterwards, they went through the pages of the guide and learned what they really had to solve, always supported by the considerations and comments of the teachers. In this way, they also began to have a clearer view of the objectives of the experience. The environment became more creative and motivating as the tasks were being carried out, however some students showed a shallow knowledge of both the contents to be acquired and the technologies to be used, relying on teachers and other peers. At the end of the experience, they showed satisfaction for reaching the end of the story – a sign that they had successfully achieved their objectives – but, at the same time, comments such as “Is it over yet? We could do another one!” What a pleasant surprise.

The final questionnaire was carried out only by 26 students out of the 35 students who participated in this experience. In the questionnaire, 100% of the students say that their contribution was valuable for the group during the classroom experience and that they were a fundamental element for the group regarding the aspects presented in Table 1. Suggest ways of solving and boosting the development of the work (76.5%); structure the work to submit it (61.5%); justify the reasoning developed (57.7%); apply different mathematical procedures (57.7%); complete the work (57.7%); mobilizing prerequisites (knowledge already acquired through previous learning - 53.8%) were the aspects selected by more than half of the students.

Student's contribution to the group	# students
Mobilize prerequisites (knowledge already acquired with previous learning)	14(53.8%)
Involve the different elements of the group	7(26.9%)
Lead the group	8(30.8%)
Suggest forms of resolution and boost the development of the work	20(76.9%)
Justify the reasoning developed	15(57.7%)
Apply the different mathematical procedures	15(57.7%)
Mobilize GeoGebra tools	13(50%)
Organize knowledge, ideas, and reasoning to build new knowledge	12(46.2%)
Complete the work	15(57.7%)
Structure the work to submit it	16(61.5%)

Table 1: Contribution of the student as an element of the group.

In the Figure 9 are represented the expressions chosen by the students that best classify their performance in carrying out the group work. Cooperation (80.8%), responsibility (69.2%),

commitment (61.5%), knowledge (57.7%) are the expressions with a percentage above 50%. It should be noted that all expressions have a positive connotation, except for “Disinterest”, which was only chosen by one student.

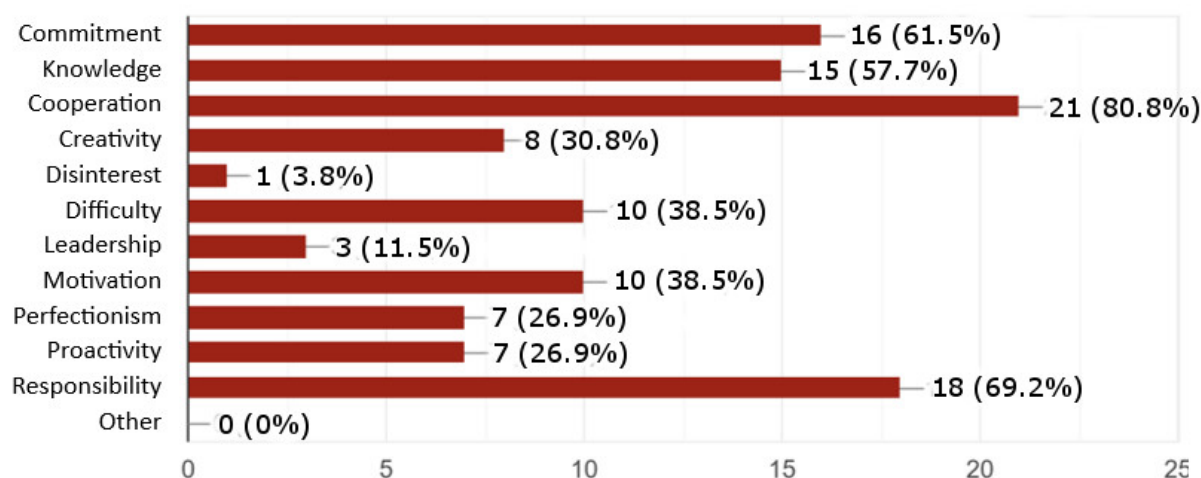


Figure 9: Expressions that best classify the student's performance in carrying out group work.

In the following 3 questions with answer (yes or no): 88.5% answered “yes” and 11.5% “no” (see Figure 10). Students feel confident in what they have learned about numerical integration (Trapezoid and Simpson rules), they enjoyed using GeoGebra and consider that the use of GeoGebra allows a greater perception of reality in relation to the syllabus and gives greater expression to their applicability in a real context.

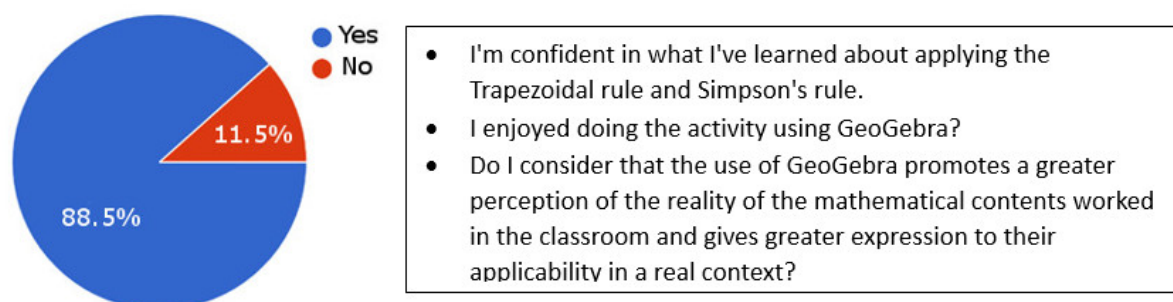


Figure 10: “Yes” or “no” questions.

The expressions that the students identify as being the ones that best define the way in which the use of GeoGebra was related to the acquisition of new knowledge are represented in the Figure 11. Allow building new knowledge in a conscious and reflective way (84.8%); Facilitate calculations (61.5%); Favouring the development of reasoning (53.8%) are the three expressions most chosen by students. This demonstrates that the students' perception of the use of GeoGebra is in line with the teachers' perception: the use of this tool as a means of learning and understanding Mathematics allows students to obtain a greater and varied number of skills.

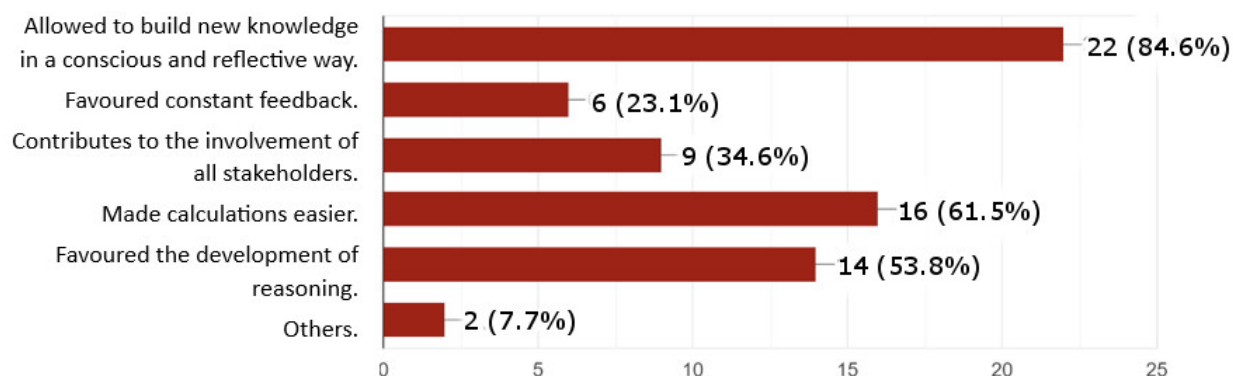


Figure 11: The expressions chosen by the students, which best define the way in which the use of GeoGebra was related to the acquisition of new knowledge.

Regarding the use of innovative learning activities in the classroom, all students liked it and 92.5% consider that the work methodology used in this experience contributes to the development of skills inherent to the students' academic (engineering) and professional choices.

The importance of mediation between teacher/student and between student/student was confirmed by the students when they answered that they were essential to overcome the stages of work design (96.2% - teacher/student and 100% student/student).

In the open answers, the students indicate that what they liked most about the experience was the use of GeoGebra (14 answers), working in groups (3 answers), developing knowledge about calculating perimeters, areas, and volumes (3 answers) and how functions can be related with maps (1 answer). However, the biggest challenge during the experience was GeoGebra (15 answers) and relating the new knowledge of the syllabus with previous knowledge (7 answers). As for the suggestions for future classes, the students proposed to work more often with GeoGebra, an introduction class to the basic functions of GeoGebra, continue to implement this type of activities and explore these tools in the classroom.

Conclusion

In this paper, an experience of PBL-CE was presented, where the student is actively involved in an enriched learning process, allowing him to acquire hard and soft skills. The experience consists of the story "An adventure on treasure island" where each group (2 or 3 students) is inserted and is invited to participate according to a set of tasks described in a small guide. The experience was presented to 35 students of Mathematical Analysis of Electrical and Computer Engineering on numerical integration. Students were encouraged to use different technologies, both computational and geometric (GeoGebra).

To assess the students' interest and acquired skills, two questionnaires were carried out. The first before the experience, to identify the students' knowledge about GeoGebra and PBL-CE learning. 35 students answered the questionnaire, where it was verified that the students had not previously used GeoGebra (71.4%) nor had PBL-CE experiences with GeoGebra in the classroom (80%). The second questionnaire, after the experience, to verify the interest and motivation of the students, as well as the skills that were acquired. 26 students answered the questionnaire, indicating that their contributions were valuable and that they were a fundamental element for the group. That cooperation (80.0%), responsibility (69.2%) and commitment (61.5%) define their performance in the group and that they had confidence in

what they learned (88.5%). All students liked the use of PBL-CE and 92.5% stated that it contributed to the development of skills inherent to the engineering course and professionals.

With this study, it was possible to verify that, despite the difficulties presented, teachers and students see that PBL-CE has great potential for promoting autonomy, learning and motivation of students in higher education. It was also possible to verify that the classes held contributed to the dynamization of pedagogical practices, creating more collaborative educational spaces in the context of teaching Mathematics. Thus, teachers and students began to act together to build learning, sharing information and knowledge, which favored peer learning and student creativity. This new dynamic of Mathematics classes allowed the students involved to develop skills and competences more efficiently for personal, academic, and professional life (soft and hard skills). Another aspect that also became quite evident from the study carried out was the gradual development of students' autonomy (individual and in groups), since the teachers in the classroom played the role of mediators and facilitators of the entire learning process.

The difficulties that occurred throughout this study, more specifically in relation to the experience, through the citation of the students were: the use of GeoGebra and relating the new knowledge of the syllabus with the previous knowledge. This goes hand in hand with the normally existing difficulties when starting to work with new technologies and different learning environments.

This case study, based on the results obtained, demonstrated the effectiveness of implementing the PBL-CE in the classroom context with a view to developing soft and hard skills in students. The results obtained were in line with the advantages of PBL learning in an CE environment mentioned in the literature, which enhance the improvement of students' academic performance and the development of essential social skills to train citizens capable of interacting in a healthy way in different contexts like family, academic life and professional. In relation to PBL-CE in learning, it will be necessary to use a summative assessment to confirm the effectiveness of learning. However, it is recognized that it is possible to develop a wide range of skills in students, encouraging them to engage in constructive learning. Through the direct observation of the teachers and the results of the surveys, the enthusiasm and dedication of the students, always present, was recognized.

After this study, the teachers feel that the experience has enriched their work, aware, however, that they still have a way to go, in the more frequent use and in the evaluation of the competences acquired with PBL-CE methodologies in the classroom. As future work, it is intended to apply this experience again in the next academic year and evaluate, in addition to the acquired skills, the knowledge obtained, through a small individual and group diagnostic test.

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A Preliminary Study on the Effect of Math Tracking on Learning: Students' and Parents' Thoughts

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Abstract

Math tracking, or ability grouping, is a practice used in mostly secondary education to place students into different math classes according to their mathematical abilities. However, the placement of students in various levels of math classrooms typically relies exclusively on adult perceptions, and the students, rarely get the chance to let the world hear their voices. In this study, we surveyed (n=40) and interviewed (n=9) students and parents to gather their thoughts on math tracking. The survey results were mixed. While more than 50% of the students reported that math tracking is stressful and preferred detracking, more than 60% of the students believed that math tracking has a positive impact on learning and motivates them to work toward more difficult courses. However, interview results revealed that the negative effect of math tracking can have significant adverse impacts on some students. One parent shared her story of transferring her child to another school due to the strain of math tracking. Overall, our interim conclusion is that schools that implement math tracking must offer additional academic and emotional support to students who might not benefit from the practice. We suggest future research on students' stress levels across different math courses to gain more insights into how math tracking impacts students' mental health.

Keywords: Math Tracking, Ability Grouping, Gifted Students, Accelerated Math, Educational Equity

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Introduction

In many parts of the world, math tracking is used in students' education. Math tracking is to place students into different math classes according to their mathematical abilities. Ability grouping is not unique to mathematics, but there are also different forms of group teaching in other subjects (see, for example, Eccles & Roeser, 2011; Li & Kam, 2011). However, the placement of students in various levels of math classrooms typically relies exclusively on adult perceptions, and the students, rarely get the chance to let the world hear their voices. There have been discussions on the topic, but a conclusion is yet to be formed. Some people, mostly students, think that math tracking has a negative effect on students' learning as it creates stress and pressure to not be left behind. At the same time, some people, mostly parents, think that it allows students to learn at their own pace and level which will cause their mathematical skills to advance sooner. This research paper will discuss the controversy of whether math tracking has a positive or negative effect on students' learning and is necessary or not.

Literature Review

Math-tracking is a common practice in American middle schools. About 75 percent of U. S. students are tracked in math (Loveless, 2013). As it is spreading to more schools, there are people that stand for it and there are people that stand against it.

When it comes to learning, two factors are most important, and they are pace and the understanding of the material. Pace is something we cannot ignore in learning. Every unique student has a different pace of learning and in the field of math, the pace of learning is crucial. By placing students in different courses, both polymath students and students who aren't gifted can learn and advance at their own pace. It will help them "engag[e] and [train with different] learning experiences" (Petrosillo, 2022). Eventually, all students will be developing a deep understanding of the content and reach their highest potential. As an example, students can "choose to take anywhere from one to five math classes in high school with varying degrees of rigor – all while meeting their graduation requirements" (Kelmon, 2019). Math tracking enables students to not only grow effectively but take as many classes as they want in school while meeting all the graduation requirements because they are able to learn at their own pace.

To add on, if math tracking isn't in action, and students with different learning paces and wide skill ranges are mixed, there will be struggles because it will slow down the class. For example, Colangelo & Kelly (1983) revealed that gifted students are eager to participate in gifted programs because they are willing to work together with other talented students rather than regular students. Doucet (2012) claimed that an accelerated course is the best arrangement for gifted students given the necessary financial support. Manuel (2017) pointed out that there are some talented students in math lose their interest when they complete middle school because they are not intellectually stimulated by the everyday tasks during mathematics lessons.

The understanding of the material is essential for learning, as there are cases when students move on without gaining the knowledge. In mixed classes, students who aren't gifted in the field of math won't be able to fully understand the material because they will be constantly asked to understand something not at their level, something they are unable to perceive. They will be scared to ask questions because they don't want to embarrass themselves in front of

other students. Their final grades will then reflect these insecurities and lack of motivation to learn and advance. Students who don't acquire the knowledge will have to retake the course and will fall far behind.

At the same time, there are schools that “eliminated math tracking, recognizing that the practice can create inequities between students, with significant ramifications as they progress through school” (Berwick, 2019). While there are students that take different courses as motivation, there are also students that lose passion in math because of math tracking and give up. To add on, there are cases around the world when math tracking has divided students. As an example, in Cambridge Public Schools, high-level courses are filled with white and Asian children, and lower-level math courses are filled with black and Latino children. It has created a negative influence on students, “students internalize it – they believe the smart kids are the white kids” (Berwick, 2019). Students lose confidence and discourage themselves to keep learning when in different leveled math courses. Correspondingly, mixed classes prevent competition and stressful atmospheres between students. They ensure that no student is left out. To learn more about the effect of math tracking might bring to students and parents, this study was conducted with the guidance of these research questions:

1. Does different math-level courses bring stress to students?
2. How do students think about the difficulty of different math-level courses?
3. Would students like it better if all students took the same math courses?
4. Do students learn mathematics effectively from courses at different levels?
5. Would students still be able to have the same performance when combined into one math course?

Methodology

The present study used surveying and interviewing as its primary research methods. In order to obtain a preliminary understanding of the effect of math tracking on students' learning, a convenience sampling method was employed, with the majority of respondents being students and parents associated with an international middle school in Shanghai. To enhance the representativeness of the sample, the authors also extended invitations to students and parents from other schools. The parent respondents exhibited diverse occupational backgrounds and nationalities, and were residing in various countries. The survey and interview participants included students enrolled in both advanced and regular mathematics classes. Data collection was carried out in-person by the first author during November and December of 2022.

Findings

Survey With Students

Quantitative data was collected by surveying ten seventh-grade students and ten eighth-grade students taking the advanced math course. The following questions were posed to them for response:

1. Do you find different math-level courses stressful or not stressful?
2. On a scale of 0~10, 0 being easy and 10 being too hard, how would you rate your math classes?
3. Would you like it better if everyone took the same math class?

Fourteen students responded that they find it stressful, which amounts to 70% of all students. The main reason was that they had to keep worrying about whether they will drop out from their current courses or not. Out of twenty responses, sixteen students rated their math classes an 8, which translates to 80% of the total and it was because the material was sometimes harder than their ability. Also, twelve students responded that they would like it better if everyone took the same class, which translates to 60% of the total. The primary reason for these responses was that they didn't want minor competitions and conflicts between their classmates to get into the higher math course. Though math tracking might be effective, with these responses, it is foreseeable that over 50% of the students might have a negative view of math tracking. These responses show that its short term might be effective, but the long-term effect is unpredictable because of the drawbacks it brings along.

Another set of qualitative data was conducted by surveying twenty eighth-grade students, 13 students from the advanced math course and 7 from the regular math course. They were asked whether they believed that math tracking has a positive effect on students' learning or not. The data shows that 60% of the students surveyed believed that math tracking has a positive effect on students' learning. Simultaneously, there were individuals who vehemently disagreed with its positive effect on students' learning. One student from the advanced math course and six students from the regular math course believed that math tracking has a negative impact on students' learning. A student from the regular math course who believes it has a positive effect said, "Even though I'm in the normal math course, I put the advanced math course as my goal and work hard every day. Math tracking helps me get motivated by students that are in higher-level courses and work towards the day to learn with them." Accordingly, most students believe that math tracking affects them positively.

Interviews With Students and Parents

Another set of qualitative data was conducted by interviewing 9 different interviewees, 5 students who each go to different schools, 3 parents that educate their children in different countries, and 2 math teachers in China and Korea. The interviewees were asked to answer the following questions: Do you think different leveled math courses are effective in students' learning? Why or why not? Would students still be able to have the same performance when combined into one math course? Kristy, a student from School A stated,

I think it's effective because students can teach and learn from each other because they have similar math levels. Also, I don't think students would have the same performance when combined because there will be students that will slow them down, which causes them to improve slowly and be unable to focus in a class entirely.

Two other students agreed with this point of view, and add to Kristy, saying that it would be more comfortable because not everyone has the same pace in learning. Meanwhile, two other students disagreed and believed that different leveled math courses are not effective in students' learning. Coco, a student from School B, stated,

I don't think it's effective because people have pretty much the same math levels. Some may be born with talent, but if people put effort towards it, they will improve so no one needs to be low-rated. Also, I think students would be able to have the same performance because the student doesn't change. If the student continues to take any course with persistence and hard work, anything would be possible.

Another student adds on to Coco and said,

Math tracking also causes stress. To add, I can't relate to my friends because some of us take different courses. Besides, another reason why students would be able to keep their performance whether good or bad because they won't be learning a different subject. It will just be the same material being easier or harder.

Parents in different regions responded with different points of view. Mrs. Johnson, a parent of two middle school students in the U.S. commented that math tracking is unnecessary and isn't effective in students' learning. She explained,

When I lived in China, my kids experienced math tracking in school. It wasn't an enjoyable experience for them. My first child started to give up on math because he was sick of the level system. And it became a lot better when we transferred him to a school without math tracking.

Parents of middle school students in Korea and China responded to the opposite of Mrs. Johnson, they both believed that it is effective in students' learning. Mrs. Ahn, a parent of a middle school student in Korea, said,

Math tracking is what motivates my son to try harder to improve faster in math. Although he indeed has that he has some stress on him, he said it himself that when he moves up, all that stress just goes away.

Mrs. Liu educating two middle school students in China added,

Yes, it is effective because students can reflect on their abilities and make plans to get better.

Interviews with teachers also showed a whole different story. In an interview with Ms. Jung, a math teacher in Korea, she said,

Whether math tracking is effective or not effective depends on the student. Throughout my years of teaching, I've met various students. To most students, math tracking works effectively, because then they desire to get better as their abilities are shown with the class they take. However, there are always some students in a class that seems careless and if math tracking is used in their learning, they will just give up. For parents with those students, I recommend first building their passion for math and progress into math tracking later.

An interview with Mr. Xi, a math teacher in China stated similarly. He said,

There is no answer in whether it is effective or not. Every student is different and so will the effect on the student. Nobody can conclude that math tracking will be effective or ineffective on students' learning.

Conclusion

To many people, mathematics is one of the most important subjects a student has to study for. As parents' zeal for education increases over generations, younger students are learning and

solving problems designated for older students to solve (Lee & Mao, 2021). Math tracking is quickly spreading to parts around the world and high schools and universities are more likely to accept a student that has better marks in math and took high-level courses than a student who took low-level courses. Math tracking allows students to learn at their own pace and learn more deeply. However, it indeed also has a negative side, because everything comes with a price. It causes the students to be pressured and to be stressed out. It may also cause students to be bullied because of the level of the course they take. The data collected shows that this is a very interesting topic to discuss for both sides as both sides have reliable evidence to prove their points. Overall, our interim conclusion is that schools that implement math tracking must offer additional academic and emotional support to students who might not benefit from the practice.

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Moral Education Curricula in East Asian Countries

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Abstract

Recent years have seen a rise in interest in social-emotional learning (SEL) in the United States and other Western countries. What is the approach of Eastern wisdom to this topic? In this study, the official middle school SEL-related curricula of a few East-Asian countries including China (mainland China, Taiwan region and Hong Kong SAR), Japan and Korea are gathered and examined with the framework of curricular spider web suggested by van den Akker (2003). This study aims at identifying the similarities and differences among the SEL-related curricula in these countries and to bring insights to other scholars and education policymakers. The biggest similarity identified is that most of these curricula emphasize the concept of “morality”. Meanwhile, the biggest difference identified is that SEL is conducted in a separate subject in mainland China (Morality and Laws), Japan (Morality) and Korea (Morality) while SEL is integrated with other academic subjects, integrative activities, and school events in Taiwan region and Hong Kong SAR. This paper does not provide a definitive conclusion but acts as an informative paper for interested parties.

Keywords: Moral Education, Social-Emotional Learning, East Asia, Morality and Laws, Values Education, Curricular Spider Web

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Introduction

Social-Emotional Learning (SEL) has received much attention in recent years. In the U.S., up to 2020, “[e]ighteen states have introduced K-12 SEL standards or competencies, and 26 states have produced guidance documents or websites designed to support SEL implementation” (Shriver & Weissberg, 2020). Studies have pointed out that SEL not only helps reduce students’ behavioral problems, but also helps students improve their academic performance. In this paper, we will shift our eyesight to East Asia and explore how SEL is conducted in East Asian countries. Official curriculum documents of China (mainland China, Taiwan region, Hong Kong SAR), Japan and Korea are gathered and examined in order to know more about how SEL is conducted at schools. In particular, this study focuses on the middle school curricula (ages around 11 to 15).

One reason that makes it worthy studying in East Asian SEL-related curricula is their highly impressed citizenship. Some of these countries have an excellent reputation among its citizen. We have a favorable impression of their politeness and attention to order and detail. This impression is evidenced quantitatively, too (see, for example, Ipsos, 2022; Social Progress Imperative, 2022). Although there is some controversy with regard to the criteria used in these indexes, they don’t avoid us to say some of these countries have a good impression of their citizenship. There must be something that other countries can learn. We also know that these societies are highly influenced by Confucianism or Taoism and Buddhism (Jeynes, 2008, p. 17; Kam, 2013), which makes these societies comparable. Exploring the similarities and differences can bring insight to scholars, policymakers and practitioners on exploring the best practice of SEL implementation.

Literature Review

SEL in the U.S.

In the U.S., the leading organization for SEL is CASEL, or the Collaborative for Academic, Social, and Emotional Learning. CASEL was founded in 1994 and was the first organization that “lead a growing movement to make SEL an integral part of education” (The Collaborative for Academic, Social, and Emotional Learning [CASEL], n.d.). The CASEL framework “addresses five broad and interrelated areas: self-awareness, self-management, social awareness, relationship skills, and responsible decision-making”, aiming at helping students “acquire and apply the knowledge, skills, and attitudes to develop healthy identities, manage emotions and achieve personal and collective goals, feel and show empathy for others, establish and maintain supportive relationships, and make responsible and caring decisions” (CASEL, n.d.). Surrounding the five areas are the contexts of classrooms, schools, families & caregivers and communities, identifying strategies from different roles of various parties on enhancing students’ SEL.

SEL in East Asian Countries

In East Asian countries, they have similar curricula taking care of students’ social and emotional welfare. It is easy to understand that students do not only come to school to learn, but child development is always an important goal besides academics. These learning activities are conducted in different titles in these countries. In China, the title is Morality and Laws (道德与法治) (Ye, 2022, p. 63). The course is called Moral Education (道德) (Ministry of Education, Culture, Sports, Science and Technology [MEXT], n.d., p. 4) in Japan and

Moral Education (도덕) (Ministry of Education of the Republic of Korea [MOE (Korea)], 2015, p. 3) in Korea. The term used in Hong Kong SAR is Values Education (價值觀教育) (Hong Kong Education Bureau, 2021, p. 5) while related items are delivered under the framework of Integrative Activities (綜合活動) in Taiwan region (Ministry of Education of the Republic of China (Taiwan) [MOE (Taiwan)], 2018). Although the scopes of the curricula are slightly different and the items listed in each curriculum are not covering exactly the same area, we can still learn how SEL-related activities are conducted in these countries.

Modern Curricula in East Asian Countries

World War II (WWII) had a significant impact on East Asian curricula. The aftermath of the war, coupled with the advent of new ruling governments in mainland China and Taiwan region or re-ruling in Hong Kong, and the influence of the American Education Mission in Japan and Korea, marked a turning point in the development of modern curricula. The first iterations of modern curricula in these countries emerged in the late 1940s and 1950s and “were strongly and deliberately modeled after the Western educational rubric” (Jeynes, 2008, p. 1). However, Jeynes (2008, p. 17) claimed that although “the reality of western moral education was used ... the actual principles were Confucian in nature”. Their histories and geographic limitations affect their beliefs as well. For example, as an island nation, Japan suffers from a lot of natural disasters, which generate a sense of the powerlessness of life. In the spirit of Bushido, contempt for one’s own life is considered the most noble quality (Fusé, 1980, p. 62).

Recent Reforms

Interestingly, it is revealed from this study that all of these countries have undergone some sort of reform in the late 2010s and early 2020s. The biggest reform was in Japan, in which they renewed their Moral Education curriculum by raising Moral Education to the status of a specific subject in 2017 (Fujioka, 2018). Hong Kong SAR launched its Values Education curriculum in 2021 based on the foundation of the existing Moral and Civic Education curriculum (Hong Kong Education Bureau, 2021, p. 2). China, unlike previously that they have various versions of textbooks, has changed its policy and reinstated the “one guideline, one textbook” policy in its Morality and Laws curriculum (Ye, 2022, p. 60). These updates were based on their society needs and these reasons will be explored more deeply in a later section of this paper. In contrast, although Taiwan region and Korea updated their curricula in 2018 and 2022, respectively, the modification is not huge and basically continues the existing framework.

Methods

In this study, I first gathered the official curriculum documents provided by the education bureau websites. Unfortunately, only a few of these documents are available in English. Therefore, other documents were downloaded in their native language, and were translated into English by Google Translator. A few other online translators were also used for triangulation purposes. The titles and hyperlinks of these documents were summarized in the following table. Besides the official curriculum documents, additional peer-reviewed articles were also used in order to keep the translation consistent and for additional information that is not provided in the official documents.

Country/ Region	Curriculum Document	Hyperlink
Mainland China	Curriculum standards of Morality and Laws 2022 (道德与法治课程标准 2022) (Ministry of Education of the People's Republic of China [MOE (China)], 2022)	http://www.moe.gov.cn/srcsite/A26/s8001/202204/t20220420_619921.html
Taiwan region	The national curriculum for the primary and secondary schools: Integrative activities (十二年國民基本教育課程綱要 綜合活動領域) (MOE (Taiwan), 2018)	https://www.naer.edu.tw/eng/PageSyllabus?fid=148
Hong Kong SAR	Values education curriculum framework (Pilot version) (價值觀教育課程架構 (試行版)) (Hong Kong Education Bureau, 2021) Secondary education curriculum guide (2017) - Booklet 6A: moral and civic education: Towards values education (in English) (Hong Kong Education Bureau, 2017)	https://www.edb.gov.hk/en/curriculum-development/4-key-tasks/moral-civic/curriculum-documents.html
Japan	Guidelines for junior high school study: Morality (中学校学習指導要領 道德篇) (MEXT, 2017)	https://www.mext.go.jp/a_menu/shotou/new-cs/1387016.htm
Korea	The national curriculum for the primary and secondary schools (in English) (MOE (Korea), 2015) Annex 6 - Moral Education curriculum(별책6_도덕과 교육과정) (MOE (Korea), 2022)	http://koreaneducentreinuk.org/wp-content/uploads/2021/02/The-National-Curriculum-for-the-Primary-and-Secondary-Schools-2015.pdf https://ncic.re.kr/mobile.dwn.ogf.inventoryList.do

Table 1. Curriculum documents in East Asian countries.

Once these documents were translated, they were examined with the guidance of the curricular spider web suggested by van den Akker (2003, p. 6). A summary of these components and questions was organized in the table below. It is acknowledged that not all of these questions can be answered by examining the official documents, and these omissions will be identified in the limitation section of this paper.

Component	Core question
Rationale	Why are they learning?
Aims and objectives	Toward which goals are they learning?
Content	What are they learning?
Learning activities	How are they learning?
Teacher role	How is the teacher facilitating learning?
Materials and resources	With what are they learning?
Grouping	With whom are they learning?
Location	Where are they learning?
Time	When are they learning?
Assessment	How far has learning progressed?

Table 2. Curricular spider web. (van den Akker, 2003)

Findings and Discussions

Rationale

Based on the framework suggested by van den Akker (2003), curriculum comparison can start with rationale and aims. “[C]urriculum design and implementation problems have taught us that it is wise to pay explicit attention to a more elaborated list of components” (van den Akker, 2003, p. 4). Rationale and aims are usually listed at the beginning of the curriculum documents. Some curricula listed their rationale briefly, while others spent a few pages explaining. For comparison, I provided the summarized versions as follows, and I provided the page number for interested readers’ references.

Mainland China:

Focus on the core qualities of Chinese students’ development, cultivate students’ correct values, necessary character and key abilities for future development, guide students to clarify the direction of their life development, and grow up to be socialist builders and successors with comprehensive development of moral, intellectual, physical, aesthetic and labor. (MOE (China), 2022a, p. 1-2)

Taiwan region:

Through the implementation of core literacies, the coherence of subjects in each stage of education, and the integration of cross-disciplinary/inter-subjects, students are guided to engage in experiential, reflective, practical, and innovative learning activities to construct internalized meanings and cultivate altruistic feelings. (MOE (Taiwan), 2018, p. 1)

Hong Kong SAR:

Values influence everyone’s perceptions and attitudes, and serve as the standards and principles behind people’s judgments, choices and attitudes... [W]e should not only consider our personal positions and opinions, but also base our judgments and decisions on the well-being of the nation and the positive values held by society. (Hong Kong Education Bureau, 2021, p. 5)

Japan:

[I]n moral education, it is important for students to learn about the rules and manners that have been handed down and shared in the past, and the various moral values that have been valued in society, in accordance with their stage of development and based on a certain educational plan, so that they can understand and acquire these values and deepen their own ideas by considering them from various angles. (MEXT, 2017, p. 3)

Korea:

Morality is embodied in the process and outcome of tension, conflict, and harmony between morality as a social norm and virtue that operates within each individual. Therefore, for the cultivation of morality, the curriculum should include the three components of the process of linking moral knowledge and practice: an inquiry into moral phenomena, reflection on inner morality, and daily practice. (MOE (Korea), 2022, p. 5)

From a Western perspective, I find that the rationale of these East Asian moral education curricula emphasizes more on cultivating the next generation’s sense of social responsibility

in addition to the emphasis on students' personal growth and needs. In Ellis's (2004) words, the East Asian moral education curricula take a more society-centered approach. Compared with the rationale of CASEL, the leading organization in SEL education in the U.S., the CASEL curriculum seems to take a more student-centered approach to its rationale. While the East Asian curricula seem to be more balance between student-centered and society-centered approaches.

In addition to outlining the rationale for the curricula as a whole, curriculum documents also specify the reasoning behind recent reforms. While the reforms in Korea and Taiwan region were primarily updates as part of the routine national curriculum review cycle, those in mainland China, Japan, and Hong Kong SAR were driven by a clear sense of urgency.

In China, the reform was corresponding to the national policy on reducing students' study load. In Japan, the reform was a response to increasing youth criminal rates, bullying incidents and suicide rates. The catalyst for the reform was a series of serious bullying cases, "including a brutal incident in which a junior high school student committed suicide in October 2011, after being severely bullied by classmates at his school" (Nishino, 2017, p. 2). The document also pointed out that because moral education was not arranged as a subject, teachers and students pay less attention to moral education than other academic disciplines (MEXT, 2017, p. 1). The reform in Hong Kong SAR was closely related to the anti-government riots in 2019, which resulted in over 10,000 persons arrested, "of which 1,754 were aged under 18" (Hong Kong Press Releases, 2022).

Aims and Objectives

The second question in van den Akker's (2003) framework is about the curricula's aims and objectives. The summarized aims and objectives from each curriculum documents are listed as follows:

Mainland China:

Cultivated political identity, moral cultivation, rule of law, sound personality, and sense of responsibility. (MOE (China), 2022a, p. 8-16)

Taiwan region:

Develop students' ability to "explore values, integrate experiences, and innovate in practice," including promoting self and career development, practicing life management and innovation, and implementing social and environmental care. (MOE (Taiwan), 2018, p. 1)

Hong Kong SAR:

Cultivating positive values and attitudes, enhancing abilities such as resilience, emotion management, judgment, problem solving, communication, social skills, and self-control, as well as qualities such as love for life, self-esteem and self-confidence, perseverance, empathy, self-discipline, and courageous commitment, equip them to contribute to society in the future. (Hong Kong Education Bureau, 2021, p. 5)

Japan:

Thinking about the way of life as a human being, acting under the judgment of the subject, and aiming to develop moral qualities, which are the basis for living better with others as an independent human being. (MEXT, 2017, p. 14)

Korea:

Development of moral human beings through the cultivation of morality... to make the society in which moral human beings must live together a more just society. (MOE (Korea), 2022, p. 5)

It is clear that the stated aims and objectives reflected the emphasis on both personal growth and needs and cultivating citizens' social responsibilities, rather than mainly emphasising personal growth as in the CASEL framework.

Content

Countries	Categories	Number of items
Mainland China (MOE (China), 2022a, p. 34-41)	Life Safety and Health Education	5
	Law Education	16
	Chinese Traditional Culture Education	5
	Revolutionary Tradition Education	5
	National Education	4
Taiwan region (MOE (Taiwan), 2018, p. 17-23)	Self and Career Development	3
	Life Management and Innovation	3
	Social and Environmental Care	3
Hong Kong SAR (Hong Kong Education Bureau, 2021, p. 30-32)	Personal	9
	Family	7
	School	7
	Relationships	6
	Society, Nation & World	7
Japan (MEXT, 2017, p. 25; Han et al., 2018, p. 5)	Matters regarding me	5
	Matters regarding a relationship with others	4
	Matters regarding a relationship with community or society	9
	Matters regarding a relationship with nature or sublimity	4
Korea (MOE (Korea), 2022, p. 6-10; Han et al., 2018, p. 5)	“I” as a moral self	7
	Relationship with “we”, others, and society	6
	Relationship with country, nation, and global community	7
	Relationship with nature and transcendent existence	2

Table 3. Content and categories in East Asian moral education curricula.

Interestingly, the learning items were categorized in a similar framework, generally starting from learning about oneself, and gradually expanding the attention to family and friends, schools and local communities, and at last to the nation and international affairs. If we compare these frameworks with the CASEL framework which was categorized into self-awareness, self-management, responsible decision-making, social-awareness and relationship skills, the content discussed in the East Asian moral education curricula does not have a huge difference from those in a Western SEL curriculum.

It may be interesting to point out that I believe although the concepts of East Asian curricula that expand gradually further and further away from a child make a structure which may

make curriculum development easier, the concept of CASEL actually makes more sense from a practitioner's perspective because a lot of SEL or moral issue discussed in the lessons can be related to more than one categories. In fact, it is explicitly mentioned in some of these East Asian curricula that although the items are listed under different categories, teachers should bear in mind that these moral issues can be interrelated and should not limit to one category during discussion [MOE (China), 2022a. p. 53; MOE (Taiwan), 2018, p. 16; Hong Kong Education Bureau, 2021, p. 13, 18; MEXT, 2017, p. 81; MOE (Korea), 2022, p. 5]. However, Fujioka (2018, p. 28) pointed out that this is a limitation of using textbooks because textbooks were prepared based on the categories and it is not easy for teachers to consider expanding the discussion to other categories.

Learning Activities

Evaluating the curriculum documents, not much difference can be identified regarding learning activities. Disciplinization in mainland China, Japan and Korea lead to separate learning times when teachers and students discuss moral issues during moral lessons, so I believe that students in these countries would have more time to read, listen and discuss moral issues than the students in Taiwan region and Hong Kong SAR. Other than that, the descriptions among different documents describing learning activities are pretty similar. During the moral lessons, students explore the related concepts by conceptual learning, theme learning, inquiry learning, group discussion, essay writing, cooperative learning, role-play learning, project-based learning, etc. (MOE (Korea), 2022, p. 20). Outside classrooms, moral or SEL-related education is conducted by site visits, site observation, volunteer services, and study tours, etc. (MOE (China), 2022a. p. 49). These activities effectively connect the knowledge students learn at schools with the real world.

However, studying the official curricula means we are only considering the intended curricula. Other research methods, for example, an ethnographic study or a grounded theory research, need to be adopted in order to identify the similarities and differences in practice in moral education among these countries.

Teacher Role

Mainland China: Specific teachers with a license in moral education.

Taiwan region: Homeroom teachers, all teachers and adults.

Hong Kong SAR: Homeroom teachers, all teachers and adults.

Japan: Homeroom teachers, all teachers and adults.

Korea: Specific teachers with a license in moral education.

While the curriculum documents from these East Asian countries do not show huge differences in their rationale, aims and objectives, content and learning activities, we start to notice the differences when we shift our attention to the teacher roles. These differences are greatly due to the models of the curricula, which will be discussed more deeply in a later section.

All countries emphasize the importance of leadership from principals and vice-principals. At schools, moral education programs are usually coordinated by an appointed moral education coordinator, who should have more professional training on this matter. All teachers and adults, especially homeroom teachers, are responsible for SEL.

In mainland China and Korea, moral education lessons are conducted by specific moral education teachers. These teachers have to hold a specific license in moral education in order to be qualified to teach moral lessons at schools (Chu et al., 1996, p. 4; National Education Examinations Authority, n.d.). These teachers are usually graduated from a degree program in related disciplines and hired as moral education experts. Developing moral education curricula and teaching moral education lessons are their major role at schools.

The requirements to teach moral education in Japan, Taiwan region and Hong Kong SAR are not as strict. In Japan, all teachers can teach moral lessons as long as they obtain a teaching license in the corresponding schools (elementary schools, middle schools or high schools). Local education bureaus also hire local community members to enter campuses to provide specific skills during the moral education lessons and activities (special teachers, or Kokoro no Sensei) (MEXT, 2002). In Taiwan region and Hong Kong SAR, SEL-related education is integrated into other academic subjects and school activities and they do not have a standalone subject for moral education or values education. Therefore, all teachers and adults are responsible for modal education during school time, and they are not required to obtain a specific license for doing so.

Materials and Resources

Mainland China: National curriculum, one textbook (Ye, 2022, p. 60).

Taiwan region: School-based curriculum, textbook not mandatory, teaching materials available on bureau's website.

Hong Kong SAR: School-based curriculum, no textbook, teaching materials available on bureau's website.

Japan: National curriculum, multiple textbooks (Han et al., 2018, p. 4-5), a uniform supplementary textbook distributed (Our morality, 私たちの道徳) (MEXT, 2014a).

Korea: National curriculum, multiple textbooks (Han et al., 2018, p. 4-5).

Because of the different models of moral education curricula, the usage of textbooks and materials also differs among these countries. Mainland China takes the most centralized approach in that it uses a national curriculum and all schools use the same set of moral education textbooks (Ye, 2022, p. 60). Japan and Korea have multiple publishers that publish different versions of textbooks for schools to choose from. In addition to the chosen textbooks, Japan MEXT also provide a uniform supplementary workbook called Our Morality (私たちの道徳) (MEXT, 2014a) to over 95% of schools (MEXT, 2014b, p. 1). For Taiwan region and Hong Kong SAR, although they also publish curriculum documents, they release more freedom to schools to develop their school-based curricula according to the frameworks provided. There are publishers in Taiwan region that publish textbooks with the title of Integrative Activities, while there are no specific textbooks related to SEL in Hong Kong SAR.

Grouping and location

Mainland China: A standalone subject

Taiwan region: Integrated under the scope of integrative activities

Hong Kong SAR: Integrated into academic subjects and school events
Japan: A standalone subject
Korea: A standalone subject

Looking into the models of education programs, there are two different models these countries adopt. Disciplinization is adopted in mainland China, Japan and Korea. This means that a certain number of teaching periods are set aside for moral education. During these periods, students attend moral lessons just like they attend other core subjects' lessons. They have a particular teacher to teach them on this subject, and these assigned moral education teachers play a major role in the moral education program at schools.

Meanwhile, integration is adopted in Taiwan region and Hong Kong SAR. On a student schedule, one would not find a period assigned for SEL-related lessons, but the SEL-related concepts are integrated into academic subjects and other school activities. In this case, the responsibility of attaining the goal of SEL-related curricula is distributed among all subject teachers and adults. Homeroom teachers play a major role in this model, although SEL is usually not their main focus at schools.

An interesting discussion can be made on Japan's decision in 2015 of shifting from integration to disciplinization. Because of increasing bullying cases among the youth, higher suicide rates and lower interest rates, the Japanese government and society thought that the previous integrative approach of moral education has to be reviewed. They revealed that because moral education is not a standalone subject, students and teachers pay less attention to moral education as compared with other academic subjects because of academic pressure. As a result, Japan decided to shift to disciplinization in 2017 (for elementary schools) and 2018 (for middle schools). Based on Japanese educational regulations, turning moral education into a standalone subject means that they need to introduce nationally approved textbooks and implement evaluations on student learning. As far as I know, there is no widely accepted conclusion so far as to whether disciplinarity has achieved the desired goal, or whether the benefits of disciplinarity or integration are inherently controversial. However, for external observers, the Japanese decision can already be inspiring that different countries/regions have to select their model of conducting SEL or moral education based on their own situation. There is no one model that is better than another, only that maybe one model is better suited than another.

Model of Curriculum		
	Disciplinization	Integration
Advantages	<ul style="list-style-type: none"> ❖ The number of learning hours can be guaranteed. ❖ Evaluations are conducted under the scope of moral education, which is easier for students and teachers to stay focused on the goal of moral education. ❖ Specific teachers teach moral lessons and are more well-trained professionally. ❖ Learning area coverage can be guaranteed. ❖ Specific learning time makes the organization of enrichment activities easier. 	<ul style="list-style-type: none"> ❖ Moral or SEL-related topics are ubiquitous. ❖ Integration makes the connection between moral or SEL-related topics and academic knowledge easier. ❖ Students learn the concept of morality not only by attending lectures but also by observing adults' practice. ❖ Although homeroom teachers may not be as well-trained as specific moral education teachers, they are the adults who know the children most at school.
Challenges	<ul style="list-style-type: none"> ❖ A separate moral subject may lead students to discuss moral related issues only in moral lessons and may create a discrepancy between knowledge and practice. ❖ If students learn and memorize "correct" answers because they need to obtain a high score on the assessments, they can not achieve the goal of moral education. ❖ Need specific moral education teachers and so more pedagogical training is needed. ❖ Specific moral education teachers spend less time with students (1 or 2 periods per week) and they may not know the students as a person as compared with their homeroom teachers. 	<ul style="list-style-type: none"> ❖ Because the teachers are not specifically trained as moral education or SEL-related teachers, they may pay less attention to these topics as compared with their teaching academic subjects. ❖ Lack of professional training may also lead to teachers' tendency on avoiding sensitive topics. ❖ Assessment of moral education learning can be more difficult. ❖ More difficult to arrange enrichment activities, or may need to use after-school time or other subjects' teaching time.

Table 4. Advantages and challenges in disciplinization and integrative approaches.

Time

Mainland China: 6-8% of total instructional time (MOE (China), 2022b).

Taiwan region: 3 periods are allocated for integrative activities among the total of 32-35 periods, which is around 9%. But Home economics and Scouting are also conducted during these periods, so time allocated for SEL-related topics must be less than 9% (MOE (Taiwan), 2014, p. 10).

Hong Kong SAR: No designated time for values education.

Japan: 35 among 1015 total teaching hours are allocated for moral education, which is around 3% (MEXT, 2017, p. 124).

Korea: 1 to 2 periods among 34 teaching periods are allocated for moral education, which is around 3-6% (Institute of Education and Culture, 2019).

From the comparison, students in China spend more time on moral education than in other countries. In Japan and Korea, students spend around 3-6% of total instruction time in moral education. Taiwan region and Hong Kong SAR take the integrative approach, so the actual instructional time is not clearly identified.

Actually, it may be misleading if we judge the level of commitment to moral education or SEL by comparing the teaching hours. In a previous section, we discuss that some countries integrate moral education into other academic subjects and school activities, while others deliver moral education as a standalone subject. For example, Hong Kong SAR does not assign a Values education time, but students in Hong Kong SAR learn about persistence, caring and empathy in a Chinese reading lesson while developing national identity through watching videos of the Chinese satellite launching process in a Science lesson (Hong Kong Education Bureau, 2021, p. 54). Although teachers may or may not explicitly tell the students about the values behind these learning and these learning do not count toward the so-called Values education time, students are learning these values and I would argue that this type of learning may have an even stronger impact than learning these values in a moral education lesson.

Assessment

Regarding evaluation, moral education or SEL emphasize less on knowledge acquisition and more on thought development, curriculum documents from all countries mention that evaluation should take multiple strategies. Paper-based assessment, portfolio assessment, observation and oral assessment are used to evaluate students' growth. Self-evaluation and peer-evaluation are also suggested. While most countries emphasize that evaluation aims at students' growth and will not be used in filtering students from enrollment to the next stage of education, mainland China takes a different approach by involving moral education in high-stakes exams for high schools and universities.

Again, there must be gains and losses for this arrangement. Relating moral education evaluation with further education opportunities must force teachers and students to pay more attention to this subject. However, the goal of moral education will not be achieved if students answer what they think the teacher wants because of the need for assessment, rather than responding according to their own feelings and thoughts. It can be an interesting research area to see how mainland China assess their students in the public exams because it is unique among these countries.

Conclusion

Studying the curricula documents of moral or SEL-related education in East Asian countries can be interesting from a Western perspective. Identifying similarities and differences among the curricula can inspire us on reflecting our current practices and explore new directions for their development.

The first finding of this study is that all of the studied curricula emphasize the concept of morality. Mainland China, Japan and Korea use the term morality as the subject name, Hong Kong SAR uses the term Values Education, while although Taiwan region doesn't put the term as the name of the subject, the concept is integrated throughout its curriculum. This may be due to the influence of their long histories and the traditional Confucianism and Buddhism.

The second finding is about the difference in the model adopted in moral or SEL-related education. Moral education is conducted in a separate subject in mainland China (Morality and Laws), Japan (Morality) and Korea (Morality) while related topics are integrated with academic subjects, integrative activities and school events in Taiwan region and Hong Kong SAR. The curricula are centralized in mainland China, Japan and Korea, while Taiwan region and Hong Kong SAR provide a centralized framework for schools and they have more freedom on constructing their school-based curriculum based on the centralized framework. In terms of the level of centralization, mainland China takes the most centralized approach by adopting one uniform series of textbooks across the nation. The centralization in Japan and Korea is lower than in mainland China by publishing a centralized curriculum but schools adopt textbooks provided by publishers. Schools in Taiwan region and Hong Kong SAR have more freedom to develop their school-based curricula based on the centralized framework.

The third finding is about the teacher arrangement. Specific teachers are arranged to teach the lessons in mainland China and Korea, and these teachers have to hold a specific license in order to be qualified to teach moral education lessons. Moral or SEL-related education is conducted by homeroom teachers in Japan, Taiwan region and Hong Kong SAR, who are usually trained as subject teachers in general.

At last, it is also revealed that only mainland China among the studied countries relates students' moral education learning outcome to high school and college enrollment opportunities.

This study does not aim at providing a definitive conclusion, but by comparing similarities and differences among East Asian moral education or SEL-related curricula, this paper can act as an informative resource for further research.

Limitations and Further Studies

There are a few limitations in this study. Firstly, this study relied solely on official curriculum documents, so only the intended curricula were examined. The practice at schools can be different from the intended curricula to various extents, and this study did not study the potential difference between the official documents and actual practices. In addition, some areas such as the learning activities and actual time allocation are not identifiable by examining the curriculum documents. At last, most documents were gathered in native languages and were translated into English using online translators. So, there are some risks that the documents were misinterpreted although the author has made an effort on inviting native language users to check the documents and this paper.

There are a few areas that can be interesting for further studies. First, a qualitative study can be conducted to reveal the similarities and differences in learning activities related to moral or SEL-related education among these countries. For example, an ethnographic study or a grounded theory research can be conducted to explore the actual practice in moral education

lessons. Another further study area is to examine the evaluation method in mainland China and its impact on people's moral level because mainland China is the only studied country that relates students' learning outcomes with their high school and college enrollment opportunities.

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You Don't Have to Feel Trapped: Virtual Field Trips During School Shutdowns –A Systematic Review and SWOT Analysis

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Abstract

The purpose of this systematic review and Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis is to examine the Virtual Field Trips, an important component of educational technology, to see how these can help ensure continuity of education (both formal and informal) in a safe manner, and how they can help address the unique needs of each learner and support diverse and inclusive education. This research systematically summarized existing literature published between January 2021 and December 2021, and search terms identified 1795 papers, from which 37 relevant articles met the inclusion criteria of the current review. Data extraction was initially conducted based on title, keywords, and abstract; it continued with a full-text analysis for the final set of 37 included studies. The results show that Virtual field trips can be useful to individuals who are unable to go on a real field trip in case of another national lockdown or in the 'new normal' and the 'next normal' post-pandemic era and due to other problems, such as climate change, as they allow students to travel to different areas without leaving their safe environment.

Keywords: Real Field Trip, Virtual Field Trip, Educational Technologies, SWOT Analysis, Covid-19 Pandemic

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Introduction

The COVID-19 outbreak disrupted normal life worldwide, and perhaps most notably affected education. Governments across the world endeavored to minimize its spread by adopting and implementing measures to limit social contact by closing public areas such as sports centers, museums, libraries, universities, etc., as this has been proven to be an effective way of minimizing the spread of the virus (Aslam, 2020). However, isolation policies and the closure of schools, colleges, and Higher Education institutions created a range of difficulties in education for students and teachers/lecturers (Daniel, 2020). Due to the Covid-19 restrictions, all affected countries were required to rapidly seek digital solutions to the continuation of education such as Educational Technologies (EdTechs) (Dhawan, 2020). EdTech, which is a combination of technology and education, includes software and hardware designed primarily to improve the quality of education and student-learning outcomes (King et al., 2016). The importance of EdTechs in education is not just about the power to engage students in cutting-edge and innovative approaches to learning and reducing costs; new learning formats, mobile apps, and online platforms have contributed tremendously to the development of the quality of the learning process, greatly improving individuals' access to education, while Cloud and online technologies bring the exciting potential for standardization of content (Pusca & Northwood, 2021; Moore, Jayme & Black, 2021). The probability of success in the transition to online learning is influenced by the user's purpose and the availability and practicality of EdTechs (Kemp, Palmer & Strelan, 2019). EdTech, if used effectively, gives opportunities to both students and teachers to mutually interact and collaborate with each other (Bower, 2019).

Educational Technologies are generally linked with online education, but this term is actually much more comprehensive. It combines all the ways to use technology in the education process, from interactive blackboards to Virtual Field Trips (VFTs), from Virtual Reality (VR) simulators for modelling surgical operations to virtual aerospace flight simulators (Ng, 2022; Han, 2020) and teaching quantum computation (Nita et al., forthcoming). The concept of field trips has also changed as a result of the increasing use of EdTechs (hardware, software, information and communications technology (ICT) systems, etc.), the use of the internet and, more recently, mobile technologies (Bowman et al., 2005). Through the rapid growth and expansion of new, practical, and affordable technologies and ICT in fieldwork, it has become critical for students and teachers to be more effective in the field (Cliffe, 2017). Such new technologies have the potential to further enhance the fieldwork environment and increase the effectiveness of ability development (Welsh et al., 2013). The use of technology in unexpected situations that pose health and safety risks, may prevent interruption of teaching and learning. In essence, VFTs try to capture the real-world environment of an area or location by combining various technological tools like photography, data, cartography, and geographic information systems (GIS) without the cost of being physically present at the location (Cliffe, 2017). VFTs integrate computer hardware and software to create real-time, networked multimedia settings that encourage students to collaborate and engage in activities interactively (Pugsley et al., 2022; Manning, 2019). The implementation of Real Field Trips (RFTs) is becoming increasingly complex due to concerns over finance, time, logistics, safety, and health pressures (Petcovic et al., 2014). If anyone, or indeed a combination of these factors exists, it may end this educational practice as it is not accessible to all students (Hall et al., 2004). VFTs can play an effective role in continuity of education as a safe and alternative option to, and indeed can be useful to children and young people who are unable to go on, RFTs due to the COVID-19 pandemic or other problems such as health or mobility constraints and in the context of desired travel restriction due to climate change. A VFT can

therefore contribute to the achievement of United Nations Sustainable Development Goal 4 (SDG), which declares that, by 2030, the world ought to “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all” (UNESCO, 2017). The purpose of this study is to analyse VFTs and RFTs in detail in terms of their Strengths, Weaknesses, Opportunities, and Threats (SWOT) and provides insight into how VFTs can be an effective option when RFTs are not available, or as a way to add value to resource intensive RFTs during school shutdowns in the age of climate change, natural disasters and epidemics.

Methods

In conducting this systematic literature review, this study followed the guidelines proposed by Kitchenham (2004). The search process used in this study is described in Figure 1 below.

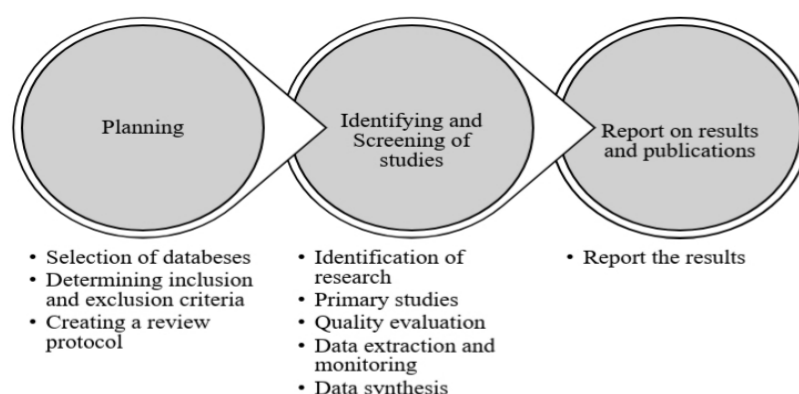
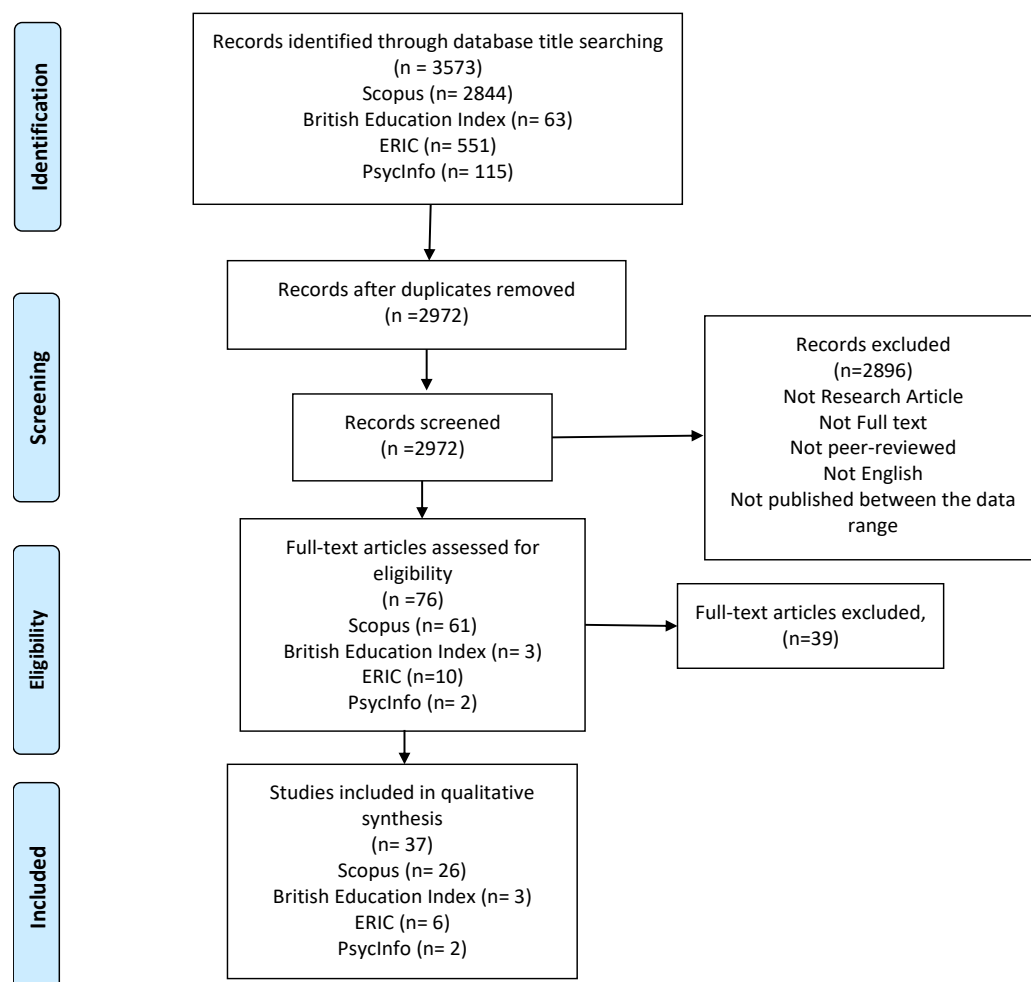


Figure 1. Systematic review process adapted from Kitchenham (2004)

In order to begin the search process, main search terms were first defined. The search string was composed of three main terms: “Real Field Trips”, “Virtual Field Trips” and “Hybrid Field Trips”. Each main term was expanded into multiple synonyms in the second step. Synonyms for real field trips and virtual field trips included ‘school excursion’ OR ‘class trips’ OR ‘day trip’ OR ‘educational excursion’ OR ‘school trip’ OR ‘school outing’ OR ‘virtual field trips’ OR ‘virtual reality field trips’ OR ‘hybrid field trip’. In the third step, the search terms were connected using the logical operators “AND” and “OR”, where “AND” referred to the two main components of the search string, while “OR” referred to similar keywords and phrases. In the fourth step, the following databases were searched: Scopus, British Education Index, ERIC and PsycInfo. A total of 3573 peer-reviewed articles in English were included in the first set of searches (see figure 2 below). The data parameters were set to include studies from January 2021 to December 2021 to gather up-to-date data. Four screening stages were used to select primary studies from the full list of candidate publications. In the first stage, several criteria were initially applied to exclude studies, including those less than three pages in length, not written in English, articles that are not related to RFTs and VFTs. After this stage of the screening, 37 articles ([1], [2], [3] [8], [13], [14], [15], [16], [17], [19], [20], [21], [22], [23], [26], [27], [28], [29], [37], [39], [42], [44], [45], [49], [50], [51], [52], [55], [58], [59], [60], [61], [62], [63], [67], [68], [69]) were selected for full text assessment. The second stage of the screening process involved reading title, keywords, and abstract to identify studies that are relevant to RFTs and VFTs that had been peer reviewed in an educational context. The final stage involved reading the full text in detail. During this stage, in-depth criteria were required to capture primary studies relevant to the research purposes of this study. The total of 37 studies obtained at the end of all these

processes were examined in depth using a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis. There has been a rapid development of new and more powerful EdTech (particularly since the Covid-19 pandemic), and governments are making substantial investments in these technologies. By providing comprehensive perspective in light of internal and external analysis of any EdTech, SWOT analysis contributes to achieving the purpose of these investments and to ensure efficiency in the output of EdTech that are used throughout the educational process at any stage. Therefore, this study classifies VFTs based on SWOT analysis to provide internal and external information to individuals and institutions seeking to use VFTs.



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Figure 2. PRISMA flow diagram showing the result of the search and screening process

Data Extraction and Analysis

Following the selection protocol, a final total of 37 selected studies were selected for review. Next, a database was developed to extract and aggregate information to then conduct an in-depth review via coding. The data were organized based on the country where the study was conducted, research theme, method of selected studies, SWOT analysis, education level, impacts of the field trips, discipline of selected studies (See Table 1). The articles were read thoroughly, related articles are classified under these sections. As shown in Table 2, 45.9%

(n= 17) of the studies selected for systematic review and SWOT analysis focused on higher education students or studies aimed to contribute to this field. A total of 51.4% (n=19) of the selected studies were in RFTs, 45.9% (n=17) in VFTs, and 2.7% (n=1) in HFTs. USA has the highest percentage of selected articles based on the country where the study was conducted, which is 40.5% (n=15), followed by Germany with 10.8% (n=4), Canada with 5.4% (n=2), Australia with 5.4% (n=2), and South Korea with 5.4% (n=2). The other countries in Table 2 each have a 2.7 (n=1) percentile. Considering the discipline of the selected articles, most studies were conducted in the field of education with 24.3%, followed by science with 13.5% and geoscience with 10.8%. After extracting those sections, they were read again to obtain and separately classify the parts related to each type of field trips. The results of this classification are shown in the SWOT analysis findings section.

Table 1. Coding Process

Categories	Sub-categories
<i>Country</i>	<i>Country</i>
1 Research theme	A Real Field Trips B Virtual Field Trips C Hybrid
2 Method of research	A Quantitative
2.1. Real Field Trip	B Qualitative
2.2. Virtual Field Trip	C Review
2.3. Hybrid Field Trip	D Mixed Method E Design-oriented
3 SWOT Analysis	A Strength
3.1. Real Field Trip	B Weaknesses
3.2. Virtual Field Trip	C Opportunities
3.3. Hybrid Field Trip	D Threat
4 Education Level	A Early Years Education
4.1. Real Field Trip	B Primary school
4.2. Virtual Field Trip	C Secondary school
4.3. Hybrid Field Trip	D Further education E Higher education F Post-graduate degree (Masters or PhD) G Teachers/lecturers/Professors (including preservice teachers) I Adults or Public or professionals J None
5 Impacts of the field trips	A History learning
5.1. Real Field Trip	B Safety and Security
5.2. Virtual Field Trip	C Social or/and professional connections
5.3. Hybrid Field Trip	D Hands-on experience or inquiry-based learning E Learn a specific topic F Provide a good alternative during restriction periods G Reduce accessibility barriers H Improve existing field work with better before-hand preparation, I Social-emotional or academic or behavioral effects

	J Career selection or professional knowledge
	K Place engagement
	L Information-rich or immersive or multimodal or interactive environments
	M Environmental knowledge or connection to nature or positive scientific attitude
	N Practice and acquire skills
	O Time saving or low cost
<hr/>	
6 <i>Discipline of selected studies</i>	A Geoscience
6.1. Real Field Trip	B Health
6.2. Virtual Field Trip	C Education
6.3. Hybrid Field Trip	D Biology
	E Science
	F Physics
	G Social Science
	H Tourism
	I Geology
	J Art
	K Game
	L Geography
	M Law
	N Anthropology

Table 2. Characteristics of the included studies

Article	Country	Research theme	Method of research	Swot Analysis	Education Level	Impacts of the field trips	Field of articles
Anderson (2021)	USA	1A	2.1.B	3.1.B	4.1.J	5.1.D	6.1.E
Ando et al. (2021)	Japan	1B	2.2.A	3.2.A	4.2.E	5.2.B	6.2.B
Arcodia et al. (2021)	Australia	1A	2.1.A	3.1.C	4.1.E	5.1.C	6.1.H
Cagalan & Whitesides (2021)	USA	1B	2.2.B	3.2.C	4.2.E	5.2.L; 5.2.F; 5.2.E; 5.2.D	6.2.L
Duncan (2021)	USA	1A	2.1.A	3.1.A; 3.1.B	4.1.G	5.1.A	6.1.C
Evelpidou et al. (2021)	Greece	1B	2.2.B	3.2.A; 3.2.B; 3.2.C; 3.2.D	4.2.E	5.2.E	6.2.I
Fadilloh, Rustaman & Sanjaya (2021)	Indonesia	1A	2.1.A	3.1.A; 3.1.C	4.1.C	5.1.F; 5.1.G; 5.1.H	6.1.F
Florick et al. (2021)	USA	1A	2.1.A	3.1.C	4.1.B	5.1.I	6.1.J
Follari et al. (2021)	USA	1A	2.1.B	3.1.C	4.1.B; 4.1.I	5.1.E; 5.1.D; 5.1.I	6.1.E
Gavin (2021)	USA	1A	2.1.B	3.1.C	4.1.E	5.1.D; 5.1.A	6.1.G
García-Vela et al. (2021)	Spain	1B	2.2.B; E	3.2.C	4.2.E	5.2.B	6.2.A
González-Herrera & Giralt-Escobar (2021)	Mexico	1A	2.1.D	3.1.A	4.1.E	5.1.D	6.1.H
Goralnik et al. (2021)	USA	1A	2.1.D	3.1.C	4.1.C	5.1.K; 5.1.I;	6.1.C
Grinfelde & Veliveronena (2021)	Latvia	1A	2.1.D	3.1.C	4.1.E	5.1.J; 5.1.E	6.1.H

Table 2. (continued)

Article	Country	Research theme	Method of research	Swot Analysis	Education Level	Impacts of the field trips	Field of articles
Han (2021)	South Korea	1B	2.2.B	3.2.C; 3.2.D	4.2.B	5.2.B; 5.2.C	6.2.C
Harrington et al. (2021)	USA	1B	2.2.B; E	3.2.A	4.2.I	5.2.L	6.2.K
Holgersen (2021)	Sweden	1A	2.1.B	3.1.A	4.1.G	5.1.	6.1.L
Hoover (2021)	USA	1A	2.1.D	3.1.C	4.1.C	5.1.M	6.1.C
Middlebrooks, & Salewski, (2021)	USA	1A	2.1.B	3.1.C 3.1.D	4.1.E	5.1.M; 5.1.E	6.1.D
Krantz & Downey (2021)	USA	1A	2.1.C	3.1.C	4.1.J	5.1.D	6.1.J
Lee et al. (2021)	South Korea	1B	2.2.A; E	3.2.A; 3.2.B; 3.2.C	4.2.C	5.2.M; 5.2.I	6.2.A
McPherson et al. (2021)	Canada	1B	2.2.B	3.2.C	4.2.C	5.2.D	6.2.E
Mohring & Brendel (2021)	Germany	1B	2.2.B; E	3.2.A	4.2.E	5.2.D; 5.2.L	6.2.L
Ní Drisceoil (2021)	UK	1B	2.2.C	3.2.A	4.2.E	5.2.E; 5.2.J; 5.2.C	6.2.M
Ordon, Bartelheimer & Asshoff (2021)	Germany	1A	2.1.D	3.1.B; 3.1.C	4.1.E	5.1.C; 5.1.M	6.1.C
Patiar et al. (2021)	Australia	1B	2.2.A	3.2.A; 3.2.B	4.2.E	5.2.L; 5.2.D; 5.2.J; 5.2.E	6.2.H
Peace, Gabriel & Eyles (2021)	Canada	1B	2.2.B	3.2.A	4.2.E	5.2.D; 5.2.L; 5.2.G	6.2.A
Price & de Ruiters (2021)	South Africa	1B	2.2.B	3.2.C	4.2.E	5.2.F; 5.2.E	6.2.N
Schneiderhan-Opel & Bogner (2021)	Germany	1A	2.1.A	3.1.C	4.1.C	5.1.M; 5.1.D	6.1.D

Table 2. (continued)

Article	Country	Research theme	Method of research	Swot Analysis	Education Level	Impacts of the field trips	Field of articles
Schulze et al. (2021)	USA	1C	2.3.D	3.3.A; 3.3.B	4.3.E	5.3.D; 5.3.E	6.3.E
Soto et al. (2021)	Peninsular Malaysia	1B	2.2.E	3.2.A; 3.2.B	4.2.J	5.2.N; 5.2.G; 5.2.L	6.2.A
Sotomayor (2021)	Peru	1A	2.1.B	3.1.C	4.1.I	5.1.C; 5.1.J; 5.1.K	6.1.H
Tigert, Fotouhi & Kirschbaum	USA	1A	2.1.B	3.1.C	4.1.G	5.1.D; 5.1.E; 5.1.N	6.1.C
Trinh (2021)	USA	1A	2.1.B	3.1.C	4.1.C	5.1.A; 5.1.E	6.1.C
Wolf et al. (2021)	Germany	1B	2.2.D; E	3.2.A	4.2.E	5.2.F; 5.2.L; 5.2.I	6.2.C
Yacobson et al. (2021)	Israel	1B	2.2.A	3.2.D	4.2.B	5.2.B	6.2.E
Zhao et al. (2021)	USA	1B	2.2.A; E	3.2.C	4.2.E	5.2.I; 5.2.L	6.2.C

After the systematic review, RFTs and VFTs were analyzed via SWOT analysis. The SWOT model allows experts/researchers to classify internal factors such as strengths (features of a task/project that give it an advantage over others) and weaknesses (features that put one task/project at a disadvantage relative to others), and external factors such as opportunities (factors in an area that a project/task could exploit to its benefit) and threats (factors in an area that could cause concern for a task/project) relating to the choice to take or implement, thereby comparing opportunities and threats with strengths and weaknesses (Humphrey, 2005).

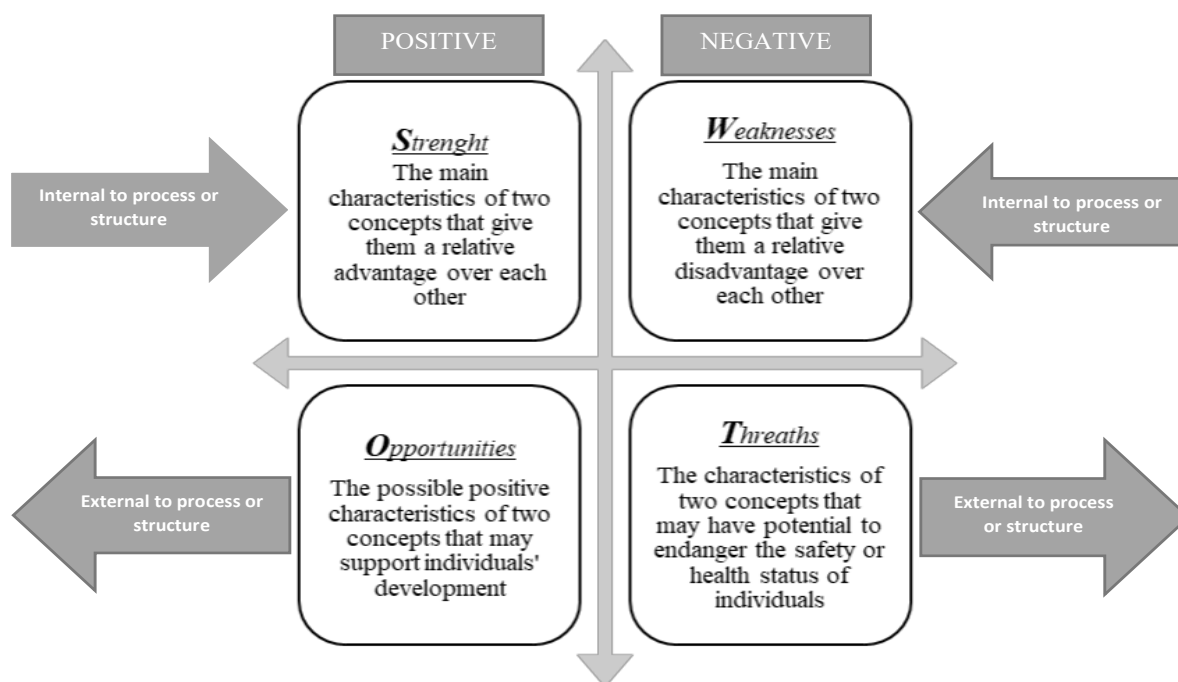


Figure 3. Schematic representation of SWOT analysis

For this study, each stage of the SWOT analysis was carried out as follows: the main features and strengths of RFTs and VFTs that give them a relative advantage over each other were classified under the heading 'Strengths'; the negative characteristics/features that put RFTs and VFTs at a disadvantage relative to each others were classified under the heading 'Weaknesses'; the possible positive factors that RFTs and VFTs may offer to individuals/participants and may support their development were categorized under the title of 'Opportunities'; finally, the features of RFTs and VFTs that may have potential to endanger the safety or health status of students/participants were evaluated under the title 'Threat' (see Fig. 3).

Findings

Strengths

A Real Field Trip is not a break from school, but rather an opportunity to have an authentic, real-life, experiential learning experience outside the classroom. The RFT experience provides students with the opportunity to deepen their understanding of a topic they have been studying in the classroom (Duncan, [13]). Through direct observation of the study area, RFTs assist individuals in understanding the relationship between inductive and deductive pathways of any knowledge, and between such knowledge's sensory and rational components (González-Herrera & Giralt-Escobar, [21]). Information and sources of knowledge are more often derived from seeing, hearing, and experiencing than from reading and, therefore, it is impossible to replicate all aspects of in-person field trips without going into the field (Holgerson, [28]; Schulze et al., [59]; Ní Drisceoil, [49]). It is also possible for students to be actively involved in planning their own learning experiences, so that they can develop memorable experiences during the three key moments of a field trip (before, during, and after activities) (González-Herrera & Giralt-Escobar, [21]). A field trip is based on outdoor learning, so it requires cooperation between teacher and students to run smoothly (Fadilloh, Rustaman & Sanjaya, [15]).

In open access VFTs, on the other hand, people from different countries/nationalities are able to participate simultaneously and gain a wide range of field experiences (Peace, Gabriel & Eyles, [52]). There are no special requirements to use this tool, and it can be accessed from any device that has an internet connection, such as a computer, tablet, or smartphone; thus, it can be used in any place such as a classroom, office, home, etc. (Evelpidou et al., [14]). In addition to providing flexible and democratized delivery of education, a VFT platform contains more content and information than students can absorb in one visit, and indeed is available at any time to be used multiple times (Patiar et al., [51]). The flexibility of VFTs allow students to learn at their own pace, hence they can practice and acquire skills by repeating VFTs without being constrained by time or space (Soto et al., [60]; Lee et al., [39]). VFTs are also useful when it is not possible to visit certain sites due to time, safety and health concerns, financial constraints, or weather conditions (Evelpidou et al., [14]). According to Ando et al., [2], indoor positioning technology and low-cost dust sensors can help visualize hazardous material exposure in order to reduce exposure and prevent health problems. VFTs make it possible for marginalized students to participate in fieldwork that would otherwise be impossible. This is so because VFTs do not exclude students from participating who have social, cultural, or physical impairments, and/or mental health issues (Peace, Gabriel & Eyles, [52]). A VFT's effectiveness depends on the quality of the material used, and there is a direct correlation between the quality of the VFTs and the available technology, resources, and time (Soto et al., [60]). With high-quality VFTs, users explore the location or area of interest in greater detail with high-resolution images, which provide quality input. Information can be further enhanced by organizing it along a virtual pathway, as this improves the ability to simulate an RFT (Soto et al., [60]). A 360o model-based VFT, which also allows the viewer to view and explore a photorealistic object from multiple locations within the model, is a promising learning activity, which on the one hand could replace RFTs in pandemic situations such as with Covid-19, whilst on the other could provide the basis for self-directed learning as part of a library of 360o models (Wolf et al., [67]). It is also becoming increasingly common to use VR in education, such as for demonstrating problems or building the ability to cope with unknown situations (Mohring & Brendel, [45]). The three-dimensional, real-time interactive visualization of GIS data resulting from this artifact creates a virtual model of the plants, which when combined correctly on a terrain produces an accurate and highly realistic virtual landscape – it is like walking into a diorama or exhibit in a natural history museum (Harrington et al., [27]).

Weaknesses

The planning and management of RFTs require considerable time and effort (Duncan, [13]). Although teachers often lack confidence when teaching outdoors, they need to be incredibly thoughtful when planning trips (Ordon, Bartelheimer & Asshoff, [50]; Duncan, [13]). Due to time and distance constraints, accessibility issues, accommodation issues, costs, cold weather, and the steepness of the field site, RFTs are not always possible (Schulze et al., [59]; Lee et al., [39]; Anderson, [1]). In hospitality sites, for example, challenges include accommodating increasingly large cohorts of students, as well as providing access to front and back of house operations and providing students with guidance and information (Patiar et al., [51]). The bus schedule can be inconvenient or not on time, or the bus stop might be far from the field (Schulze et al., [59]). There may be the need for an alternative means of transportation for students who might have difficulties getting to the field sites on their own, or from being able to explore the field sites through Google Maps/Google Street View (Schulze et al., [59]).

In similar to RFTs, VFTs have also a number of features that make them in disadvantage situations. Compared to RFTs, a VFT is less effective at imparting field-based skills (Soto et al., [60]). VFTs cannot convey the non-visual and aural sensory perceptions that are crucial in real fieldwork settings, such as smell and touch (Soto et al., [60]). These trips also appear to lack one of the main aims of trips, namely discovering something new and/or interesting. In contrast to RFTs, VFTs are not able to strengthen a student's observation skills since they would not be able to observe the site from different angles and are also not fully capable of replicating RFTs' ability to test students' decision-making skills (Evelpidou et al., [14]). Moreover, through an online platform, it may not be possible to view or recognize a small or detailed landform or feature in detail. The display size of the screen contributes to more solitary work and reduced group activity, and this decreases the benefits of group interaction (Soto et al., [60]). Despite the fact that VFTs are designed to be interactive, the interaction between the participant and the instructor is something that technology cannot replicate, and this poses a significant problem for the student as it reduces the social component of a trip (Soto et al., [60]). Also, due to the pace at which technology moves, educators need to spend a lot of time and resources developing VFT components (Patiar et al., [51]). This can result in products being perceived as "dated" or obsolete within relatively short periods of time.

Opportunities

Through active and exploratory learning, short-term field trips are widely used by teachers to provide students with new knowledge and experiences (Hoover, [29]). Students can gain an enhanced understanding of landscapes, places, and events if they are given the opportunity to engage with them in an interdisciplinary, sensory-rich, self-directed way during short-term trips (Goralnik et al., [22]). Excursions to sporting events, for example, may be the most beneficial to players since they are able to observe "systematic scientific" baseball on its home soil, for instance, and to better comprehend the racial issues affecting their compatriots (Gavin, [20]). As part of these kind of trips, individuals learn how to recognize their differences, name their biases, and discuss social injustices with one another (Trinh, [63]). Participating in RFTs can also help students succeed in their classes in the short term but provide them with a sense of empowerment and self-confidence in the long term (Sotomayor, [61]; Arcodia et al., [3]). Educating people about the environment in natural settings through RFTs, which allow for direct contact with nature, can increase environmental knowledge and potentially influence environmental attitudes (Hoover, [29]; Schneiderhan-Opel & Bogner, [58]). RFTs enable them to identify geological structures and landforms and understand their formation processes (Evelpidou et al., [14]). A highway traversing a 7,000-foot altitude offers students the opportunity to observe geological structures and discuss related dating information (Follari et al., [17]). Students can develop their sense of curiosity for nature and spark their passion for biology by spending time outside observing and collecting specimens (Middlebrooks & Salewski, [44]). This sparks their curiosity for nature, opens their eyes to the sheer magnitude of biodiversity, and fuels their future passion for biology in the longer term. Prospective biology teachers may also benefit from field trip-oriented courses by increasing their cognitive-affective parameters of interest and self-efficacy expectations (Ordon, Bartelheimer & Asshoff, [50]).

As learners gain an awareness that place is not just background but a storied context in which they take part, they explore what they value from multiple perspectives, compare observations from different locations – they cultivate empathy and vital skills that are applicable beyond the field trip itself (Goralnik et al., [22]). These field trips help students to examine the spiritual issues and reactions of different faiths and stimulate empathy by

introducing them to the history, literature, arts, etc., that are inspired by certain events (Grinfelde & Veliverronena, [23]). As a result of exposure to multiple high-quality or arts-based field trips, students are able to make better academic progress, improve their social and emotional well-being, as well as engage more in school activities (Florick et al., [16]). Even one museum visit contributes significantly to a student's visual arts education at school since it boosts four capacities that will carry over into their lives after graduation: creative thinking, empathy, critical thinking, and curiosity (Krantz & Downey, [37]). During these trips, educators engage students in instructional discourses or purposeful educator-student dialogues in order to create new understandings through co-construction (Tigert, Fotouhi & Kirschbaum, [62]). As a follow-up to the trip, educators can continue engaging students by soliciting their thoughts and ideas regarding any topic like satellite and manufacturing technologies (McPherson et al., [42]). During the preparation phase, data can also be gathered on multiple intelligences (musical, bodily-kinesthetics, naturalistic, etc.), and student scientific reasoning can be used to adjust the level of difficulty of the task according to their abilities (Fadilloh, Rustaman & Sanjaya, [15]).

A virtual experience, on the other hand, can impact learning or behavior in a lasting way and can bring a positive scientific attitude as a component of an affective learning process (Lee et al., [39]; Price & de Ruiters, [55]). It is possible to use immersive VFTs to provide engaging learning experiences in a classroom by making students feel as though they are in a virtual space, and by making them feel as if they are experiencing reality in a virtual space (Han, [26]). Compared to less immersive systems such as desktop VR, long-term use of VR may maintain student engagement and satisfaction and compensate for the initial lack of objective learning outcomes (Zhao et al., [69]). VR can also help improve RFTs. It represents a way to offer a first glance of what a place is like, the risks it poses, and the areas to observe; it represents a form of virtual briefing. In this way, students do not have to worry about getting lost or having trouble listening to the briefing in the field when there is wind, cold, and other adverse circumstances (García-Vela et al., [19]). It is also possible for VFTs to decrease the cost of international learning opportunities, both in terms of travel and tuition (Cagalan & Whitesides, [8]). They can also ease the time burden placed on students interested in participating and make international learning more accessible to upper-level students. The benefits of VFTs are that they allow individuals to gain introductory knowledge before departure, identify specific interdisciplinary research opportunities, and develop relationships with peers and faculty. As a result of global uncertainty, they eliminate the "all-or-nothing" aspect of learning outcomes associated with standalone international learning opportunities (Cagalan & Whitesides, [8]).

Threat

RFTs are important to students' education but cannot be conducted due to the Covid-19 pandemic (Evelpidou et al., [14]). During such a pandemic, travel and working together can give rise to a number of unique issues. For example, during the current pandemic, students were required to be with someone at the site but encouraged to travel separately and wear face masks at all times when in close contact. On site, however, there was considerable chance for students to spread the virus, and this might obviously result in associated health problems. Despite the fact that no locations are going to be completely free of hazards, it is important to identify likely hazards and ensure that students are aware of them. Rip currents, violent wave action, high crime rates, or unstable terrain are just a few examples of serious hazards that students may also encounter (Middlebrooks & Salewski, [44]). Safety briefings

are an important tool for identifying hazards and alerting students but are often used to limit liability as well (Middlebrooks & Salewski, [44]).

Using group information, educational institutions can target students with different types of advertisements, or reject students based on school and class characteristics. Additionally, such group profiling increases the risk of re-identification due to the possibility of linking data sets in new ways. The modern digital learning environment collects and analyses a large amount of data that can be utilized to improve their design as well as to develop "intelligent" mechanisms for individualized learning (Yacobson et al., [68]). The number and variety of learning analytics applications is growing rapidly, demonstrating the potential of this technology in this regard. The development of this field relies on data and an ecosystem of interoperable technologies to process it, so data is being exchanged between a wide range of third-party applications. Students' privacy and ethical use of student data are major concerns due to the rapidly growing collection of student data, its transfer between entities, and its use in making various decisions (Yacobson et al., [68]). It is possible that the pandemic will have a long-term effect on education systems worldwide, moving learning towards, if not heavily into, the digital realm. Due to the increase in time students spend in learning environments that are subject to automatic data collection, privacy safeguards for big data are essential for the use of big data in education. Immersive VFTs may have a number of disadvantages due to the increase in time students spend in learning environments, including collisions in the classroom, motion sickness, and social isolation. Prolonged use can result in addiction confusion about reality, eye damage, and reduced novelty (Han, [26]).

Discussion

Virtual Field Trips, explained as computer-based environments that allow students to virtually visit an area without having to leave the classroom or home, are seen as an innovative solution to overcome the challenges of Real Field Trips (Mead et al., 2019), especially during the restrictions associated with Covid-19. Using computer visualization techniques, VFTs give possible advantages for education, such as providing a preview or review of RFTs, providing access to inaccessible areas, presenting scenes from various angles and scales, enriching learning experiences, as well as helping to understand complex processes through additional and supplementary explanations and information. VFTs are not proposed to replace RFTs but could well help bring the trips into the classroom or home if the barriers to RFTs are insurmountable.

With their ability to place students in real learning settings, RFTs are frequently used for experiential learning (Krakowka, 2012). Experiential learning theory describes how knowledge is acquired through the transformation of experiences (Kolb, 1984). Dewey (1897) and Kolb (1984) emphasized that learning is a multi-linear, dynamic, and cyclical process because experiences continuously create and change thoughts, interests, and attitudes. Learning is an important part of the adaptation process in individuals' lives and shows its presence in all phases of life (Kolb & Kolb, 2009). From this point of view, experiential learning proposes a constructivist learning theory, where individuals' personal and social knowledge and experiences are shaped both collectively and constantly. By involving students as active participants in field trips and pre- and post-trip activities, field trips provide the opportunity to directly observe, examine, and scaffold knowledge of teaching materials in the physical world (Krepel & DuVall, 1981). That is, field trips not only support students' experiential learning through exploration, but also enable them to gain first-hand experience

and understanding of specific learning themes, and to establish a connection between existing knowledge and newly acquired knowledge.

The closure of schools caused by the pandemic has hindered the experience-based learning of many students and their scaffolding of knowledge through field trips. One solution to enabling a wider audience to reach field trips during the pandemic and bringing experiential, kinesthetic field trips lie in the continued advances in EdTechs such as through VR technologies. VR simulates real-time situations and makes it available to individuals through computer/communication devices. Some research findings have shown that simulations, games, and VFTs significantly increase student motivation, interest, and participation (Makransky et al., 2019). Studies on VFTs used in a wide variety of fields, including biology, engineering, medicine, geography, and geology, showed that students enjoy using VFTs and that researchers have seen gains in attention in the material through interaction and immersive experience compared to traditional learning (Friess et al., 2016). It was recommended to incorporate multimedia learning principles, such as coherence or segmentation principles, into the design of immersive VR content to ensure positive improvements in learning outcomes. Together with collaborative learning activities, VFTs facilitate interaction between peers in a particular group or between peers in different groups in any part of the world. Collaboration in the process of immersive VFTs not only promotes the zone of proximal development of students over peer learning but can also solve the problems of low social interaction perceived by students in earlier studies (Han, 2020). Piaget (1970) and Vygotsky (1978) highlighted that students build shared knowledge and understanding together by building on ideas through interacting with each other. Recent advances in technology allow researchers and practitioners to develop more interesting and interactive VFTs using advanced tools. Although these developments, as a result of new technologies, have provided flexibility to VFTs, there are various factors that need to be considered, and those that may threaten the success of VFTs are also examined in this study. Many websites are temporary, a site might go down, or quality control might not be regularly performed, students can easily get lost in these sites, and not every student can benefit from VFTs equally (being located in rural areas or due to socio-economic status). These show that educators and parents need to be very careful in their preparation before the use of VFTs.

Conclusion

Although the Covid-19 pandemic made the world aware of the risks of traveling abroad, and indeed the uncertainty in even planning to go abroad, and the closure of educational institutions/schools and disruption in education, such risks and uncertainties are not new. Natural disasters, especially in the age of climate change, political unrest, and epidemics, are challenges that may be present at any given place and time. The pandemic can be considered the first signs of disruption in the traditional education system globally. In the 'new normal' post-pandemic era, Educational Technologies have played a vital role – as they did during the pandemic – and they will continue to play this role for the 'next normal' post-pandemic era. The use of innovative and problem-solving methods like VFTs in education can help ensure continuity of education (both formal and informal) in a safe manner, and how they can help address the unique needs of each learner and support diverse and inclusive education. In this study, using systematic analysis, RFTs and VFTs were analyzed in depth and the findings were supported via SWOT analysis. Both forms of field trip have their particular strengths and weaknesses, opportunities and threats. Where one lacks, it is important that the other can step in. In other words, by using RFTs and VFTs together, one can ensure that any shortcomings are addressed and thus the efficiency of field trips and their benefits to students

are increased. A combination of RFTs and VFTs can provide a richer learning experience than having fewer RFTs or VFTs. It is important to have an alternative option in unexpected situations that would otherwise prevent education and teaching from continuing in order to minimize disruptions to education. In special cases (such as Covid-19) where RFTs cannot take place or students have limited opportunities to attend, VFTs offer an alternative to RFTs and can support the development of students in such situations.

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Research Methods and Data Analysis Techniques Used in Disability Based Studies in Nepal

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Abstract

The fundamentals of studies that focus on research methods and data analysis techniques in the disability field focuses on finding out the research gaps. The same research gaps could serve as the areas for the researchers in applying proper methods and data analysis techniques so that the depth and breadth of the subject matters related with a disability, especially children with disabilities and their education can be analyzed properly and effectively in the coming days. Unfortunately, this kind of research is still rare in Nepal. This study aimed to access the diversity of research approaches, designs, variables, data collection and analysis techniques, as well as research subjects in studies published/issued on the subject matter of disability, children with disabilities and inclusive education in Nepal from the year 2010 to 2020. Content analysis was used as the research tool in this study in which as many as 31 detailed studies were analyzed. The results revealed that the most widely used approach, design, variable, data collection and analysis techniques, as well as the subject which frequently used, were qualitative, document review and compilation, persons with disabilities (PWDs), document review, descriptive analysis and children with disabilities respectively. There were a variety of approaches, designs, data collection and analysis techniques, as considerable as research subjects that have been used in the studies carried out in Nepal. Moreover, there are findings where some studies with the same research design have applied different data collection and data analysis techniques. Thus, it is suggested to the next researchers to choose the most appropriate methods and consider the identified gaps areas in research in the coming days.

Keywords: Persons/Children With Disabilities, Disability, Inclusive Education

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Introduction

Research activities in the education field are the crucial indicators that support to assess the development of the education system in a country (Cai et al., 2017). This is because of the crucial role to be played by the educational research in influencing policy in education and increasing knowledge for education practitioners (Goktas et al., 2012; Ion & Iucu, 2015; Tseng, 2012). Some previous research reports in the education field are often used for the basis of educational improvement and to determine how education works in a variety of situations (Lodico et al., 2010).

When we talk about education and educational research, it is a general idea that the research should incorporate the needs and deeds of every sector most specifically, the vulnerable sections of society including caste, ethnicity and of course disability to find out the complexity and severity of the sector.

Related to its frequency, research in the disability sector has gathered momentum in the recent years. This condition is reflected in the rapidly increasing rate of educational research with the spotlight on the disability sector. This growing number of educational research is evident from the proliferation of journals with their central discourses focused on different sectors including disability. Even the academic level studies are being carried out with due focus on disabilities and education sector including inclusive education and education of marginalized people for ensuring quality education for every child.

Education including all other fundamental rights is the right of every child/citizen regardless of their gender, caste, ethnicity, race, disability and any forms of vulnerability. It is guaranteed by the constitution of Nepal, 2015. Similarly, the United Nations Convention on the Rights of Persons with Disabilities (CRDP), 2006 has special provisions for the persons with disabilities and children. These all provisions and entitlements are focused to ensure the fundamental rights of persons/children with disabilities.

In the context of ensuring the rights, different sectors' roles and responsibilities are always of paramount importance. The state functionaries including academic and non-academic/social sectors should work together to ensure the rights of persons/children with disabilities. These sectors can at least contribute from their sides to gather the information and reveal the situation of such persons/children to contextualize the situation and recommend for proper considerations to ensure their fundamental rights.

In gathering the information, revealing the situation and contributing to the sector, there is always the need of proper studies. The proper studies are the studies that ensure proper methods and proper data analysis tools and techniques. The methodological aspects including data collection techniques, tools and data analysis techniques are always a matter of discussion.

The diversity of approaches, methods and data collection techniques led to a variety of data analysis techniques employed in various research reports. Although Goktas et al. (2012) and Uzunboylu and Asiksoy (2014) informed descriptive analysis methods are the most commonly used data analysis techniques, yet various other techniques are also frequently used by various researchers. Examples of such analysis techniques are t-test, ANOVA, ANCOVA, correlation, regression, factor analysis, and nonparametric test (Karadag, 2010). It has been revealed that even though the data analysis techniques chosen are different, the

studies use a similar design and research procedures (Dimitrov & Rumrill, 2003; Knapp & Ohio, 2009; Liou et al., 2006).

Similar to other countries, the studies in the education sector by the academic students including education practitioners in Nepal tend to be increasing. One of the areas of education research in Nepal is often in the disability and inclusive education sector. However, the Inclusive Education Policy for Persons with Disabilities (2016) indicates that there is a lack of adequate investigative researches and practices for disable friendly evaluation, exam systems, and learning management of disabled students in Nepal.

The minimum studies on disability perspectives inclusive education could be one of the factors impeding better education of children with disabilities in Nepal. However, this has not been checked and figured out exclusively about how many studies (researchers, investigations, reports, books, journals, etc.) were published in Nepal from disability perspectives inclusive education? What were the findings of such studies, what were the methods and data analysis techniques used in such studies? And what are the research gaps in terms of its methods and data analysis on disability perspectives inclusive education in Nepal? These are some of the questions which are not dealt with appropriately prior in Nepal. Thus, there is a need to address these prominent questions to contribute better in the field of disability and children with disabilities so that it will be easy to figure out the quantity and quality of disability based studies carried out in Nepal.

As indicated by DoE, (2016) also, there is a need of comprehensive study in the sector of disability and more specifically children with disabilities. Hence, as being the inclusive education research practitioner, I attempted to write this paper based on disability and children with disabilities.

This paper intends to find and explore the methods and data analysis techniques used by the available published/issued 'disability and inclusive education-based studies (researches, reports, books, journals) from the period of 2010 to 2020 in Nepal. By surveying research methods in various studies from the period 2010-2020, this paper is proposed to access the diversity of methods, analytical techniques, as well as research subjects used by the studies. Thus, the intention and agenda of this paper is basically to find out the methods and data analysis tools and techniques used by the studies carried out in the theme of disability in Nepal and provide recommendations on the basis of identified gaps of the studies for further research in the coming days in the field of disability and children with disabilities in Nepal to contribute better in the field of disability.

Research Questions

With the above context, this paper is designed to answer the following questions as what are the most frequently used research approaches (methods) used by researchers? What are the most repeatedly opted research designs in the studies? What are the most frequent variables studied? What is the most preferred data collection techniques used in the studies? What are the most frequently used analytical techniques to analyze the research data? And which are the most commonly selected research subjects studied by researchers?

Research Method and Data Collection Process

This study used content analysis as the research method/tool. The quantitative content analysis was used to know the frequency of the categorized aspects. After frequency of each of the aspects was figured out, the meaning making of such results were discussed qualitatively in this paper. As per the need of the content analysis, first I formulated the research question or objectives (described in research questions). Then, the studies on disability and children with disabilities were collected and selected according to the bases of this study. The third steps I followed was developing the content categories (6 categories were developed) then the content categories were analyzed in terms of frequency (no./percentage) to reveal the results. Finally, the meaning making of such results were discussed qualitatively.

To find the results of research questions, first I collected/compiled available studies of the period (2010-2020) based on inclusive education and persons/children with disabilities and education by visiting libraries (Tribhuvan University and Kathmandu University, School of Education), inquiring with the experts of inclusive education and disability, scholars/students studying and doing researches in disability and inclusive education, collecting documents from them, and searching via search engines basically the journals. There were three bases (Disability and education, Persons/Children with disabilities and education, and inclusive education of children with disabilities) for the collection of the studies. The major purpose of determining the categories was to ensure the maximum no. of studies in the field of disabled-focused inclusive education. Collecting studies in the field of disability and children with disabilities found problematic due to limited no. of studies carried out in the context of Nepal from the scholars and researchers. On the one hand, there were limited no. of studies and on the other hand, it was very hard to get access to the studies as most of the studies were not uploaded even in Google scholars. Limited academic studies were there in the university's libraries. So, it was tried to contact directly to the authors to get access and became successful either. This kind of challenge might not happen in other fields of studies. After collecting all the studies of the mentioned period, the documents were tabularized in the form of the document title, researcher/writer, institute, and published year.

There were six aspects analyzed in this study. Each collected studies were reviewed and classified based on six aspects: (i) a research approach (3 categories), (ii) research design (19 categories), (iii) investigated variables (24 categories), (iv) data collection techniques (9 categories); (v) data analysis techniques (18 categories); and (vi) research subjects (14 categories). The aspects were determined by itself as to analyze the results from different dimensions as much as possible so that probable recommendations in disability field in Nepal can be given effectively. The aspects used in this study were adapted going deeply to each study and from the previous studies. The appearance of the various categories in each aspect of each study was recorded and positioned as the raw data in this study. Then, the raw data was converted as a percentage and number. No. or percentages describe the frequency of occurrence of a category on a particular aspect from 31 studies based on the subject line were analyzed.

Results and Discussion

The thematic approach of the studies was inclusive education, children with disabilities and disabilities and the education sector. Besides, the title of the studies, researcher/writer, and institutions were the other areas that undoubtedly determined the types of studies published

from 2010 to 2020 in Nepal. After searching, a total of 31 studies were found in the study theme. There were 12 studies from children with disabilities; 11 studies from disability-based; 7 studies from inclusive education; and one study from the education sector incorporating the ideas of inclusive education and disability.

Similarly, in types of studies, the academic level research was in higher number (12) followed by journal articles (7), then reports (6) and non-academic studies/books (6). There were academic studies including journals are in higher no. (19) than the others in the category. The report, book, and non-academic studies were carried out from different I/NGOs in Nepal on the subject matter.

The collected academic studies were from the Ludwig-Maximilians-University, Munich; University of Canterbury, New Zealand; Graduate School of Daegu University, Korea; Kathmandu University, School of Education; Oslo and Akershus University College of Applied Sciences; Faculty of Social Sciences, Flinders University, Adelaide, South Australia; Utrecht University, Netherlands; Graduate School of the Social Sciences University of Amsterdam; Maastricht University, Faculty of Health, Medicine and Life Sciences, Netherlands; Vrije Universiteit, Amsterdam, Netherlands; and University of Tsukuba, Japan.

In academic researches with the university, there seemed to be high contribution from the scholars of Nepal. A total of 9 studies were conducted by Nepali scholars on the subject matter whereas only three foreigners with foreign universities have done the studies. Most Nepali scholars (5) have done studies with the affiliation of international universities of abroad rather than national universities. From the national university, only Kathmandu University-affiliated scholars have done studies on the thematic subject. None of the studies were carried out by foreigners with the affiliation of the national university on the subject matter.

Frequency of Each Research Approach Category

The graph illustrating the percentage distribution of various research approaches used in the studies is presented in Figure 1. Based on the graph presented in Figure 1, of the 31 studies analyzed, the majority of research is qualitative (18, 58%). Furthermore, the second and third positions are mixed research (7, 23%) and quantitative research (6, 19%).

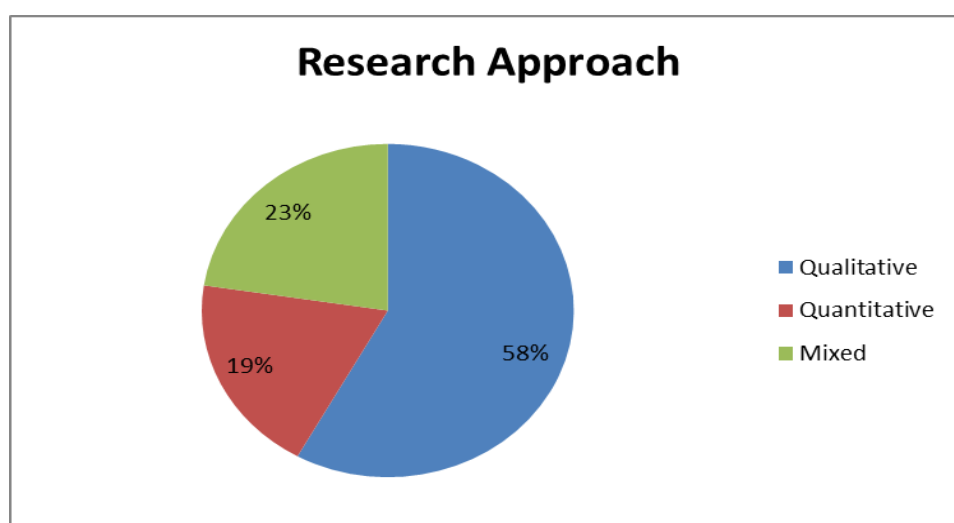


Figure 1. *The distribution of the Studies based on the Research Approach*

Based on the research approach used, qualitative research has a greater frequency than other research approaches. The characteristics of the studies carried out in other countries are largely focused on quantitative research but here the studies are mainly inclined to qualitative and mixed ones. Goktas et al. (2012) who conducted similar research in Turkey reported that the quantitative approach dominated educational research. The report is in contrary to the report of Uzunboyulu and Asiksoy (2014) report which reports on the same country as Goktas report. Similarly, research conducted in Indonesia by Fauzi and Pradipta (2018) reported the domination of R& D and quantitative researches.

The high percentage of qualitative research and mixed in disability and inclusive education sector in Nepal is maybe because of the seriousness and needed subjective analysis triangulation in the findings of the issues. On the other hand, the smallest percentage of quantitative research is maybe because they were less desirable for the researchers due to its complexity in using tools and its interpretation on objectively verified validity on the reality. Some of the studies used a quantitative study approach to validate the findings objectively. The studies from Aryal, 2013; Adhikari, 2015; Shrestha, 2017; Disability Research Center, 2016; RCRD, 2012; and Lamichhane, 2014 used quantitative research approach. The studies from Thapaliya, 2018; Thapa, 2012; Dawadi, 2019 ; Shrestha, 2019; Thapa, 2017; John, 2018; Brandt, 2015; Mol et al., 2014; UK AID, 2019; Thapaliya, 2016; HRDC, 2018; Baral, 2018; Banskota, 2011; Banks et al., 2019; Sugimura et al., 2017; HR Watch, 2011; NFDN, 2015; and Basnet et al., 2010 used qualitative research approach. Similarly, the studies from Regmi, 2017; Oosterlee, 2012; NIRT, 2017; DIRD, 2014; Shrestha et al., 2012; Lamichhane, 2015; and Lamichhane, 2017 used mixed research approach.

Frequency of Each Research Design Category

The selection of research design will serve as a guideline for how and where the research direction will be conducted (Grimshaw et al., 2000). In Figure 2, it can be seen, from 31 studies, document review and compilation (5 studies), descriptive quantitative (3 studies), case study (3 studies), descriptive qualitative (3 studies) were the most frequently used research designs. On the other hand, some studies are phenomenological, ethnography, convergence parallel, descriptive (document review, consultation, survey), exploratory and analytical, evaluation, binary logistic regression, and correlation including bivariate and multivariate logistic regression research.

Based on the research design, descriptive research is the most common design found in the studies. However, this study also revealed that several studies use similar approaches and research objectives, but have different research designs. It is believed that the field conditions of educational studies prevent the possibility of researchers doing the random selection and random design on research subjects (Liou et al., 2006).

In addition, in line with data obtained in the research approaches aspect, in the research design aspect, quantitative research designs were still minimally found in the studies. Ethnography and phenomenological, convergence, logistic and multiple regression, correlational studies were found minimally through this study. However, it does not mean that quantitative and best qualitative researches have never been conducted in the sector focusing on Nepal.

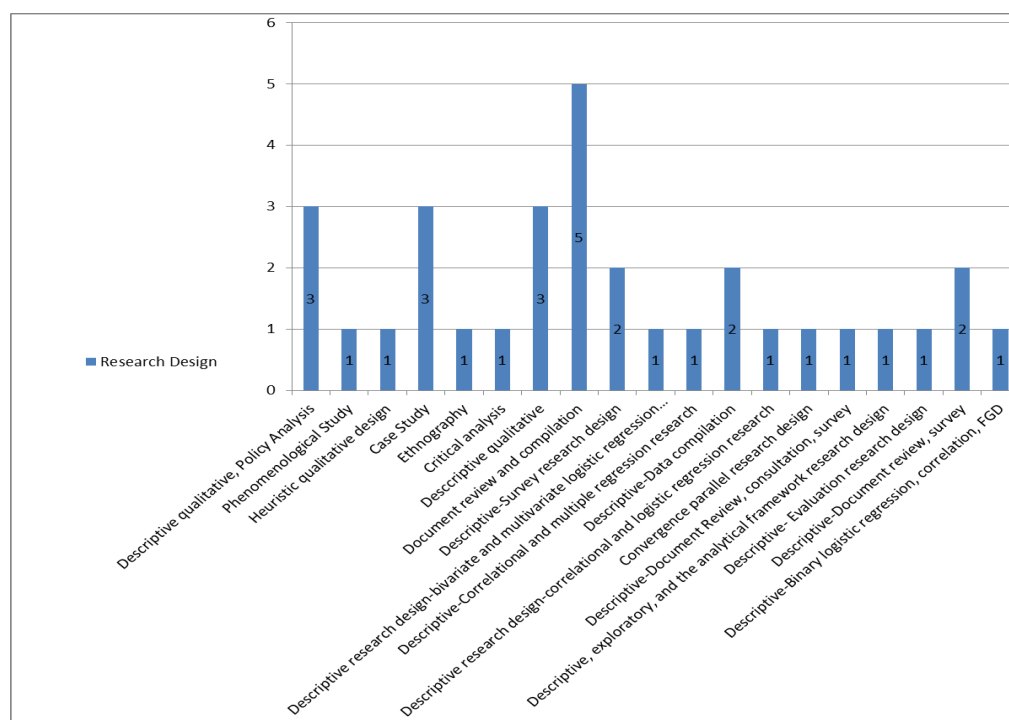


Figure 2. *The distribution of the Studies Based on Research Design*

Frequency of Each Research Variable Category

Various studies used various variables in the research. The diversity of those variables is presented in Figure 3. Based on the graph presented in Figure 3, it can be seen that studies studying education and employment of PWDs (3 studies) and status of PWDs (3 studies) were the most common studies. Furthermore, studies that examine inclusive education policies, classroom practices (2 studies), inclusive education status (2 studies) and inclusive education challenges (2 studies) occupy the second position. On the other hand, other studies were based on general and special teachers' attitudes, general teachers' attitude, classroom pedagogy, inclusive education practices, accessibility and availability of schools for the children, education sector, enrollment, retention and success of the students, development programs and disability, education of visually impaired children, schooling of GWDs, early childhood education and development programs, learning experiences, teaching practices, inclusive education strategy, disability discourse, quality of life of disabled, education barriers, the status of CWDs, disability policy and special needs education. These were the research variables found in the studies carried out from 2010-2020 in the sector in Nepal.

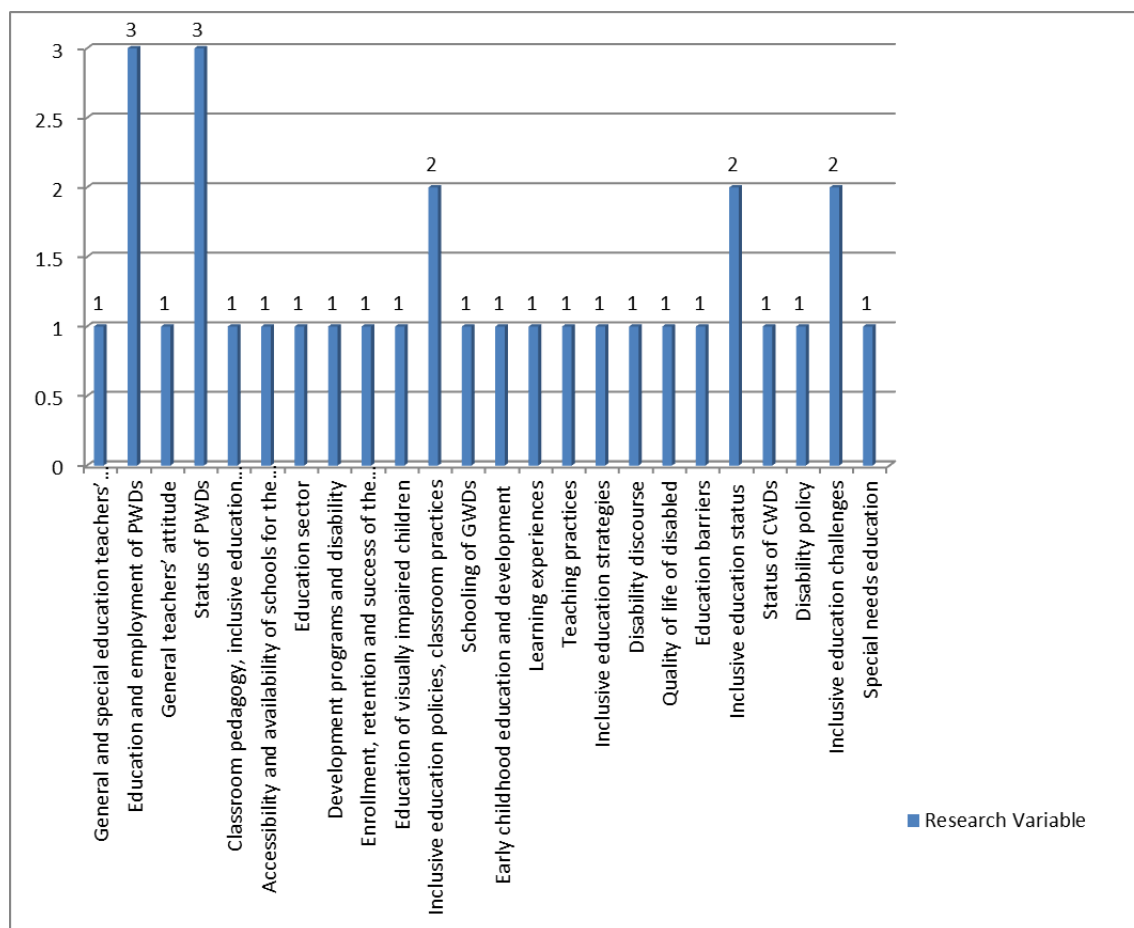


Figure 3. *The distribution of the studies based on research variables*

Frequency of Each Data Collection Techniques

Various data collection techniques have been used in various researches. From 31 analyzed studies, 9 data collection techniques have been identified. According to the graph presented in Figure 4, the most frequently used data collection techniques were document review (15), interview (14), and questionnaire (11). Other techniques were used in the studies and those were statistical tests (6), FGD (5), observation (4), in-depth interview (4), discussion (3) and KII (1).

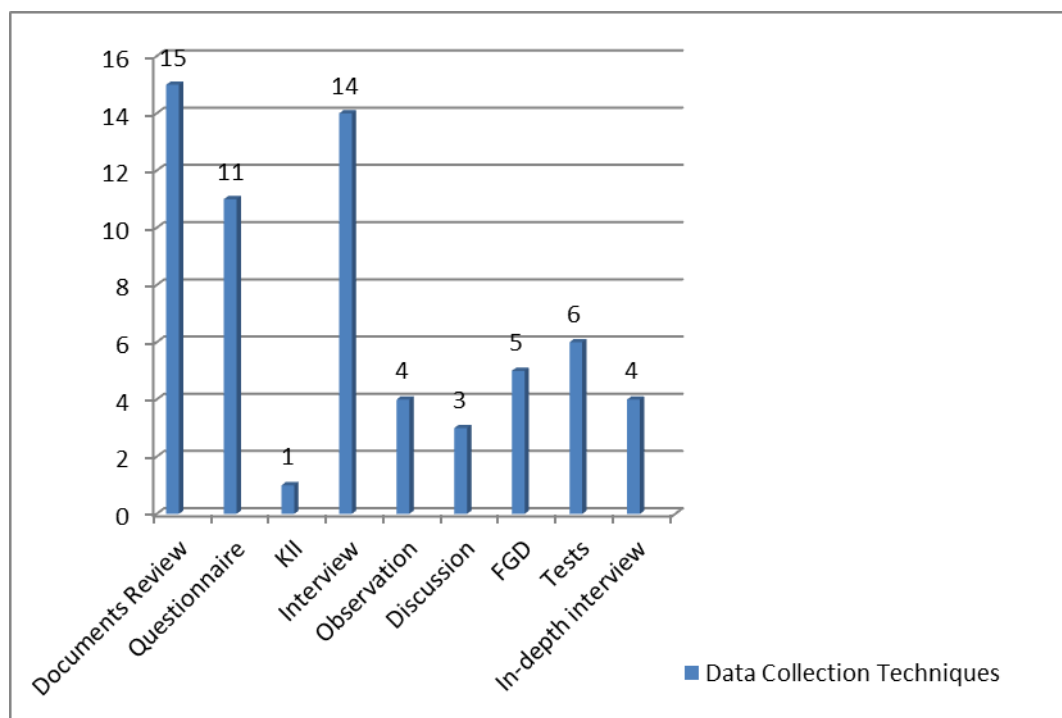


Figure 4. *The Distribution of the Studies based on Data Collection Techniques*

Frequency of Each Data Analysis Techniques

The diversity of data analysis techniques used in articles that have been analyzed in this study is presented in Figure 5. Based on the graphs shown in Figure 5, the most commonly used data analysis techniques were descriptive analysis (22) then correlational (4), data compilation and analysis (4), logistic regression (3), policy analysis (3), regression (2), and descriptive and inferential analysis (2). There were other analysis techniques applied by the studies among them narration, theoretical analysis, scoping review, content analysis, context and practice analysis, literature review and case collection and analysis.

In the data collection and data analysis techniques, document review, interview, questionnaires, tests, and observations were the most popular techniques selected for data collection, while percentages, mean/SD, and interpretation were the most commonly used data analysis techniques. Thus, in general, the data obtained in the studies were more often analyzed using descriptive rather than inferential statistics. The frequent selection of descriptive statistics as a technique of data analysis is in line with Karadag (2010).

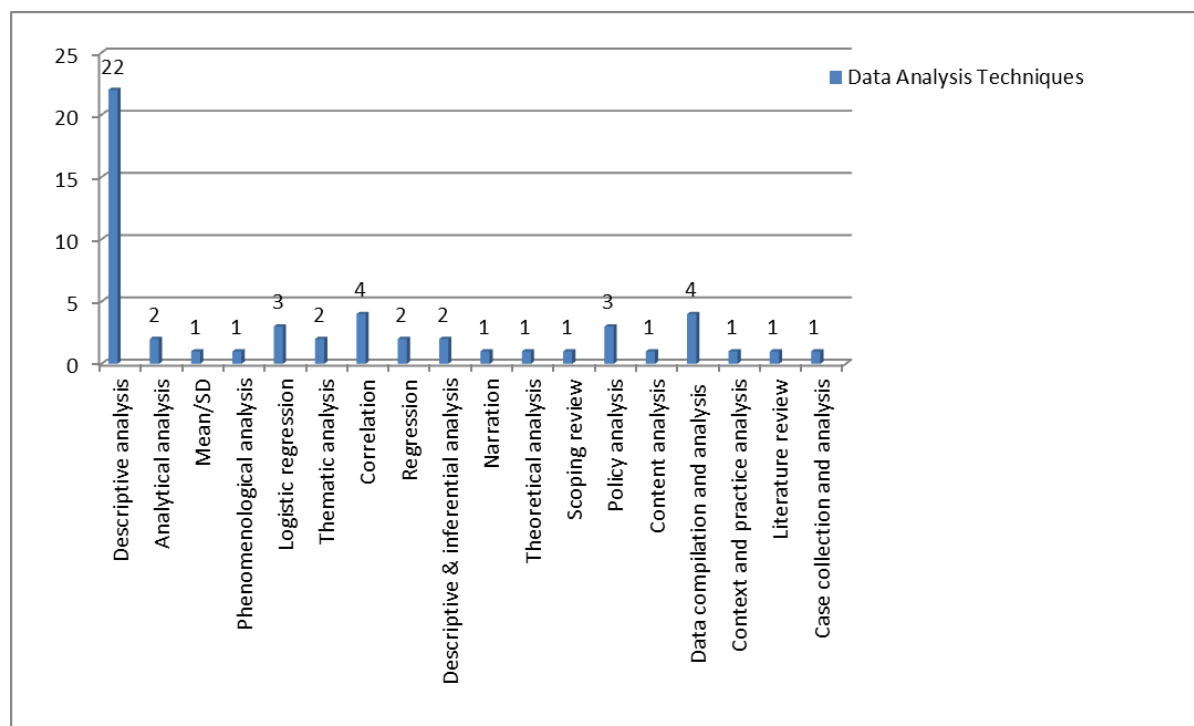


Figure 5. *The Distribution of the studies based on Data Analysis Techniques*

Frequency of Each Research Subjects

In the category of disability, children with disability, inclusive education, the focus of the study was not limited to teachers and classrooms only. Various levels of disability and inclusive education were studied. The diverse subjects of the studies that have been analyzed in this study are presented in Figure 6. According to the graph shown in Figure 6, of the 31 studies, the research subjects that most frequently used were children with disabilities (10). After that purely disability (9) has the second position. Then the other studies subjects were rounded up on special school teachers (2), people with disabilities (2), visually impaired students (2), poor and disadvantaged ethnic groups (2). Besides these, other subject studies were classroom, students with or without disabilities, special and general school teachers, girls with disability, early children living with disabilities, students with intellectual disabilities, marginalized groups and special needs education.

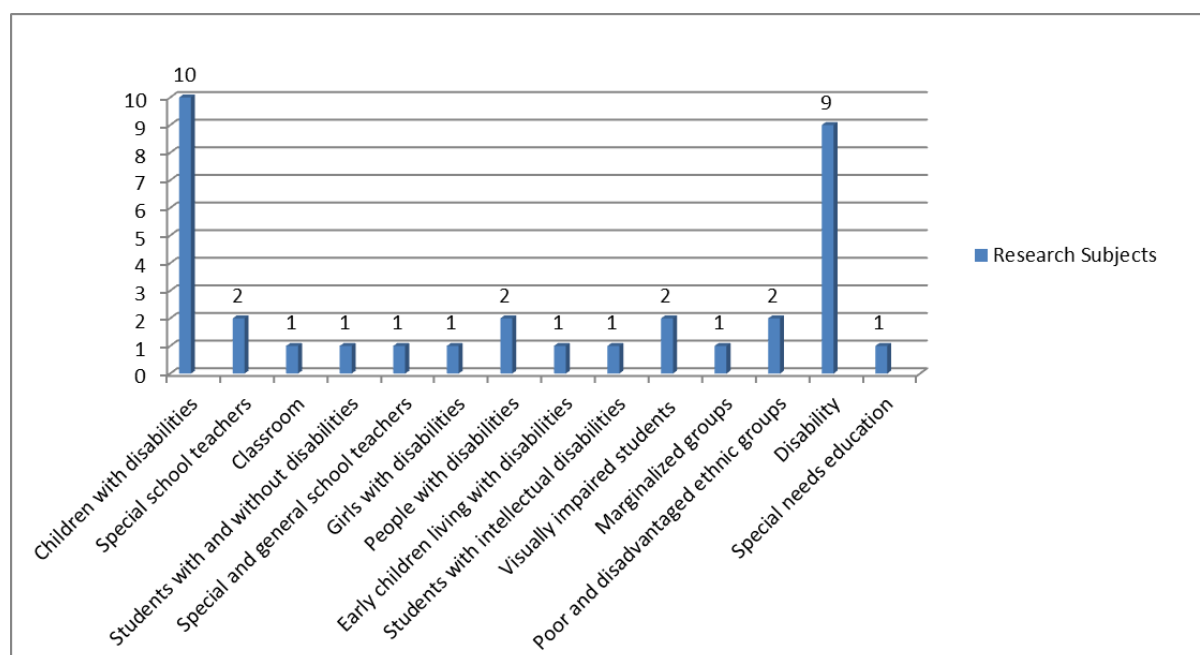


Figure 6. *The Distribution of the Studies based on Research Subjects*

Gaps Noticed

Through the content analysis of the studies from its methods and data analysis techniques, it is found that some good studies were carried out in the field of inclusive education, children with disabilities and their education and disability as a whole in Nepal. However, there is still a gap in producing no. of studies in the field of inclusive education, children with disabilities and disability, considering the acute and vulnerable situations of disabled children in Nepal.

It has been found that there were minimum studies carried out from a quantitative approach. The studies domination can be seen as there were qualitative and mixed approach researches in the field. The subjectivity of the subject matters is somehow fulfilled, though the available research designs, research subjects are not fully accustomed. There seems to be a gap in determining and checking the facts through objectively analyzed findings.

Through methodological approaches, it has been found that most of the researches were carried out in qualitative research based worldviews. Minimum researches were carried out from quantitative research based worldview. It may be because that the selection of topic and its needed gravity of analysis demanded to go basically for qualitative and mixed research approach thereby theory, paradigm and design were set accordingly. In contrary, when we go to the research trend in entire world in disability sector, there is a predomination of empirical works. A large number of quantitative studies are found with cross-sectional. However in the world, there is still dearth of more longitudinal research to test the evolution of the variables (Caraballo et al., 2020).

In research design, the domination of document review, descriptive, and case studies has been observed. Some of the studies tried to go beyond the hegemonic practices of qualitative and quantitative research. However, the dearth of deconstructing the hegemonic practices in research designs and analyses were found. Besides descriptive, some studies tried their best to use the updated research designs in terms of convergence, phenomenological including the statistical tests as correlation, regressions, and inferential tests. But these were also indulged

not to go beyond the assumptions in describing the findings with the use of rigorous descriptive analysis.

It is a known fact that most of the researches are guided by theory. Separate theories were used in the researches namely constructionist, disability, ecological system & dysontogenesis, Giddens' structure-agency, inclusive education, inclusive education & education for all, pedagogical discourse and alternative models of teaching-learning, positioning theory, theory of access and inclusion, interpretation, and theory of planned behavior. The paradigms/traditions of the study were non-positivist and post-positivist basically for qualitative and quantitative researches respectively. In non-positivist paradigm, nine types of research were found with six different angles. There were four types of research carried out from the angle of interpretive whereas other one-one research was carried out with the angle of ethnographic, pragmatism, social constructionist, social constructionist and interpretive and transcendental phenomenology.

Talking about the theoretical approaches, each of the research design are not inclined to the theoretical ideas. The theoretical lapses are also figured out in some of the studies. Some of the academic studies were also carried out without theoretical backing in the studies. For inclusive education and disability-related studies, the theory of inclusive education and educational is inclined. Theoretically, inclusive education and educational theory (democratic theory) is linked directly to the study of inclusive education. The inclusive education and educational theory has the post-modernist paradigm where the social construct of disability in the perspective of right-outcome approach is accorded.

As suggested by a paper on trends and opportunities in research on disability and work: An interdisciplinary perspective (2020), there is a need of triangulation of different methodologies because of the interdisciplinary nature of the topic as disability and inclusive education in establishing strategies and policies for the section of society.

The selected studies tried to give angles for the triangulation of different methodologies. 23% studies were carried out utilizing the research approach as mixed. On mixed research approach, almost all studies used mixed research methodologies to triangulate the findings. However, the new dimension in terms of longitudinal research methodology was rarely found in the selected studies.

The inclusive education and educational theory has the strategy of inclusiveness in the classroom. A paper presented by Knight (1999) argues that the theory are related with the democratic theory which has seven critical constructs or attributes as, the nature of educational authority; the ordering and inclusiveness of membership; the determination of important knowledge; the definition and availability of rights; the nature of participation in decisions that affect one's life; the creation of an optimum environment for learning; and equality.

The theory includes democratic authority, inclusiveness and democratic classroom, the democratic curriculum, student rights, the nature of participation in decisions that affect one's life, establishing optimum environments for learning, and equality. In the same paper, it has been argued that the above-mentioned things are the democratic requirements in the classrooms which are expected by inclusive education. These will determine whether the school and classroom can become inclusive or not. The envisioned goal of democratic theory in education is that all students, upon completion of secondary schooling, are capable of

fulfilling the requirements of an informed, active, and responsible democratic citizen. Thus, from this construct of democratic theory, there is a huge gap in the Nepali context, which was not dealt with properly by the studies carried out previously in Nepal by using different theories by the studies.

Going through some of the findings of the studies, the right outcome approach is not considered minutely in implementing inclusive education in Nepal. Theoretically, a rights-outcome approach (right based approach) constructs an analysis of how society marginalizes people and how society can be adjusted to eliminate this marginalization (Rioux, 1997). There is a need of right outcome approach to address the problems of disabled but none of the studies carried out in Nepali context could reveal how right outcome approach is being implemented to ensure the rights of disabled in Nepal.

It is found that there are different determining factors contributing to the success and failure of inclusive education but solely and critically the attitude and self-efficacy of teachers, who is the main implementer of inclusive education, are the main actors to implement it properly considering the diverse forms of disabilities. In teachers' self-efficacy and knowledge and attitude, several researches have revealed that there is relationship between teachers' self-efficacy and inclusive education practices. A positive relationship between teachers' attitude towards inclusion and their self-efficacy in practicing inclusion was reported in Tanzania (Hofman & Kilimo, 2014). Similarly, another study conducted in Canada indicated that higher self-efficacy for collaboration was the only predictor associated with more positive attitudes about inclusive education practices for students with developmental disabilities (Montgomery & Mirenda, 2014). It is found that teachers' self-efficacy and attitude based studies were also not carried out particularly in Nepal considering the situation of children with disabilities.

The contextual and organizational factors of inclusive education are not dealt with adequately in Nepal. The contextual factors (learning environment, inclusiveness, equality and participation) and the organizational factors (roles and responsibilities of educational authority, availability of rights, important knowledge in schools) were also spelled by Knight (1999) in democratic theory. He suggested that there is a need of such factors in school to provide better education to children with disabilities. From this angle, none of the studies carried out in Nepali context, could be one of the area for further research in the field.

It is found that the inclusive education phenomenon is considered as integrated education, thus has created even more challenging atmosphere to the children with disabilities to cope with the situation. Why integrated practices are being applied in the name of inclusive education in Nepal? This has also not been dealt by any studies carried out so far.

These identified gaps can be fulfilled through rigorous research in the field by the academia, scholars, researchers and I/NGOs sector. These are actually the knowledge gaps in disability sector that can be contributed through rich methodological including interdisciplinary approaches. The research subjects of the field are mostly fulfilled but particular section of disability like physical, hearing impairment, autism, multiple disabilities can be contributed in the coming days.

Moreover, these findings can be linked to the concept of development education. Development education is an educational process that increases awareness and understanding of a rapidly changing, interdependent and unequal world (Irish Aid, 2006). Here in providing

better education to persons/children with disabilities, the concept of development education can be linked to ensure lifelong education of such vulnerable section of society. The methodological aspect as well as essential elements of development education is the crucial parts in coming days to ensure better education to the vulnerable section of society including disability.

Conclusion

The study was a content analysis of studies in the field of children with disabilities, inclusive education and disability carried out in the context of Nepal from the year 2010-2020. There was a diversity of approaches, designs, variables, data collection techniques, data analysis techniques, and research subjects used in the various studies. Qualitative research approach was most commonly used research approach by the studies. Document review and compilation, descriptive quantitative, descriptive qualitative were the most repeatedly used research designs found in the studies. It is also found that some studies with the same research design applied different data collection and analysis techniques including statistical tools. Some of the non-academic researches were also carried out from I/NGOs in the field but there is still a dearth of adequate researches comparing to the no. of I/NGOs available in the country. So, it is suggested to carry out researches in the gaps figured out by this study by prioritizing disability, inclusive education, and children with disabilities and vulnerabilities in the coming days. From methodological perspectives, there is a need to deconstruct the methodological considerations in coming days by unfolding the traditional perspectives of the individual, community and society towards disability.

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Engaging University Students in Designing an E-magazine

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Abstract

Student learning outcomes rely on the depth and quality of their engagement in language learning. Since the early 2000s, the concept of engagement has gained a lot of attention from researchers. They often define engagement as a complex construct that consists of behavioral, cognitive, and emotional components. In addition, students' engagement is very important in the class as it functions as a facilitator of their learning. It leads to meaningful outcomes and prevents students from dropping out. The aim of this paper is to present how university students were engaged in designing an e-magazine. The participants in this project were 10 students who are studying the English language at the Faculty of Education and Philology at "Fan S. Noli" University, in Korca, Albania, in their first year. This project was part of their final continuous assessment in the subject of "Text Analysis 2" in the academic year 2022-2023. Students were divided in groups and each of the groups had a specific task. They developed their own ideas and perspectives on a range of topics that are important to young people nowadays. Students worked collaboratively and individually online and onsite to plan and compose a variety of content. Later, they turned their ideas into digital texts for the e-magazine. The digital website that was used to design it was www.canva.com. In the end, students downloaded the Pdf version of the e-magazine. The results of this project were really satisfying for the students as they were involved in online research, analysis, discussion, writing, and designing an e-magazine in the English language.

Keywords: University Students, E-magazine, Writing Process, Designing

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1. Introduction

Electronic material in education presents the potential to provide knowledge in a more cost-efficient, expedient, and impactful manner. As a result of this benefit, Druin (2002) asserts that numerous educators and training providers are beginning to shift towards delivering content through digital media. Lesk (1997) further asserts that the rising expenses associated with publishing necessitate the creation of digitized content. Consequently, there is an increasing inclination towards transforming physical books into digital format and creating new titles in electronic form (Carjaval, 1999). Electronic material provides numerous advantages that are not present in traditional printed text. Readers will be provided with supplementary resources that are enriched with multimedia elements such as video and audio snippets. These materials will be presented with a level of information that may be customized according to the reader's taste (Collins, 1996).

Norshuhada et al. (2003a) propose that contemporary electronic content for readers can be sourced from several web platforms, including novels, journals, newspapers, magazines, manuals, and books. All of these materials belong to the category of electronic books (e-books) and can exist in many formats, including PDF, HTML, LIT, or RTF (Norshuhada et al., 2003b). In the past, e-magazines were exclusively limited to paper books that had undergone digitization processes, enabling them to be seen on computers. Later on, the phrase was expanded to include multimedia, hypertext, or hypermedia systems that are structured around a book metaphor.

Nevertheless, the existing definition of an e-magazine has been broadened to encompass titles accessible online, articles that can be read via email and retrieved using a portable electronic reading device or files that can be downloaded onto a computer (Norshuhada, 2002).

Numerous researches have focused on the electronic versions of textbooks, storybooks, dictionaries, and encyclopedias. This study primarily examines the e-magazine, which serves as a significant source of knowledge for students. Magazines are often published periodically and feature popular articles that are written and illustrated in a less technical style compared to those found in journals.

Magazines like *Time*, *Redbook*, *People*, and *Newsweek* are serial magazines targeting a broad readership. They feature stories on popular topics spanning various domains, including entertainment, business, economics, and academic disciplines. Magazines in the university setting are typically available at the library, serving as a resource for students to acquire more knowledge to supplement their studies or to just expand their general knowledge.

2. Literature Review

Dewey and Kilpatrick, prominent American pragmatists during the early 1900s, focused on establishing the theoretical and practical basis for learning via direct experience. Dewey and Kilpatrick regarded education as a comprehensive and intentional endeavor occurring within a social context, with a substantial influence. They perceived it as a means to establish a more democratic society, as the process of education should not only equip young folks to be responsible citizens, but also enable them to develop the ability to collaborate.

The educational reform movement in Germany after the First World War was influenced by the works of Dewey and Kilpatrick, with a focus on creating a more democratic society.

Similarly, in the Soviet Union during the revolutionary and post-revolutionary period, the idea of project learning had a significant impact, as this was a time when new and experimental ideas were still viable. In the 1960s and 1970s, as criticism of institutionalized schooling increased, project learning emerged as a prominent topic of educational concern in Europe. Subsequently, there has been a notable surge in project work across several domains of education. However, concurrently, the term 'project' has frequently been misconstrued as an activity that does not meet the criteria of a project. Typically, it involved opposing established educational methods and emphasizing the idea of enjoyment rather than serious and responsible work, as well as prioritizing freedom over restrictions (Legutke, M and Howard, Th. 1991:157-158).

Diane L Fried-Booth asserts that more learner engagement in an activity leads to greater benefits for them. As motivation in project work originates internally rather than outside, the project becomes a process driven by the learner, resulting in more useful products. The projects are not structured according to a syllabus and the terminology used does not just come from the textbook, but rather from the inherent nature of the project. However, it is still necessary to carefully organize, discuss, and assess the project (Fried, B. D. 198: 5).

In addition, learners are empowered to incorporate their understanding of the world into the classroom and apply information from various disciplines (Phillips, D. Burwood, S. & Dunford, H. 1999:6). In conclusion, Wicks highlights that project work allows learners to use their knowledge from other disciplines in the classroom and expand upon it while working on a project (Wicks, 2000: 9).

Language teaching often revolves around the concepts of grammatical complexity and accuracy, as well as challenges related to vocabulary and spelling. In project-based learning, the focus is not solely on language, but also on other tasks that the teacher must handle. These tasks include managing the input of topic information, organizing social interaction and relationships among the learners, and providing opportunities for discussion and planning future actions. These responsibilities should be included in the work and planning arrangements of teachers. Diana L Fried-Booth asserts that in order to achieve success in project work, it is crucial to build a strong working connection. It is essential for learners to possess the ability to collaborate, not just amongst themselves, but also with their instructor (Fried-Booth, 1986: 9).

2.1 Definition of Key Terms

E-Magazine: An electronic magazine that combines traditional magazine content with multimedia elements such as videos, interactive graphics, and hyperlinks.

Student Engagement: The degree of students' participation, involvement, and interest in the learning process.

Role of Technology in Education: Technology has revolutionized education by providing students with access to a wide range of digital resources, enhancing communication and collaboration, and enabling self-directed learning.

3. Methodology

3.1 Participants of the Study

The participants of this case study are 10 students, 5 of whom are females and 5 are males. They range in age from 18 to 21. They study in the Bachelor study program “English Language”, in the Faculty of Education and Philology, Department of Foreign Languages at “Fan S. Noli” University, Korça, Albania. They had to write and design an e-magazine collaboratively as a group.

3.2 The Research Design

The aim of this research project is to design an e-magazine using the platform, www.canva.com. This research design outlines the steps to be followed in order to create a high-quality e-magazine in this platform:

1. Selection of E-Magazine Topic: Identify a specific topic or theme for the e-magazine that aligns with the intended audience and purpose of the publication.
2. Timeline: Develop a detailed project timeline with milestones for each phase of the project.
3. Students' roles: Assign students a role that they will have during this project.
4. Canva Platform Familiarization: Familiarize students with the Canva platform's features and capabilities through training and tutorials.
5. Content Curation: Gather and organize relevant content, including articles, images, and other multimedia elements, based on the chosen topic.
6. E-Magazine Design: Create a wireframe or design layout for the e-magazine, considering visual hierarchy, typography, color schemes, and branding.
7. E-Magazine Creation on Canva: Utilize Canva's design tools and templates to create the e-magazine, incorporating the selected content and design elements.
8. Review and Testing: Conduct internal testing to ensure that the e-magazine functions properly, is visually appealing, and aligns with the target audience's preferences.
9. Finalization: Finalize the e-magazine design, content, and layout.
10. Presentation: Students present the e-magazine in front of the class.

3.3 The Research Instrument

The research adopted a qualitative approach to investigate student engagement in designing e-magazines. Data were collected through observations of university students involved in the e-magazine creation process. Ethical considerations, including informed consent and privacy, were addressed.

3.4 Students' Roles

Designing an e-magazine on [www.canva](https://www.canva.com) is a collaborative effort, and students can take on various roles to ensure the project's success. Here are the roles and responsibilities for students working on this project:

1. Project Manager

- Coordinate the project timeline and deadlines.
- Ensure that all team members are on track and meeting their responsibilities.
- Communicate with the instructor or team leader and provide updates on the project's progress.

2. Content Creators

- Research and write articles, features, and content for the e-magazine.
- Source images and other media content that complements the articles.
- Proofread and edit the content for accuracy and clarity.

3. Graphic Designers

- Use [www.canva](https://www.canva.com) to create visually appealing layouts and templates for the e-magazine.
- Select fonts, colors, and graphics that align with the magazine's theme.
- Design cover pages, page layouts, and other visual elements.

4. Editor

- Review and edit the content for grammar, spelling, and style.
- Ensure consistency in tone and branding throughout the e-magazine.
- Collaborate with content creators to refine their work.

5. Layout and Formatting

- Work on the formatting of the e-magazine, ensuring that it is visually appealing and user-friendly.
- Adjust the layout as necessary to make the content flow smoothly.

4. Findings

The findings of the research revealed varying levels of student engagement in the e-magazine design process. Some students exhibited high levels of enthusiasm, taking ownership of their projects and demonstrating a deeper understanding of the content. Others faced challenges related to technology, time management, and design aesthetics. The students' experiences, both positive and negative, shed light on the complexities of engaging students in the e-magazine design.

4.1 The Process of Creating an E-magazine Involved Several

The first step was selecting a specific topic or theme that aligned with the intended audience and purpose of the publication. Their topic was focused on “Digidiscovery – Discover our digital world.” The title of the e-magazine was “Crithinks”.

The project timeline was developed, with milestones for each phase as displayed in the table below:

Table 1. The timeline of the project

Week 1 Identification Onsite	Week 2 Familiarization Onsite	Week 3 Production Online	Week 4 Presentation and Evaluation Onsite
<ul style="list-style-type: none"> • Identify a specific topic or theme of the e-magazine • Decide on the topic they each will write about in the e-magazine • Take roles 	<ul style="list-style-type: none"> • Familiarize students with the www.canva platform's features and capabilities through training and tutorials. • Gather and organize relevant content, including articles, images, and other multimedia elements, based on the chosen topic. 	<ul style="list-style-type: none"> • Create a wireframe or design layout for the e-magazine, considering visual hierarchy, typography, color schemes, and branding. • Utilize canva's design tools and templates to create the e-magazine, incorporating the selected content and design elements. 	<ul style="list-style-type: none"> • Present the project in front of the class and receive the evaluation.

Students worked both onsite and online to discuss their ideas about the content of the e-magazine. From their discussion it resulted that their magazine would be multidisciplinary and they decided to write articles on the following topics:

1. 7 chakras of the body
2. The science if the emotional intelligence
3. Film industry: the latest news and releases
4. Sports activities developed by universities in Albania
5. Best books of 2023
6. Tattoos that Albanian youngsters love
7. Beauty standards
8. The impact of social media has on students
9. Fashion Trends
10. Most impressive record on the world of football

The roles that students took were as follow:

- Project manager (1 student): The project manager was responsible for overseeing the entire project, coordinating the efforts of the team members, setting goals, creating timelines, and ensuring that the project was on track to meet its objectives.
- Graphic designers (2 students): they were responsible for creating visual elements, such as images, illustrations, and layouts, that were aesthetically pleasing and align with the project's goals. They worked closely with the project manager and other team members to ensure that the design elements enhance the project's overall presentation.
- Editor (3 students): Editors were responsible for reviewing and improving the written content of the project. They ensured that the text was free from grammatical errors, was well-structured, and effectively communicated the intended message.

- Layout and formatting (3 students): Layout and Formatting team members were responsible for structuring and organizing the project's content. They ensured that text, images, and other elements were placed correctly within the project, creating a visually appealing and user-friendly layout.
- Content creator (all students): All students were involved in content creation. They contributed to the project's content by providing information, ideas, text, and other materials necessary to fulfill the project's goals.

This team structure allowed for a clear division of responsibilities and ensured that each aspect of the project, from project management to content creation and design, was handled by students with the relevant skills and expertise. Effective communication and collaboration among team members were essential to ensure the project's success.

Each student in the class presented the project, showcasing and providing comments on their individual pages. The e-magazine included some of the following pages:



Figure 1. Cover of the e-magazine

Crithinks Magazine	
Introduction:	
Crithinks Magazine is a magazine created by students of the first year 2022-2023, the 2nd Group in the English language program at "Fan S. Noli" University, Korçë, Albania.	
Every student has written his/her article as part of their project in "Text Analysis 2".	
The purpose of this project is for students to further develop their writing skills and improve their use of English, as well as encourage teamwork and cooperation within the classroom.	
We would like to thank our professor Dr. Dorela Kaçani for her support throughout the project!	
We hope you enjoy reading/listening to this project as much as we enjoyed working on it!	
	
Page 02	
Section 1	
7 chakras of the body.	03
The science of emotional intelligence.	05
Section 2	
Film Industry: The latest news and releases.	07
Sports activities developed by the universities of Albania.	10
Section 3	
Best Books of 2023.	12
Tattoos That Albanian Youngsters Love.	14
Video Games.	15
Section 4	
Beauty Standards.	16
The impact social media has on students.	19
Section 5	
Fashion Trends.	22
Most impressive records in all of world football.	24

Figure 2. Table of content



Figure 3. An example of an article

5. Discussion

The findings of the study revealed that student engagement in the e-magazine design process varied among participants. Some students exhibited high levels of enthusiasm and a strong sense of ownership over their respective roles, resulting in a deeper understanding of the content and its presentation. On the other hand, some students encountered challenges related to technology, time management, and design aesthetics. These challenges underscored the complexities involved in engaging students in the e-magazine design process.

The Project's Multidisciplinary Nature

One of the noteworthy aspects of this project was the students' decision to create a multidisciplinary e-magazine. They chose to explore a diverse range of topics, reflecting the multifaceted interests and perspectives of the team members. This diversity is evident in the choice of article topics, which spanned areas such as chakras, emotional intelligence, film industry updates, sports activities in Albanian universities, book recommendations, tattoo trends, beauty standards, the impact of social media on students, fashion trends, and remarkable records in the world of football. This diverse set of topics provided a rich and engaging content mix for their e-magazine.

Team Structure and Roles

The division of roles among the students in this project was a crucial element in its success. The project manager played a pivotal role in coordinating the efforts of the team and ensuring that the project remained on track and met its objectives. Graphic designers focused on creating visually appealing layouts and templates, aligning with the project's goals, and collaborating closely with other team members. Editors were responsible for improving the written content, guaranteeing that it was grammatically correct, well-structured, and effectively conveyed the intended message. The layout and formatting team members were tasked with organizing the content to create a visually appealing and user-friendly layout. All students contributed to content creation, providing information, ideas, and materials to fulfill the project's goals.

The team structure made it possible for a distinct division of labor, ensuring that students with the necessary knowledge and abilities handled each component of the project. Effective communication and collaboration among team members were essential to ensuring the project's success.

6. Conclusion

This paper is focused on a case study involving 10 students from “Fan S. Noli” University in Korça, Albania, aimed to design an e-magazine using the Canva platform. The project involved students aged 18-21, enrolled in the Bachelor study program "English Language." The research design covered topics such as topic selection, timeline development, students' roles, Canva platform familiarization, content curation, e-magazine design, creation on the online platform www.canva.com, review and testing, finalization, and presentation. The study adopted a qualitative approach, observing students involved in the process and addressing ethical considerations. Students took on various roles, including project manager, content creator, graphic designer, editors, and layout and formatting. The e-magazine, titled "Crithinks," featured articles on various topics, and involved both onsite and online collaboration. Each student presented their individual pages, including the cover, table of content, and their pages. The case study provides a comprehensive overview of the collaborative effort and the outcomes of the students' efforts in creating the e-magazine.

Engaging university students in designing e-magazines offers an innovative and effective approach to enhancing student engagement and learning. The findings emphasize the importance of providing students with opportunities to actively participate in the creation of digital content. By addressing the challenges and providing support, educators and institutions can harness the potential of e-magazines to foster digital literacy, creativity, and

critical thinking among students, ultimately preparing them for the demands of the 21st century.

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Teaching and Learning Process and Tics From the Remote Perspective

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Abstract

This article discusses the experience of educational consultants in response to the urgent need to maintain the pedagogical process during the Covid-19 pandemic. It explores the transition to distance education, which has led to the enhancement of technology-mediated teaching and learning strategies. The article also details the development of a bank of teaching-learning strategies linked to digital resources, categorized based on their pedagogical potential. This includes an exploration of the intersection of these strategies with Bloom's Taxonomy and their alignment with competency-based approaches. Furthermore, it examines the relationship between connectivity, digital networks, and the evolving landscape of educational communication, which has resulted in new trends in teaching and learning. The Covid-19 pandemic has underscored the importance of digital technologies in education, emphasizing the need for a structured and deliberate approach to technological integration. Effective pedagogical mediation remains fundamental, with teachers playing a crucial role in adapting to the new conditions presented by technology. Teachers not only play a central role in pedagogical mediation but also in ensuring that technology is used effectively to promote student learning. The pandemic served as a reminder of the importance of preparing educators to address technological challenges. Teachers' adoption of digital tools was essential to ensure the success of the teaching and learning process. Additionally, ongoing teacher training is essential to enable them to make the most of technologies in the classroom. Collaboration between educators and technology experts plays a key role in creating effective learning environments. This approach to technology integration in education proves essential in addressing contemporary educational challenges, preparing students and teachers for the constantly evolving digital environment.

Keywords: Technologies, Education, Teaching-Learning Strategies, Bloom's Taxonomy

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Introduction

During the COVID-19 pandemic, a group of educators faced the challenge of adapting teaching to a remote format. As a result of this experience, a bank of strategies was developed based on Bloom's Taxonomy, linking learning objectives to the use of digital resources. This effective approach facilitated teachers' pedagogical planning, allowing the choice of teaching-learning strategies based on the different cognitive levels of Bloom's Taxonomy. These strategies proved to be fundamental to guarantee the continuity of the teaching and learning process in a challenging scenario (Arruda, 2020).

This article explores the integration of technology in education, covering public and private institutions, emphasizing the importance of careful analysis of factors such as privacy, costs, transparency, government coordination, professional training, accessibility, and environmental impact in the use of educational technology. Furthermore, it highlights the need to align digital culture in the educational context with the needs of students and the constant changes in the economic, political, and social scenario.

Integrating technology into education requires a holistic approach that takes into account not only digital tools but also ethical, economic, and environmental aspects. This approach is fundamental to ensuring that technology is an effective ally in the teaching-learning process.

The curriculum must be designed to meet the demands of students immersed in digital culture, providing an active and meaningful learning experience. This goes beyond the simple use of technological tools in pedagogical mediation, involving the promotion of the development of the skills that make up the curriculum. Adapting the curriculum for the digital era involves rethinking how skills are developed, considering new ways of learning and the need to prepare students for a constantly evolving world.

Technology in Education

Technology in education is already a reality at all levels and modalities of education, both in the state and municipal public network and in the private network, despite marked socioeconomic differences (Couto, Ferraz, & Pinto, 2017). When we talk about educational technology, we need to consider that there are several types, and each one has its functionalities and purposes in the process of teaching and learning, such as infrastructure, teaching, and creation/experimentation technologies (Blikstein et al., 2021).

The choice of technologies that will be used in the educational process requires managers and educators to consider concerns such as "issues of privacy, costs, transparency, coordination between government entities, professional training, accessibility, and environmental impact of educational technology, among others" (Blikstein et al., 2021). Furthermore, considering that digital culture in the school context needs to analyze the real needs of students and the transformations that always occur in the economic, political, and social scenario (Couto, Ferraz, & Pinto, 2017).

Educational institutions need to include in their projects and pedagogical proposals the components of culture and the use of digital technologies that, through collaborative practice, creation, and everyday experience, can contribute to the teaching and learning process (Couto, Ferraz, & Pinto, 2017). Digital technologies must be considered in the institution's design and

pedagogical proposal, as they contribute to the transformation of educational practices (Almeida & Silva, 2011).

Curriculum Design and Technology in Education

The curriculum needs to be designed to meet the demands of students already inserted in digital culture, providing an active and meaningful learning process. It is not just about using technological tools in the pedagogical mediation process but rather about taking advantage of the possibilities that these tools bring to work on the skills that make up the curriculum (Almeida & Valente, 2011).

The curriculum, in addition to the use of technology, must be designed considering that the teaching and learning process is not watertight. It is a dynamic and complex process in which teaching methodologies and strategies will be fundamental for its application (Stein, 2020). Inserting technologies into the curriculum is a necessity that needs to be considered, as they help in the use of active methodologies that support learning through diverse experiences, challenges, practice in different contexts, and innovation (Camargo, 2018).

The pedagogical project of the institution to which the group of consultants belongs is based on curricula determined in course plans for different teaching modalities, including technical professional education and higher education. The pedagogical model is based on the development of skills, which are the result of the articulation of three dimensions of knowledge: knowledge, skills, and values/attitudes, which are permeated by principles, values, and the fulfillment of the institutional mission and integrated by methodologies and strategies of active learning activities, contributing to the comprehensive training of course graduates.

Pedagogical Mediation and Technology

Pedagogical mediation occurs through an intentional action by the teacher in order to collaborate with the development of skills, through the elements that compose it (Santana & Barros de Almeida, 2020). These elements include the choice of learning objectives, curricular content, and teaching resources. Furthermore, it encompasses all planning, teaching methodologies, strategies, and the evaluation process.

In the technological universe, if in one aspect educational technologies have elements that promote abundant interaction, on the other hand, this characteristic is not necessarily directed to the intended educational objectives, in their entirety, making the selection process more complex and intensifying the need for teachers to act as facilitators of the teaching-learning process and revisit their mediation criteria (Sousa, Despresbiteris, & Machado, 2019).

For this mediation to become more effective in creating meanings or bringing the student closer to achieving objectives, teachers need to make a more detailed record of the intended objectives, so that the change in strategies and/or tools used throughout the process of mediation does not compromise the development of professional profile skills.

In this context, reflection on the new challenges of mediation becomes imminent, and the intense use of technological resources requires teachers to master different tools and more agility in the appropriate use of the countless stimuli offered by the resources chosen in planning, overcoming the barrier of purely instrumental use of technological resources.

Bank of Strategies: The Experience of a Group of Pedagogical Consultants

During the Covid-19 pandemic and the need for remote teaching, the use of Digital Information and Communication Technologies (TDIC) became essential, through various technological resources and digital teaching resources, for the continuity of the teaching process and learning process (Arruda, 2020). Despite the existing knowledge that skills-based work in conjunction with hybrid teaching meets the needs of contemporary students, enabling personalization and innovation in the teaching and learning process (Camargo, 2018), teachers needed support to adapt to the new reality of remote teaching, permeated by various technological tools and digital teaching resources.

The experience of the group of pedagogical consultants, responsible for the curricular development of professional education courses, in the search for the possibility of allowing the curricular contents developed in person to continue to be offered to students, was the starting point for the development of a bank of strategies, which served as a subsidy for the practice and pedagogical mediation of teachers at different levels and teaching modalities.

Among the countless possibilities used to support didactic-pedagogical planning, structuring, organization, and definition of objectives and the choice of teaching-learning strategies, Bloom's Taxonomy was chosen, which aims to help in the identification and declaration of objectives linked to the cognitive development, which brings together the construction of knowledge, skills, and attitudes, pointing out theoretical assumptions of the cognitive domain as support so that educators can define, in their educational planning, objectives, strategies, and evaluation systems (Bloom & Krathwohl, 1956).

The objective of creating the bank of teaching-learning strategies linked to digital resources was to offer subsidies for teachers' pedagogical planning with regard to the selection of teaching-learning strategies, as a means of developing skills, in accordance with the educational principles of the institution and according to the specific needs of each phase of the knowledge construction process. In this context, there was an imminent need to support planning that considered the possibility of remote classes using digital resources.

It is known that the simple execution of an activity does not guarantee that the student will establish the necessary relationships that will lead him to achieve the proposed objectives and that, in a set of actions, will lead him to the desired professional competence. It is understood that for this, it is necessary to trace a logical and meaningful trajectory within a context, creating a didactic sequence. To do this, it is necessary to know the potential of the different learning strategies and relevant articulations, enabling cognitive development by overcoming cognitive phases. In this sense, the subsidies offered by the bank of digital strategies and resources for the act of planning corroborate teaching praxis.

Thus, the bank of digital strategies and resources, which was based on Bloom's Taxonomy (Bloom & Krathwohl, 1956), considers that its use focuses precisely on clearly specifying the objectives, to facilitate the selection of teaching strategies -learning, determination of content, and assessment techniques. The relationships established between the development of skills, Bloom's taxonomy, and active strategies converge towards spiral learning (Bacich & Moran, 2018), starting from simpler to more complex levels of knowledge, skills, and attitudes.

In preparing the bank of strategies, teaching-learning strategies were mapped and conceptualized, their possibilities explored and, in a transposition from the physical mode to

the virtual mode of class, such strategies were associated with such that they could achieve the objectives initially outlined in the planning of the courses. Therefore, the objective is to use digital tools and resources in the teaching and learning process at various levels of Bloom's taxonomy.

Digital resources were categorized by pedagogical potential, that is, by skills they could offer students, be they elaboration, editing, collaboration, creation, sharing, among others and not just the use of digital tools. The focus is on how these digital resources and tools support the evolution of student thinking at different levels of cognition. Thus, to achieve the objective designed during class planning, different strategies can be indicated, depending on the level of cognitive development and stage of the course, as well as, in the case of remote or hybrid teaching, the digital resources that best meet the needs are articulated. those initially proposed objectives. In this way, value was attributed to the objectives and pedagogical intentionality of each category of digital resources.

It is worth mentioning that we find, in the literature, the articulation between the various digital resources widely available on the internet and Bloom's Taxonomy, in a direct way. The option to carry out a triangulation between learning strategies, Bloom's Taxonomy, and digital resources, assumed that the resource, by itself, without being linked mainly to a pedagogical intention, can become empty, considering the importance of pedagogical mediation in this process.

Conclusion

Technological resources assist the teaching and learning process, through methodologies and strategies that, combined with pedagogical mediation, become important instruments and provide support for learning (Camargo, 2018). When developing curricula that consider technology and digital teaching resources, it is possible to think about meaningful learning experiences. Integrated and structured work becomes possible, facilitating the teaching and learning process.

For the group of pedagogical consultants, the taxonomy proposed by Bloom served as a basis to assist in planning, organizing, and controlling learning objectives. The processes categorized by the Taxonomy represent the expected learning results and are cumulative, as they have a dependency relationship between levels and are organized in terms of the complexity of mental processes. For learning to be meaningful, strategies must be linked not only to the pedagogical project, proposed objectives, and themes but also to the student's learning context. The clear and structured definition of learning objectives, considering the development of skills relevant to the professional profile to be trained, guides the teaching and learning process towards the appropriate choice of methodologies and strategies and assessment instruments, which enables effective learning and lasting (Arruda, 2020).

In this way, the development of a bank of strategies composed of the association of educational objectives, starting from a selection of learning strategies already widely used by teachers and the selection of digital tools and resources, considering their forms of presentation, functionalities, and purposes, became assertive pedagogical mediation providing continuity in the teaching and learning process.

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Gender Inequality in STEM Education: Basis for Gender Sensitization Program

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Abstract

This study aimed to examine the factors contributing to gender inequality in STEM education, and the conclusions served as the foundation for policy recommendations. The findings of this study served as the foundation for a policy on integrating gender equality themes into STEM education. Gender disparity in STEM education is striking, claims New UNESCO (2017). Female students' learning experiences are compromised by gender stereotypes and discriminatory, prejudiced attitudes, which also restrict their options for higher education. This is the study's GAP, which the STEM Education policy has to address. This study used a content analysis-based qualitative methodology. Contextual analysis can be done in one of three ways: traditional, guided, or summative. These methods analyzed the data concepts tied to the paradigm's significance. Data analysis employed coding to identify common themes in the data. The study's conclusions showed that women have a role in science. One of the reasons some females are not interested in STEM is culture. As a result, gender sensitization training programs should be integrated into STEM Education to promote gender equality among students.

Keywords: Curriculum Disparity, Stereotyping

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Introduction

Persistent gender inequality in higher education's STEM programs is glaring, spanning fields like engineering, technology, mathematics, biology, and chemistry (Luttenberger, Paechter, & Ert, 2019). The concern deepens as women remain significantly underrepresented, with STEM courses consistently attracting fewer female students (Lazarides & Lauermann, 2019). The curriculum and instruction in STEM subjects contribute to this gap through stereotyping, further hindering female enrollment (Watt, Shapka, Morris, Durik, Keating, & Eccles, 2012; Watt, 2016). A critical aspect of this gender disparity is the elevated academic requirements, creating formidable obstacles for female students (Ihsen, 2009). This sets the stage for gender discrimination in the selection process for STEM enrollment, as indicated by *Causes of Gender Discrimination in STEM* (2019). The study underscores that women and men often navigate the world with distinct perspectives, influencing their inclination toward STEM careers. The glaring gap in gender representation within STEM education demands urgent attention. Addressing stereotypes, academic barriers, and discriminatory enrollment practices is pivotal for fostering an inclusive and diverse STEM learning environment. The study recognizes the gravity of these issues and underscores the pressing need for targeted interventions to bridge the gender gap in STEM education.

To overcome these challenges, we need policies that include gender sensitivity in every aspect of STEM education, such as curriculum, instruction, research, community involvement, and school practices (*Causes of Gender Discrimination in STEM*, 2019). This requires collaborative efforts from administrators, faculty, and diverse stakeholders, embracing different cultures and beliefs. By adopting a multidisciplinary and humanitarian approach, we can create a more fair and inclusive future in STEM. Changing girls' perceptions about STEM is crucial. Many think they aren't naturally skilled and attribute their grades solely to hard work. On the flip side, some boys overly confident in their superiority perpetuate harmful stereotypes (Kessels, 2015). To tackle this, an information campaign for young learners, future STEM students, is vital. They need to understand that STEM is for everyone, regardless of gender, fostering genuine interest and passion (Ertl, Luttenberger, & Paechter, 2017).

Societal perceptions play a role too. Studies show math and science are wrongly seen as exclusively for males (Makarova, Aeschlimann, & Herzog, 2019). This misconception discourages young women from STEM and reinforces the belief in young men that STEM is solely theirs (Makarova, Aeschlimann, & Herzog, 2019). Challenging these biases early on and creating an environment that celebrates diversity and equal opportunities is crucial for a more equitable future in STEM education.

Additionally, women face challenges in job hiring, which affects their choice of STEM courses (*Gender Disparities in STEM: What You Need To Know*, 2019). Even with excellent performance in STEM education, women are often overlooked, showing gender-based stereotypes in hiring. This disparity is prominent in STEM fields like physical sciences, computer science, math, and engineering (*Gender Disparities in STEM: What You Need To Know*, 2019). Furthermore, students' personalities and perceptions influence their choice of STEM courses during enrollment (Ihsen, Höhle, & Baldin, 2013; Ertl, Luttenberger, & Paechter, 2014). Women's enrollment in STEM is affected by personal attitudes and characteristics. Unfortunately, male STEM students show higher motivation, leading to fewer women pursuing math and feeling excluded (Else-Quest, Hyde, & Linn, 2010). These practices uphold stereotypes and discrimination against women in STEM, hindering gender

equality. Efforts are crucial to combat biases and create a supportive environment, encouraging all students, regardless of gender, to pursue their interests and talents in STEM.

Literature Review

Promoting gender equality in STEM Education needs active involvement from educational agencies and stakeholders. As the first teachers, parents can influence their children's mindsets, sparking an early interest in STEM Education and preparing them for higher education. Essential education agencies are crucial in making STEM Education inclusive for both boys and girls. Creating a supportive and inclusive learning environment challenges stereotypes and discrimination. Changing these mindsets is a gradual process unfolding over developmental stages (Watt, Eccles, & Durik, 2006; Lent & Brown, 2019; Turner, Joeng, Sims, Dade, & Reid, 2019). Encouraging young learners to love STEM Education requires efforts from parents, educators, and society. By working together to offer equal opportunities and support for all students, regardless of gender, we can pave the way for a more fair and diverse future in STEM.

Cultural beliefs held by parents contribute significantly to stereotyping and discrimination in STEM Education choices. These trainings should also highlight the benefits of pursuing STEM Education for young men and women. By emphasizing equal opportunities and potential success in STEM fields, young learners can be motivated without gender bias (Eccles & Wang, 2016). Both home and school environments are crucial in changing stereotyping concepts about STEM Education. Parents can instill gender equality values at home, while teachers reinforce these principles and support young learners in pursuing STEM fields.

Meaningful change requires addressing and challenging negative concepts within schools and among stakeholders. A more inclusive approach and promoting gender equality in STEM Education will empower young women to enroll and thrive (Eccles & Wang, 2016). Working together to create a welcoming atmosphere can increase the number of young women in STEM and contribute to a diverse and equitable future in these fields. Addressing this concern necessitates providing gender sensitivity training for parents. Teachers can lead these sessions to educate parents, challenge cultural beliefs, and reshape perceptions. This approach seeks to eliminate stereotyping concepts, promoting a more inclusive learning environment (Eccles & Wang, 2016).

Parents hold considerable sway over their daughters' career decisions, including choices related to STEM Education (Ertl, 2010). Therefore, schools must promote gender equality, especially in STEM subjects. Incorporating gender-sensitive practices can inspire young women to pursue STEM careers, helping them overcome discrimination, self-concept issues, and stereotypical beliefs (Ertl, Luttenberger & Paechter, 2017).

Teaching methods should embrace experiential learning and role modeling, showcasing the success stories of STEM graduates (Ertl, Luttenberger & Paechter, 2017). Establishing a gender-sensitive classroom aligned with STEM Education sets the stage for a brighter future for all students (Ertl, ed., 2010). Research suggests that the school environment has a more significant impact on influencing career choices than the home environment (Dresel, Schober, & Ziegler, 2007).

Schools and homes may have different cultural beliefs, but by forming a partnership with a shared vision to change young learners' mindsets regarding gender equality in STEM Education, both parents and teachers can play crucial roles in this transformative process (Dresel, Schober, & Ziegler, 2007). Collaborative efforts can create a supportive and inclusive atmosphere, empowering young women to pursue their interests in STEM fields and contributing to a more diverse and equitable future.

Moreover, for gender equality in STEM Education, it's crucial to boost the enrollment of young men and women in various industries and agencies. To achieve hiring processes, we must actively prioritize diversity and inclusivity, ensuring STEM careers offer equal employment opportunities (Paechter, Luttenberger, & Ertl, 2020). By taking these steps, we can progress toward eradicating gender inequality in the STEM Education profession (Paechter, Luttenberger, & Ertl, 2020).

It is vital to recognize that girls often start feeling uneasy about STEM subjects in their early education, recognizing that girls usually begin feeling anxious about STEM subjects in their early education (Paechter, Luttenberger, & Ertl, 2020). School Practices, especially during primary basic education, may contribute to this unease through stereotyping. Some teachers might unintentionally emphasize boys' better performance in STEM, suggesting that girls lag. This perception can make girls hesitant to engage with STEM subjects. To address this, teachers play a crucial role in creating a positive learning environment. Educators can inspire girls to love STEM subjects through effective and inclusive teaching methods. Educators can encourage girls to love STEM subjects through effective and inclusive teaching method through effective and inclusive teaching methods, educators can inspire girls to love STEM subjects, boosting their confidence and interest (Paechter, Luttenberger, & Ertl, 2020). Encouraging girls to embrace STEM subjects from a young age can dismantle barriers and empower them to pursue STEM Education with enthusiasm and determination.

Teachers are crucial in guiding young women toward choosing STEM for their higher education. Acting as supportive guidance counselors, they should specifically encourage girls to consider STEM Education as a rewarding and fulfilling career choice. Nurturing the intellectual potential of young girls is essential for fostering a positive outlook on learning STEM subjects to the fullest (Paechter, Luttenberger, & Ertl, 2020).

Particular attention is needed in math subjects, where girls are often unfairly perceived as inferior to boys. Despite their ability to excel in math, stereotyping concepts can undermine their confidence and motivation to learn (Lazarides & Lauermann, 2019). This may lead to lower grades in math, limiting opportunities for higher education in STEM curricula (Lazarides & Lauermann, 2019). These barriers hinder them from pursuing their interests and passions in STEM Education (Lazarides & Lauermann, 2019).

To overcome these challenges, teachers must actively work to dismantle stereotypes and biases contributing to gender disparities in math and other STEM subjects. Teachers can help young women develop confidence and break free from societal expectations by providing a supportive and empowering learning environment. Teachers can help young women build confidence and break free from societal expectations by providing a supportive and empowering learning environment. Teachers can help young women develop confidence and break free from societal expectations by providing a supportive and empowering learning environment. Teachers can help young women build confidence and break free from societal expectations by providing a supportive and empowering learning environment. Teachers can

help young women develop confidence and break free from societal expectations. Encouraging girls to embrace STEM subjects based on their capabilities and interests can pave the way for greater gender equality and diversity in STEM fields.

Another aspect of stereotyping involves the belief that boys are better at math while girls excel in language areas. It's essential to challenge and change these ideas. Gender equality should be in all areas, including academic performance. Teachers play a significant role in shaping the minds of both boys and girls, promoting the idea that math and language abilities are equal for everyone (Lazarides & Lauermann, 2019).

Starting in early education, teachers should share information and explain that math is for everyone, regardless of nation, and that math is for everyone, regardless of gender. They should highlight across the curriculum that learning math can be enjoyable and fun, dispelling fears or apprehensions. Inclusive activities should show gender equality in future careers, especially emphasizing the benefits and usefulness of STEM Education worldwide. It is crucial to implement gender equality in enrollment processes. Cultivating an inclusive environment in STEM Education can generate enduring work opportunities for women, contributing to the battle against poverty. When preparing career plans for young learners, teaching math and promoting it as a favorite domain for girls should be a vital part of the process (Lazarides & Lauermann, 2019). By breaking down gender stereotypes and empowering all students to pursue their interests without bias, we can shape a more fair and diverse future for STEM Education and beyond.

Gender Equality Is Essential in STEM Education

Gender inequality remains in science, technology, engineering, and mathematics (STEM) education despite various strategies. Girls encounter obstacles that limit their access to opportunities and preferred courses (New UNESCO report on gender inequality in STEM education, 2017). Consequently, their income stability is affected by gender inequality impacting their careers (New UNESCO report on gender inequality in STEM education, 2017).

The Status of Girls in STEM Education

Young women face substantial obstacles in enrolling in STEM Education due to gender inequality. Stereotypes and biased approaches toward students have played a role in creating this disparity. For example, during enrollment, priority is often given to young men, limiting opportunities for young women. Even those excelling in STEM subjects encounter gender disparity in choosing STEM careers due to biases and stereotypes (New UNESCO report on gender inequality in STEM education, 2017).

To tackle this issue, it's crucial to recommend policies that change the enrollment process in STEM Education. We need inclusive policies to encourage and support young women's enrollment in STEM and provide equal job opportunities in industries and educational agencies. By implementing these policies into action, we can strive for a fairer and more diverse future in STEM, empowering young women to pursue their interests and talents in these fields.

The Obstacles or Challenges

The enrollment of girls in STEM Education is a concern shared by many countries. Girls often have limited educational pathways, especially in the classroom, leading to gender disparity in STEM subjects (New UNESCO report on gender inequality in STEM education, 2017). This results in more male students receiving quality education while women remain underrepresented in STEM fields. It's crucial to address this issue to achieve gender equality in STEM subjects, offering both men and women equal opportunities for personal and professional growth.

The existing gender disparity has caused a loss of interest among girls to lose interest in STEM subjects. This disparity is noticeable from early to secondary education, where gender gaps persist in math and science (New UNESCO report on gender inequality in STEM education, 2017). As a result, many women abandon their pursuit of STEM subjects at higher education levels. This leads to fewer opportunities for women when applying for sustainable jobs, as many industries prioritize expertise and experience in STEM Education careers (New UNESCO Report on gender inequality in STEM Education, 2017).

To create a more equitable future, it's crucial to implement policies and practices fostering gender equality in STEM Education. By providing equal opportunities and support for girls in their STEM studies, we can empower them to pursue fulfilling careers and contribute to diverse and thriving STEM industries.

Negative Stereotypes Associated With Girls

Negative stereotypes about girls develop through the human development process, starting from birth and evolving through social interactions as a child grows. For example, suppose a mother tells her daughter that math is difficult and meant only for boys who excel in it. In that case if a mother tells her daughter that math is difficult and meant only for boys who excel in it, negative thoughts can take root in the child's mind (New UNESCO report on gender inequality in STEM education, 2017). Cultural beliefs and family norms also play a significant role in shaping a child's negative stereotypes.

Family practices and influences continue to contribute to a child's mindset throughout the human development stages. When a child starts school, teachers influential in shaping their concepts and beliefs. Interactions with friends and the broader community further influence young learners' attitudes, even affecting family dynamics at home (New UNESCO report on gender inequality in STEM education, 2017). Home, school, and community learning environments The learning environments of home, school, and community collectively contribute to young learners' negative stereotype thoughts, impacting their career choices (New UNESCO report on gender inequality in STEM education, 2017).

Unfortunately, suppose parents, family members, and teachers and family members, as well as teachers, continually emphasize that STEM subjects are only for males. In that case, if parents, family members, and teachers and family members, as well as teachers, continually emphasize that STEM subjects are only for males, girls may develop apprehensions and fear towards math, feeling inferior to boys in STEM subjects (New UNESCO report on gender inequality in STEM education, 2017). Addressing these negative stereotypes and biases is crucial to creating an inclusive and supportive environment that encourages girls to explore and excel in STEM fields without limitations or biases.

Societal Constructs That Define Gender Roles and Norms

Educational agencies have a crucial role in boosting girls' self-confidence, courage, and interest in becoming passionate learners of STEM subjects. Schools, in particular, bear significant responsibility in incorporating empowerment concepts for girls in STEM into their curriculum. This helps in creating an environment that not only encourages but also supports girls in pursuing STEM Education. This includes promoting gender equality in job opportunities and highlighting the benefits of STEM careers. To achieve this, educational agencies must adopt policies ensuring equal access for girls and women to STEM careers, facilitating their journey to decent work opportunities through STEM fields. Gender equality in STEM subjects should be integrated throughout the entire educational journey, starting from early childhood education and continuing through higher education. Collaboration between schools and stakeholders is vital to creating and implementing policies promoting gender equality in STEM Education (New UNESCO Report on gender inequality in STEM Education, 2017).

Fields Related to Science, Technology, Engineering, and Mathematics (STEM)

The sustainability of STEM subjects can significantly contribute to a country's international competitiveness. STEM Education curriculum equips learners to be critical thinkers, collaborators, and problem solvers (Reinking, & Martin, 2018). However, gender inequalities persist in students' career choices in STEM, both in higher education and the workplace ((Reinking, & Martin, 2018. The hiring of faculty in higher education also exhibits gender disparities, with women having fewer opportunities to teach in computer science, mathematics, engineering, and physical sciences (Girls, Inc., 2016).

Professionals in STEM Education also experience gender gaps in motivational strategies. For instance, males are more likely to receive extrinsic motivation in STEM-related subjects, while females receive it in other areas (Burton, 1986). These disparities are influenced by external factors, such as parents, teachers, and societal expectations, which contribute to gendered socialization (Leaper, 2014). Generations of women have not been encouraged to pursue STEM interests, perpetuating this pattern (Reinking, & Martin, 2018). To create a more equitable future, it is essential to address these gender biases and encourage all individuals to explore their interests and passions in STEM subjects. By promoting diversity and inclusivity in STEM Education, we can foster a thriving and innovative environment that benefits society as a whole.

Achieving a Balance Between Genders

Gender differences in STEM, particularly in mathematics, have been observed as early as in early childhood education (Knowledge into action research briefing: LOOKING AT GENDER BALANCE IN STEM SUBJECTS AT SCHOOL, 2015). This highlights the significance of instilling an interest in STEM subjects from a very young age, considering the impact of social learning experiences (Knowledge into Action research briefing: LOOKING AT GENDER BALANCE IN STEM SUBJECTS AT SCHOOL, 2015). Unfortunately, girls in early childhood education tend to perceive science and technology subjects as not suitable for them [28]. Therefore, it is crucial to recognize and promote gender equality in STEM during the early years of children to positively influence young girls' engagement in sciences (Knowledge into action research briefing: LOOKING AT GENDER BALANCE IN STEM SUBJECTS AT SCHOOL, 2015).

Families, teachers, and workers are challenged to introduce innovative approaches that encourage women to develop a passion for STEM careers even during their childhood education (Knowledge into Action research briefing: LOOKING AT GENDER BALANCE IN STEM SUBJECTS AT SCHOOL,2015). Despite equal or even better performance in science and STEM subjects, girls often lack self-efficacy or confidence in their abilities (Knowledge into Action research briefing: LOOKING AT GENDER BALANCE IN STEM SUBJECTS AT SCHOOL,2015). Addressing this issue early on can help build girls' self-confidence and enthusiasm in STEM fields, leading to a more balanced and diverse representation in these areas.

The Perspective From a Cultural Standpoint

To understand gender inequality in STEM Education (Miner, Walker, Bergman, Jean, Carter-Sowell, January, & Kaunas, 2018), a variety of perspectives are required. Analyzing gender disparities in STEM is challenging, as they are intertwined with societal structures, procedures, and concepts related to gender (Katsuhiko Yoshikawa Akiko Kokubo and Chia-Huei Wu, 2018). Academic researchers across science and technology fields have observed that women's representation diminishes significantly in the higher echelons of organizational hierarchies, with slower career progression compared to men (EPMEWSE,2016). This disparity becomes more pronounced as women move into their 50s, resulting in lower salaries and limited opportunities in both industry and academic institutions (EPMEWSE,2016).

The attitudes of elders also impact students in STEM Education (Muramatsu, Kawano, Nakazawa, Fujiwara, & Takahashi, 2004). Female students who have completed their STEM education often encounter difficulties in continuing their STEM careers due to household chores and other domestic responsibilities. Culturally, women are often perceived as caregivers for their families (Katsuhiko Yoshikawa Akiko Kokubo and Chia-Huei Wu, 2018).

To address gender inequality in STEM, a comprehensive approach is necessary, taking into account the multifaceted factors contributing to the issue. By promoting equal opportunities, challenging cultural norms, and supporting work-life balance, we can create an environment that fosters diversity and inclusivity in STEM fields, empowering women to pursue and thrive in their STEM careers.

The Perspective From a Feminist Standpoint

The issue of STEM education and careers for girls and women is a global problem, with substantial disparities observed across different regions. Limited access to education due to cultural and ethnic discrimination based on sex, color, and functionality remains a significant challenge (Hussénius,2020). Biases suggesting that men possess a higher innate talent for certain subjects compared to women persist in various disciplines, including physics, mathematics, engineering, computer science, and even philosophy, albeit to varying degrees in each field (Leslie, Cimpian, Meyer, &Edward, 2015).

In the context of STEM education, the way content is taught often conveys an implicit message about who the discipline is intended for and who can access it (Lemke, Jay. 1990). Feminist philosophers have long criticized the cultural expression and power dynamics within natural sciences, highlighting an imbalance of power characterized by masculine

gender coding that persists at both structural and symbolic levels in STEM education (Harding, 1986 & Stengers, 2018). These inequalities are deeply rooted and have historical origins, perpetuating gender disparities within STEM education (Archer, DeWitt, Osborne, Dillon, Beatrice Willis, & Wong. 2012; Scantlebury, 2014).

Various insights suggest that the root causes of gender inequality in STEM Education can be traced back to early childhood education. Home environments, schools, and communities significantly influence children's mindsets at an early stage of their development. Social learning during human development sheds light on the different conditions that exist for participation in STEM education (Hussénus, 2020).

Addressing gender inequality in STEM Education requires a comprehensive approach, involving systemic changes, cultural shifts, and inclusive policies to provide equal opportunities and support for girls and women pursuing STEM careers. By challenging biases and fostering an environment that empowers all individuals to pursue their interests in STEM, we can work towards achieving greater gender equality in these fields.

Methodology

This study adopts a qualitative approach utilizing content analysis, employing three different methods: conventional, directed, and summative. These approaches are utilized to analyze data by anchoring the concepts to the paradigmatic meaning. The data analysis process employs common themes through coding (Reinking, & Martin, 2018). The insights gathered from literature reviews, related to the causes of gender inequality in STEM Education, are collected and categorized using thematic analysis.

Findings and Discussions

Based on a thorough review of the literature using qualitative content and thematic analysis, the following findings on the causes of gender inequality in STEM Education have been identified:

1. One of the primary causes of gender inequality in STEM Education originates from early childhood education. The home environment, schools, and communities during a child's early stages significantly influence their mindset. Social learning during human development sheds light on the various conditions that exist for participation in STEM education.
2. Attitudes of elders have an impact on students in STEM Education. Female students who have completed education in STEM fields encounter challenges in continuing their STEM careers due to household chores and other home responsibilities. Culturally, women are often perceived as caregivers for their families.
3. Gender differences in STEM, particularly in mathematics, have been observed during early childhood education. This implies that cultivating an interest in STEM among early learners should commence at a very young age, given the influence of social learning experiences. Girls in childhood education tend to perceive science and technology subjects as not suitable for them.

4. The upbringing of children affects the perceptions of girls and women that STEM subjects are predominantly for males. Consequently, female students may feel inferior to males in the performance of STEM Education.

5. Families, teachers, and workers face the challenge of devising innovative ways to encourage women to develop a passion for STEM careers as early as during childhood education. Despite equal or even superior performance to boys, girls often lack self-efficacy or confidence in their own abilities in science and STEM subjects.

6. Educational agencies hold the potential to effect change and assist girls in enhancing their self-confidence, courage, and interest in becoming passionate learners of STEM subjects. Schools have a significant responsibility to incorporate empowerment concepts for girls in STEM into their curriculum, as well as empowering them with job opportunities and benefits of STEM Education.

Policy Recommendations to Close the Gender Gap in STEM Education

The policy recommendation is a solution to solve the gender gap in STEM Education. This policy is about the integration of gender equality in STEM subjects in early childhood education. Another policy recommendation is for the parents' information drive on the proper upbringing of their children on gender equality in STEM subjects. There would also be policy for teachers to integrate the concepts of gender equality of STEM Education in the curriculum and instruction.

Conclusion

Based on the content and thematic analysis of literature reviews related to the causes of gender inequality in STEM Education, it has been determined that the primary cause of this inequality stems from early childhood education. The home environment, including parental upbringing and family interactions, particularly in cultural beliefs and norms, significantly influence children's mindsets. Parents often perceive STEM subjects as exclusively for males, while females are encouraged to pursue other related subjects, such as language areas. Teachers play a pivotal role as partners with parents in promoting gender equality in STEM Education. Integrating gender equality in STEM with other related subject areas becomes a strategic approach to teaching students.

Addressing gender stereotyping and biases in STEM Education is crucial from early childhood through adolescence. Implementing a Gender Sensitization Program during this period can help increase the enrollment of young women in STEM Education. By instilling a sense of gender equality and challenging stereotypes at an early age, we can pave the way for more girls to pursue and thrive in STEM fields.

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Teaching and Learning in the Post-pandemic Context: The Teaching Perspective on the Use of Information and Communication Technology

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Abstract

The COVID-19 pandemic has precipitated an abrupt and unprecedented shift in the field of education. This subject demands thoughtful contemplation in the current moment, particularly concerning the future prospects stemming from these novel experiences. Therefore, the objective of this study is to analyze the implications of the use of ICT (Information and Communication Technologies) experienced by teachers during the emergency period of the pandemic on their teaching practice in face-to-face education. A qualitative approach was adopted, characterized by its descriptive nature, utilizing a field research methodology comprising semi-structured interviews conducted with seven educators from a public Brazilian institution specializing in professional, scientific, and technological education. The research findings indicate significant innovations in the dissemination of content, enhancements in the utilization of institutional mediation systems, integration of novel collaborative educational technologies, and an upsurge in the utilization of open educational resources (OER). At the micro level, the narratives unveiled fresh pedagogical practices and perspectives regarding ICT, alongside considerations for its continued integration into face-to-face instruction. Furthermore, the study highlights uncertainties pertaining to the future of education and the sociocultural implications arising from the digital culture.

Keywords: Information and Communication Technology, Professional Education, Online Teaching, COVID-19

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Introduction

In the era of connectivity, when everything is interconnected with cybernetic networks, the speed of transformations has turned the world digital. Many technologies duplicate very quickly due to digitization (Cabero-Almenara et al., 2021), and information and communication technologies (ICT), especially the digital aspects, are now a label in the knowledge society. Its massive use creates new scenarios for social, political, cultural, and educational performance, changing the context in which teachers and students work through the mutual construction of knowledge and sociocultural practices, which give rise to new educational formats, with no distinction of time or space (Fernández & Pérez, 2018).

As a result of the role that ICTs have played in all dimensions of society, in the educational context, it becomes relevant to interconnect them with the processes of cultural and social transformation created around their use (Villarreal-Vila et al., 2019). This scenario also brings new aspects to teachers' skills. Currently, it is addressed the development of teaching digital competences, a transversal competence that mobilizes skills for the critical and adequate use of information to transform it into knowledge, while responsibly using different technological and digital supports to inform oneself, learn and communicate in different scenarios and to incorporate ICT, in a technical, didactic and methodological way, in the educational context (Cabero-Almenara et al., 2021; Flores-Lueg & Roig-Vila, 2019).

The global health crisis caused by COVID-19 has brought the world unprecedented challenges. Faced with the impossibility of face-to-face interactions, educational institutions found themselves amid the task of abruptly adapting and transforming their practices. The challenge has become even greater in professional training institutions, where work practice is the object of teaching. From an optional insertion, in many systems and levels of education, the use of ICT was intensive and compulsory.

The academic literature presents studies in the educational context and the use of ICT during this emergency period. Singh and Meena (2022), for example, analyzed the difficulties and challenges faced by higher education teachers and students in India during the period of exclusively virtual teaching. Soto et al. (2022) assessed the digital skills of higher education teachers in Peru. While Diz-Otero et al. (2022) and Prieto-Ballester et al. (2021) classified such teaching skills in high school. However, it is noticed that there is a lack of publications in the field of Brazilian professional education related to the use of ICT and post-pandemic perspectives, and studies of an interpretive nature.

The experience of this period brings new learning, perceptions about the experiences, looks to the future, questions, and epistemological reflections on the role of ICT in education. It is these concerns that motivated the problematization of this article, expressed through the following research question: What are the implications of the use of ICT by teachers, during the emergency period of the pandemic, to teaching practice in face-to-face teaching? The context of analysis was that of Brazilian public professional education, with field research carried out with professors who teach in face-to-face teaching and who have worked in the online model mediated by ICT since the beginning of the pandemics.

The Role of ICT in Education

The term Information and Communication Technology (ICT) consists of a set of technical means, whether by wire, cable or wireless, that handles information and enables

communication. This term is usually used to address electronic and technological devices, including computer, internet, tablet, and smartphone, as well as other earlier devices, such as television and newspaper (Costa, Duqueviz & Pedroza, 2015).

Digital Information and Communication Technologies (DICT) refer to any electronic equipment that, when connected to the internet, can expand the possibilities of communication between users (Valente, 2013). Today, its dissemination has gained strength due to the current digital transformation of society. For the present study, the term ICT will be used because it encompasses, in a more global way, more than only digital technologies.

The occurrence of the COVID-19 pandemic accelerated the processes of digital transformation and, in many cases, highlighted social inequalities (Pacheco, Santos & Wahrhaftig, 2020). In the education field specifically, it increased the need to introduce ICT in teaching practices and the development of specific skills (Cabero-Almenara & Valencia, 2021).

Although the sudden shift from face-to-face teaching to the remote model was triggered by the pandemic and compulsory confinement, this fact is not a phenomenon that causes the disruption of models. In recent decades, the complexity of humanity's problems, the characteristics of the digital society, digital disruption, and the necessary organizational restructuring of all sectors (Pacheco, Santos & Wahrhaftig, 2020) were already pointing to new teaching-learning models. The changes in the transition from the knowledge society to the digital one has consequences for education and bring new learning contexts.

Pacheco, Santos and Wahrhaftig (2020) state that meeting the demands of the digital society entails new looks at the organizational and curricular structures of educational institutions. They also pay attention to an inversion of the model focused on teacher-student interaction, towards a model with student-centricity. There is a paradigm shift in teaching activities, which moves from being a content transmitter to a guide and mediator of student learning (López et al., 2020), becoming a central figure for training students in the critical and reflective use of ICT (Guillén-Gámez & Mayorga-Fernández, 2020).

When studying the mobilizing variables for the development of teaching digital skills, Cabero-Almenara et al. (2020) identified as major variables: i) teacher training, degree of knowledge and work experience; ii) the infrastructure and availability of digital technologies; iii) the time of use of ICT, inside and outside the room; iv) time available to prepare lessons; and v) the teacher's attitudes and beliefs in relation to the possibilities offered by ICT.

References in the literature accredit the importance of the ongoing process of teacher training for the use of ICT (Amhag, Hellström & Stigmar, 2019; Domingo-Coscolla et al., 2020; Dominguez et al., 2020; Gomez, 2017; Lopez et al., 2020), as well as the provision of technological and pedagogical support (Amhag; Hellström & Stigmar, 2019). The incorporation of ICT in the teaching-learning process implies reflections that range from the analysis of the technology itself to, at a deeper level, the epistemological models involved (Flores-Lueg and Roig-Vila, 2019).

The applicability of ICT integrates other types of knowledge, as shown by the studies by Mishra and Koehler (2006), who developed the Technological Pedagogical Content Knowledge (TPCK) framework for interactional understanding between content, pedagogy, and technology. In the conception of Mishra and Koehler (2006), technology cannot be treated

disconnected from the content to be addressed and the teaching-learning method, as they are central aspects of an educational model (figure 1).



Figure 1 – TPACK Model
Source: Mishra and Koehler (2006)

Mishra and Koehler's (2006) approach brings specific constructs (content, technology and pedagogy) and emphasizes the possible relationships between knowledge, namely: technological content knowledge (reciprocal relationships between technology and content), and pedagogical technological knowledge (knowledge of the existence of technological resources for certain teaching-learning configurations) and, integration - pedagogical technological knowledge of content (TCPK), which emerges from the interconnection between the three constructs.

Method

The present paper is classified as a qualitative and interpretive research, whose central point is to capture and understand the point of view of those surveyed, that is, the meaning attributed (Creswell & Creswell, 2021), which will identify the learning of teachers resulting from experiences with the use of ICT in didactic-pedagogical practices, during the period of the COVID-19 pandemic, which can be applied in face-to-face teaching.

Data were collected from September to November 2021, with prior and voluntary consent, signed in a document that clarified the research objectives and respective ethical procedures. The respondents were seven professors from a Campus of professional, scientific, and technological education in the Brazilian public educational system, selected according to accessibility (Creswell & Creswell 2021). This unit offers integrated technical courses in Administration and Information Technology (professional training at high school level), subsequent technical courses in Lodging and Tour Guides (post-medium level training), technical courses in Environmental Management (higher level), in addition to initial and continuing training (extracurricular). During the pandemic period, the institution adopted the term non-face-to-face teaching to designate the teaching-learning activities developed during the pandemic period. This expression will be used throughout this study.

The following criteria were established for choosing professors: i) to have been part of the institution's permanent staff for at least two years; ii) teach on-site technical or technological courses (when outside the pandemic); and iii) having acted remotely, since the beginning of the pandemic crisis. Considering that it is a Campus with a great diversity of backgrounds among professors, however, with a small number per area of education, and for reasons of accessibility, it was not possible to select only professors who worked in the same area of knowledge. The Campus operated in virtual mode from March 2020 until the closing of this research (January 2022).

As a data collection technique, a semi-structured interview was used, which provided flexibility for inserting or reformulating questions (Flick, 2009), through interactions with the respondent. The interviews took place remotely, via Google Meet, with recording of the session, with the consent of the respondent. A free participation consent form was agreed with each participant. The preliminary interview script contained questions regarding perceptions about the understanding of ICT and its application for learning, methods and ICT tools applied during the pandemic and before the pandemic, mediation system employed, possibilities of adoption in face-to-face teaching and learning with the application of ICT during the period.

Seven teachers were interviewed. To ensure anonymity, a code was assigned to each of the educators (Table 1). In order not to make a gender distinction, they were all called respondent, teacher or investigated, without distinction. Of these, three teachers (A, B and C) have similar backgrounds – Literature, while the others have backgrounds in Agronomy, Administration, Social Sciences and Sociology, and History. The levels of education at which they operate are similar, ranging from integrated technical courses, subsequent technical courses (post-medium level training), technologist courses and initial and continuous training. Among those surveyed, only teacher F had previous experience in online education.

Respondent	Education	Teaching experience	Level of education
A	Literature Portuguese/English	27 years	Integrated and subsequent technician
B	Social Sciences and Sociology	10 years	Integrated technician
C	Literature Spanish	21 years	Integrated technician and Technologist
D	Agronomy	15 years	Technologist and subsequent technician
E	Literature English	17 years	Integrated technician, Technologist, and Initial and continuing education
F	Administration	13 years	Integrated technician, Technologist, and subsequent technician
G	History	10 years	Technologist and subsequent technician

Table 1 – Characterization of respondents

Fonte: Collected data (2021).

Each interview lasted 29 minutes on average. Data analysis was based on the Thematic Analysis technique by Braun and Clark (2011), inductively and deductively and at a semantic level. After transcribing the interviews, with the support of the Atlas Ti® software, the coding proceeded, observing the semantic contents derived from the research questions and latent data that emerged from the reports of the respondents. In the end, the definition and naming of themes resulted in five macro themes analyzed, namely: i) understanding and perception of

ICT in education, ii) adoption of ICT before and during the pandemic, iii) challenges, and iv) learning and implications for face-to-face teaching.

Results

In this section, the results are presented, subdivided according to the themes identified by the thematic analysis.

Understanding and Perception of ICT in Education

In general, the respondents say ICTs are devices, systems, software, and platforms applicable in the teaching-learning process. Regarding its importance in education, there is unanimity as to its relevance. teacher F perceives a movement that arises not only because of the pandemic, but also because of globalization and the existence of new generations, which are digital natives (Feixa & Leccardi, 2010). In the report of respondent E, such an application is something that currently permeates both the bureaucratic part of teaching, since processes, such as the class diary, for example, were fully digitized, as well as the teaching-learning process itself.

The reflection of ICT in education brought to respondents A, B, C and E notes referring to digital culture and the cognitive changes that digital technologies have been causing in individuals. In this scope, issues considered new and that enter the school environment were also cited, such as, for example, social networks and cyberbullying, especially with adolescent students, as attested by the investigated E: “How do we deal with this? We don't know, because we are also learning while it is happening”. Investigated C considers that ICT are also changing the perception of space, time, and accessibility to information. In this sense, the narratives of respondents C and E bring a new attribution to the teacher, which is to help students in the criticality and discernment of information that is valuable for the development of their intellect.

It was identified, in the statements of respondent A, the importance of the use of ICT associated with the area of professional technical training of the student, as well as the pedagogical practices of the teacher. This refers to the TPCK model by Mishra and Koehler (2006), that is, it makes an association with pedagogical issues and content mastery. The use of ICT, whether at a distance or in face-to-face teaching, needs to be rethought within the scope of professional education to have a meaning for the student, considered this investigated. As an English teacher, investigated A still suggests that ICT be found capable of enabling the student to create and understand discursive genres that will be part of their world of work. A similar concern integrates the thinking of teacher C: “it is no use for us to think that, now, as digital resources for education, it will be much better, it will not be, if your idea of education is traditional”, weaving some review of the technological application devoid of pedagogical changes.

The challenges related to pedagogical technological knowledge (TPK) (Mishra & Koehler, 2006) were commented on by respondents D and G, who work with practices that involve the areas of food production and tourism guiding, respectively. The difficulty of finding virtual laboratories, suitable applications, and designing classes with video recordings were identified as barriers faced in the adaptation of practical and technical content, previously taught exclusively in on site models.

Regarding training, during the period, the Institution scheduled lectures in the live system, dealing with these topics: strategies for carrying out non-face-to-face activities; mini workshops on creating videos, creating podcasts and longer courses, with technical support for

adapting content to non-face-to-face teaching. These trainings were promoted by a unit of the network specialized in distance education, whose membership was voluntary. A repository in the virtual learning environment MOODLE (Modular Object-Oriented Dynamic Learning Environment) was also created to share different practices, including the most advanced use of the institutional mediation system (Integrated System), class recording techniques, among other relevant subjects. Four respondents participated in internal training, and teachers D and E also took external courses. Of the respondents, only one did not participate in training.

Adoption of ICT Before and During the Pandemics

This analysis was subdivided into two subtopics: i) ICT for teaching-learning mediation and ii) ICT tools for teaching practice. Regarding the mediation of learning, all respondents reported using the institution's standard software, here called the integrated system (IS). Although the IS has unanimous application – as it is an official instrument, for respondents B and F, MOODLE, when compared in terms of resources, interactivity and visual, is superior to the IS. In contrast, respondent C was the only one who had a different perception of MOODLE. In her understanding, this resource is also outdated and far from the configuration of virtual environments accessed by students in their daily activities.

Respondents A, B, G and E reported the adoption of open educational resources (OER) such as, for example, videos, texts, and music – a routine that was already part of the face-to-face mode of operation. Although for certain areas there is an abundance of materials, such as videos on platforms such as YouTube, investigated E reported that many do not meet the pedagogical needs, which requires great dedication of time to analyze the contents, verify their feasibility to make them available to the student. His intention with curating OER is to encourage greater autonomy in student learning.

In the case of ICT tools applied in teaching-learning, Google Meet was the most cited by all respondents for holding synchronous meetings with students. Such adherence may be linked to the fact that the Institution uses the Google package for electronic communications, and this, at the time of the interview, allowed the recording of synchronous classes.

The other ICTs are quite varied (Table 2), including gamification applications, interactive whiteboards (Jamboard & Padlet) used in asynchronous and synchronous moments, exclusive social networks (Discord), platforms for creating videos (Flip Grid). One of the characteristics of the ICT tools adopted is the possibility of being used by different areas of knowledge. For respondent E, such tools emulate virtual environments that students are already used to using, indicating the possibility of transposition to the formal learning environment.

1. <i>Discord</i> (1)	9. <i>HP5C – MOODLE</i> (1)
2. <i>Flip Grid</i> (1)	10. <i>Jamboard</i> (1)
3. <i>Google forms</i> (3)	11. <i>Kahoot</i> (1)
4. <i>Google drive</i> (2)	12. <i>Libre CAD</i> (1)
5. <i>Google Earth Pro</i> (1)	13. <i>Mentimeter</i> (1)
6. <i>Google keep</i> (1)	14. <i>Padlet</i> (4)
7. <i>Google meet</i> (7)	15. <i>Windows Board</i> (1)
8. <i>Google agenda</i> (1)	16. <i>WhastApp</i> (7)

Table 2 – ICT tools adopted by teachers and citation frequency
Source: Survey data (2021).

Challenges

One of the themes that emerged as a challenge was the generational adaptation and engagement of students, especially teenagers, with the format of virtual classes. Three professors pointed out the lack that this method brings to socialization among them, from which learning also derives. They also point out the need for the student to have a more autonomous profile and attentive to the progression of their studies, a characteristic not yet shared by all of them.

Teachers A, B, C and E reported a concern with the lack of active participation by students in synchronous online classes. For respondent A, even if ICT tools enable interaction, not all students, for example, open the camera and there is no possibility of such a requirement, due to the different social realities of students. Moreover, in his perception, non-face-to-face teaching requires greater individuality from the student in the progression of his own learning. A similar report is shared by respondent B who, throughout the pandemic, after ongoing improvements in lesson planning, achieved greater student engagement in synchronous classes. He considers that such a result derives, also, from a synergistic effort of the pedagogical and course coordinators in the individual interaction with the students. Respondent A reported that the online learning Campus, belonging to the network, also provided important support to teachers during this period.

Another point that is also related to the engagement of academics was mentioned by respondent C and which refers to the difficulty of delineating a profile of the class at the beginning of the disciplines. The teacher compares that, in face-to-face interaction, this process is easier and closer. He points out that, in a possibility of hybrid teaching, an initial face-to-face meeting is strategic. As for teachers A and E, one of the measures applied to alleviate this barrier was the adoption of questionnaires to outline the student profile and expectations and initial presentation activities, using the creation of videos by students or interactive and collaborative panels.

From the analysis, access to ICT and scarce investments by the Institution also emerged as a challenge. Respondents D and E pointed out that, during this period, they discovered convenient technological solutions for the needs of their disciplines and student learning, however, free access is restricted to some experiments or is completely paid for, which prevents them from innovating some practices. Teacher E also pointed out that the available resources fall short of technological progress and that this can impact on a delay in the students' own cognitive development. In his words (author's translation):

It is rare to have a platform like this, which involves state-of-the-art technology and is free of charge. So, we will always stay there on the bank. In that sense, we are always a little behind. We do what we can, as education professionals, we go after every platform we can use.

Respondent E mentioned, as an example, the use of virtual reality, something that he perceives as being difficult to achieve in the short term, "while other international schools are already using it, since 2017".

Lessons and Implications for Face-to-Face Teaching

The pandemic, in the perception of respondent F, brought a change without return, with innovations in countless areas, not being different in education. ICTs *"have shown themselves*

to be potent, they have shown potential, and the adequacy is up to us, because we cannot simply go back to face-to-face, to our normality of face-to-face presence and forget all that, we will need to add”, he informed. For the teacher, the great lesson will be to consider digital culture in face-to-face teaching and proceed with the adoption of ICTs so that they can be used by society to produce value.

One of the respondents (E) stated that hybrid learning will be a new reality and that attention should be paid to the issue of socialization, especially with the public of adolescent students who live a unique period, due to their age group. Teacher B, on the other hand, considers that the change is not focused on ICT itself, but on the consideration of a new context that needs to be brought to light in education.

For the investigated individual D, the pandemic unveiled a new perception of ICT in their teaching practice. When working with subjects involving topography and georeferencing, for example, it became necessary to completely reconsider their methodology and discover technologies that were not previously used in face-to-face teaching, but were adaptable due to students' access to their own devices, which relates to the "bring your own device" (BYOD) movement. As explained:

I discovered a new world that I can use with students and in some ways much easier! For example, I realized that in geo-referencing classes I no longer need to use the Garmin GPS, which is available at the Institution, as it has much better cell phone technology. For me, ICTs have a very important pedagogical meaning.

Two respondents (A and G) revealed their progression as teachers during the pandemic period, as they realized that, in the first half of 2020, there was an adaptation of what was available from the face-to-face to the non-face-to-face format. The three subsequent semesters, still in a 100% online learning environment, allowed for more critical planning, seeking to improve “teaching work” and open up new knowledge arising from training and daily practices.

Despite existing criticisms, the need for a mediation system in the non-face-to-face teaching period meant that the potential of the IS was better used to carry out activities with students and, also, as a repository of materials and academic records of classes taught and student assessments. This report was shared by respondents A, D and G. In an equivalent way, it is the adoption of MOODLE for extracurricular courses taught by teacher A, something that was not adopted before the pandemic.

For investigated C, this pandemic experience brought new perspectives to his lesson planning. The expectation is to continue working with shorter topics, which end in a period and contain small tasks, which help the student in the assimilation of knowledge.

The possibility of virtual interaction with the students is one of the lessons learned by researcher B, because according to this respondent, one of the riches of ICT is to enable this connectivity. As for investigated E, a practice that intends to continue beyond the new applied ICT is the provision of OER for students. Realizes that this initiative emphasizes continuous learning by students, giving students greater autonomy.

For teacher F and G, web conferences with different professionals open an opportunity for new interactions between students and the external environment, without depending on commuting and resulting costs.

Discussion

The teaching narratives show the understanding of the teachers that the educational experiences of the pandemic go far beyond the application of digital technologies, as they involve sociocultural issues. It also exposes concerns about the student's professional training, their profile and the use of ICT to generate value. This highlights what Flores-Lueg and Roig-Vila (2019) weave about the need for an epistemological debate on the topic in the educational field, leading to post-pandemic measures and ongoing adaptation to a framework of digital transformation.

Despite the diversity of teaching practices employed, there are obvious differences between teachers. At this point, relying on Mishra and Koehler (2006) and the reports, the need for debates on: i) technological content knowledge, which refers to the context, teacher and student profile and the specific areas of professional training in which each teacher works; ii) technological pedagogical content knowledge (TPCK), at a broad level, with discussions and dissemination of inter and intra-course practices and by teaching segments.

Regarding investments in infrastructure and digital technologies, one of the mobilizing variables of teaching digital competence (Cabero-Almenara et al., 2020), there is a lack of improvements in mediation platforms, as well as access to new digital technologies. However, the debate about technologies in education, in the empirical field researched, and the training of educators (Domingo-Coscolla et al., 2020), precedes or needs to occur in parallel with such efforts.

In terms of ICT used, in addition to the adoption of new digital resources, including OER, it was observed that there was teaching learning with the optimization of existing tools, underused before the pandemic. On the other hand, in the search for technological pedagogical and technological content knowledge (Mishra and Koehler, 2006), teachers faced difficulties related to the inadequacy of OER found or access to digital technologies that require financial contributions.

The core of teaching-learning in the student, student engagement in non-face-to-face teaching and the expectation of their autonomy is still something to be achieved. Digital technologies can become an important ally. However, it sends new lessons and efforts on the part of educators, educational managers, and students. Institutional support, with broad debate and the creation of new policies and programs aimed at teaching digital skills and future professionals, can become a prolific path opened in a period of abrupt changes.

Conclusions

The present study aimed to analyze the implications of the use of ICT, during the pandemic period, for teaching practices in face-to-face teaching, which took place from the perceptions of teachers of public professional education teaching. The interviews carried out demonstrated a variety of ICT used and an openness to the continuity of their use in face-to-face teaching. They also revealed issues of an institutional nature regarding teacher training, investment in ICT infrastructure for teaching-learning and, above all, the need for debate about educational policies, hybrid learning, student and teacher profiles and technological infrastructure in these new times.

The realization of this empirical research showed evidence that the total immersion in online teaching during the global health crisis caused by the Covid-19 pandemic, unveiled new teaching practices, looks, knowledge and generated uncertainties about the future of education and sociocultural issues arising from digital culture. It was found that innovations occurred in the way content was delivered, in the more effective use of existing mediation systems, in the adoption of collaborative technologies and in the greater use of OER.

The qualitative method made it possible to analyze the teaching narratives in relation to the adoption of ICT, in the challenging period of transposition from face-to-face to virtual teaching. The chosen research technique does not allow the generalization of the data, constituting a limitation of the study, however, it points to perceptions and experiences that, apparently singular, give voice and reflection to an important public – the teachers. More than reporting the technologies employed and their implications, the results demonstrate the real need for an epistemological debate in education, in this digital transformation movement, characterized by the perspective of lifelong learning, student autonomy and ubiquity.

Future research may focus on the development of teaching digital competence, sharing practices and specific policies for educator training. In this transformation scenario, it is also relevant to listen to the students' vision, how they feel and think about it. In this line, empirical research with students becomes relevant, especially due to the tendency of the teaching-learning process to be more focused on the student, with the teacher, a mediator of this process. And so, the responsibilities of both increase: the student, since they are the protagonist, and the teacher, since they have to offer a more personal education.

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Students' Attitudes Towards Education in Biology-Related Disciplines and the Need for Internationalization: A Survey at a Vietnamese University

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Abstract

This survey examined the attitudes of 538 undergraduate students enrolled at a Vietnamese university towards biology-related disciplines. Employing a structured questionnaire, the study explored several aspects, including students' interests in various biology-related fields, their motivations for pursuing these disciplines, their opinions on teaching methods, their aspirations for internationalization and study abroad experiences, the essential skills they believed were crucial for success, and the areas in teaching that required improvement. The survey results indicated that students acknowledged the significance of fields such as medicine and veterinary sciences, with their motivations largely influenced by job prospects and societal needs. Moreover, the results identified specific areas in teaching that students wanted to have improvement, such as laboratory work, practical skills development, fieldwork experiences, and exchange programs, and their attitude towards internationalization and study abroad opportunities, in relations to the factors such as age, gender, grade, and major. The insights gained from this survey can contribute to the enhancement of educational strategies and the creation of an engaging learning environment for students majoring in biology-related disciplines.

Keywords: Attitudes, Biology-Related Disciplines, Internationalization, Study Abroad, Teaching Methods, Undergraduates

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Introduction

In recent years, the field of biology has witnessed remarkable advancements, influencing various sectors such as veterinary medicine (Gyles, 2016), environmental conservation, and agriculture (Kassam, 2020). This has underscored the significance of biology-related disciplines in addressing contemporary challenges and shaping the future. Within this context, understanding students' attitudes towards biology-related disciplines becomes crucial, as their perceptions and motivations can significantly impact their academic choices, career trajectories, and the broader scientific community.

Numerous studies have explored students' attitudes towards various biology-related disciplines, shedding light on factors that influence their preferences, motivations, and perceptions either at secondary (Acarlı & Acarlı, 2020), high school (Ekli et al., 2009) or college level of education (Beumer, 2019).

Previous research on students' attitudes towards science disciplines has revealed that their interests and motivations are shaped by a variety of factors. These factors encompass personal interests, career aspirations, societal influences, and educational experiences (Beumer, 2019; Prokop et al., 2007). Studies conducted in diverse cultural contexts have demonstrated that students often prioritize fields with perceived lucrative job prospects, aligning their choices with societal needs and economic opportunities. Furthermore, the influence of teaching methods and curricular structures on students' attitudes has been widely explored. Practical experiences, such as laboratory work, fieldwork, and study abroad programs, have been recognized as pivotal components in fostering students' engagement and interest in science disciplines (Prokop et al., 2007). These investigations have contributed to the refinement of educational strategies and curricula, aiming to create more engaging and effective learning environments.

However, within the Vietnamese context, limited research has been done about the attitudes of school students or undergraduates towards biology-related disciplines, despite the growing importance of these fields in the global landscape. This gap is particularly pertinent given the evolving academic and economic landscape in Vietnam, where the importance of scientific expertise and innovation is steadily increasing (Tran, 2013; Trung & Swierczek, 2009). Understanding how Vietnamese students perceive biology-related disciplines and identifying their motivations, preferences, and suggestions for improvements in teaching methods and curricula is essential for tailoring educational strategies to meet their needs and aspirations.

This research seeks to bridge this gap by examining the attitudes of undergraduate students enrolled at a university in Vietnam towards biology-related disciplines. It aims to accomplish the following objectives:

- Investigate the specific biology-related fields that Vietnamese undergraduate students are most interested in and understand the motivations driving their preferences.
- Examine students' opinions on existing teaching methods in biology-related disciplines, identifying areas that require improvement and exploring factors influencing their perceptions.
- Investigate students' attitudes towards internationalization and study abroad experiences, and analyze how factors like age, gender, grade, and major might influence these attitudes.
- Identify the essential skills that students believe are crucial for success in biology-related disciplines and determine specific areas in teaching that students

perceive as needing enhancement, such as laboratory work, practical skills development, fieldwork experiences, and exchange programs.

- Provide recommendations for improving educational strategies and creating a more engaging and effective learning environment for students pursuing biology-related disciplines in Vietnam's higher education.

By addressing these objectives, this research aims to contribute to the understanding of students' attitudes towards biology-related disciplines within the Vietnamese context and provide valuable insights for educational institutions seeking to enhance their curricula and programs in response to students' preferences and aspirations.

Methodology

The current study used a cross-sectional survey design to collect data from a diverse sample of undergraduate students enrolled in biology-related disciplines at a university in Vietnam. A structured questionnaire was designed to encompass the research objectives and includes both closed-ended and Likert scale questions for quantitative data collection, as well as open-ended questions for qualitative insights. The Likert 5-level scale consists of response options including "strongly disagree," "disagree," "neutral," "agree," and "strongly agree". The data was conducted in summer 2023 in the form of an online survey to maximize response rates and accommodate participants' preferences. Quantitative analysis was conducted using SPSS software. We used descriptive statistics to summarize demographic characteristics, interests, motivations, and perceptions; and inferential statistics to identify relationships between variables. Qualitative data related to students' suggestions for improvement in teaching methods, essential skills, and internationalization aspirations were analyzed using KH-Coder software.

Results

The survey was completed by a total of 538 undergraduate students enrolled in biology-related disciplines at a Vietnamese university. The sample consisted of diverse participants representing various majors, genders, grades, and age groups.

Perceived Subjects of Importance and Interests

Table 1 represents the mean ratings of importance assigned by 538 undergraduate students to various fields of study on a Likert 5-level scale. These mean scores indicate the average level of importance or priority given to each subject by the students surveyed. According to the data, the subjects with the highest mean scores and thus perceived as the most important by the undergraduate students are Medicine (3.99), Veterinary medicine (3.91), and Genetics (3.68). These subjects received the highest average ratings, suggesting that the students consider them to be important. Other subjects that received relatively high mean scores include Biotechnology (3.66), Zoology (3.66), Cell biology (3.66), Microbiology (3.68), and Parasitology (3.65). These subjects are also viewed as important by the students surveyed. Subjects such as Environmental biology (3.61), Agriculture (3.53), Botany (3.39), Ecology (3.50), Biochemistry (3.53), Bioinformatics (3.47), and Husbandry (3.68) received slightly lower mean scores but still above-average priority ratings. It is important to note that the list of subjects was not included some important fields such as Food technology.

Table 1. Fields of importance / priority? (N=538)

	Mean	Median	Mode	SD
Medicine	3.99	5	5	1.20
Veterinary medicine	3.91	4	5	1.18
Genetics	3.68	4	5	1.18
Microbiology	3.68	4	5	1.18
Husbandry	3.68	4	5	1.17
Biotechnology	3.66	4	5	1.22
Zoology	3.66	4	4	1.15
Cell biology	3.66	4	5	1.18
Parasitology	3.65	4	5	1.19
Environmental biology	3.61	4	5	1.23
Agriculture	3.53	4	4	1.18
Biochemistry	3.53	4	4	1.17
Ecology	3.50	4	4	1.19
Bioinformatics	3.47	4	4	1.17
Botany	3.39	3	4	1.21
Others	2.77	3	1	1.50

Table 2 shows the mean scores assigned by 538 undergraduate students to various fields of study based on their interest. The scores were collected using a Likert 5-level scale, where higher scores indicate a greater level of interest. The fields with the highest mean interest scores from the undergraduate students are Veterinary medicine (3.73), Medicine (3.45), and Genetics (3.28). These subjects received the highest average interest ratings, suggesting that the students have a relatively high level of interest in these fields. Other fields that received above-average mean interest scores include Biotechnology (3.24), Microbiology (3.25), Parasitology (3.23), and Cell biology (3.26). These subjects are also perceived as interesting by the students surveyed. Subjects such as Environmental biology (3.06), Agriculture (3.04), Botany (3.07), Ecology (3.10), Biochemistry (3.10), Bioinformatics (3.04), and Husbandry (3.23) received slightly lower mean interest scores but still indicate some level of interest among the students.

Table 2. Fields of interest?

	Mean	Median	Mode	SD
Veterinary medicine	3.73	4	5	1.28
Medicine	3.45	4	5	1.30
Zoology	3.39	3.5	4	1.27
Genetics	3.28	3	3	1.31
Cell biology	3.26	3	3	1.30
Microbiology	3.25	3	4	1.28
Biotechnology	3.24	3	3	1.36
Parasitology	3.23	3	3	1.31
Husbandry	3.23	3	3	1.31
Ecology	3.10	3	3	1.31
Biochemistry	3.10	3	3	1.29
Botany	3.07	3	3	1.30
Environmental biology	3.06	3	3	1.32
Agriculture	3.04	3	3	1.31
Bioinformatics	3.04	3	3	1.29
Other	2.60	2	1	1.52

Study Motives

Table 3 shows the mean scores assigned to different motivations for studying biology-related subjects. Participants were asked to rate their motivations on a 5 level Likert scale. The motivations that received relatively higher mean scores are meeting social needs (3.54), finding a job (3.50), and loving the subject (3.48). These motivations indicate that participants are driven by their interest in the subject, the desire for career opportunities, and the desire to contribute to society. Motivations such as liking research (3.33) and business (3.32) also received above-average mean scores, suggesting that some participants are motivated by the opportunities for research and business-related applications in the field of biology. On the other hand, having family in the field (2.71) received a lower mean score, indicating that it is a less influential motivation for the participants surveyed.

Table 3. Motives to study biology-related subjects

	Mean	Median	Mode	SD
Meet social needs	3.54	4	5	1.25
To find job	3.50	4	5	1.27
Love the subject	3.48	3	5	1.30
Like research	3.33	3	5	1.32
Business	3.32	3	5	1.30
Has family in the field	2.71	3	1	1.47
Others	2.44	2	1	1.49

Perceptions About Teaching Quality

Regarding perceived teaching-learning quality, participants were asked to evaluate their perceptions. Table 4 presents students' perceptions regarding the education they receive in biology-related subjects. The mean scores generally indicate a positive perception across all aspects, with median and mode values supporting this consistency. The mean perception score for theoretical teaching aspects such as lecturers' quality, lecture content quality and curriculum are relatively high, indicating that students tend to view the quality of theoretical class positively. On the contrary, practical and field training received lower scores indicate the need of paying more attention on practical experiences, such as laboratory work and fieldwork, in enhancing their engagement and understanding of the subjects. In the qualitative data, a substantial number of participants indicated that there is room for improvement in these practical components. Many suggested that integrating more hands-on activities, real-world applications, and interactive learning methods could enhance their learning experiences.

Table 4. Students' perceptions about the education of biology-related subjects

	Mean	Median	Mode	SD
Lecturers' quality	3.91	4	4	0.87
Lectures	3.84	4	4	0.85
Curriculum	3.83	4	4	0.86
Practice training quality	3.81	4	4	0.88
Field training quality	3.79	4	4	0.89
Laboratory quality	3.7	4	4	0.93

Internationalization and Study Abroad Aspirations

Table 5 provides insight into individuals' attitudes towards internationalization, with a focus on various aspects related to international cooperation and involvement in an educational setting. The respondents placed higher importance on the need for strengthening international cooperation to bring education up to international standard and to have more exchange

programs. Respondents seemed not interested in higher number of international students, foreign lecturers or programs conducted in English.

Table 5. Attitude on internationalization

	Mean	Median	Mode	SD
International cooperation	4.01	4	5	1.14
International standard	4.00	4	5	1.11
Short-term exchange Prog.	3.96	4	5	1.10
Having int'l students	3.85	4	5	1.11
Hiring foreign lecturers	3.80	4	5	1.13
EMI pilot program	3.70	4	5	1.18

Table 6 displays the study abroad intentions of the respondents. Only 10% of the respondents currently have immediate plans to continue their education abroad. However, when considering students who contemplate studying abroad later, over half of the students have expressed an intention to study abroad. From qualitative data, the majority of participants expressed a strong interest in international exposure and the chance to study abroad.

Table 6. Study Abroad Intention for graduate degree

	Frequency	Percent
Will study abroad	54	10.0
May study abroad later	229	42.6
Will study domestic	73	13.6
No more study	182	33.8
Total	538	100.0

Essential Skills

Participants were asked to identify the essential skills they considered crucial for success in biology-related disciplines. Figure 1 shows the word cloud of their responses. The responses were categorized into both hard skills and soft skills, offering a comprehensive understanding of the competencies that students deem important. Many participants emphasized the significance of acquiring hard skills for success in biology-related fields. These practical skills encompassed areas such as laboratory techniques, research methodologies, and observational abilities. The emphasis on these hard skills underscores the importance of hands-on experience in effectively navigating the demands of scientific research and analysis. Furthermore, participants highlighted the need for specialized knowledge in specific areas of biology, indicating the growing recognition of the interdisciplinary nature of modern biological sciences. In addition to hard skills, participants recognized the importance of soft skills in their academic and professional pursuits. Effective communication emerged as a prominent soft skill, with participants acknowledging the ability to convey complex scientific concepts to diverse audiences as essential. Teamwork was also highlighted as a vital skill for collaboration in group projects and interdisciplinary research settings. Moreover, participants identified self-learning and adaptability as crucial soft skills in an evolving scientific landscape, where the capacity to stay updated with new developments is paramount.



Figure 1. Skills needed as perceived by students

Improvement Areas

Participants' insights into areas requiring improvement within the teaching of biology-related disciplines provided valuable guidance for enhancing the learning experience. A significant portion of participants expressed the need for more comprehensive laboratory work, emphasizing hands-on practice in applying theoretical concepts. Practical skills development was specifically mentioned, indicating a desire for more structured opportunities to acquire and refine technical skills. Additionally, participants voiced a desire for more meaningful fieldwork experiences, which could offer real-world context to theoretical learning. The call for exchange programs highlighted an aspiration for cross-cultural exposure and diverse learning environments, indicative of a broader perspective on education.

Discussion

The findings of this survey-based research shed light on the attitudes of undergraduate students towards biology-related disciplines at a Vietnamese university. Through an exploration of various dimensions, including students' interests, motivations, teaching methods, internationalization aspirations, essential skills, and areas for improvement, this discussion section seeks to contextualize the results within the broader landscape of science education and offer implications for enhancing educational strategies.

The survey results reveal that undergraduate students demonstrated a significant interest in biology-related fields, particularly those with perceived direct job prospects such as veterinary sciences or biotechnology. These preferences align with societal needs and economic opportunities, highlighting the pragmatic considerations that influence students' academic choices. Such motivations underline the role of education in not only fostering scientific curiosity but also aligning academic pursuits with real-world demands. There is almost no evidence about interests of undergraduates towards biology-related disciplines. However, there are plenty of such study targeting school students. The current study's findings are in line with some previous literature which found that high school students are interested in zoology, genetics, biotechnology; so they believe that the researches on the medicine, genetics and human biology (Ekli et al., 2009). Positive attitude of school students are found to be

influenced by factors such as gender, grade, education environment, life style (Acarlı & Acarlı, 2020; Almasri et al., 2021; Weinburgh & Englehard, 1994). But in the current study, we did not find factors associated with the motivation and interest.

The participants' opinions on essential skills for success in biology-related disciplines mirror the demands of modern science. These findings underscore the multifaceted nature of success in biology-related disciplines. While hard skills equip students with the technical proficiencies needed for research and practice, soft skills empower them to effectively communicate, collaborate, and adapt within the scientific community. The emphasis on critical thinking, communication, problem-solving, and teamwork aligns with the multifaceted nature of scientific research and collaboration. The current finding support the evidences that collaborative learning in biology could be effective in specific context (Almasri et al., 2021).

The need to emphasize on practice-based learning was reported in literature (Tran, 2013; Trung & Swierczek, 2009). In the current study, the students' call for improvements in laboratory work, practical skills development, fieldwork experiences, and exchange programs underscores the importance of experiential learning. These findings advocate for pedagogical approaches that bridge theoretical knowledge and practical application. These findings highlight the importance of hands-on learning experiences, which have been shown to enhance student engagement and comprehension. Integrating more practical components into the curriculum could lead to a more enriching learning environment, catering to diverse learning styles and promoting holistic skill development. The identified improvement areas align with the growing recognition of the value of practical experiences in science education, emphasizing the need to bridge the gap between theory and application for a well-rounded academic journey.

The insights gained from the current study hold valuable implications for educational strategies within the context of biology-related disciplines. The emphasis on practical components calls for curricular revisions that integrate more hands-on experiences, ensuring a balance between theoretical understanding and practical application. Initiatives aimed at fostering internationalization should consider tailored interventions that address the unique preferences and barriers faced by different demographic groups.

The attitudes of students towards internationalization and study abroad experiences provide intriguing insights into their broader educational aspirations. This study emphasizes the need for tailored strategies to promote international exposure. Literature has shown initiatives such as bringing new concepts and strategies into biology-related lessons (Knippels & Waarlo, 2018; Tipmontiane & Williams, 2021), or applying different approaches based on gender (Isaak et al., 2022). Institutions could consider targeted programs and approaches to encourage students to explore global academic environments, fostering cross-cultural competence and expanding their horizons.

It is important to acknowledge the limitations of this research. The study's focus on a single Vietnamese university may limit the generalizability of the findings to broader educational contexts. Additionally, self-report bias and the cross-sectional design pose inherent limitations. Future research could adopt longitudinal designs and involve multiple institutions to enhance the robustness and generalizability of the findings.

Conclusion

This survey-based research offers valuable insights into the attitudes of undergraduate students towards biology-related disciplines at an university in Vietnam. The findings underscore the importance of aligning educational strategies with students' interests, aspirations, and skill development needs. By tailoring teaching methods and curricula to incorporate practical experiences and promoting internationalization opportunities, educational institutions can cultivate an environment that nurtures well-rounded, motivated, and globally competent professionals in the field of biology-related disciplines.

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Enhancing Mathematical Skills for Vocational School Students Pursuing Undergraduate Studies

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Abstract

Over the past two decades, competence-based education has become a dominant trend in vocational and undergraduate education. The term competence-based education covers various conceptual ideas and practices arising from technical thinking in which education is seen as training competency, emphasising the development of complete vocational competence promoting autonomous identity and its continuous improvement. It should reflect how mathematics is taught at all levels of vocational education. As the PISA research has revealed gaps in skills in STEM subjects, our goal is to develop a powerful online learning model to promote access to undergraduate studies and employment for the disadvantaged in Finland. Their mathematical and scientific skills are analysed and trained online according to their self-direction. This facilitates graduating on time and applying for further studies. de Bruijn and Leeman's original model of a powerful learning environment is enhanced, focusing now on online adaptive guidance, and supporting self-regulating skills. The initial state for improving mathematical competence and self-regulating skills is the formation of a vocational identity obtained in previous education. The model is delineated by the idea of cognitive apprenticeship, acquiring knowledge and skills to pursue further studies. Online reflection and constructive learning from authentic situations towards a more abstract construction of knowledge is viewed from sociocultural theory and its perspective on cognition. Understanding the mathematical self-concept of online learners can inform strategies for improving online mathematics education.

Keywords: STEM, Online Learning, Self-Directed Learning

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Introduction

Education and needs do not always coincide in the Finnish labour market (Huttunen, 2022). There is a huge need for employees in the social, welfare, and healthcare sectors, while there is an oversupply of secretaries and travel agency officials, for example. The Technology Industries of Finland has reported that the technology industry will need 130,000 new experts within the next ten years, both with university degrees and vocational degrees (Teknologiateollisuus, 2023).

On average, 14 per cent of youth do not have a secondary education, even though unemployment is lower among the more educated (Witting, 2021). Witting remarks that education has a generational component: children of less educated families tend to educate themselves less at the tertiary level than other children, on average. Furthermore, students with less educated parents seem to drop out of studies more often than students with highly educated parents. The underlying reasons are not the subject of this paper but describe an urgent need to help youth catch up with their studies.

It is essential to overcome the mismatch in labour needs and provide the opportunity to access education at any time. Within the Finnish context, the threshold for applying for studies may be high, but suspicion of one's own mathematical skills may even prevent one from applying. For example, those applying to universities of applied sciences must take an entrance exam that includes a mathematical-logical part. Further, immigrants, who might fill these future roles, may be highly educated, but entering the Finnish labour market is often difficult without a Finnish degree.

This paper focuses on promoting access to education and employment for the disadvantaged (less educated, immigrants, and others) by improving their mathematical and scientific skills, thereby improving their chances of graduating on time, and applying for further education. Those without recent education experience or without a formal education might need a refresher on the basics, but those considering a new career entirely may want to improve their skills before taking the entrance examinations.

This paper discusses the role of competence-based education in pursuing vocational and professional education. Effective competence-based vocational education promotes self-directed and authentic learning within and beyond the workplace (de Bruijn & Leeman, 2010). Those skills must be trained so those seeking new employment opportunities can pursue undergraduate education. In this paper, we aim to present a powerful online learning environment to fill in the gaps in STEM competencies. We explore the key features of the virtual learning environment. Dilemmas and encountered practical problematics of implementing online competence-based courses should be resolved when teaching, guidance and learning occur in practice.

Competence-Based Learning

Competence-based learning is deeply associated with learning and acquiring knowledge independent of time and place and is truly challenged in virtual learning environments. To ensure that students successfully pursue undergraduate studies, it is essential to underline that online courses must recognise and utilise the knowledge and related competencies of previous vocational studies and skills. In this paper, we develop a model considering that

effective competence-based vocational education promotes self-directed and authentic learning.

Our model's concept of cognitive apprenticeships acknowledges learning to perform in practice and going towards a more general representation and understanding of STEM concepts than the initial vocational presentations. These specific professional skills and concepts lead students towards acquiring a more profound understanding, meta-cognitive skills and flexibility in STEM subjects.

We rely on a socio-constructivist view of students' awareness of their learning responsibility and the need to direct one's development to become a professional. To succeed in this, as the social interaction normal to in-situ classroom teaching is absent, developing interaction and feedback and fostering self-regulation skills makes it possible to retrieve demanded skills in STEM subjects of undergraduate studies.

Situated cognition refers to the idea that learning is situated in a social and functional context: it is about acquiring knowledge and skills and understanding how the knowledge is used in real-world situations (de Bruijn & Leeman, 2010). It must be viewed so that knowledge is not just stored in the students' memory but is also distributed across tools and resources used to support learning. Learning from a situated perspective on cognition emphasises the importance of understanding the social and cultural context in which learning takes place and the role that this context plays in shaping the way that knowledge is acquired and used. Jossberger et al. (2010) state, concerning workplace simulations, that environments should be adaptive to learner's needs. It is also noticeable in online learning.

Characteristics of a Powerful Vocational Online Learning Environment

Even though COVID-19 increased the speed of the use of digital technology in teaching, it evoked new approaches to the design of teaching and learning. Digital technologies generate new ways of thinking about mathematics, the settings in which it is learnt and how mathematics teacher educators frame the new initiatives of initial and professional training (Engelbrecht et al., 2020). For the disadvantaged, the situation has not become any easier. Digital technologies have widely enlarged the number of new ways of visualising and learning mathematics and the settings in which it is learnt. Even if this sounds appealing to educators, the same may not be true for students. The findings of Llinares and Valls (2010) suggest that incorporating the analysis of video clips from mathematics lessons and engaging in online discussions can be an effective way to support the learning process of prospective teachers. Keep in mind that transferring this idea to other types of learners not so involved in education and the absence of online discussions must be recompensed via self-directed skills, motivation, reflection, and the system's structural guidance.

We frame the initiative skills of vocational STEM competence to build an operating model for online learning to promote access to undergraduate studies. By designing a powerful online model focused on self-directed learning and the construction of knowledge, we invoke students' professional development. We will describe the resources for how this will be implemented. Our developed model is based on the scheme proposed by de Bruijn and Leeman (2010). The powerful learning environment originally comprised a mix of instruction with features like active and reflective training and a delineated focus on authentic and self-directed learning. The original models are further developed, focusing on guidance, self-

regulated learning and promoting the student's active role in learning and reflection. Four themes with descriptive features comprise the model:

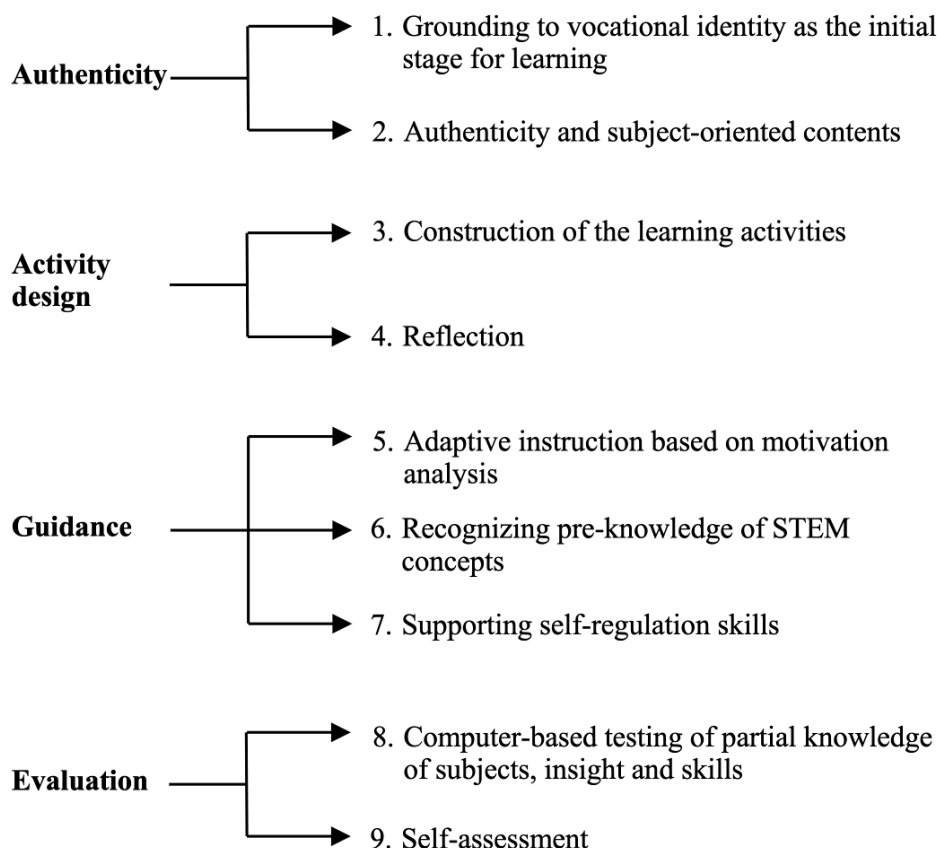


Figure 1: Characteristics of the pedagogical model for online studies promoting SDL skills.

The model presented in Figure 1 is based on the idea of de Bruijn and Leeman (2010) and is revised in the view of online learning. Authenticity is not seen here as a professional identity but rather as a way to evoke an 'I can' identity (self-efficacy), for example, in people thinking about a possible career change. The pedagogical idea is to captivate the desire for learning by using suitable exercises from professional fields to promote further learning of the abstract terms and structures of mathematics and physics.

Guidance plays a remarkable role in online courses. Activity design is based on Bloom's Learning for Mastery (Bloom, 1968, 1984; Pelkola et al., 2018). Different exercises with similar complexity and degree of difficulty vary in each activity package. The computer algebra system STACK enables feedback to be interactive and makes it possible to learn from mistakes. Each package of exercises allows multiple trials, enabling monitoring of their own progress. Examples are presented later in this paper.

Computer-based evaluation is essential in online courses. Each course section (mathematics, physics, and general studying skills) can be studied independently. The student's learning for mastery is tested after completion of the mathematics and physics parts. Self-assessment and reflection provide results on how successfully SDL skills developed, and the final mathematics exam indicates the improvement in skills in these subjects.

The chosen themes reflect authentic and constructive learning from a situated perspective on cognition from various fields of vocational education. The tools and resources used to support learning are crucial in students' individual learning processes. This means that learning is not just about acquiring knowledge but also developing the ability to use that knowledge in real-world situations.

Self-Directed Learning

Radmehr and Goodchild (2022) discovered that the COVID-19 pandemic revealed that it is not easy for mathematics lecturers to be aware of many challenges students may encounter through online education. This must be considered when the aim is to develop a standalone online course for the disadvantaged. Their second finding was that advanced technology and the internet were not entirely successful in supporting many students to learn mathematics.

The pedagogical model used for learning activities in Moodle (Porrás et al., 2023) utilises a modified Bloom's model for a successful learning process. It is based on reflective learning and is now implemented in a vocational framework. The learning model emphasises the power of automated assessment and feedback to provide the seeds to support growth in self-direction and learning for mastery in the discourse of STEM competencies.

A study by Artino (2008) reveals that developmental differences exist in students' self-regulatory beliefs and behaviour-adaptive academic outcomes in online settings. According to Alotaibi and Alanazi (2021), students with highly cohesive conceptions of mathematics tend to have higher self-directed learning skills than students with fragmented conceptions of mathematics. Fragmented understanding predicts low mathematics achievement. Students with fragmented conceptions develop lower-level learning skills, e.g., memorisation. The approach represented here tries to influence learning outcomes via conceptual gains promoting self-direction skills.

Self-direction learning (SDL) and self-regulation learning (SRL) are the focus of learning processes. They are widely used and often interpreted as the same. As Saks and Leijen (2013) noticed, these two initially crucial concepts have much in common and are divided into two distinct approaches or discourses. The main difference is that SDL handles adult education and is practised mainly outside the school environment, whereas SRL is practised in the school environment. As SRL focuses on the school environment, teachers usually set the tasks, and there is not much room for a person to plan a place or a time to do the task. In self-paced learning, students can choose the timing but neither the material nor the resources (Robinson & Persky, 2020). Self-paced learning requires motivation, but it happens in the school environment. Online learning is mainly done outside the school environment and, therefore, requires planning, for example, timing and place. Furthermore, the structure of the target group is socially diverse and demands aspects of lifelong learning. The vocational background needs to be considered as a high motivational factor. Therefore, the SDL approach is more valid for this study.

Self-Directed Learning Readiness Scale

Online learning is fragmented: learners use fragmented time and thinking methods to acquire knowledge (Liang et al., 2018). Thus, an independent online course requires determination from the participant to complete the course: it is widely reported that dropout rates of MOOCs are high, especially at the beginning, e.g. Ihantola et al. (2020) and Onah et al.

(2021). These studies are done among university students, who presumptively possess good studying methods. Our target group is the disadvantaged, whose previous studies may have been a long time ago. If their studies have been incomplete or they have not even applied to post-comprehensive school education, then the students may lack the most critical element for the progress of their studies, i.e., self-direction. Self-directed learning involves, among other things, goal setting, time management, environment structuring and help-seeking. In other words, a learner takes control of their learning. As Park et al. (2022) mention, online/distance learning based on self-directed learning strategies enhanced students' achievement, their beliefs, and their perception of long-term future possibilities, suggesting that readiness for self-directed learning is essential for progressive learning.

One part of this project is to study how students in online courses can be supported to maintain focus till the end. If the student's readiness for self-directed learning is known, they could be individually guided to promote their weaker aspects of self-direction. Grow (1991) introduced four types of self-directed learners, their pros and cons and what kind of teaching suits them best. This division was done when online lecturing was not so common. It is interesting to see how well this advice works in independently studied online courses and how easily it can be applied from a teacher's point of view.

There are several tests for testing readiness for self-directed learning (M. Fisher et al., 2001; Guglielmino, 1978; Williamson, 2007). Fisher et al. (2001) developed their original self-directed readiness scale test with 40 statements. Fisher and King (2010) revised test having 29 statements. We selected the revised test by Fisher and King (later referred to as SDLRS). One of the excluded statements was 'I am logical'. The test was designed for and tested with nurses, and this may not be the most relevant statement for them. However, this project is about studying mathematics and sciences, where logical thinking and acting are relevant. For that reason, this statement is included in our test. As they mention (M. Fisher et al., 2001), measuring SDL readiness needs to be done within a specific context.

SDLRS studies three aspects of self-directed learning: self-management, desire for learning and self-control. In an ideal situation, all statements would be mixed, and some would be negatively phrased. Our online course will be on the Moodle platform. To give individual guidance, we need to know which aspects (or maybe all) of self-directed learning a student needs direction. Unfortunately, Moodle does not contain a Likert scale activity where the mixed individual questions could be individually added to a specific variable value. A Likert scale can be found in the Questionnaire activity, but it only adds up the points given. Thus, negative statements cannot be used either. For these reasons, we separated all aspects into their own queries.

Students' motivation and self-regulation skills are investigated using a self-directed learning readiness scale (SDLRS) when entering the course. Students get feedback after answering a query. Feedback is categorised into three levels by 75% and 45% from maximum scores. The lower the scores are, the more detailed instructions are given to a student.

Competence Level Test in Mathematics

The online course covers mathematics and physics and a section on general studying methods and basic skills like the usage of calculators and formula books. Each section is worth one ECTS and can be done separately. For example, a person interested in tourism and hospitality does not need physics as much as automation or maintenance. However, someone interested

in technology must have some knowledge of physics. Mathematics being common to all participants, the topics must be selected carefully.

In spring 2023, students at regional vocational schools in three provinces around Finland participated in a competence level test in mathematics. Although most students were from technology, there were participants also from the service industry. The test was done under supervision in a classroom without a calculator or a formula book. The topics covered middle school mathematics. We used the information obtained from the test to determine the topics covered in the online course. The common part in universities of applied sciences entrance exams is based on middle school mathematics. Calculators and formula books are also not allowed: mental calculation skills must be strong, although questions are multiple-choice.

Participants of this online course will do the same but with a randomised test at the beginning of the online course. After completing it, they will repeat the test to see their progress. These tests will be time-limited to 30 minutes, and time will be running down visibly. There is a similar situation for entrance exams, so they can practice solving exercises under pressure. When the final test results are analysed with SDLRS, we will see whether learning models helped achieve the desired knowledge.

STACK-Based Testing of STEM Competence

STACK is Moodle's leading open-source computer-aided assessment system plugin (<https://stack-assessment.org/>). It enables the creation of randomised mathematical questions in which the answer can be typed in multiple ways, for example, an algebraic expression, an integer, or a float together with SI units, to mention a few of the most common ones. Moodle also supports coding multilingual STACK tasks through the Multilang filter so that the students see the tasks in the respective language they selected from the Moodle language settings. Porras and Naukkarinen (2021) introduced STACK's basic functionalities and more advanced interactive usage cases when combined with the JavaScript library JSXGraph.

Moodle is a widely used virtual learning environment. It provides comprehensive tools for increasing students' activity and independence in learning (Takaendengan & Santosa, 2018). Porras et al. (2023) presented a desired model for STACK-based exercises, ensuring students achieve a deep and comprehensive understanding of a subject and reduction of learning gaps before moving on to more advanced topics. In this model, learning is based on Bloom's Learning for Mastery (LFM) (1968, 1984). Mastery is achieved here using automated assessment and feedback to provide the seeds to support growth in self-regulation and learning for mastery in mathematical skills.

Following Bloom's LFM, one essential focus is to increase students' conceptual understanding that benefits the students so that mathematics is not merely seen from the surface learning point of view as memorising a mechanical step-by-step process but engaging in deep learning. Various kinds of interactive exercises testing conceptual understanding can be programmed by combining JSXGraph with STACK. One example is given below.

In the exercise of Figure 2, a student is asked to move the elements from the yellow window into their correct places: equations into the left-hand-side column's windows and written text to the right-hand-side column's windows. STACK is utilised to determine if the elements are in the correct window, and after clicking "check", student receives automatic feedback in the form of a potential response tree (PRT). Beyond the common post-check PRT feedback, not

so common pre-check annotations are also utilised. Students can see the pre-check annotations in real time while dragging the elements as the visibility of the annotations is triggered according to the coordinates of the elements. Real time annotations become handy in cases that demand immediate actions such as if the student moves the equations beyond the blue vertical line on its right side or the text elements to its left side. In these cases, the annotations will state that the equations ought to be on the left side and the text elements on the right side. If some elements are not dragged away from the yellow area, an annotation will state that no elements shall be left within the yellow area. Thus, real time annotations may help the students to notice their inadvertent mistakes and do initial corrective actions to evade losing points in vain when checking their answers.

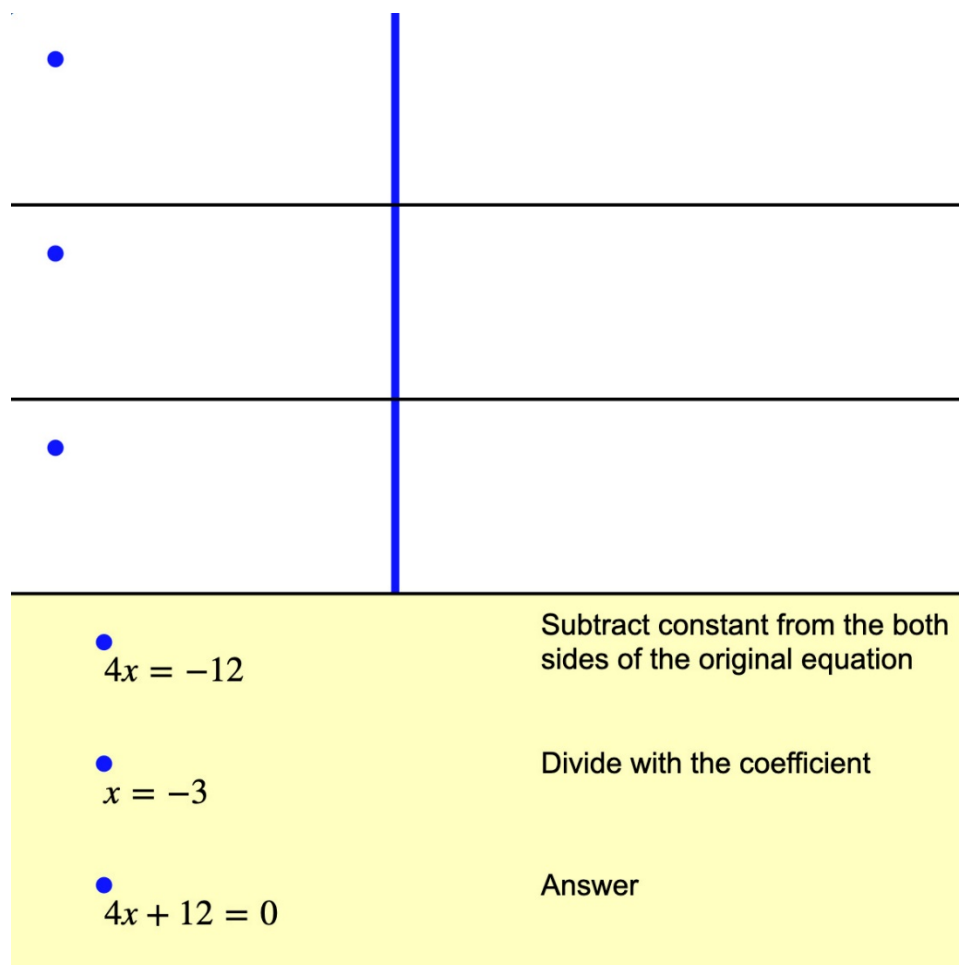


Figure 2. Interactive exercise testing the student's conceptual understanding of the steps for solving a linear equation. STACK is used to randomise the numbers for the equations.

In Figure 2, the equation-solving steps are written out on purpose. It has been proven to enhance learning if the student writes out the mathematical processes or deals with written processes, not solely using mathematical notations (Porras, 2015). The texts will be shown in English or Finnish, depending on the language the student is using in Moodle. Following Bloom's LFM, after the student understands the connection between written-out processes and equation-solving steps, the next step would be introducing the mathematical notations of making the same mathematical operation on both sides of the equation.

The initial state of Figure 2 is the most challenging case because the student needs to move all the elements. However, the exercise can be modified so that, for instance, one or many of

the equations are initially in the correct windows, and then the student is asked to move merely the written text to the correct windows. Consequently, different difficulty levels can be created by slightly modifying the same exercise.

The PRT is shown in Figure 3. It is designed for checking the validity of students' answers, carrying out automatic scoring and generating automatic feedback for the student. The PRT is designed to state if the student's answer is correct or incorrect, but it can also guide the student's understanding and concept formation with thought-rising hints and thought-provoking questions.

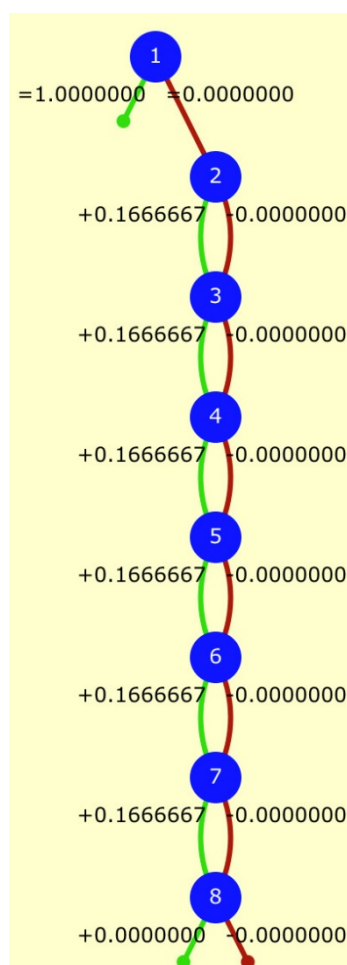


Figure 3. The PRT is utilised in scoring and automatic feedback.

The PRT is organised into a tree with eight nodes. Each node represents a test that is done to determine if some parts of students' answers are correct or incorrect. If the test is passed, a movement is made along the green lines. If the test fails, a movement is made along the red lines. The small green and red dots represent the states where no more tests are executed, and the algorithm stops. The numbers indicate the scoring of points as a percentage of the maximum points.

The PRT is structured as follows: beginning at the root (node 1), STACK checks if all elements are within the correct respective windows and gives feedback if everything is correct. It gives full points, and no more tests are executed as the algorithm stops at the first small green dot. If even one element is within the incorrect window, the node 2 to 8 tests are executed. The node 2 to 7 tests check if the individual six elements are within the correct

window, and feedback is given stating whether the element is within the correct window. At node 8 STACK checks if the equation-text pairs are horizontally correct even if their location is incorrect. Feedback is given stating that one or more pairs are horizontally correct, but they need to be moved vertically into the correct row.

The above example shows the power of utilising STACK together with JSXGraph. Moreover, interactive exercises and exercises including a visual aid benefit people with dyslexia or who are not proficient in Finnish or English to grasp the underlying idea of the exercises better. Through the interactive exercises, students can play around and discover mathematics and physics by themselves, hopefully increasing their motivation and self-directed learning readiness.

Conclusion

In this paper, we have introduced our pedagogical model to increase the self-efficacy and self-direction of the disadvantaged to continue their studies. It is based on a model for developing vocational identity in the context of competence-based vocational education and Bloom's Learning for Mastery. Although the purpose of this online course is to provide sufficient tools in mathematics and physics for further studies, in addition to these, the student's self-esteem, i.e., self-efficacy and self-direction, must be improved. Scientific skills are not enough if the level of mental competence is insufficient.

Bloom observed that students learn much better with individual tutors (Bloom, 1984). It is difficult to arrange a personal tutor no matter what kind of study it is. However, online platforms such as Moodle provide more opportunities for this than traditional classroom teaching. In STACK, this has been taken into account with task-specific feedback. The student receives feedback on the intermediate assignment before submission (equivalence reasoning) and on all assignments after submission. Post-submission feedback can be very detailed, as the limit is mainly the author's interest in forming a PRT (Porrás, 2021; Porrás & Naukkarinen, 2022).

Crawford et al. (1998) introduced an interesting instrument for studying how students comprehend mathematics: fragmented or cohesive. Fragmented refers more to surface learning and cohesive to deep learning. Based on studies (Alotaibi & Alanazi, 2021; Crawford et al., 1998), fragmented conception is connected with lower readiness for self-directed learning. Alotaibi and Alanazi (2021) suggest that 'students' conceptions of mathematics may play a filtering role that regulates students' thinking and actions in mathematics learning and teaching; this is key for developing self-directed learning skills'. According to them, both conceptions of mathematics and self-directed skills should be levelled up to promote students' learning in mathematics. In the future, it would be interesting to study how fragmented learning is among disadvantaged people and how this fragmentation could be reduced.

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Semiotic Theory in Literature Classes

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Abstract

The aim of this paper is to analyze the benefit of interpreting literary works in class, on the one hand through an approach of free interpretation and hermeneutics, and on the other hand with semiotics as a theory that directs the further interpreting of the literary works. The corpus of research is based on the works of Umberto Eco, as an author of theoretical works, but also as author of novels on which the semiotics can be applied. The research was done with the students in order to observe how they perceive the literary works without having an interpretive matrix at hand, and how the meanings are changed after they are being offered a theoretical apparatus. In the second case, it is shown that many of the meanings are easier to grasp when there is a system of theory to predict them, and the classes are easier to organize and more effective in the end. The solutions that are ultimately obtained are more productive, and the meanings are more precise and richer. Another question that remains to be asked is whether the use of such interpretive models limits interpretation in other respects. We will dwell on several works by Umberto Eco, such as *Six Walks in the Fictional Woods* (1994), *The Open Work* (1979) and *The Limits of Interpretation* (1991), etc. and from the literary works we will use the novel *The Prague Cemetery* (2011).

Keywords: Semiotics, Interpretation, Literature Classes

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Introduction

The research discussed in this paper was based on the practice of World and Italian literature classes, with students from the Departments of Macedonian Language and Literature and Italian Language and Literature at the Faculty of Philology in Stip, Goce Delcev University. Among the many literary works that are covered in these classes, the work of Umberto Eco occupies a significant place. Although the study programs remain almost unchanged over the past years, the advantage of the teacher's experience consists in experimenting with new methods in the class during the different academic years. So, in this case, at the beginning, students were offered the work to read, and then they were challenged to interpret it themselves in class, using free hermeneutics. Next years, however, a new task was given: each of the works that was analyzed in class had to be presented through an interpretive method. For example, to use deconstruction for Beckett, phenomenology for Proust, narratology for Ariosto, etc. The task that concerned Umberto Eco was, of course, related to semiotics, which the author himself uses as a matrix in his theoretical books. What we will present in this paper is how all levels of finding and interpreting signs in *The Prague Cemetery* text can be derived. We can conclude that after we started using this method, the motivation in the classes grew significantly, and the students began to feel much more competent in the approach to the literary text. We will present all aspects of decoding levels of meaning in the mentioned work.

Defining the Theory According to Specific Novels

The first question that was posed to students was: Why exactly does Eco's work correspond to this theory of semiotics? The first step was to define why we prefer to use semiotics and not deconstruction or feminism, for example. This approach made students more sensitive to the connection between literature and theory, and to the fact that there is a reason why we choose one theory instead of another.

In one of his interviews, Umberto Eco gives the answer himself. He states that as a writer, as well as a semiotician, he is particularly interested in the structure of the false sign. His novels, erudite and often historical, deal with intrigues, conspiracies, mysteries and mystifications whose interpretation poses a challenge to semiotics and to the reader. The false sign emphasizes the significance of the transmitted information and the consequences it has in the formation of reality.

In the paper that follows, we propose a semiotic reading of Umberto Eco's penultimate novel, *The Prague Cemetery* (2011), in the way it was analyzed in class. The novel is set in the 19th century, which deals with the production of historical (un)truths through the falsification of documents, the introduction of secret services, freemasons, spies... Through the activity of the main character and his participation in the manipulation of some of the turning historical documents, such as the *Protocols of the Elders of Zion*, Eco offers us his revisionist reading of history. Umberto Eco (1939-2016) is undoubtedly one of the most striking figures of contemporary Italian and world literature. His novels have the paradoxical fate of being extremely erudite, historically documented, but also conspiratorial, with an interest in the occult and mysticism, while at the same time bestsellers. Since he is a writer and a semiotician, as is the case with other writers - theoreticians, in his works one can sense the self-awareness of the writer's procedure, that is, find a conditionality between his theory and his works. In the field of semiotics, he gives several titles: *Absent Structure* (1968), *Theory of Semiotics* (1976), *The Role of the Reader* (1979), *Semiotics and the Philosophy of Language*

(1984), *The Limits of Interpretation* (1990), *Six Walks Through Narrative Forests* (1994), *Open Work* (2011).

What is particularly interesting about *The Prague Cemetery* (2011) is the possibility of looking at history as a literary narrative, where the fictionality and intertextuality that are a feature of literature are mirrored in history, and the history, through the disclosure of the narrator, is no longer a collection of documents and facts, but an instructed construction of political subjects depending on the needs of the day. This is why history requires not only reading, but also interpretation, something that the implicit narrator of this novel does by exposing the original processes that led to significant milestones. In this way, students are being offered a series of questions that establish theoretical considerations through a practical approach. For example, how historical facts are significant for the literary text, and how, on the other hand, history turns into fiction.

In addition to this thesis, in *Open Work* (2011) Umberto Eco separates the classical from the modern novel according to the degree of open interpretation to which each of them is subject. Although literary works have always, even those that Eco calls classical, carried the possibility of a plurality of meaning, however, according to him, the contemporary literary work possesses an open tendency to bring the interpretation to its ultimate possibilities.

The Place of the Reader in the Novel

The second task was to determine where is the place of the reader when we are talking about semiotic reading. If in the classical work there is a certain determinism of the meaning, in the contemporary work the reader is the one who stands in front of the possibility to invent the ending, to choose and combine the meanings depending on his worldview, degree of knowledge and results he expects from the text. The more the work is unusual and deviates from expectations, the more it is a carrier of information. The reader is called to constant organization, reconstruction, invention of the text he reads. If in *The Prague Cemetery* (2011) the first level of interpretation is done by the narrator, who writes his letters and texts in relation to the historical reality, the reader is the one who extracts the meanings at the next level, in relation to the structure of the novel. What we are interested in is the way in which Eco builds and organizes the meaning of the text, or as Larsch Moschel says in *Semiotic Analysis* (2012): "Semiotics is a method of text analysis that allows the true content of the text to emerge from its structure. It is about exploring how the text says what it says. The organization of the signified is more important than the sign." The Prague cemeteries do exist today in Prague and the interesting thing about them is that due to lack of space, the graves are piled on top of each other or next to each other; over time the plates have shifted and become distorted, so that if someone wanted to find the true meaning, he would first have to search from plate to plate, leaving it unclear whether each of the plates is in its proper place, so that each meaning is covered by some other meaning. Such a structure corresponds to Eco's idea of the interpretation of meaning in the text and of its constantly open interpretation. The very theme around which the action in the novel is formed becomes a metaphor about interpretation and serves as meta-poetics for the theory of semiotics.

But the Prague cemetery is also significant because of another historical fact. In the novel, the protagonist Simonini appears as the compiler of the historically famous forgery *Protocols of the Elders of Zion*, published for the first time in 1905 in Russia. They purport to be a record of the gathering at the Prague cemetery of twelve rabbis conspiring about the way to conquer the world and thereby avenge the long history of Jewish persecution. On the other level, the

narrator's vision is that the Protocols should be released to the public in order to incite hatred against the Jews and contribute to their extermination. According to the narrator, although it has been proven that the Protocols represent a mystification, many years after their appearance they have been used to justify anti-Semitism.

The semiotic reading brought the students to the question of intertextuality, as the meaning of one text as a system of signs was explained by using other texts that had influence on the previous. The students concluded that the *Protocols* mentioned in the novel were a representative sample of intertext (in reality, but also in Eco's novel), most likely compiled by the Russian journalist Matvey Golovinsky, who, apart from the fictional moments, also includes elements from the previously published novels of Maurice Joly (*The dialogue in hell between Machiavelli and Montesquieu*) and Eugène Sue (*The Wandering Jew*), as well as from the novel *Biarritz* by Hermann Goedsche, in which an excerpt was taken from *Joseph Balzamo*, written by Alexandre Dumas. Each sign refers to the plagiarism of a previous sign, the works mentioned by Simonini are only a copy of another copy, pre-blaming the original, but still used as true for a certain political purpose. This interweaving of literary works justifies Eco's thesis regarding intertextuality: "It is not true that works are created by their authors. Works are made of other works, texts are made of other texts, they all speak to each other independently of the authors' intention" (Plett, 1991:193). The foreknowledge of the mentioned novels reveals the way in which the meaning was created, up to the moment when the novel appropriates the character of mystification. If Joly's novel opposes the theses of liberalism and despotism and is an implicit criticism of Napoleon III, the protagonist Simonini uses the frame of this text in order to express his opinions on the Jewish tendency to overthrow the monarchy. Aleksandar Dima in turn contributes to the inspiration of the occult space of the meeting at the *Prague Cemetery* through the creation of a site of conspiracy in the novel *Thunder in the Mountains* written by Joseph Balzamo.

In fact, the creation of historical truth by the protagonist's writings made the students conscient of the position they have in the interpretation and of the distance they should accomplish in order to understand the truth.

History vs. Fiction

Other question that was assigned to students was: how does the historical truth influence the creating the semiotics of text? We know that the semantic core that produces and drives the narrative throughout this novel is the hatred of Jews. The narrator presents the history of France and Italy from the period between 1855 and 1898, but seeking the blame and responsibility for all the evil in history from the Jews – a fact that determines the direction of any future interpretation. And Simonini, who is a forger of political documents, through the insertion of his manuscripts, changes the course and meaning of history. The protagonist of Umberto Eco is involved in the unfolding of historical events, where the reader can follow the documented events of Simonini's participation in the Piedmontese secret services; in the activities during the period of the annexation of Savoy to France; in the arrival of Garibaldi in Sicily in order to overthrow the Bourbons and the attempt to unify Italy; in the attack of Prussia in Paris; in the overthrow of the Second Kingdom and the establishment of the Third French Republic; in The Paris Commune; in the Dreyfus Affair... One chapter in the novel is dedicated to each of these historical moments. Simonini's character is paid to orchestrate the outcome of all these significant historical events. He is a spy embedded in Garibaldi's army whose projects he tries to modify precisely by collecting information, transmitting false news, letters, plots against them. He is also the author of the famous *Bordereau* in the Dreyfus

Affair, the creator of the forgery that is to be planted on a Jewish soldier to accuse him of treason in the interest of the Prussians. He is sent to incite the writers of the works preceding the *Protocols*, Joly, Dimas, Gedsche, to write against the Jews or against the Freemasons, according to the interests of politics.

Signs, according to Eco, are always *signs-functions* (Lucie Guillemette et Josiane Cossette, 2006), i.e. they get their meaning depending on the culture, as Simonini's interpretation in relation to his contemporaries is reductive compared to our current view of their cultural contribution: in the novel we follow the caricature of Emile Zola, Proust, Victor Hugo, Garibaldi... As a contemporary of the 19th century, Dr. Freud is also found in the novel filled with significant historical figures. It complements the psychoanalytical reading of the semiotic, namely, psychoanalysis also interprets signs and symptoms. Simonini takes two ideas from Freud: one is that writing, i.e. symbolic marking, enables memory, i.e. finding meaning from what has been experienced, and the roots of memory are in childhood itself. The second idea is the doubling of personality explored by Freud. Applying the Freudian model, the narrator appears again in the role of an interpreter, but this time to himself: "That's why I decided to keep this diary, even against my will, telling myself my own past, gradually as I can bring them back to my mind, even the most insignificant things, until (how was it said?) the traumatizing element comes to light. By itself. And I want to heal myself, without surrendering myself to the hands of the crazy doctors" (Eco, 2011:67). As an essential determinant of his being, the protagonist considers the two basic passions, love and hate, and begins his presentation by defining himself through what he hates: "I feel a certain discomfort as I begin to write, at least I have to bare my soul, on orders - not from God!" Let me say on the advice of a German (or Austrian, but it's the same) Jew. Who am I? Perhaps it is more useful to ask myself first about my own passions than about the events of my life. Who do I love? Some loved ones do not come to mind. I know I love good cuisine (...) Who do I hate? I hate the Jews, it comes naturally to me to say..." (Eco, 2011:13).

The main subject towards whom his hatred is directed are the Jews, a hatred that was created and nurtured in childhood, transmitted by tradition through the stories of his grandfather. Simonini is in a duality, first of all psychological, divided into two personalities, one of whom is a schemer, and the other an honest abbot, and while the first one remembers the events that are within the acceptable limits of his morality, the abbot Dalla Piccola blames him for those events that Simonini's reason suppresses due to their cruelty. The students were able to distinguish the semiotic levels of the characters descriptions from physical, psychological or ideological point of view. Their different semiotic descriptions emphasize the different narrations that they undertake and the different paths of the two narrators who are actually one literary character with divided conscience.

The Divided Narrators Who Leave Signs

Another assignment that was posed in class was the way in which the detection of different narrators in text is crucial for the strategy of production of signs in text.

Simonini and Dalla Piccola do not meet, even though they live in two rooms connected by a corridor in the same house, but only come across signs, traces and clues that tell one about the other. They both follow up on their letters in the *Diary* and read about each other. From their *Diary* comes the novel that we are reading, which should clarify to each of them whether they are one or two persons. Thus, there are three narrators, Simonini, Dalla Piccola and the narrator who, like the two previous ones, and the readers, are trying to figure out who

is who. The two narrators leave signs for each other in the form of letters that complete the story. They also leave parts of their clothing and dwelling which as *signs-indexes* should enable the other to find their true face. They also leave *signs-traces*, that is, unconsciously forgotten prints that speak of their presence in the other's room. In that mutual interpretation of diary entries, Umberto Eco seems to confirm his thesis about compactness, but at the same time about the openness of each work to additional interpretations: "The work of art is a completed and closed form in its uniqueness as a balanced organic whole, while at the same time it constitutes an open product due to its susceptibility to numerous different interpretations that do not violate its indestructible specificity" (Eco, 1979: 49).

The Distance and the Empathy of the Reader

In one of the final chapters of the novel, entitled *The Devil of the XIXth Century*, the meaning becomes openly subversive. Eco is radical in presenting one of the black masses of the sects to the reader, but perhaps this is the culmination of all the evil that pervades the novel. The evil of history, the evil of the characters, who, under the pressure of conscience, double down in order not to admit to themselves what they have done. As one of the characters in the novel, the Russian Rashkovski, says: "The sense of identity is based on hatred, on hatred towards the one who is not the same. That is why hatred should be nurtured as a passion of every citizen. The enemy is, in fact, the enemy of the entire nation. We always need someone to despise to comfort us with our own misery. Hate is the true primal passion. Love is, in fact, an unnatural state. That's why they killed Christ: he preached against nature. There is no love that lasts a lifetime... Hate, on the contrary, can last a lifetime. It is enough that the object of impatience is always before our eyes, because hatred warms the heart. " (Eco, 1979: 458-459). In an interview, Eco claims that the idea was to create a character, the worst protagonist in the history of literature. And indeed, the students cannot identify themselves with the character, his absence of morality and psychology reduces him to just a structure or a sign. From the very beginning of the novel, he is a bearer of hatred, a misogynist, a misanthrope, an anti-Semite, he despises all people and nations. Just as the character Rashkovski says that Europe needed the Jew to have someone to direct his hatred towards and avoid internal discord, so Simonini's diary writing allows him to sublimate hatred and overcome the doubling of the personality, so the record of history helps to overcome the hatred of the past. But can one know history ahead of time and write it as one writes a novel? And to what extent can the literary be an inspiration for the historical narrative? How does Eco's novel ask these questions? Between the individual and the collective identity, between the personal, historical and literary text, the unbreakable ties of love and hate are woven. Perhaps Eco's idea is similar to Freud's: that writing sublimates the negative drive that abounds in Europe's dirty past, and history presented by direct participants who know its pitfalls and entanglements is a kind of anamnesis of the past.

Conclusion

We have elaborated some of the student's conclusions from applying the semiotic method in literature. Instead of presenting the authors in class in the traditional way, starting from their biography, their bibliography and main aspect of their most popular work, we determine an adequate method for each work and interpret the work of the author using that specific terminology and structure. After couple of classes, the students were feeling more competent in analyzing literature and more confident to express their personal opinions regarding the books, because they knew that there is a method behind it and they do not risk a complete subjectivity.

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Promoting Metacognitive Skills for Enhancing ESL Underachievers' Comprehension of English Reading: A Case Study in Saudi Arabia

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Abstract

The present study aimed to improve the reading comprehension of underperforming ESL students in a Saudi Arabian girls' school by investigating the effects of metacognitive strategies. For this purpose, three sixth-grade classrooms received specialized training and lessons on these strategies, while three other classrooms followed the standard curriculum with different teachers for comparison. Data collection included pre- and post-intervention comprehension tests and interviews. Quantitative analysis involved comparing test scores, while qualitative research assessed students' use of metacognitive strategies during interviews. A 5-point scale coding framework was used for qualitative analysis, with two coders achieving 80-90% agreement. The results unequivocally demonstrated the positive impact of metacognitive strategies on low-achieving students' reading comprehension. The significant increase in average test scores post-intervention substantiated the strategy's efficacy. This study underscores the potential benefits of targeted interventions and specialized lessons in ESL settings, ultimately enhancing academic performance for second-language learners.

Keywords: Metacognition, Metacognitive Strategies, Reading Comprehension, English as a Second Language, Underachievers

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Introduction

Reading comprehension plays a pivotal role in developing ESL language proficiency, especially in acquiring second and foreign languages like English. ESL students need help comprehending English reading materials due to their limited reading abilities (Al-Jarrah & Ismail, 2018) and insufficient mastery of reading skills (Qarqez & Rashid, 2017). These challenges can impede their progress toward English proficiency (Kiew & Shah, 2020; Lim et al., 2018; Liu et al., 2016; Mansor, 2017). Recognizing these shared challenges and promoting effective reading strategies can empower ESL learners to enhance their language acquisition and overcome obstacles in reading proficiency. In line with this perspective, Tamin and Buyukahuska (2020) highlighted the positive impact of integrating metacognitive strategies into reading lessons to enhance students' reading abilities. Despite the importance of metacognition to reading proficiency (Anderson, 2002; Kamil et al., 2010; Mokhtari & Sheorey, 2002; Mokhtari et al., 2008), little is known about L2 low-achieving students' awareness and use of metacognitive strategies in academic reading contexts. The literature characterizes these students as young children with limited reading skills (Gambrell & Heathington, 1981; Micklos, 1990; Hoskyn & Swanson, 2000). They need to gain the characteristics typically associated with proficient readers, including weak word identification, study skills, reading comprehension, and fluency (Vacca & Vacca, 1999). Consequently, they need help self-regulating and more skills to learn effectively and navigate challenging tasks. By investigating metacognition among low-achieving readers, we can uncover strategies to unlock their potential and support their academic growth.

Metacognition, a vital component of self-regulated learning, is pivotal in students' ability to monitor, control, and gain self-awareness of their learning processes (Zhang and Zhang, 2019; Sun and Zhang, 2022; Teng et al., 2022). It is widely recognized that metacognition, encompassing metacognitive information, experiences, and strategies, significantly impacts the acquisition and development of second languages (Qin and Zhang, 2019; Zhang et al., 2019; Teng and Zhang, 2020; Wu, 2021; Zhang and Zhang, 2022). Acting as a form of self-consciousness, metacognition facilitates optimal control, knowledge, and comprehension of cognitive processes. By engaging in cognitive reflection, metacognition stimulates interest and enables learners to examine their cognitive functions (Sato, 2021). It is essential because understanding cognitive processes empowers students to design and adopt performance-enhancing strategies (Zhang & Teng, 2021). Metacognitive awareness, also known as understanding how one learns in a classroom, is crucial for learners to become more productive and, most importantly, autonomous (Akbarzadeh et al., 2020). The outcomes of this study are to suggest strategies for enhancing the instruction of English reading comprehension as a second language and supporting ESL teachers in improving reading skills.

Moreover, the findings can contribute to understanding diverse teaching practices and how students develop reading approaches. The study also intends to establish a connection between reading difficulties among ESL learners and using metacognitive reading strategies. The research findings will assist in designing academic curricula and guiding programs for lower-performing students in upper elementary grades to enhance their reading comprehension by applying metacognitive reading strategies.

Literature Review

Reading comprehension can be a challenging task for second-language learners of English. Numerous research studies have delved into the factors influencing the reading proficiency and

comprehension of ESL learners, and they have highlighted the significance of metacognitive strategies in enhancing students' reading comprehension (Ahmadian & Pasand, 2017; Al-Jarrah & Ismail, 2018; Alsalihi, 2020; Chen et al., 2016; Kiew & Shah, 2020; Lim et al., 2018; Mansor, 2017; Qrgez & Ab Rashid, 2017; Tamin & Büyükahıska, 2020). These studies have consistently shown a positive correlation between the use of metacognitive methods by readers and their ability to comprehend text in a second language.

Interestingly, most researchers (Grabe, 2002; Mokhtari et al., 2018) have underscored the pivotal role of cognitive process awareness in comprehension. This awareness of one's thinking processes is commonly referred to in the literature as metacognition (Flavell, 1979). Regardless of potential variations in teaching and learning approaches in different countries and cultures, metacognition is essential to the learning process on a global scale. A study on the Program for International Student Assessment (PISA) demonstrates a positive correlation between metacognitive knowledge and reading comprehension across the thirty-four Organizations for Economic Co-operation and Development (OECD) countries analyzed (Ertelt & Schneider, 2015). Thus, students with higher metacognitive knowledge tend to achieve higher reading comprehension scores. Kuhn and Dean (2004) define this concept as "the awareness and management of an individual's thoughts." Similarly, Collins and Smith (2008) have highlighted that these strategies "help students focus their attention on understanding content and making connections between prior knowledge and new information." Various cognitive activities related to L2 learning depend on metacognition, which essentially involves thinking about one's thinking (Flavell, 1979; Zhang, 2018).

Readers' application of metacognitive strategies also depends on their understanding of these strategies that enhance reading comprehension (Soodla et al., 2016; Zhang, 2018). Low performance in reading does not stem from a single factor but instead results from a combination of factors that accumulate over time and impede progress. The literature often describes these individuals as adolescents with limited reading skills (Gambrell & Heathington, 1981; Micklos, 1990; Hoskyn & Swanson, 2000, p. 102), lacking the attributes that differentiate struggling readers, including poor word identification, research skills, comprehension, and fluency (R. et al., 1999). Studies examining the impact of reading proficiency on other skills have shown a correlation between the amount of reading and spelling competence (Stanovich & West, 1989; Polak & Krashen, 1998), as well as a positive association between reading and writing proficiency (Lee & Krashen, 1997).

Numerous ESL students may not have a daily need for spoken English but are obligated to read it to access the wealth of information available in the language, as Eskey (2005) emphasized. Researchers in the field of metacognition have shown that learners' comprehension of the learning process guides and directs their thinking and behavior (Jacobs & Paris, 1987; Zhang & Seepho, 2013).

In practical terms, metacognition theory, when applied to reading, becomes strategic reading. Readers of a second language (L2) often need help with unfamiliar words, grammatical structures, or topics. It is during these moments that reading difficulties surface, prompting L2 readers to consciously assess and explore alternative approaches or sources to overcome comprehension challenges (Phakiti, 2006).

These findings and others indicate that less proficient L2 readers can benefit from metacognitive training programs that promote an understanding of effective metacognitive strategies for enhancing reading comprehension. Introducing them to various effective

metacognitive strategies in L2 academic reading can assist in reducing errors, addressing reading challenges, and deepening their comprehension of L2 academic texts (Roohani, 2017).

Current research on the impact of metacognitive strategies on the reading comprehension of low-achieving L2 students remains limited in the local context. Within studies conducted by Saudi Arabian researchers focusing on enhancing English reading skills, Tausif (2021) emphasizes that "Studying in English poses a significant challenge for students, and a substantial number of them discontinue their education. The authors contend that metacognitive awareness assists students in surmounting this hurdle and promotes academic success. It cultivates self-confidence and encourages lifelong learning. A key finding relevant to this study is that metacognitive reading strategies enhance the reading comprehension of low-achieving ESL readers despite their initial discomfort with metacognitive strategies (Ismaeil & Tawalbeh, 2015).

A substantial body of research on metacognition in L2 reading underscores the positive correlation between readers' metacognitive strategies and their success in L2 reading comprehension. Additionally, language proficiency is linked to readers' development of metacognitive skills (Taraban et al., 2000; Hong-Nam et al., 2014). Therefore, L2 readers must know how to apply reading strategies when planning, regulating, and evaluating their reading processes.

Research Questions

1. How significantly can Metacognitive strategies help low-achieving ESL students improve their reading comprehension skills?
2. How do ESL low-achieving students perceive and respond to the Metacognitive strategy's implementation in their reading comprehension lessons?
3. What is the strength and nature of the correlation between semi-structured interviews and reading comprehension test scores, and how does this correlation vary across different subgroups within the population?

The approach used is described in the section that follows.

Methodology

Participants

This study involved 54 upper elementary ESL female learners and their teachers from a private school in Riyadh City, Saudi Arabia. The students, aged 10 to 12, were native Arabic speakers. To identify low achievers in reading, we used a combination of their GPA and pre-test results, selecting those who scored below the criteria for low achievers.

The students were divided into two groups. The control group consisted of 21 students with varying levels of achievement (low, average, and high) in ESL. They were taught using a traditional reading comprehension method emphasizing grammar, vocabulary, and sentence structure.

The experimental group comprised 33 students with different levels of achievement (low, average, and high) in ESL. They received direct instruction on metacognitive strategies as part of the intervention.

Prior to the intervention, three teachers were chosen for the experimental group. They attended a one-week workshop on using metacognitive strategies, providing approximately six hours of training spread over three days.

Materials

Reading Comprehension Test

The study employed a reading comprehension test designed by the researcher, which consisted of a single passage and various questions to assess students' utilization of metacognitive strategies. This test was divided into two categories. The Pretest was administered before implementing the reading comprehension techniques in both groups to evaluate students' fundamental reading comprehension abilities. The posttest was conducted after the intervention to measure students' reading comprehension differences.

The reading material used in the test was adapted from Grade VI textbooks and online sources, focusing on descriptive genre content. The questions on the test were formulated based on activities and exercises outlined in the training manual.

Semi-structured Interviews

Semi-structured interviews were used in the research to allow participants to express their thoughts about what they were reading. The main goal was to investigate the association between metacognitive reading strategies and students' achievement in reading comprehension after completing the task. Respondents were asked about a text in which they used the strategy during the interviews. The researchers wanted to know if the intervention affected their reading comprehension abilities.

Each student participated in an individual interview with the researcher. They read and analyzed prompts using various metacognitive reading strategies. These interviews typically lasted 5 to 10 minutes, during which students were guided to read a text progressively and respond to comprehension questions that encouraged the use of reading strategies, including prediction, visualization, making connections to their own lives, inferring, and employing fix-up methods to interpret context clues and recognize patterns in the text. The students' responses were recorded as verbatim notes during the interviews and subsequently coded by two educational researchers.

Procedure

This study utilized an experimental research approach, explicitly employing a quasi-experimental design. The study assessed students' reading comprehension of descriptive text using metacognitive strategies through a pretest and post-test design.

Before the intervention, teachers were trained in specific reading strategies, which included a thirty-minute lecture on the metacognitive approach. The students were divided into two groups: the control group and the experimental group. Before the treatment, all students took a pretest to gauge their fundamental reading comprehension abilities. The treatment involved regular reading instruction for the control group, while the experimental group received activities and metacognitive strategies for approximately 6 months.

Teaching English as a Second Language (ESL) reading followed a set of procedures outlined by Moreillon (2007). These procedures included re-reading the text, engaging with prior knowledge, making inferences, visualizing, summarizing what was read in writing, making predictions, and generating new questions.

Following the intervention, a post-test was administered to the students to determine whether there was a significant difference in their reading comprehension scores. The program's effectiveness was assessed by comparing the pretest and post-test scores between the experimental and control groups. Additionally, individual interviews were conducted with the students before and after the intervention, using an evaluation tool prepared by the researcher.

Procedures of Data Collection and Methods of Analysis

Concurrent collection of both quantitative and qualitative data was incorporated in the research. Quantitative data, represented by the Reading Comprehension Test, were gathered before and after a 6-month intervention. During this period, the experimental group received reading lessons incorporating metacognitive strategies (used before, during, and after reading) and customized activities. In contrast, the control group followed the standard approach of using textbooks for their reading lessons. The quantitative data collected underwent analysis, including descriptive and inferential statistical methods.

Qualitative data were acquired through semi-structured interviews, allowing participants to articulate their thoughts and experiences. A coding framework was devised, employing a 5-point scale to evaluate students' responses to the interview questions. This framework facilitated the assessment of the effectiveness of the metacognitive strategies applied by the students, and a consensus was reached on their effectiveness. Eight metacognitive strategies were identified, with the fix-up approach, prediction, and making connections being recognized as the most effective for enhancing text comprehension.

Results

In this research, we undertook a comprehensive study using an experimental design to assess the effects of Metacognitive strategies on the reading comprehension skills of low-achieving ESL students. The study spanned from November 2021 to June 2022, encompassing pre- and post-intervention periods. To assess the effectiveness of the intervention, we employed the Wilcoxon Rank-Sum test as a statistical tool, which allowed us to scrutinize the data collected from both the experimental and control groups.

We aimed to understand how the application of Metacognitive strategies impacted the reading comprehension abilities of the participants. For this purpose, we administered pre- and post-reading comprehension tests and meticulously analyzed the results. As presented in Table 1, our analysis demonstrated intriguing findings. Firstly, in the control group, we observed that only about half of the students displayed improvements in their post-test scores. Even more concerning, nearly one-third of the students in the control group scored lower on the post-test than their initial scores on the pre-test. This indicates a substantial variability in performance within the control group. In contrast, the experimental group exhibited significantly more promising results. All students in this group showcased improvements in their post-test scores, which were noticeable and reached statistical significance. This points to the effectiveness of the Metacognitive strategies in enhancing the reading comprehension skills of low-achieving ESL students.

What's particularly intriguing is that, despite the initial advantage that the control group had at the beginning of the study, the students in the experimental group managed to outperform their counterparts in the control group. This underscores the substantial impact of the Metacognitive strategies, allowing students in the experimental group to catch up and surpass those who initially had a head start. To put this remarkable progress into perspective, it's worth highlighting that, on average, students in the experimental group achieved a significant increase of 20 points in their overall performance. This substantial improvement underlines the transformative effect of Metacognitive strategies on the reading comprehension skills of the low-achieving ESL students involved in this study.

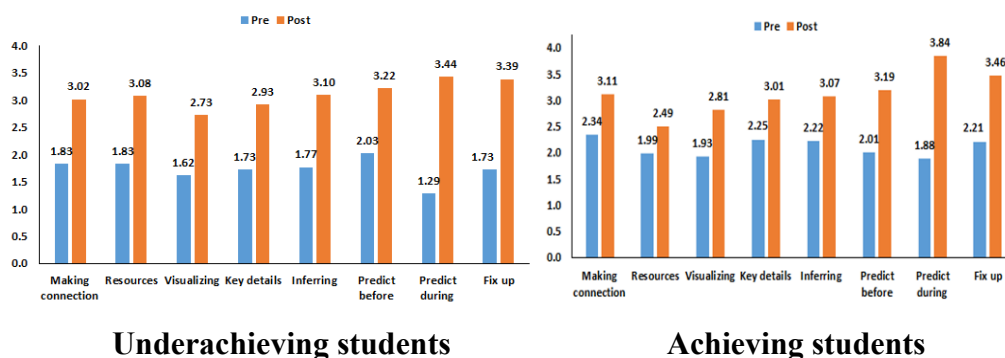
Table 1: Comparing students' grades on pre- and post-reading tests by groups

	Means %		N		Ties	Mean Rank		Z	P -value
	Pre test	Post test	Neg. Ranks	Pos. Ranks		Neg. Ranks	Pos. Ranks		
Cont. group	60.60%	62.00%	6	10	5	9.50	7.90	-0.573	0.567
Exp. group	55.85%	76.60%	1	32	0	1.00	17.50	-5.005	0.000**

For the second question about perceiving and responding to the Metacognitive strategy's implementation in their reading comprehension lessons the results are displayed in Figure 1. The outcomes of our research clearly indicate that all students in the experimental group made substantial progress in their ability to apply the strategies taught during the intervention. Notably, each of the techniques employed by the students exhibited statistical significance at a significance level of $p < 0.01$.

During the interview phase, we gained valuable insights into the range of strategies employed by the students. These strategies included making connections, visualization, predictions, inferencing, using available resources, focusing on key details, and utilizing the fix-up strategy. Initially, the underachieving students demonstrated lower proficiency in utilizing each of these strategies compared to their high-achieving counterparts (as seen by comparing the blue bars in the top and bottom graphs of Figure 1). However, after the instructional intervention, the low-achieving students gradually improved and reached a proficiency level similar to that of the high-achieving students (as indicated by the orange bars in the top and bottom graphs of Figure 1). In some instances, the low-achieving students even surpassed the average scores of the high-achievers.

The results presented in Figure 1 strongly suggest that the strategies taught during the intervention were effective in helping low-achieving students apply reading strategies more effectively. These findings highlight the pivotal role of the intervention in narrowing the proficiency gap in reading strategy utilization between low-achieving students and their high-achieving peers. Furthermore, the students significantly improved their utilization of the less-explored metacognitive strategies, with scores shifting from below average (1.2 to 2.25 on a scale of 5) to above average (ranging from 3.49 to 3.84). While this improvement is evident, it's worth noting that none of the strategies received a high score, defined as above.



Underachieving students **Achieving students**
 Figure 1: Comparing students' metacognitive strategies in the pre- and post-interviews for the underachieving (first graph) and high-achieving (second graph) students

The inquiry before the intervention centered on the correlation between semi-structured interviews and reading comprehension test scores and how this correlation might differ across various subgroups in the population. Several elements contributed to the assertion of metacognitive strategies' efficacy in enhancing the reading comprehension of underperforming students. This was substantiated by noticeable disparities in students' responses during pre-interviews and post-interviews. In particular, some students exhibited substantial score improvements, advancing from level one on the rubric to levels four and five.

An illustrative example is a student struggling to grasp and interpret the text during the pre-interview. In this case, one student worked to respond coherently to the question, "What is your understanding of the text we have covered so far?" However, after the intervention, there was a noticeable transformation as the student confidently expressed, "Andy, a young boy, hides within a tree while his family enjoys a meal in their backyard." Likewise, a different student faced a question during the pre-interview: "How do you make sense of the text?" At that time, the student couldn't formulate a substantial response. However, there was a significant improvement in the post-interview as the student responded fluently, saying, "I approach the text by re-reading it, which helps me visualize the unfolding events. Additionally, I use self-inquiry to consider the whereabouts of Andy and the other characters."

A clear and remarkable pattern emerges when we carefully analyze the performance of both underachieving and achieving students in both the experimental and control groups during the pre-and post-interviews (see Table 2). Notably, the underachieving students in the experimental group showed the most significant improvement despite starting as the lowest performers. Their mean score in the post-interview assessment impressively reached 3.33. This substantial improvement is supported by rigorous statistical analysis using the Wilcoxon signed-rank test. The analysis yielded a Z value of -3.27 with a p-value of less than 0.05. This indicates that the difference in performance between the pre-and post-interviews among underachieving students in the experimental group is statistically significant. In other words, the improvement in their performance can be attributed to the intervention, specifically the implementation of the fix-up strategy, and is not due to random chance.

What's particularly intriguing is the change in the p-value. Initially, during the pretest, the p-value was above the conventional significance threshold ($p > 0.05$), indicating no statistically significant differences. However, after implementing the fix-up strategy, the p-value decreased significantly. This shift underscores the effectiveness of the fix-up strategy in creating a notable difference between the pre-and post-interviews, ultimately leading to improved performance.

An exciting aspect examines how the fix-up strategy correlates with interview questions and its impact on comprehension outcomes, especially among underachieving students. They demonstrated a correlation coefficient of 0.69, indicating a strong positive relationship between employing the strategy and improved comprehension outcomes. In simpler terms, there's a 70% likelihood that underachieving students benefited more from the strategy in understanding interview questions, which, in turn, contributed to their improved performance.

Table 2: Comparing (UA) underachievers and (A) achieving students' improvement between pre-and post- interviews and reading comprehension tests using the metacognitive strategies by groups

Groups	N	Mean	SD	Z	Sig 2-tailed	correlation
UA-Exp. / pre-int. and pretests	16	1.8	0.46	-0.38	0.69	0.17
UA-Exp./ post-int. and posttests	16	3.33	0.27	-3.27	0.001	0.69
A-Exp./ pre-int. and pretests	17	2.4	0.66	-0.30	0.75	0.34
A-Exp./ post-int. and posttests	17	3.34	0.36	-0.68	0.49	0.43
UA-cont./ pre-int. and pretests	9	2.12	0.42	-0.35	0.72	0.11
UA-cont./ post-int. and posttests	9	2.7	0.48	-1.83	0.06	0.16
A-cont./ pre-int. and pretests	12	2.08	0.35	-2.12	0.03	0.32
A-cont./ post-int. and posttests	12	2.95	0.42	-0.45	0.9	0.37

Conclusion and Discussion

The main objective of this study was to examine the impact of explicitly teaching metacognitive reading strategies to underperform ESL students in KSA on their reading comprehension. The results from reading comprehension tests conducted before and after the training showed a statistically significant improvement in student performance. Both low- and high-performing students demonstrated a substantial 20-point increase in their reading comprehension scores. According to the school's achievement criteria, 10 out of 12 low-achieving students in the experimental group succeeded in reading comprehension by scoring above 50%. Moreover, the students improved their test scores and demonstrated enhanced utilization of the metacognitive reading strategies they were taught, as evident in individual interviews. Particularly noteworthy was that underachieving students in the experimental group improved their application of these strategies to a level on par with that of the high-achieving students.

This study's findings align with existing literature, underscoring the importance of metacognitive reading techniques in enhancing comprehension among second language learners. Numerous studies have consistently shown that metacognition enhances students' reading comprehension abilities. For example, Anderson's (2003), emphasizes that reading development is an ongoing process positively influenced by active engagement in metacognitive processes during reading. Additionally, Gordon and Lu's study (2008) found that students' reading performance improved significantly after instruction on selecting the

most effective reading strategies. Moreover, our data aligns with the results of Gordon and Lu's 2021 study, suggesting that the experimental group continued to benefit from the reading training program well into the follow-up period.

While the study yielded positive results supporting metacognitive reading strategies, a potential limitation stems from its relatively small sample size, which may raise concerns about the findings' generalizability. Nonetheless, it's crucial to highlight that the study's effect size was substantial, measuring 1, and the test's statistical power fell within the recommended range of 0.80 to 1, following Siddharth's guidance (2019). This underscores the adequacy of the sample size and ensures the study's validity. Consequently, though variations in sample size can introduce some bias, they did not significantly impact the study's outcomes.

Given the ongoing endorsement of metacognitive reading strategy instruction as an ongoing process, it is advisable to develop tailored programs to enhance students' reading comprehension performance. This proactive approach should be an integral component of the teaching and learning of reading.

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The Impacts of Lifelong and Distance Education on Adult Learners' Lives and Reclaiming Lifelong Learning as a Human Development Process

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Abstract

This article makes a focus on the importance of Adult, Lifelong & Distance Learning. Nowadays, in modern information and communication conditions, it is impossible to imagine education without distance and lifelong learning. The article explores the potentials of distance learning in the lives of adult learners. Distance education, for adult learners, is a scenario that not only strengthens the personal, social and professional development of individuals, but also the development of competencies applied not only to the digital world but also to each person's daily activities. The consequence of lifelong learning is fixed in our societies through documents and speeches published by national and supranational organizations worldwide such as the OECD (Organization for Economic Co-operation and Development) UNESCO (United Nations Educational, Scientific and Cultural Organization), the World Bank and the European Union (EU). Thus, educational reforms, particularly in the European Union' countries, since the 1990s have been guided by the recommendations of these international organizations that, through an abundant production of documents and the development of statistical projects, emphasize the centrality of education and its ability to guarantee employability, avoiding social exclusion, promoting citizenship and personal development. The desired scenarios for the evolution of societies in the official discourses and documents emphasize the importance of learning and access to skills, competencies, and knowledge, as determinants of an adaptation of societies to the globalization of economies and technological and social changes (UNESCO, 2016). At the heart of this vision is the idea of Lifelong Learning.

Keywords: Adult Education, Distance Learning, Lifelong Learning, Online Education, Human Development, National and Supranational Organizations, Vision of Education

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Introduction

The continuous nature of education and learning, which derives from the universal principle of education, is united in the concept of "lifelong learning". According to the UNESCO Institute for Lifelong Learning (UNESCO UIL), one of the most important international actors in the field, lifelong learning is essentially "based on the combination of learning and living, involving people of all age groups in all life situations (family, school, community, workplace, etc.) educational activities carried out in different ways (formal, informal and informal) aimed at meeting a wide range of educational needs and requirements"(UNESCO, 2014).

Thus, we can outline the relationship between the concepts of Lifelong and Adult Learning, that is supported by the vision that "in the world of lifelong learning" includes all forms of education and learning that aim to "ensure the participation of all adults in the life of a given society and in the world of work". (UNESCO, 2015) Thus, adult learners are the main actors of lifelong learning. In general, an adult learner is considered to be a person who "systematically attends any format of adult education, is representative of the chronological period following adolescence, and voluntarily participates in learning and teaching processes." Adulthood is characterized by different forms of maturity, from biological to emotional and psychosocial, vocational, cultural and political" (Mavrak, 2018). This means that adult learners are an extremely heterogeneous group, defined not so much by age criteria as by learning needs and motivations. Therefore, the official "age threshold" for obtaining adult status varies quite a bit in a number of countries and is not necessarily related to the legal age of majority.

Lifelong learning is "The self-directed, continuous quest to seek formal or informal education for personal enjoyment or to develop career skills. Lifelong learning is imperative to the maximization of human potential across the lifespan and remains at the forefront of these challenges. Learning can take place in *formal, non-formal and informal settings*.

Formal education is provided in an institutionalized, deliberate and planned manner through public organizations and recognized private institutions, which in their entirety, constitute the formal education system of a country. Formal education is usually associated with a continuous path from initial education to an individual's first entry into the labor market. However, it may also include vocational education, education for people with special needs and other types of adult education. In any case, formal education programs must have at least one semester of study.

Non-formal education is also institutionalized, deliberate and planned by the institution providing education, as is the case with formal education. However, the important feature of non-formal education is that it "appears as an addition, alternative and/or complement to formal education in the process of lifelong learning". Non-formal education programs may provide qualifications but are not recognized by government education authorities as equivalent to formal qualifications.

Informal learning includes all forms of learning that are intentional or incidental, but not institutionalized (UNESCO UIL, 2012). In contrast, formal and informal education, informal learning is much less structured and organized. It can take place in the context of everyday life: in the family, at work, in the local community, through volunteering, in the digital space, in museums or libraries.

Distance Education

Distance education is based on the learner's independence theory, with the minimum needed face-to-face teacher-student interaction, and the maximum level of personal learning materials. Distance learning is not a new concept; it has expanded all over the world since the 1980s. Industrialized and developing countries as well have adopted distance learning (Rumble & Harry, 1982). In Europe and other Western countries, a worldwide interest was arising.

Honeyman and Miller (1993) defined Distance education as: “ a field of education that focuses on teaching methods and technology with the aim of delivering teaching, often on an individual basis, to students who are not physically present in a traditional educational setting such as a classroom”¹. (Honeyman and Miller, 1993, p. 67). According to Rikala et al traditional teaching and learning approaches are insufficient to fulfil the expectations of today's learners. Distance learning, e-learning, online learning, virtual or mobile learning opportunities have been widely discussed as an alternative to traditional teaching and learning in the recent decades. Rikala (2015) analyses the interrelationship and differences between eLearning, distance learning and mobile learning. The author emphasizes differences in time and space and views technology as a tool to bridge the differences and gaps using the pace of study and methods convenient for students.

Another definition of distance education is “the process of acquiring knowledge and skills through a variety of media for the transfer of education and information, including all types of technology and various forms of education level for distance learning” (The American Association for Distance Learning [USDLA], 2004). ELearning is a type of learning or teaching platform that depends on electronic devices and technology instead of papers and classroom teaching (Wheeler, 2012). There are two main types of e-Learning: time-independent asynchronous type, where students study from downloadable courseware at their convenient time, and the synchronous type, where real-time online learning with the ability to interact and chat with students in live conferences is scheduled at set times (Merzouk et al., 2014). There are many distance learning choices; like video conferences, synchronous learning, asynchronous learning, open-schedule, fixed-time, computer-based, and hybrid learning.

Characteristics of Distance Education

Distance education has various characteristics that make this model of learning so attractive for students around the world, but the following characteristics are most important:

1. **Flexibility** - One of the main reasons why people choose online learning is the ability to balance their private and school commitments. In most cases, students who opt for online education have commitments that cannot be postponed.

This is why they need the freedom of being able to plan when they will attend lectures and complete assignments. In addition, e-learning allows a learning rhythm that does not depend on other students, so one can speed up or slow down depending on their abilities and commitments.

¹ Honeyman, M., Miller, G. (1993). Agriculture distance education: A valid alternative for higher education? Proceedings of the National Agricultural Education Research Meeting, pp. 67-73.

2. All learning materials are in one place - In online learning, learning materials are available to students at all times. Educational institutions are obligated to provide each student with the learning material necessary for passing exams and successfully completing the course.

Learning material usually refers to recordings of online lectures, online books, tests, etc. Literature is mostly stored on the school server or sent to students' email so they could use it when it suits them. This saves time and facilitates independent learning.

3. Possibility of delayed viewing/replay – People choose distance learning because they want to have the freedom to study when their obligations allow. This is possible thanks to the main characteristic of online education, i.e. possibility of delayed viewing. All lectures are recorded and uploaded to the server, after which they are available to students 24/7. The recorded material can be paused, rewatched, which makes it easier to follow lessons and maintain the desired learning pace.

4. Cost effective – online education is, as a rule, significantly cheaper than traditional education. Tuition fees are lower primarily because students are not physically present at lectures. In addition, there are no accompanying costs of transportation, books and food. Online education only requires a stable Internet connection and a laptop (or even a mobile phone).

5. Quality – distance education provides high-quality education that not only enables the acquisition of new knowledge, but also internationally recognized diplomas and certificates. A large number of schools that organize online courses have years of experience in this field, and can guarantee top quality teachers and latest study programs. This is why diplomas and certificates acquired in online programs are highly valued around the world, both by other educational institutions and employers.

Conclusion

The rapid advances in technology, globalization and longevity should be met with an adaptable and flexible community. Lifelong learning will be instrumental in preparing for these changes and in cultivating a future-ready society that positively shifts the future of education, health and well-being. Interdisciplinary research integrating knowledge from learning sciences with psychology, social sciences, and cognitive neuroscience should be considered in tandem to inform lifelong learning policies and practices. Importantly, open source data platforms that promote knowledge-sharing, accessibility and inclusivity among educators, businesses, policy-makers, individuals and their communities are fundamental for the future of the science of lifelong learning. Thanks to its many positive characteristics, distance education as an instrument of lifelong learning has never been so accessible as it is now. Various obstacles, such as lack of time have been solved in this form of education, as shown by the data, because more and more students around the world opt for e-learning. Simply put, studying from home enables one to obtain high-quality education, while retaining the flexibility of their private life. Everyone is entitled to a good education and a chance for a successful career, and this is exactly what distance education can provide.

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How to Improve Choral Teaching Efficiency? An Experimental Research of Structured Teaching Model in Primary Choral Education

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Abstract

In recent years, various choral exhibition festivals and choral competitions have emerged, which is an effective way to promote the prosperity of choral teaching, but under the performance-oriented evaluation method, it will lead to too utilitarian choral teaching and weaken the educational significance of choral teaching itself. In choral education within primary schools, a successful stage performance is often considered the standard to assess the effectiveness of choral teaching. However, this outcome-oriented evaluation method may lead teachers to gradually prioritize performance as the ultimate goal of choral education, while disregarding the true improvement of students' abilities and characters. Consequently, teachers may excessively emphasize repetitive and mechanical rehearsals in order to achieve the best performance, which creates a paradox between performance and education. Performance-oriented choral teaching has various drawbacks, which speaks to the necessity for a teaching approach that reconciles this paradox and promotes the educational value of choral teaching. In this article, a structured choral teaching model was developed, we conducted an experimental study with two classes of students (N=96) from a school in central China to verify the nurturing effectiveness of structured instruction. The results of the study showed that structured teaching model takes a student-centered approach with the goal of enhancing student ability and character development, thereby balancing the relationship between performance and education.

Keywords: Choral Teaching, Students Development, Structured Teaching Model, Music Education

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1. Introduction

The famous music educator Kodály once said that a small-town singing teacher may be more important than the conductor of a large opera house. Because a poor conductor may just suffer a failure (even a good conductor may suffer a failure), but an incompetent teacher may kill the love of music in 30 classes in 30 years, which highlights the importance of singing in school music education.

As one of the most common forms of musical performance, choral singing has been widely present in the school music education system. However, the paradox of performance and teaching in choral teaching has always existed, as an excellent performance is often seen as the most effective and direct way to assess the effectiveness of choral teaching. This has led to choral teaching becoming increasingly guided by utilitarianism, which deviates from the nurturing role of foundational music education: students say that “too much time spent on behavioral drilling, correct sitting and standing and complain that in the allotted hour slot there is little time left for singing (Pietsch, H. M. 2002). The purpose of choral teaching is not only to realize a wonderful artistic show, but also to improve students' pitch ability, scientific vocal ability, aesthetic ability and cooperation ability, etc. (Dumont, F. 1984). However, the two goals of being performance-oriented and being oriented towards improving students' musical literacy seem to be parallel, for example, it has been pointed out that an orientation toward performance might lead a teacher to deemphasize music reading skills in favor of rote teaching for the sake of expediency even when the comprehension of notation is clearly within the students' potential grasp (Freer, P. K. 2011).

The purpose of this paper is not to provide an in-depth analysis and exploration of why the paradox exists, or to critique performance as a way to test the effectiveness of choral teaching, but rather to reconcile the tension between performance and nurturing and to enhance the effectiveness of choral teaching.

2. Literature Review

Undoubtedly, the overarching goal of music education extends beyond the mere cultivation of artists, with an emphasis on holistic development in individuals (Tawnya D. Smith, 2021; D'Olimpio, L., 2022). Choral education, as an integral component of music education, has also demonstrated its rich educational value. Research has shown that choral instruction can foster students' friendships (Ferrer, R., Puiggalí, J., & Tesouro, M., 2018), promote cooperation (Varvarigou, M., 2016), enhance psychological well-being and overall health (Clift et al., 2010; Mellor, 2013), and address mental health issues (Dingle, Brander, Ballantyne, & Baker, 2013).

Furthermore, despite choral education in primary and secondary schools being primarily offered through extracurricular clubs and rehearsals, some scholars argue for its integration into the formal education system. For instance, Fuelberth, R., and Todd, C. (2017) suggest that choral programs should expand beyond traditional curricular and presentation models, aligning with national music standards. In China, according to the National Compulsory Education Curriculum Standards, music education during the compulsory education stage (grades 1-9) encompasses four major categories of artistic practice: vocal performance, instrumental performance, comprehensive artistic performance, and music score reading. Consequently, choral instruction serves as an integral part of formal music education.

In addition to exploring the significance and impact of choral education, researchers have also delved into the instructional processes within choral settings. Some studies classify music learning into internal and external representations, with external representations focusing on symbolic or notational aspects (Corbalán, M., Pérez-Echeverría, M. P., Pozo, J. I., & Casas-Mas, A., 2019), and internal representations centering on referential and semantic dimensions (Casas & Pozo, 2008). In the context of choral education, external representations encompass physical gestures and movements that contribute to the learning of musical works, while internal representations primarily involve auditory and proprioceptive elements that reflect students' abilities and musical literacy. However, the acquisition of these internal representations often comes at the expense of students' overall musical development (Hicks, 1980; Phillips, 2003). This is partially due to a tendency to neglect the educational implications of rehearsal activities, an occasional overemphasis on competition, and a failure to recognize that choral music education takes place within schools, where programs thrive or decline based on their educational implications (Hylton, J. 1997).

In addressing the aforementioned paradox, some scholars have made initial attempts and conducted research (Wright, R. 1996; Freer, P. K. 2011). For example, Wright, R. advocates a holistic approach that offers an alternative to the more traditional separatist curriculum approach, which is inspiring but leaves room for further research. Meanwhile, Freer, P. K. argues that resolution of the paradox can be achieved by viewing it as a "both-and" duality, where both propositions are true, and balance is key.

In summary, current research on choral education has evolved from theoretical aspects such as its purpose, significance, and effects to the micro-level of teaching and practice. While some scholars have recognized the need to enhance the educative aspects of choral instruction and have proposed recommendations, there is still limited research focused on improving the educative qualities of choral education through new experiments and explorations, which provides a direction for this study.

3. Methodology

This study adopted a mixed research methodology with the aim of verifying whether structured classroom choral teaching can effectively enhance the nurturing effectiveness of choral teaching and whether it can play a role in reconciling the paradox of performance-nurturing. We conducted a 2-year follow-up and experimental study in an elementary school in central China, where the subjects were divided into an experimental group and a control group of third-grade students from the same elementary school. The experimental group used structured choral teaching methods, while the control group used traditional choral teaching methods. The effectiveness of structured teaching was verified by analyzing and comparing the differences in the improvement of choral ability literacy between the two groups of students.

3.1 Research Design

One of the centers for verifying the effectiveness of choral teaching lies in whether choral teaching can actually improve students' choral ability and music literacy. Therefore, based on Edward Gordon's theory of music learning sequence and Émile Jaques-Dalcroze theory of choral teaching, we compiled a questionnaire to assess students' choral ability, which includes four major assessment sections: listening, reading, writing and singing, and utilizes a combination of paper-and-pencil tests and performance evaluation (Fig. 1).

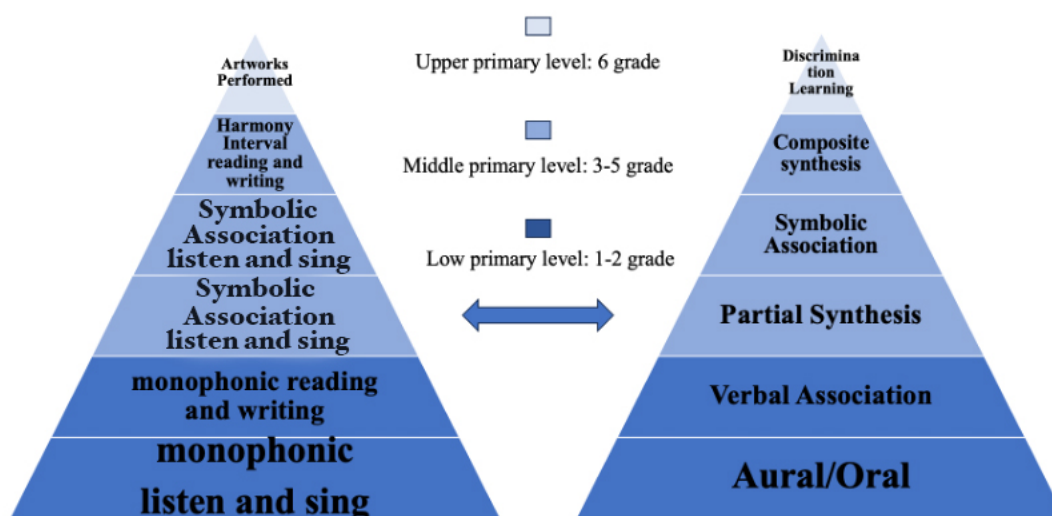


Fig. 1 The research design & procedures

Fig.1 categorizes paper-pencil tests and performance assessments into three distinct stages based on grade levels: Low primary level (1-2 grade)/Middle primary level (3-5 grade)/Upper primary level (6 grade). Different plans are laid out for the aspects to be examined at each stage. At the Low primary level, we focus on the four basic aspects of monophonic listening, reading, writing, and singing. As students advance to the Middle primary level, with the development of their intelligence and the initial establishment of their aesthetic framework, we lean towards nurturing their capabilities in symbolic listening, reading, writing, and singing. In the Upper primary level, since students have essentially grasped the basic monophonic and symbolic listening, reading, writing, and singing abilities, we employ performance assessments to evaluate students' learning conditions. Figure 1 illustrates the logical sequence of questionnaire development and the sequence of choral ability constructs. The difficulty of the assessments was adjusted as time progressed. In order to enhance the scientific validity and rationality of the study, the experimental group and the control group controlled the variables as much as possible: the choral ability of the students in the experimental group and the control group were front-ended and the choral teacher was the same one before the implementation of the structured teaching.

3.2 Participants

Participants in this study included students from two classes in an elementary school in central China. In order to enhance the feasibility and efficiency of the research conducted, this study abandoned the principle of random assignment and divided the participants into experimental and control groups based on their original classes. The two groups of students were slightly different in terms of gender percentage, age, and musical specialties, but remained generally the same, with the following specific data:

Participants' Gender

Gender	n	%	Cumulative Percent
Male	25	52%	52%
Female	23	48%	100%
Total	48	100%	

Table1.Intervention Group

Gender	n	%	Cumulative Percent
Male	26	54%	54%
Female	22	46%	100%
Total	48	100%	

Table2.Control Group

Participants' Age

Age	n	%	Cumulative Percent
5	3	6.3%	6.3%
6	23	47.9%	54.2%
7	18	37.5%	91.7%
8	4	8.3%	100%
Total	48	100%	

Table 3. Intervention Group

Age	n	%	Cumulative Percent
5	4	8.3%	8.3%
6	25	52.1%	60.4%
7	15	31.3%	91.7%
8	4	8.3%	100%
Total	48	100%	

Table 4. Control Group

Participants' Musical Specialty

Learning music specialty experience	n	%	Cumulative Percent
Vocal	3	6.3%	6.3%
Piano	3	6.3%	12.6%
Other western instruments	4	8.3%	20.9%
Chinese folk musical instrument	6	12.5%	33.4%
Without any experience	32	66.6%	100%
Total	48	100%	

Table 5. Intervention Group

Learning music specialty experience	n	%	Cumulative Percent
Vocal	4	8.3%	8.3%
Piano	3	6.3%	14.6%
Other western instruments	5	10.4%	25.0%
Chinese folk musical instrument	6	12.5%	37.5%
Without any experience	30	62.5%	100%
Total	48	100%	

Table 6. Control Group

In addition, in order to improve the science and validation, this research conducted a pre-experimental test towards two groups before the beginning of structured choral teaching, which shows that the choral literacy of the two groups are converging, and thus verified the varieties in this research is scientifically controlled.

3.3 Data Collection& Analysis

This study adopts a mixed research method, i.e., a combination of quantitative and qualitative methods to collect data. On the one hand, as mentioned earlier, we developed the "Measurement of Students' Choral Ability" test questionnaire and quantified the students' choral ability level through scoring to validate the effectiveness of the structured choral teaching in the classroom; on the other hand, we collected qualitative data through interviews with music teachers and students to explore the students' and teachers' feelings and experiences of the structured teaching.

Regarding quantitative research, this study conducted three assessments of students' choral ability during the two years of structured teaching, respectively before structured teaching, one year after structured teaching and two years after structured teaching. The significance test between the experimental group and the control group was used to verify whether structured teaching could improve students' choral ability and music literacy. The experimental data of the three measurements are as follows:

Mann-Whitney U Test Abstract

Total N	96
Mann-Whitney U	1265.500
Wilcoxon W	2441.500
Test Statistic	1265.500
Standard Error	136.279
Standardized Test Statistic	.833
Asymptotic Significance (Two-Tailed Test)	.405

Table.7 The First Test Data

Mann-Whitney U Test Abstract

Total N	96
Mann-Whitney U	1828.500
Wilcoxon W	3004.000
Test Statistic	1828.000
Standard Error	136.354
Standardized Test Statistic	4.958
Asymptotic Significance (Two-Tailed Test)	.000

Table 8. The Second Test Data

Mann-Whitney U Test Abstract

Total N	96
Mann-Whitney U	1828.500
Wilcoxon W	3004.000
Test Statistic	1828.000
Standard Error	136.354
Standardized Test Statistic	4.958
Asymptotic Significance (Two-Tailed Test)	.000

Table 9. The Third Test Data

Regarding the qualitative study, we conducted several interviews with teachers and students in the two classes through formal and informal interviews in both open-ended and semi-structured formats. During the interviews, a number of students (especially those who had a relatively weak foundation in music before) said that by being in a structured classroom, they could gradually participate and keep up with the teacher's progress; the music teacher who implemented structured teaching also said that structured teaching enhanced the participation in classroom teaching and provided a new solution for her teaching practice.

4. Discussion& Conclusion

This study proposes a structured teaching model that emphasizes treating choral teaching at the elementary school level as a whole, focusing on the sequential, logical, and correlative nature of the course content, and exploring whether structured teaching can enhance the effectiveness and nurturing nature of choral teaching. Through our two-year follow-up survey and experimental study, combining qualitative and quantitative research methods, we have come to a conclusion about the nurturing effectiveness of classroom choral structured teaching.

4.1 Effectively Enhance Students' Choral Ability and Music Literacy

There was no significant difference between the experimental group and the control group in terms of choral ability at the first measurement ($P>0.05$), but as the structured teaching progressed, the gap in choral ability literacy between the two groups of students was gradually shown. After one year of the implementation of structured teaching, there was a

significant difference between the performance of the experimental group and the control group in terms of choral ability, and the significant difference still existed after two years of the implementation of structured teaching. This proves that compared with traditional choral teaching, structured choral teaching has a higher parenting effect, and has a significant role in improving students' choral ability and music literacy.

The traditional choral teaching method pays more attention to the teaching progress and the completion of teaching tasks than to whether the students' ability is improved, and relatively neglects the cultivation of students' choral ability and musical literacy. Structured teaching is a step-by-step teaching design oriented to the improvement of students' choral ability and literacy, with the ultimate goal of realizing the construction of students' ability and the development of their literacy.

4.2 Enhance Students' Participation and Promote the Fairness of Choral Teaching

In traditional choral teaching, due to the high demand for students' musical literacy, choral teaching becomes a one-man show for a small number of students, while more students with weaker musical foundation often find it difficult to integrate and choose to remain silent in class. In the process of implementing structured teaching, through interviews and exchanges with students in the experimental group (especially those with relatively poor music foundation), it was found that many students said "they no longer find choral lessons boring and difficult, and no longer feel that it is noisy when different voices sing together but begin to gradually find the beauty of harmony and be able to integrate into it! ".

Since one of the core elements of structured teaching is to follow the sequence and relevance of teaching, emphasizing the gradual progress of the teaching process, this mode of teaching is more suitable for students with poor or even no foundation than the traditional choral teaching mode, and provides all students with the opportunity to cultivate their interests and improve their abilities. To a certain extent, structured teaching breaks the barrier of "elite education" of traditional choral teaching, so that all students can feel the charm of choral singing and realizes the fairness of music education in the true sense.

5. Suggestion& Limitation

This study explores how to enhance the effectiveness and nurturing of choral teaching, creates a structured choral teaching model based on sequentiality, and proves the reliability and validity through the experimental research method. What does the implementation of structured teaching tell us about choral teaching? Through this study, we will make appropriate recommendations for choral teaching as well as basic music education with a view to improving the quality of teaching and learning activities.

5.1 Make More Attempts to Reconcile Paradoxes

The paradox of performing or nurturing exists not only in choral singing, but also in music education between utilitarianism and non-utilitarianism (find out where). On the one hand, music education is to cultivate students' aesthetic ability and develop their interests, on the other hand, music education, due to the pressure of exhibition and social demand, is often utilitarianized into performances and competitions, and becomes a vanity field for students to prove themselves. While the visualized results of music education are certainly an important factor in proving its success, what is more crucial is the nurturing values that are hidden

behind the performance, such as whether the students have truly gained the enhancement of their aesthetic ability, whether they have developed their interest in music, and whether they have improved their musical literacy. Mapping from the small scope of choral teaching to the large scope of music education, we need to pay attention to this seemingly antagonistic but actually parallel relationship, and always make clear the non-utilitarian nature of music education, and at the same time make performance evaluation such as performances and competitions a means to promote the development of choral singing and music education, rather than becoming the ultimate goal of choral singing or music teaching.

The structured teaching model created in this study is, in a sense, an attempt to balance the paradox of performance and nurturing. With the development of students' abilities as the core goal, this study creates a step-by-step teaching content and methodology that, on the one hand, improves students' choral ability and music literacy, and ensures the nurturing nature of choral teaching, and on the other hand, makes performances and expressions more natural because of the practical improvement of students' choral ability. The results of this study are intended to inform music educators of the possibility of paradoxical fit, so that music education can return to its non-utilitarian nature.

5.2 Promoting Equity in Music Education

One of the key indicators of equity in education is the participation of all students in teaching and learning activities. Basic music education is open to all students, but music, especially choral singing, has a certain threshold, which requires students to have higher requirements for pitch, harmonic syntax and scientific vocal methods, etc. This means that in choral teaching, some of the students who are weak in music literacy cannot fully participate in and integrate into the class. In our previous teaching experience, we found that many students failed to establish a solid inner hearing and stable pitch, so they always failed to find the key or were disturbed by other voices in the chorus, so they finally chose to be silent or easily distracted and lost their interest in chorus. This reflects from the side that traditional choral teaching still belongs to elite education to some extent, more suitable for some special or superior students with higher music literacy, and also reflects the unfairness of education.

Whether in choral teaching or conventional music curriculum teaching, ensuring that all students have a good experience should be the teacher's main goal and code of conduct. In structured teaching, we are oriented to the construction of students' abilities, focusing on the development of all students' abilities and the enhancement of their literacy, creating teaching contents from simple to complex, ensuring higher student participation and promoting educational equity to a certain extent. Many students reported feeling that choral lessons became simpler and more interesting, that the different voices that appeared around them in the past were no longer noise, that they could gradually find their pitches from the harmonies, and that they felt the charm of polyphonic choral singing. Our study shows music educators in general an attempt to promote equity in choral teaching, to make choral teaching more suitable for all students, and to make the appeal of polyphony truly belong to everyone.

The elitist form of music education is not only found in choral teaching, but also in the regular curriculum. Instead of focusing only on a few students with musical specialties or talents, we should focus on each and every student, on the growth of all students, so that music education truly belongs to everyone.

5.3 Limitations

The limitations of this study are mainly reflected in the case-by-case nature of the research sample. Due to the limitations of time, energy and ability, we only conducted a case-based practical study in one elementary school in central China. Although this 2-year experimental study confirmed the effectiveness and feasibility of structured teaching, the sample was too small to prove whether structured teaching is suitable for the rest of schools and the rest of the region, i.e., its universality has yet to be tested. In any case, this study has made a forward-looking and exploratory attempt to improve the effectiveness of choral teaching in nurturing people, and we look forward to more studies focusing on the field of choral teaching in the future, and to conduct more in-depth and referable studies.

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Oral Communicative Competence: Explicit Teaching and Systematic Practice in Portuguese L1 Classes–Impact of a Program Implemented in Middle School

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Abstract

Oral language skills support not only the oral communicative competence itself but also reading skills. However, the development of oral communicative competence has not received the same attention in research as reading or even writing has. The main goal of this study was to examine the effect of the oral skills training program “Communication and Oral Expression: speaking, listening, and reading in middle school” on 7th-grade students’ oral communicative competence (verbal, paraverbal, and non-verbal skills). Possible effects on students’ vocabulary knowledge were also considered. This quasi-experimental study design, involving an experimental and a control group, comprises a sample of 122 students from two public middle schools located in the North of Portugal, with ages ranging from 11 to 16. Verbal, paraverbal, and nonverbal skills were taught and practiced for seven months. These skills were assessed four times (pre-test, two intermediate measures, and post-test). A vocabulary test was administered as a pre-test to check students’ vocabulary knowledge, being also assessed at the end of the intervention program (post-test). Multivariate and univariate analyses of covariance tests showed a significant and large effect of the group on students’ oral communicative performances at the end of the intervention, after controlling for the effect of the pre-test results. The results of a Mixed ANOVA showed that there was a significant improvement in the experimental group concerning vocabulary knowledge. These results highlight the importance of practicing speaking skills within educative settings for the development of children’s oral communicative competence and vocabulary knowledge.

Keywords: Explicit Teaching of Oral Skills, Vocabulary Development, First Language Learning

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Introduction

Language acquisition begins naturally and spontaneously at a very young age within the family. Its learning and development, both leading to the acquisition of knowledge, are not limited to this environment. They also depend on the contribution of social interaction in various communicative contexts, notably within the microcosm of society, which is the school (and preschool) environment. The school plays a central role in creating opportunities for the development of children's linguistic repertoire, regardless of their original contexts (Monteiro & Viana, 2021).

Oral communicative competence currently constitutes an integrative and holistic concept. In a broad sense, it encompasses knowledge, skills, and attitudes that enable effective information transmission in diverse contexts, guided by sociocultural rules (Cassany et al., 1994; Celce-Murcia, 2008; Hymes, 1972; Rosales-López, 1994a). It is “an ability to act effectively in certain types of situations, supported by knowledge, but not being limited to it” (Perrenoud, 1999, p. 7). This competence involves knowing how to use oral language in different contexts and complements verbal communication skills with paraverbal and non-verbal ones (Monteiro et al., 2013; Monteiro & Viana, 2021, 2022; Rosales-López, 2013).

The most recent guidelines from the Ministry of Education for the 7th grade – Portuguese 1st language (Martins et al., 2017; Ministério da Educação, 2018) – emphasize the practice of speaking skills, along with writing and reading. However, the explicit teaching of oral communicative skills in the classroom has not received the attention it deserves and requires (Monteiro, 2020). In this sense, the program “Communication and Oral Expression: speaking, listening and reading in middle school – 7th grade” (COE-7) was designed to help teachers develop students' oral communication skills. It is an original program but strongly inspired by the program “Comunicación y Expresión Oral: Hablar, escuchar y leer en Secondary” authored by Maria Pilar Núñez Delgado (2001). COE-7 presents itself as an innovative proposal due to the selection of texts and activities specially designed for 7th-grade students, closely aligning with the curricular learning outcomes and the student's profile (Ministério da Educação, 2018). Furthermore, COE-7 integrates analysis and textual production scripts, as well as instruments for evaluating students learning and content mastery, which allow the implementation of self-regulated learning strategies in practice.

In this study, the conceptual framework of the program will be briefly described, as well as the results of the quasi-experimental study carried out to verify its impact on students' oral communicative skills and vocabulary.

The term “competence” is, due to its nature, complex to define. However, recent research conducted in the field has brought very relevant contributions to the clarification of this multidimensional construct, particularly in the educational context, where attention is beginning to be directed towards the explicit teaching of oral communication skills.

Therefore, considering the concept of “oral communicative competence,” it becomes relevant to understand the term “competence” based on the sociolinguistic dimension of Hymes (1972), which places competence in the field of performance. This refers to the concrete use of language in specific communication contexts, governed by sociocultural norms. Later, this concept was expanded by the contributions of Canale and Swain (1980) and Canale (1983), who first added strategic competence to the concept (i.e., the effective use of verbal and non-verbal strategies to compensate for communication problems or deficits). Subsequently, a

discursive competence was added (i.e., the knowledge that the speaker-listener must combine grammatical forms and meanings in a unified way, using cohesion at the level of linguistic form, and coherence at the level of meaning). This year, Savignon (1983, p. 22) supports that being successful in communicative tasks also depends on students' "knowledge of the paralinguistic and kinesic features of language – intonation, facial expression, gesture."

In the field of Education, the concept of competence extends to the syllabus, recommending the implementation of a competence-based teaching and learning process in schools. Competence does not only imply the use of knowledge; it is depicted as "an ability to act effectively according to a certain kind of situation, supported by knowledge, but not being limited to it" (Perrenoud, 1999, p. 7). This also encourages us to consider the skills and the attitudes of students.

The beginning of the 90s promoted new approaches to teaching and learning languages, grounded in a constructivist conception. Oral interaction started to be stimulated, appealing to prior knowledge and text manipulation (Bachman, 1990; Coseriu, 1992; Rosales-López, 1992, 1994b, 1994a). The theoretical framework developed by Bachman (1990) encompasses "both knowledge, or competence, and the ability to implement, or execute, this competence in appropriate contexts of communicative language use" (p. 84). This conception of linguistic competence is shared by Eugenio Coseriu (1992) when he emphasizes that it corresponds to the knowledge of the language that speakers apply when speaking. Coseriu's focus is the effective use of language – individual speaking that corresponds to expressive knowledge, and which consists of knowing how to apply pertinent factors in communication that are appropriate to the subject, the interlocutors, and the situation that shape each communicative act. In fact, as Humboldt (1990, p. 65) established in literature, language is *enérgeia*, not *érgon*, meaning that language is activity, not a completed work. Speakers are, in fact, creative when they demonstrate how to adapt language to the situational context, which takes us to the real meaning of oral communicative competence – the capacity to use language effectively in different situations (Monteiro et al., 2013, 2020; Núñez-Delgado, 2002, 2003).

As in other specific areas where oral interactions occur, knowledge of the context is crucial for students to become more competent in communication (Archer, 2000; Rosales-López, 2013). Therefore, a comprehensive process of understanding different contexts is necessary so that students have the opportunity to develop their verbal, paraverbal and non-verbal communicative skills (Cassany et al., 1994; Monteiro et al., 2013; Monteiro & Viana, 2021; Rosales-López, 2013; Savignon, 1983). These skills must be developed alongside with reading, writing, and grammar so that students' training can be fully implemented throughout their educational journey. This should be based on active pedagogical methodologies and strategies that promote their development (Dumais, 2016). Just as students practice reading and writing at school, they must have the opportunity to improve their oral communication skills.

Currently, there is undeniable recognition of the potential of learning oral language skills for the development of vocabulary, writing, and reading (Cadime et al., 2017; Capovilla et al., 2004; Connor et al., 2018; Ripoll et al., 2014; Skoczylas et al., 2016). It is also important to highlight the fact that students develop an awareness of their discursive abilities, becoming capable of self-regulating their learning. Systematic observation by teachers is, therefore, fundamental, as monitoring learning proves to be an essential source of information for diagnosing learning difficulties and for pedagogical intervention. According to a recent systematic review of oral communication skills training programs (Monteiro, 2020), empirical

evidence, both national and international, is limited when it comes to L1 oral skills teaching and learning. Most interventions are implemented in preschool and elementary school.

Communicative competence is effective when individuals put their skills into practice in various communicative contexts. This requires setting clear objectives for students to comprehend oral statements and interact in different classroom situations. In this regard, promoting and developing oral communicative competence in classes is crucial, encouraging students to deliver speeches in different scenarios and monitoring their progress. Observing oral performances consumes a significant amount of class time and can be challenging to carry out and analyse (Dumais, 2016). Therefore, this monitoring can be facilitated by the existence of instruments that encompass different components of communication, including verbal, paraverbal and non-verbal aspects (Dumais, 2015; Lomas, 2002; Monteiro et al., 2013; Monteiro & Viana, 2021). This, in turn, reflects positively in students' performance in terms of interaction and oral communication skills.

The development of the student's oral expression depends considerably on the school providing an environment that respects the turn and welcomes the voice, differences, and diversity. In this sense, the program “Communication and Oral Expression: speaking, listening, and reading in middle school – 7th grade,” which is presented in the following section, aims to provide teachers with a set of strategies and materials to support their pedagogical action in the field of oral communicative competence (OCC).

Communication and Oral Expression: Speaking, Listening, and Reading in Middle School – 7th Grade (COE–7)

The Program's Structure and Description

The COE–7 program aims to help students acquire and develop speaking skills in a guided and sustained manner (Ministério da Educação, 2018, pp. 5–6). This skills include: planning texts while considering the objectives of the communication; using language fluently, correctly, and naturally in formal situations; expressing points of view and opinions, and giving presentations; respecting the conventions that regulate discursive interaction in situations with different levels of formality; using mechanisms to control discursive production based on feedback from interlocutors; self-regulating oral presentations based on criteria previously agreed upon with the teacher.

The COE–7 seeks to achieve, in a motivating, active and integrated way, the objectives recommended by the Ministry of Education (2018) for the field of orality, including: paying particular attention to the planning of information; understanding different communicative intentions in oral situations and knowing how to use them critically, not only in daily interactions but also in the production of speeches in formal contexts, including argumentative presentations; producing oral texts, according to specific categories and genres, progressively increasing the complexity of their different dimensions and characterizations.

According to its structure, the didactic program includes two blocks: Block I – Programming; Block II – Didactic Units. Block I presents the contents, objectives, and performance descriptors for the 7th-grade L1 Portuguese class. It also includes summary tables for the 13 thematic units, determining the concepts, strategies and attitudes that are practiced in different content domains – oral and written comprehension or expression, literary education, and verbal and non-verbal communication systems. Block II brings together the activities and assessment

instruments for each of the didactic units: 1) Presentation; 2) Most frequent communication difficulties; 3) Oral communication; 4) Oral texts; 5) Expressive reading; 6) Verbal and non-verbal language; 7) Spontaneous conversation and interview; 8) Literary dialogue; 9) Debate; 10) Oral narrative; 11) Oral description; 12) Oral presentation; and 13) Oral argumentation.

These units allow students to promote reflection on the importance of oral language for social relations; activate all the skills that make up oral discursive and communicative competence (receptive and expressive language) – debates, interviews, dialogues, oral presentations, etc. They work on expressive reading and address aspects that affect communication through oral language, such as pauses, intonation, clarity. Additionally, they serve to assess progress and difficulties that have not been overcome, and often provide instruments for self-regulation and evaluation of learning. Throughout the program, assessment is conceived as integral to the development of language learning, assuming a procedural approach due to students' different learning styles and rhythms. In this sense, each unit offers various instruments for self-regulation and leaning assessment, such as: How do I evaluate myself as a speaker? (Appendix A); Grid for self- and heteroevaluation of reading (Appendix B); Planning the oral presentation (Appendix C); and GOAOCC: Grid for Observation and Assessment of the Oral Communicative Competence (Appendix D) (Monteiro et al., 2013).

To evaluate the impact of CEO-7 on students' oral communicative competence, and vocabulary, a quasi-experimental study was conducted. The methodology and results will be subsequently outlined.

The Implementation of the Program COE – 7

The empirical study conducted to evaluate the impact of the program will be presented next. This study has the following objectives:

- (1) to analyse the impact of COE-7 on students' oral communicative competence (verbal, paraverbal, non-verbal skills, and total OCC), during the intervention (M2, M3, M4), while controlling the effects of the pre-test (M1);
- (2) to analyse the impact of COE-7 on students' vocabulary, specifically word definition.

The following section describes the methodology that was followed.

Methodology

Participants

As previously mentioned, to evaluate the impact of CEO-7 on students' oral communicative competence, a quasi-experimental study was conducted using a convenience sample, consisting of 122 students from the 7th grade in two public middle schools in Northern Portugal. The experimental group (EG) comprised 67 students, while 55 belonged to the control group (CG). The experimental group is composed of 35 male students (52.2%) and 32 female students (47.8%). The control group comprises 28 female participants (50.9%) and 27 male participants (49.1%). Differences in gender distribution between groups are not statistically significant ($\chi^2(1) = 0.120$, $p=0.729$). The mean age of the children was 12 years old ($SD=0.84$), with ages ranging between 11 (13.9%) and 16 (0.8%) years old. Groups are equivalents in terms of age [$t = -1.916$, $df=120$, $p=.058$, $CI\ 95\%Mdif[-0.01; 0.62]$, $d = 0.34$].

Instruments

The assessment of students' oral communicative competence was carried out using GOAOCC (Appendix D) (Monteiro et al., 2013). This instrument is used to assess verbal skills, which include knowledge of the theme, vocabulary, argumentation, coherence; paraverbal skills, covering fluency, expressiveness, tone, pace; and non-verbal skills, encompassing eye contact, gesture, and posture.

Students' vocabulary was evaluated using the vocabulary subtest from the Wechsler Intelligence Scale for Children (Simões et al., 2003). This subtest comprises 30 items, each consisting of orally presented words that the children are required to define as comprehensively as possible. The response to each item is scored with 2, 1, or 0 points.

Procedure

This study was approved by the Ethics Committee for Research in Social and Human Sciences (REF. CEICSH 110) at the University of Minho and by the school boards involved. Written informed consents from all the students who participated in the study were previously obtained from their parents or legal tutors. Sixty-seven students followed the program CEO-7 alongside their regular curricular content. The program was applied to 7th-grade students and took place in L1 Portuguese classroom, from October 2018 to May 2019. The program intervention was structured in 20 sessions (each lasting 90/100 min.) conducted by the teacher, following an infusion approach. The units were distributed during the academic year as shown in Table 1:

	1 st Trimester	2 nd Trimester	3 rd Trimester
Didactic units			
	Unit 1	Unit 4	Unit 3
	Unit 2	Unit 6	Unit 5
	Unit 7	Unit 8	Unit 9
	Unit 10	Unit 13	Unit 12
	Unit 11		
Text genre			
	Narrative	Poetic	Dramatic
Number of sessions			
	8 sessions	7 sessions	5 sessions

Table 1: Distribution of didactic Units

Before implementing the program, training was provided to participating teachers, aiming to not only explain the theoretical rationale of the program but also how GOAOCC functions. To ensure methodological rigor, support for teachers continued throughout the didactic intervention.

Students from both groups were required to conduct individual presentations lasting four minutes each. The assessment of students' oral communicative competence performance using GOAOCC took place, for both groups, at four moments: Moment 1 (M1) – beginning of the school year (pre-test, 1st week of October); Moment 2 (M2) – end of the 1st trimester (last week of November); Moment 3 (M3) – end of the 2nd trimester (last week of March); Moment 4 (M4) – end of the 3rd trimester (post-test, first week of June). Before these individual presentations performed during the intervention program, students learned about successful and unsuccessful presentations behaviour. Therefore, GOAOCC was introduced, and its three components were

explained. The presentations were monitored beforehand, and oral communicative competence was assessed by the teacher, on a self-selected topic, to evaluate students' verbal, paraverbal, and non-verbal skills.

Before conducting any statistical analysis, various tests were performed to check various assumptions and ensure that the data were suitable for inferential statistical analysis. Formal tests to analyse the assumption of normal distribution were not conducted. The literature suggests that with large samples, significant results can be obtained even with small deviations from normality. Therefore, it is advisable to observe the values of the skewness and kurtosis coefficients as an alternative (Field, 2009). Z-Tests were calculated for skewness and kurtosis, resulting in values lower than 3.29, the limit specified as a reference for medium-sized samples. This conclusion indicates that the sample follows a normal distribution (Field, 2009; Kim, 2013). Table 2 presents the descriptive statistics of verbal, paraverbal and non-verbal communication skills.

			<i>Mean</i>	<i>SD</i>	<i>Skewness</i>	<i>SE_{Skewness}</i>	<i>Z_{Skewness}</i>	<i>Kurtosis</i>	<i>SE_{Kurtosis}</i>	<i>Z_{Kurtosis}</i>	<i>Min-Max</i>
Verbal	EG	M1	2.71	0.74	0.096	0.293	0.328	-0.137	0.578	-0.237	1,00 - 4,50
		M2	2.94	0.79	-0.174	0.293	-0.594	-0.427	0.578	-0.739	1,00 - 4,25
		M3	3.18	0.78	-0.460	0.293	-1.570	-0.177	0.578	-0.306	1,25 - 4,50
		M4	3.37	0.85	-0.625	0.293	-2.133	1.074	0.578	1.858	1,00 - 5,00
	CG	M1	3.15	0.94	0.791	0.322	2.457	-0.574	0.634	-0.905	2,00 - 5,00
		M2	3.26	0.63	0.944	0.322	2.932	0.534	0.634	0.842	2,00 - 5,00
		M3	3.19	0.77	0.352	0.322	1.093	0.988	0.634	1.558	1,50 - 5,00
		M4	3.03	0.81	0.986	0.322	3.062	0.241	0.634	0.380	2,00 - 5,00
Paraverbal	EG	M1	2.91	0.84	0.597	0.293	2.038	-0.148	0.578	-0.256	1,50 - 5,00
		M2	3.15	0.97	0.154	0.293	0.526	-0.672	0.578	-1.163	1,00 - 5,00
		M3	3.21	0.89	0.193	0.293	0.659	-0.424	0.578	-0.734	1,00 - 5,00
		M4	3.35	0.99	-0.136	0.293	-0.464	-0.151	0.578	-0.261	1,00 - 5,00
	CG	M1	3.22	0.87	0.566	0.322	1.758	-0.333	0.634	-0.525	2,00 - 5,00
		M2	3.15	0.54	0.151	0.322	0.469	0.429	0.634	0.677	2,00 - 4,50
		M3	3.31	0.73	1.038	0.322	3.224	0.782	0.634	1.233	2,00 - 5,00
		M4	3.08	0.65	0.888	0.322	2.758	0.585	0.634	0.923	2,00 - 4,75
Non-Verbal	EG	M1	2.57	0.84	0.815	0.293	2.782	0.273	0.578	0.472	1,30 - 5,00
		M2	2.55	0.81	0.017	0.293	0.058	0.097	0.578	0.168	1,00 - 4,70
		M3	2.83	0.76	0.783	0.293	2.672	0.821	0.578	1.420	1,00 - 5,00
		M4	3.15	1,03	0.001	0.293	0.003	-0.361	0.578	-0.625	1,00 - 5,00
	CG	M1	3.21	0.94	0.503	0.322	1.562	-0.535	0.634	-0.844	2,00 - 5,00
		M2	3.09	0.84	0.146	0.322	0.453	-1.024	0.634	-1.615	2,00 - 4,70
		M3	3.20	0.97	0.489	0.322	1.519	-0.676	0.634	-1.066	2,00 - 5,00
		M4	3.18	0.99	0.583	0.322	1.811	-0.946	0.634	-1.492	2,00 - 5,00
Total score	EG	M1	2.76	0.72	0.429	0.293	1.464	-0.208	0.578	-0.360	1,54 - 4,63
		M2	2.96	0.76	-0.140	0.293	-0.478	-0.421	0.578	-0.728	1,00 - 4,35
		M3	3.16	0.72	-0.231	0.293	-0.788	-0.461	0.578	-0.798	1,54 - 4,63
		M4	3.34	0.88	-0.458	0.293	-1.563	0.605	0.578	1.047	1,00 - 5,00
	CG	M1	3.17	0.87	0.928	0.322	2.882	-0.381	0.634	-0.601	2,00 - 5,00
		M2	3.04	0.73	0.318	0.322	0.988	-0.361	0.634	-0.569	2,00 - 4,67
		M3	3.22	0.73	0.867	0.322	2.693	0.814	0.634	1.284	1,88 - 5,00
		M4	3.04	0.73	1.052	0.322	3.267	0.271	0.634	0.427	2,00 - 4,78

Table 2: Descriptive statistics for the verbal, paraverbal, non-verbal components and total score

Considering the non-equivalence of the groups in the pre-test, for all variables under study, a multivariate analysis of covariance (MANCOVA) was conducted to assess the effects of the CEO-7 program on students' oral communicative skills. The OCC total score was analysed independently using a univariate analysis of covariance (ANCOVA).

For this test, the values of partial eta-squared (η_p^2) were calculated as a measure of effect size, considering the following reference values for interpretation: small effect, $\eta_p^2 > 0.01$; medium effect, $\eta_p^2 > 0.06$; large effect, $\eta_p^2 > 0.14$ (Cohen, 1988). The results of the three subscales (verbal, paraverbal and non-verbal) were used as dependent variables in each of the

assessments carried out throughout and at the end of the intervention, with the students' performance in the pre-test (M1) incorporated as a covariate. All assumptions required for the execution of MANCOVA and ANCOVA were analysed and met.

In terms of assessing students' vocabulary, the vocabulary subtest from the Wechsler Intelligence Scale for Children (WISC-III) (Simões et al., 2003) was conducted by a psychologist and was administered at only two points in time: the pre-test and post-test, corresponding to the beginning and end of the school year. In the analysis of the vocabulary variable, 3 participants were excluded (2 students from the CG and 1 student from the EG), who did not take the test in the post-test. The sample is the following: EG (n=66) and CG (n=53). Table 3 presents the descriptive statistics for vocabulary.

		<i>Mean</i>	<i>SD</i>	<i>Skewn.</i>	<i>EP_{Skew}</i>	<i>Z_{Zkew.}</i>	<i>Kurt.</i>	<i>EP_{Kurt}</i>	<i>Z_{Kurt.}</i>	<i>Min-Max</i>
EG	Pre-test	20,41	9.30	-0.136	0.295	-0,461	-0.731	0.582	-1,256	2-40
	Post-test	27,06	9.75	-0.239	0.295	-0,810	-0.515	0.582	-0,885	3-48
CG	Pre-test	20,55	7.37	0.408	0.327	1,25	-0.309	0.644	-0,480	7-38
	Post-test	19,06	9.17	0.160	0.327	0,489	-0.061	0.644	-0,095	0-42

Table 3: Descriptive statistics of the scores obtained in the WISC-III subtest

The independent samples T-test confirms that there are no statistically significant differences between the groups in comparison [$t = -0.880$, $df=117$, $p > .05$, 95% *CI Mdif* [-3.24; 2.97], $d = 0.02$], concluding that the experimental group and the control group are equivalent. Considering this result, to assess the effect of the intervention on students' vocabulary, a mixed-design analysis of variance was performed, with pre and post-test measures of vocabulary values. The values of partial eta-squared (η_p^2) were calculated as a measure of effect size, based on the reference values mentioned before, for their interpretation. All assumptions required for the execution of this type of analysis were examined and met.

The results are summarized in the following section, first those concerning oral communicative competence, and then vocabulary.

Results

Oral Communicative Competence

Considering the second assessment (M2) of the OCC, conducted at the end of the first trimester, multivariate tests revealed statistically significant differences between groups in terms of the set of the three components of the OCC (*Pillai's Trace* = 0.069, $F(3, 115) = 9.171$, $p = 0.041$, $\eta_p^2 = 0.069$). However, univariate tests showed no statistically significant differences between groups for any of the three individual components of the OCC ($p > 0.05$). ANCOVA results for the variable "total score" are also not significant. In short, the groups only differ by a combination of the variables that make up the OCC, but not when we observe the individual effects of the variables.

As with the results obtained in the M2 of OCC assessment, in M3 (end of the second trimester), MANCOVA results do not show statistically significant differences between groups in the combination of verbal, paraverbal, and non-verbal oral communication skills (*Pillai's Trace* = 0.011, $F(3, 115) = 0.409$, $p = 0.747$, $\eta_p^2 = 0.011$). The univariate tests of covariance revealed

that there are no statistically significant differences between the groups in terms of any of the three components of the oral communicative competence. The same goes for the variable “total score.”

At the end of the intervention, 3rd trimester (M4), corresponding to the post-test, the MANCOVA tests revealed that there was a significant effect of the group on students’ oral communicative performances at the end of the didactic intervention (M4), after controlling for the effect of the pre-test results (*Pillai’s Trace* = 0.0193, $F(3, 115) = 9.196$, $p < 0.001$, $\eta_p^2 = 0.193$).

The univariate covariance tests corroborate this result, as there were statistically significant differences between the groups in the three components of oral communicative competence (see Table 4).

	EG EMM (CI)	CG EMM (CI)	F (df)	p -value	η_p^2
Verbal skills	3.49 (3.33; 3.64)	2.88 (2.72; 3.05)	25,637 (1, 117)	< 0.0001	0.180
Paraverbal skills	3.44 (3.29; 3.60)	2.97 (2.79; 3.15)	13,860 (1, 117)	< 0.0001	0.106
Non-verbal skills	3.37 (3.22; 3.52)	2.91 (2.74; 3.08)	14,889 (1, 117)	< 0.0001	0.113
OCC Total score	3.48 (3.34; 3.62)	2.87 (2.72; 3.03)	31,158 (1, 119)	< 0.0001	0.207

Table 4. Results of univariate analysis of covariance – Post-test (M4)

The effect size is large for verbal skills, and moderate for paraverbal and nonverbal skills. Regarding the variable “total score,” statistically significant differences were observed between the groups, after controlling for the effect of the performances in the pre-test, complemented by a large effect size.

Vocabulary

Multivariate tests report a significant effect of time (*Pillai’s trace* = 0.055, $F(1, 117) = 6.829$, $p = .010$, $\eta_p^2 = 0.055$), indicating an increase in vocabulary between the pre- and post-test.

A statistically significant group effect was also observed, indicating that performances on the “vocabulary” variable differ between the experimental group and the control group ($F(1, 117) = 8.658$, $p = .004$, $\eta_p^2 = .069$). The results also demonstrate a significant interaction effect between time and group (*Pillai’s trace* = 0.127, $F(1, 117) = 16.997$, $p < .0001$, $\eta_p^2 = 0.127$) (Figure 1).

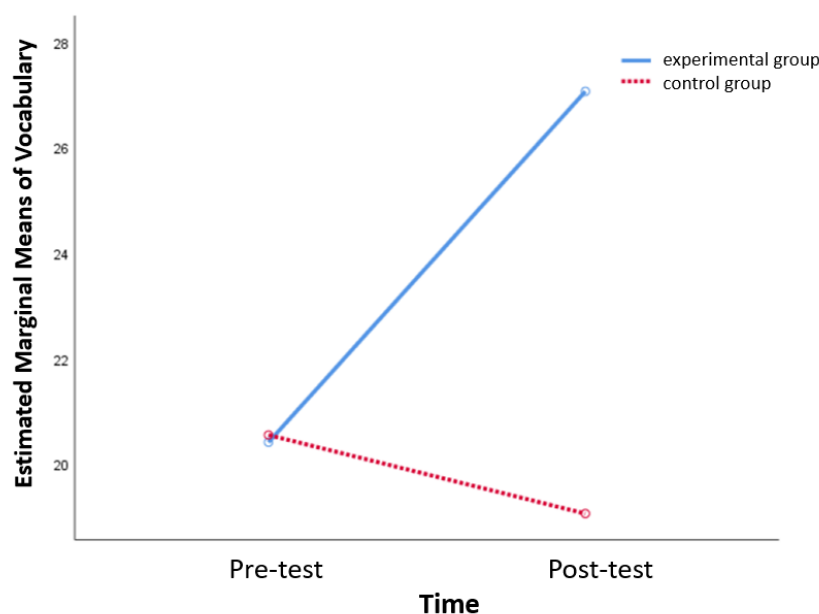


Figure 1: Graph of the interaction between time and group

The graph reveals an increase in vocabulary averages for the experimental group, represented by the steep slope of the solid line, contrasting with the slight decrease in average vocabulary values in the control group. Contrast tests confirm that only in the experimental group does the vocabulary level increase significantly from the pre-test to the post-test, as can be observed in Table 5.

		Mean difference			95% Confidence Interval for Difference(a)	
Time a	Time b	a-b	Std. Error	Sig.(a)	Upper Bound	Lower Bound
EG 1	2	-6,652*	1,318	.000	-9,262	-4,041
2	1	6,652*	1,318	.000	4,041	9,262
CG 1	2	1,491	1,471	.313	-1,422	4,403
2	1	-1,491	1,471	.313	-4,403	1,422

a. Adjustment for multiple comparisons: Bonferroni

Table 5: Test of Contrasts for Vocabulary

Discussion and Conclusions

Regarding the first objective, which was “to analyse the impact of COE–7 on students' oral communicative competence (verbal, paraverbal, non-verbal skills, and total OCC), during the intervention (M2, M3, M4), while controlling the effects of the pre-test (M1)”, the experimental group did, in fact, show significant improvements in the three components of oral communicative competence (verbal, paraverbal and non-verbal skills) and in the total score at the end of the intervention (M4). Furthermore, the effect size was large in the verbal component and moderate in the paraverbal and non-verbal components, which is very relevant, considering the seven-month intervention period. Since these are behavioural skills, their development takes time, as highlighted by Mattheoudakis et al. (2014). This means that the effect of the program tends to only occur in the medium or long term. Núñez-Delgado et al. (2008) even consider that an academic year can be a short period to observe progress in discursive

competence, which is in line with the conclusions obtained in the systematic review of didactic intervention programs conducted at the beginning of the study (Monteiro, 2020).

The results of the present study are also consistent with those of previous studies that show the benefits of practicing oral skills in the classroom in developing the communicative competence of adolescents of similar ages (11 to 14 years old) when learning their mother tongue (Núñez-Delgado, 2002; Núñez-Delgado et al., 2008). This trend is also observed in learning non-native languages, particularly in an immersion context (Fisher & Frei, 2018; Short et al., 2012), as well as in studies conducted with preschool children (Fricke et al., 2013; Haley et al., 2017; Van der Veen et al., 2017).

Concerning the second objective, which was “to analyse the impact of COE-7 on students’ vocabulary, specifically word definition,” students showed significant improvements in terms of vocabulary between pre and post-test. The results do, in fact, point to a considerable effect, corroborating conclusions from studies (Ford-Connors & Paratore, 2015; Teberosky & Jarque, 2014) that report the contribution of oral language practice to the enrichment and development of vocabulary. Explicit teaching and associated practice could prevent or bridge the differences observed in language repertoire among children from different socioeconomic backgrounds (Hart & Risley, 2003).

Based on the research findings, it can be inferred that two main themes emerge. The first points to the feasibility of the adopted curricular infusion, which enhances the utility and educational value of this program and the materials it includes. The second theme directly stems from the obtained results, which can be considered promising. This suggests that CEO-7 could serve as a valuable resource for explicitly teaching oral communication skills.

At this point, it is also important to highlight that teachers viewed the program as an added benefit for conducting activities that promote oral language. Students, on the other hand, responded very positively to the different proposals offered by COE-7, highlighting an increased sense of confidence during oral interactions. Despite the systematization introduced in students’ communicative competence, the diversity of proposals makes it possible to cater to the variety that characterizes typical classrooms. Considering the flexibility allowed, the program “Communication and Oral Expression: speaking, listening, and reading in middle school – 7th grade” could potentially serve as a model for designing other interventions.

Limitations and Further Research

There are some limitations to this study. On one hand, the sample used in this investigation was selected for convenience. On the other hand, the teachers (OCC evaluators) were different, although everyone was aware of the assessment criteria.

Furthermore, future research could consider analysing the ideal frequency and duration of sessions, as well as the didactic intervention itself. It could also explore other variables that may contribute to the development of oral communicative competence, conduct longitudinal studies, and perform the OCC assessment based on the observations of two independent teachers, among other approaches.

The results from future research will help expand the empirical evidence of the benefits of explicitly teaching oral communicative skills and systematically practicing them, thereby

contributing to the development of more competent citizens in terms of oral communication and in the social domain.

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Appendices

Appendix A

How do I evaluate myself as a speaker? (Unit 2)

	Never	Rarely	Sometimes	Often	Ever
1. I articulate words well.					
2. I adapt the tone of voice to the interlocutor and the space.					
3. I shout or speak in too high a tone.					
4. I gesture a lot when I speak.					
5. I follow secondary topics and deviate from the central theme.					
6. I choose the right words to say what I want.					
7. When the conversation seems not to be progressing, I intervene with new data.					
8. When my ideas are confused, it's difficult for me to express them in an orderly way.					
9. I repeat the same idea countless times so as not to give up the floor.					
I talk nonstop and forget to give others time to give their opinion.					
10. I'm an inhibited person, so I avoid talking.					
11. I tend to agree with others and not say what I think.					
12. I use speech articulators to organize my ideas.					

Appendix B

Grid for self- and heteroevaluation of reading (L.) (Unit 5)

CATEGORIES		Teacher	Students				
		L.1	L.2	L.3	L.4	L.5	
TONE	Inaudible						
	Normal						
	High						
ARTICULATION	Deficient						
	Problems with sounds						
	clear						
INTONATION	Monotone						
	Natural and pleasant						
	Forced						
SPEED	Excessive						
	Slow						
	Proper						
PAUSES	Inadequate						
	Adequate						

Appendix C

Planning the oral presentation (Unit 5)

STEP 2 Planning of the written text		Topics
	Introduction Theme presentation (1 paragraph)	-
	Development Development of the theme, concise and objective way.	-
	Conclusion Summary of the above aspects (1 paragraph), highlighting the most relevant aspects of personality.	-

Appendix D

GOAOCC: Grid for Observation and Assessment of the Oral Communicative Competence (Monteiro et al., 2013)

GOAOCC - Grid for Observation and Assessment of the Oral Communicative Competence																		
20 / 20		School:										GRADE		CLASS				
Oral task:																		
N.º	Name/Code number	Verbal skills 60%				SUBTOTAL	Paraverbal skills 30%				SUBTOTAL	Non verbal skills 10%			SUBTOTAL	TOTAL	Assessment	
		Theme knowledge	Vocabulary	Argumentation	Coherence		Fluency	Expressiveness	Tone	Pace		Eye contact	Gesture	Posture				
1		G	S	S	S	3,25	S	I	I	G	2,75	F	S	S		2,33	3	SATISFACTORY
2						0,00					0,00						0	
3						0,00					0,00						0	
4						0,00					0,00						0	
5						0,00					0,00						0	
6						0,00					0,00						0	
7						0,00					0,00						0	
8						0,00					0,00						0	
9						0,00					0,00						0	
10						0,00					0,00						0	

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Sync or Async: Charting the Course for Engagement in Adult Education

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Abstract

Adult education often offers both asynchronous and synchronous modes of online learning to provide flexibility for learners. However, there is a limited understanding of engagement in these modes within adult education. This study aims to explore how the behavioural, cognitive, emotional, and social dimensions of engagement are facilitated in asynchronous and synchronous modes. A mixed-methods approach was used, involving observations and interviews with a total of 33 participants, conducted between April and December 2021. The study examined both Asynchronous Distance Education (ADE) and Synchronous Distance Education (SDE) classes. The findings indicate a significant correlation between the mode of delivery and how engagement is facilitated. ADE designs exhibited a wider variety of engagement facilitation compared to SDE. Furthermore, specific engagement dimensions were found to be more prominently supported in either ADE or SDE classes. To address the one-sided focus on engagement in each mode, teachers should actively design learning activities that promote varied ways for learners to engage in the learning process. This development is crucial as one-sided engagement, particularly in assimilative learning, has been associated with lower academic performance.

Keywords: Adult Education, Synchronous, Asynchronous, Engagement, Second Language Learning

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Introduction

The leap in educational digitalisation has led to an uptake of online educational modes, in adult education, where the previous traditional means of distribution are being challenged. Distance education has traditionally been associated with low levels of interactivity (e.g., Greener, 2021). However, functions in digital technologies that enable interaction (e.g., communication, collaboration) across synchronous and asynchronous modes of education are currently being adopted (Bergdahl, 2022b; Greener, 2021; Watts, 2016), which may indicate a shift in how distance education will be delivered (with a potential increase of synchronous elements). When technologies and conditions for education change, the designs of learning activities must follow, as digital technologies, and uses of them, influence how learners engage (Bergdahl & Bond, 2021; Engle and Conant, 2002; Mejia, 2020; Vuopala, Hyvönen and Eagle, 2014). As an example, collaboration may spur engagement, but uneven participation in collaboration can be linked back to poor designs (Vuopala, Hyvönen and Eagle, 2014). Thus, teachers need to consider the type of interactivity and how their design supports engagement in learning in both synchronous and asynchronous modes of teaching. While teachers are designers of learning activities (e.g., Goodyear and Dimitriadis, 2013; Laurillard, 2012), they may find it challenging to design engaging learning activities in digital learning environments (Dalgarno, 2014). There is a general call for research to identify strategies to increase learner engagement, particularly in distance (Samson, 2020) and adult education (Swedish Institute for Educational Research, 2019) and a particular call to explore how dimensions of engagement in online learning environments (Hu and Li, 2017) that is subject-specific (Fredricks et al 2016). Responding to this gap in existing research is a comparison on how engagement is facilitated in synchronous and asynchronous modes, in Swedish and English second language (L2) learning for adults.

To contribute with insights in this regard, this study raises the research question: How are learners' behavioural, cognitive, emotional, and social engagement supported in asynchronous and synchronous learning designs in L2 adult education?

Background

Synchronous and Asynchronous Modes of Online Delivery

Distance learning is common in both higher education (Watts, 2016) and adult education (Zigerell, 1984). Parallel, with the demand to offer flexible education to adult learners, to promote lifelong learning, schools are seeking alternative ways of educational delivery. Following Pullen (1996) we use the term synchronous distance education (SDE) when addressing education in real-time mediated via video-conferencing systems and Learning Management Systems (LMS), and asynchronous education, for education that does not include real-time lessons. Studies have previously pointed out advantages of both modes: that synchronous distance learning may stimulate active interaction (Hrastinski, 2008), and that learner who take an asynchronous distance course can study at their own pace (Liu et al 2019). The two modes have also been identified to encompass different challenges: where synchronous online learners may experience distraction, learners in asynchronous courses may feel isolated (*ibid.*). A major concern of distance learning has been the lack of interaction (Greener, 2021; Watts, 2016). When comparing results in the synchronous and asynchronous modes, several studies suggest that there are no differences between grades for learners who participate in synchronous and asynchronous modes of learning (e.g., Nieuwoudt, 2020; Schoenfeld-Tacher and Dorman, 2021). Instead, research suggest that it's

the time spent studying, not the mode, that is critical for the outcome (Schoenfeld- Tacher and Dorman, 2021). Research on L2 learning show disparate results, one study showed that synchronous learners outperformed the asynchronous group (Lotfi and Pozveh, 2019) and another study found that there were little differences in outcomes in synchronous and asynchronous modes (Ajabshir, 2019). The digital technologies of today provide ample possibilities for interaction in both synchronous and asynchronous modes (Greener, 2021; Watts, 2016) and some educational practices have begun to combine the synchronous and asynchronous modes of delivery and found that to be effective (Riwayatiningsih and Sulistyani, 2020). Challenges include that when made optional, low achievers can choose the distance education as a strategy to avoid engaging in learning. It is therefore important to guide learners in their choices (Samson, 2020). When comparing classroom based face-to-face (f2f) learning with online education, Samson also observed that test-results and engagement levels decreased. However, Samson concludes that f2f does not mean learners are more engaged, but instead that more engaged learners are more likely to participate wherever education is offered. On a positive note, studies have linked combinations of synchronous and asynchronous modes of distance education to increased learner engagement (Rehman and Fatima, 2021) and increased interaction (Bruscato and Baptista, 2021; Lin and Gao, 2020). While some learners may prefer one mode over the other (Bailey, Almusharraf and Hatcher, 2021; Karaaslan, 2018) studies have also identified an emerging preference for both modes (Amiti, 2020; Gazan, 2020); that learners in general (Samson, 2020), and language learners (Cechova, Skybova and Koukalova, 2018) appreciate the flexibility the modes can offer if they are able to choose.

Learning Designs and Learning Activities

Following Lockyer, Agostinho and Bennett (2016) learning design is viewed as the outcome of teacher planning and design of learning activities that have a pedagogical intent. It seems commonly agreed that Learning Designs (LD) recognises a vast range of digital resources and potential combinations to facilitate and stimulate learner engagement in learning. However, LD goes beyond the technological aspects of education and commonly include a view of teachers as designers for learning, development of teaching practices, operationalisation of pedagogic theory, uses of digital tools and resources, and efforts to improve learning (Bonderup-Dohn, Godsk and Buus, 2019). Interestingly, researchers have advised that learner engagement should be at the forefront of LDs (e.g., Bezemer and Kress, 2008) and that poor designs may lead to unintended disengagement and increased discrepancies of outcomes between learners (Saltz and Heckman, 2020). Linking design to performance, researchers have found that merely informing teachers on the impact of their LD, reduced the number of assimilative activities (Toetenel and Rienties, 2016b). Importantly, it is the execution of learning activity, not the design itself that will lead to positive results (Awuor et al 2021; Missildine et al 2013; Pettersson, 2020; Teng, 2017). LDs in themselves cannot foresee all possible events that may play out in a complex real-life learning situation. Teachers in synchronous settings can to some extent, compensate for a less effective LD in a real-time setting, where learner engagement is negotiated (Bergdahl & Bond, 2021). However, in asynchronous settings the learner's engagement relies fully on the design considerations which are planned in beforehand. Similarly, without LD in synchronous settings, the lesson design would not build on any forethought. Thus, teachers need to understand how they influence engagement through their LD in synchronous as well as asynchronous modes in advance of the learning situation.

Engagement

Engagement can be said to reflect the interaction between a learner and learning content, learners, teachers, digital tools, and resources, (Boekaerts, 2016) and interpreted as purposeful direction of focus, mental effort in thinking, pro-active actions for learning (Bergdahl, 2022b; Halverson, 2016). Engaged learners experience higher levels of school success, grades, attendance, and overall well-being (Fredricks, Blumenfeld and Paris, 2004; Wang and Hofkens, 2019; Wang et al 2016). The behavioural dimension reflects the learner's capacity for participation and task involvement. (e.g., Bergdahl, 2022 a,b; Fredricks, Blumenfeld and Paris, 2004). In successful LDs, teachers include strategies that activate learners. This can be by prompts to participate in activity (Liu et al 2019). The emotional dimension includes the learner's (positive and negative) emotions in relation to learning, such as perceived enjoyment, acceptance of the teacher's instruction but also test anxiety or arousal (Linnenbrink, 2007). The cognitive dimension reflects, the learner's ability to concentrate, focus and have higher cognitive functions, and the ability to regulate and balance requirements and stimuli, in and out of school, both in relation to the physical space and to the digital tools and via the digital tools. It also reflects learner cognitive self-regulation; orientating, planning, managing, and organising their education (Fredricks, Blumenfeld and Paris, 2004; Greene, 2015). However, a one-sided focus on assimilative learning activities (i.e., cognitive engagement through listening, watching, reading) correlate negatively with grades (Toetenel and Rienties, 2016a). While specific tasks can stimulate asynchronous learner interaction, the complexity of the task in asynchronous L2 collaborative writing have been seen to have limited effects on the interaction learner patterns (Hsu, 2020). Thus, more cognitive load, does not seem to affect patterns of social engagement. Finally, the social dimension which can be said to reflect the learner interaction and communication with teachers and schoolmates and includes the process of becoming actively involved in interaction (e.g., asking for help, supporting others, engage in dialogues and collaboration) (Bergdahl, 2022 a, b; Fredricks, Blumenfeld and Paris, 2004). Zydney et al (2012) explored interaction in online learning and suggest that interaction that also is cognitively demanding does not easily happen in asynchronous learning without the facilitation of a teacher. The presented study explores how engagement is facilitated in synchronous and asynchronous second language learning.

Method

Context and Participants

To answer the research question, case study methodology is used to explore a phenomenon in a real-life setting: in a larger school for adult education in a city in Sweden, (Yin, 2003). The school offered BYOD Internet access, Google workspace for Education and laptops to all teachers and learners. After receiving the approval of the principle, purposive sampling (Bryman, 2016) was employed, meaning that teachers who taught second language learning online in ADE and SDE modes were approached. Both English as a second language (ESL) and Swedish as a second language (SSL) teachers accepted to take part in the study (see Table 1). This selection was made to enable a comparison of how engagement was facilitated across second language teaching (Olofsson et al 2020).

Data Collection

Data was collected at one school between April and December 2021 using observations and interviews (n=34), ADE, n=24, SDE, n=9. While observations were done in situ for the synchronous lessons that is not possible in an asynchronous setting (Kovanović et al 2015). With a focus on how the design facilitated learner engagement, the teacher was asked to demonstrate their design to the interviewer. The teacher would do this using a ‘talk-aloud’ technique (Li, 2016) taking on the role of a learner. As interviews were conducted using Zoom, the teachers would share their screen and perform the learning activities while describing aloud all actions they did as a learner. Shifting between the role as a learner and the teacher as designer, the teacher also answered clarifying questions and rated how each act time that passed. Since the learning situation had passed, teachers could potentially also be influenced about actual responses from learners when responding to the estimated duration (for e.g., one teacher demonstrated the number of times and duration that learners had watched an instructional video). When think-aloud is used, teachers access their design from another perspective (the learners), in which the arrangement may function as a stimulated recall (Li, 2016). The teachers visualised a ‘typical learner’, similar to a hypothetical user, in use-case scenarios (Kuropka et al 2008). Although one learner will not reflect the time needed for every individual learner, time-related factors are critical in teaching (Kyndt et al 2014, Riel et al 2018).

Table 1: Demographics

Gender	Mode	Subject	Level	No. observation	Years' experience
Female	SDE	ESL	Course 4	1	27
Female	SDE	ESL	Course 4	1	25
Female	SDE	ESL	Course 3	1	17
Female	SDE	ESL	Course 2	1	14
Female	ADE	ESL	Course 3	3	10
Male	SDE	ESL	Course 1	1	13
Female	SDE	ESL	Course 3	1	9
Female	ADE	SSL	Course 1	2	30
Female	ADE	SSL	Course 4	2	25
Female	ADE	SSL	Course 4	2	12
Female	ADE	SSL	Course 3	2	25
Female	ADE	SSL	Course 1	2	43
Female	ADE	SSL	Course 3	2	12
Female	ADE	SSL	Course 2	2	17
Female	ADE	SSL	Course 4	2	4
Female	ADE/SDE	SSL	Course 4	2	15
Female	ADE	SSL	Course 3	2	22
Female	SDE	SSL	Course 3	1	8
Female	ADE	SSL	Course 2	1	17
Female	ADE	SSL	Course 1	2	12

During synchronous observations the duration of learning activities was observed in situ, and for asynchronous LD, teachers were asked to estimate the duration of each learning activity. The intention of such estimation is not to reflect the enactment of the LD, but to make visible the "hunch" or vague feeling that teachers base their decisions on when designing for learning (Thorpe, 2013). An observations schema was used in which the design elements (Cazden et al 1996) were captured using minute-by-minute coding of learning activities. Building on

engagement theory and what was inductively observed, these activities were subsequently linked to specific dimensions of engagement (see Section 3.4).

Data Analysis

A learning activity was used as the unit of analysis (Wellborn, 1991). Each LA was linked to the engagement dimension in the forefront of that LA informed by the EDLA-schema (Bergdahl & Gyllander-Torkildsen, 2022). Engagement was operationalised using previous engagement theory (Wang et al 2017, Bergdahl, 2022 a, b) and what was inductively captured using the observation schemas. For a detailed overview of operationalisation see Appendix A. While engagement dimensions may overlap, (learners may for example be both emotionally enthused and adopt pro-learning behaviours) (Fredricks, Reschly and Christenson, 2019), each activity was connected to the engagement dimension which was at the forefront of teacher design (see Appendix A). (Thus, if not observed in the empirical data, then it was not included). The data was screened and analysed using descriptive statistics to demonstrate the distribution of facilitation of engagement across the online educational modes using. Then Pearson's correlations test was conducted to further explore associations between variables (Field, 2018). Microsoft Excel 21.02 and JASP 16.0 were used for the statistical analyses.

Ethical Considerations

Following a written approval of the principal, each respondent was approached individually and asked for their consent to participate. The informed consent included information about the study, data collection, use and storage of data, principles of anonymity, and respondents' right to withdraw at any time without questions asked, in line with ethical guidelines (Ess, 2016; Hermerén, 2011) and were collected in writing. The respondents signed the informed consent before the data was collected.

Results

When exploring the total number of engagement dimensions facilitated (see Table 2), results reveal SDE and ADE designs would include a higher number of facilitated nuances within a specific engagement dimension (SDE 3.44, ADE, 2.92). The high number accounted for facilitation of social engagement (SDE) or cognitive engagement (ADE). SDE more often reflected behavioural engagement during the learning activity (SDE 0.89, ADE 0.69), but lesser facilitation for emotional engagement (SDE 0.11, ADE 0.68).

Table 2: Facilitated engagement across educational modes

Engagement	Synchronous Distance Education					Asynchronous Distance Education				
	<i>n</i>	M	SD	Min.	Max.	<i>n</i>	M	SD	Min.	Max.
	9					25				
Beh		0.89	0.93	0.00	3.00		0.68	0.69	0.00	3.00
Cog		1.00	0.50	0.00	2.00		2.84	0.90	0.00	4.00
Emo		0.11	0.33	0.00	1.00		0.68	0.75	0.00	2.00
Soc		3.33	1.41	1.00	5.00		0.32	0.48	0.00	1.00
Tot. nuances		3.44	1.33	1.00	5.00		2.92	0.70	1.00	4.00

Further exploration shows that the facilitation of specific nuances within the engagement dimension was similar to the occurrence of support for that dimension. That is teachers who readily design for an engagement dimension would also facilitate for more nuances within that dimension.

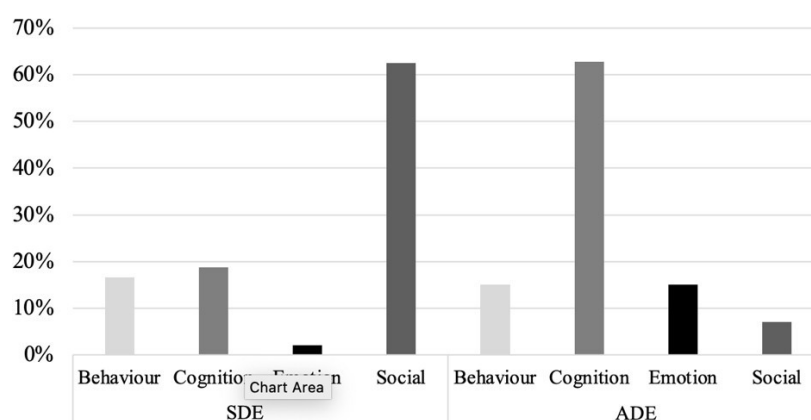


Figure 1: Engagement dimension across synchronous and asynchronous modes

Figure 1 reflects that the social and cognitive dimensions were dominated in separate modes, indicating it might be easier, or more intuitive, to facilitate social or cognitive engagement. There is a potential risk with a one-sided focus on engagement; for SDE that learning situations may stimulate social interaction so much that the time is not effectively used to support practice or training (behavioural) and may not be cognitively challenging, and for ADE that learners are required to own self-regulation capacities. In turn, if these asynchronous activities have an assimilative nature; that is related with lower grades. A one-sided focus on supporting cognitive engagement may thus not be the most effective way of designing asynchronous online learning (for a visualisation of observed combinations, see Figure 2). ADE and SDE also supported combinations of learning engagement in a learning situation differently. Results show that SDE teachers rely on fewer combinations: facilitating cognitive and social engagement or adding behavioural or emotional engagement (even if the former were rare). Given that ADE has been traditionally employed in adult education, it was unsurprising to find that ADE teachers offered a wider plethora of nuances in their designs.

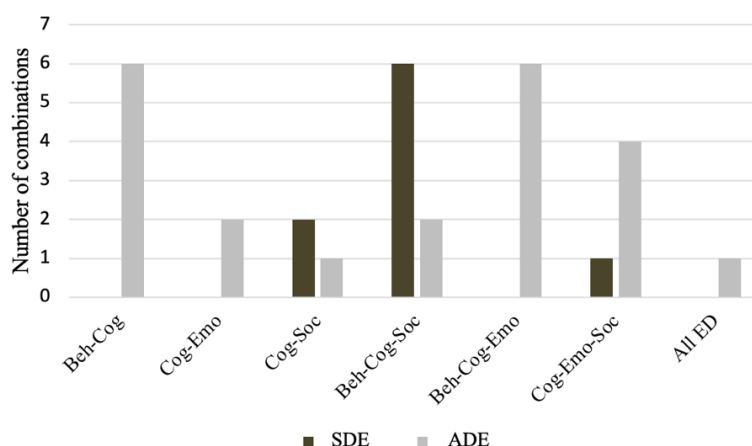


Figure 2 Combinations of engagement dimension across synchronous and asynchronous modes

Figure 2 shows that while one ADE teacher-facilitated for all engagement dimensions (with cognitive engagement being dominant) and two other designs supported socially shared regulation, there was otherwise little support for behaviour and social engagement. Given that ADE has more experience in offering online Education, it was unsurprising to find that ADE teachers offer a wider plethora of nuances in their designs. While one ADE teacher-facilitated for all engagement.

Table 3 Correlation between factors that may influence engagement

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. SDE	1.00								
2. ESL	0.55*	1.00							
3. Level	0.02	0.08	1.00						
4. Duration	0.01	0.07	0.44	1.00					
5. Years***	-0.12	-0.19	0.30*	-0.57**	1.00				
6. Behavioural	0.13	0.13	0.09	0.16	0.25	1.00			
7. Cognitive	-0.71**	-0.36	0.14	0.16	0.18	-0.34	1.00		
8. Emotional	-0.36*	-0.17	0.07	-0.05	0.18	-0.36	0.40	1.00	
9. Social**	0.86**	.60**	0.10	0.06	0.18	0.03	-0.64*	-0.33	1.00

Correlation is significant (**) at the level of $p > 0.001$, and (*) at the level of $p > 0.05$

*** years relates to the number of years with teaching experience

Exploring if other factors, like subject, course level, duration or teachers' years in occupation influenced how teachers enacted designs for learner engagement. Table 3 shows that none of these, but instead the mode, influences how designs are enacted. Social engagement and SDE was found to be strongly positively correlated ($r(32) = 0.86$, $p > 0.001$). There was a significant negative moderate correlation between SDE and cognition ($r(32) = -0.71$, $p > 0.001$) and between SDE and emotion ($r(32) = -0.36$, $p > 0.05$). While teachers' years in occupation was significantly negatively correlated with duration (length of learning situation) ($r(32) = -0.57$, $p > 0.001$), there were no influences of years in occupation, course level or duration on how engagement was supported in learning. There was a moderate and negative correlation between the subject ESL and cognition ($r(32) = -0.36$, $p > 0.05$). However, because most lessons were ESL, which were taught in the SDE mode, the result is likely to reflect the mode, not the subject.

Discussion

Results have revealed that learners' behavioural, cognitive, emotional, and social engagement are supported in very different ways in asynchronous and synchronous learning designs in L2 adult education. As described in the background, it may be tempting to refer to a particular mode when deciding on the effectiveness of education. Some previous studies have indeed pointed out that there is little difference in educational outcome when comparing the synchronous and asynchronous mode of delivery (e.g., Ajabshir, 2019; Nieuwoudt, 2020; Schoenfeld-Tacher and Dorman, 2021). Yet, others propose that synchronous education is better than asynchronous (Lotfi and Pozveh, 2019). This study adds to these findings, that it is not merely about the mode of delivery that need to be considered, but how the learning engages learners, and how the teacher can work across the conditions of each mode of delivery. Exploring the link between L2 learners' engagement and satisfaction Ji (et al 2022) adopted a three-dimensional conceptualisation (behavioural, cognitive and emotional), where

indicators like note-taking and using materials would have been coded similarly here (to the behavioural dimension), but interaction; such as asking question, discussing, in this study coded as social (rather than behavioural) engagement, as this study adopts a four-dimensional conceptualisation of engagement (Bergdahl et al 2022a; Fredricks et al 2016; Wang et al 2017). Adopting a four-dimensional conceptualisation, that includes a social dimension of engagement enabled exploration of significant differences between ADE and SDE designs. For example, the major ingredient in SDE designs was social engagement. Moreover, SDE (planned and enacted) designs could include facilitation of 4-5 nuances of social engagement (but not support other dimensions of engagement in a similar nuanced way). Irrespective of the estimated or real time of learning activities, such variation of social engagement was not identified in the ADE designs. On the other hand, SDE designs typically had little support for emotional engagement and results revealed fewer variation of support for the cognitive dimension than ADE. At the same time, ADE designs displayed nuanced ways to support cognition and a much less facilitation of social engagement. As it has been observed that uneven participation in collaboration can be linked back to poor designs (Vuopala et al 2014), social engagement can be supported through dialogues, interaction, and collaboration (Wang et al 2017). It is also suggested that both SDE and ADE designs can include more aware facilitation of the behavioural dimensions (i.e., what can learners do, such as practice and rehearse) to - and in line with (Riel et al 2018; Samson, 2020) further stimulate learner engagement. While asynchronous practices are difficult to change ad hoc, the synchronous practice also require an aware online design. A single focus on the educational mode alone might not be the best way forward; indeed, both synchronous and asynchronous elements, may be combined to best influence learner engagement. Developed technologies and inclusion of real-time elements, are likely to increase, and with that, also the need to provide guidance for teachers on how to design for learning and support learner engagement in these emerging combinations of educational modes.

There are several limitations to the study: A first limitation is related to the measurements of behavioural, cognitive, emotional, and social engagement. This study only includes such indicators of engagement that were designs to be facilitated. Although appendix A shows the learning activities in relation to each dimension, the learner perspective of which engagement dimensions that were activated remains to be explored. Second, generalization is limited due to the low number of observations, the context (the focus of adult education).

Conclusion

Distance education is no longer merely asynchronous but may be offered with synchronous elements, or a combination of the modes, that may include interaction of varying kind. However, one cannot say that one mode is “better” than the other. Instead, this study shows that synchronous and asynchronous modes in adult education significantly impact the kind of engagement teachers support. Results also reveal that despite being “traditional”, the well-established mode of asynchronous distance education reflected a wider repertoire of facilitated engagement. However, learners who enrol with asynchronous education are still to expect cognitive- heavy learning that requires self-regulation. On the other hand, the emerging mode (SDE) displayed facilitating social engagement with ease. Conclusively, educational modes are still emerging and could develop to support learners in more varied ways. Teachers may also become more aware of how to overcome the hindrances to support engagement in the different modes, either by including a/synchronous elements, innovative and informed learning designs.

Appendix A

Operationalisation, overview of abbreviation These dimensions refer to teachers' enacted learning designs

Behavioural dimension

P: Practice i.e., teacher instructs learners to practice through synchronous exercises

P(a/s): Practice a/synchronous i.e., teacher instructs learners practice through both asynchronous and synchronous exercises

P(a/i): Asynchronous interact i.e., teacher instructs learners to practice through asynchronously interact with peers

P(a): Practice asynchronous i.e., teacher instructs learners to practice individually through asynchronous exercises

Cognitive dimension

L: Listen, look i.e., teacher provides understanding through assimilative tasks, reading, listening.

SRL/O: Orientation i.e., learner orientates himself/herself in an online system/forum/application

SRL/P: Planning i.e., learner plans schoolwork

SRL/C: Checking i.e., learner check and submits work

Emotional dimension

DO: Produce i.e., teacher instructs learners to do schoolwork which is to be assessed

IA Individual Assessment i.e., teacher provides a checklist for self-assessment

A Test and assessment i.e., teacher assess progression, e.g., through quizzes, oral exams

Social dimension

D: Discussion i.e., teacher instructs learners to discuss a matter

C: Collaboration i.e., teacher instructs learners to collaborate

I(S): Student-led interaction i.e., learner take initiative to interaction, e.g., raising question

I(T): Teacher- led interaction i.e., teacher prompts interaction, e.g., asking question I(Tech):

IT-led interaction i.e., learner moves through a system with built in scaffolding

SSRL: Shared Regulation i.e., Socially Shared Regulation: learner plans, set goals and strategies to collaborate

AI: Asynchronous interaction i.e., learner interacts using static for a, e.g., through blog posts

Other activities observed

Break (intentional) i.e., teacher proposes a break

TeB Technology breakdown B i.e., technology that is not working causes a halt to learn

Paus (intentional) i.e., teacher waits for all learners to re-join after having done separate activities

DRL Digital relocation i.e., learner moves into different online locations

ID Paus (unintentional) i.e., teacher pauses the instruction if there are issues with accessing materials Adm Course-administration. i.e., time for learners to for example create an account

CI Course information i.e., teacher provide general course-related information

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Influence of Teachers' Salaries on the Promotion of Sustainable National Development in Lagos State Basic Schools, Nigeria

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Abstract

In Nigeria and some other developing countries, teachers who are supposed to be the important resource that links the survival of the present and the future generation are not satisfied with their salaries and this has affected the quality of the educational system. Thus, the need to determine the relationship between teachers' salaries and sustainable National development became inevitable. The descriptive survey design was adopted for the study. A stratified random sampling technique was used to divide the population of 16,913 UBE teachers in Lagos state into five geographical zones after which a sample size of 378 teachers responded to two self-developed questionnaires titled "Teachers' Salaries' Questionnaire (TSQ) and Sustainable National Development Questionnaire (SNDQ)." Both the TSQ and SNDQ were a 4-point Likert-type scale (four response options). The construct validity of the instrument was done through average variance extraction measurement while the reliability of the instrument was measured through Cronbach alpha with a split-half reliability coefficient that ranged from 0.71 to 0.88. Data were collected and analysed through descriptive and inferential statistics of correlation, ANOVA and regression analysis, tested at 0.05 and 0.01 levels of significance. The major finding revealed that teachers' salaries strongly correlated with sustainable National Development. This finding poses serious consequences and implications for students' academic performance and the attainment of Sustainable Development Goals. Thus, it is recommended among others that the Nigerian Government and policymakers should embed sustainability in budgetary allocation for education, thereby, making adequate financial resources available for increased teachers' salaries.

Keywords: Education, Motivation, Sustainable National Development, Teachers' Motivation, Universal Basic Education

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1. Introduction

The issue of sustainability has become a recurrent discourse by many scholars and researchers because it has a lot to do with today and the future. This is why Boeve-de Pauw, Gericke, Olsson and Teresa Berglund (2015) concluded that sustaining the natural environment and resources as well as developing wealth and well-being for a growing population is the most important issue for survival. Edet and Beyin (2018), also define sustainability as the ability to sustain, maintain, provide for or nourish something for an indefinite period without damaging or depleting it. The implication of this for any nation is the need to focus on the present generation's development without compromising those of the future generation. This implication can be connected to a statement made by an American Professor of Education Dr Ivan Welton as reported by Adesulu, Abayomi, Youdeowei, Kwenuya, Iruoma, and Enwere in the Nigerian Online Vanguard news of October 8, 2015 that tomorrow's future is in today's classroom of every teacher.

However, in Nigeria and some other developing countries, teachers who are supposed to be the important resource that links the survival of the present and the future generation are not satisfied with their jobs as most studies confirm this. For instance, the studies of Ejiogwu (1983), Akinwunmi, (2000), Ololube, (2006), Alabi, (2011), Suleimann, (2012), Chiemeka-Unogui, (2018) and Alfagira, (2019) found that teachers have been poorly motivated and this has affected the quality of the educational system. The study by Doggor (2014) also found that Universal Basic Education (UBE) teachers are not satisfied with their salaries and conditions surrounding their service apart from inadequate provision of teaching and learning facilities. Emeya and Antiaobong (2016) also found that the joint contribution of teachers' motivation and regular payment of salary increased agricultural science teachers' commitment in the Port-Harcourt Local Government area of Rivers State. These findings also tally with the notion of Alfagira (2019) that motivation is one of the main factors that can influence employee performance in organizations. The implication of this is that teachers will be induced and willing to put in their best (without being forced) in achieving educational goals when certain inducements are given to them.

Meanwhile, in advanced countries like the United State of America and the United Kingdom, government look out for what is best for its teachers in terms of welfare package while their Nigerian counterparts have to fight for better conditions of service with the government before any such thing is granted to them. The American National Education Association (2015) as reported by Vanguard News on May 6, 2015, reported that (depending on the state), high school teachers in the US get as much as \$48,631. While the best-paid 10 per cent in the field made approximately \$86,720, the bottom 10 per cent made \$37,230. Newly qualified teachers in England and Wales start on the main salary scale, which rises incrementally from £22,023 to £32,187, though salaries may be higher depending on location. Salaries on the main scale in Northern Ireland range from £21,804 to £31,868. Similarly, high school teachers in South Africa earn an average of R166,068 per year.

The UNESCO Report (2020) also confirms the influence and powerful effect teachers have on the provision of equitable, accessible, qualitative and sustainable global development. In the same vein, Nwakasi and Cummins (2018) found that teachers are crucial inputs of any educational system because they have the command of the knowledge and skills to offer learners. However, while this is true and undebatable, its effective implementation is greatly dependent on the motivation, commitment and support of many stakeholders and institutions including school leaders supporting teachers who are involved with implementing Education

for Sustainable Development pedagogies. Basic Education programme, which according to Suleimann, (2012) is the early childhood care and education and nine (9) years of formal schooling was introduced by the Federal Government of Nigeria in September 1999 along with the Universal Basic Education Commission (UBEC) to facilitate the achievement of its objectives. According to Mbanefo (2000), the provision of free, universal basic education for every Nigerian child of school age among others is the major objective of UBE.

However, as discovered by Chiemeka-Unogui (2018), inadequate trained teachers and infrastructure, non-availability of equipment and learning materials and poor funding have been major problems of Universal Basic Education in Nigeria. The study of Suleimann (2012) also found that the effectiveness of the Universal Basic Education Programme has been grossly hindered by inadequate funds. Moreover, a UNESCO Report (2020), still put the figure of out-of-school children in Nigeria at 10.2 million in spite of significant progress made on the programme since 2000. Although in Lagos state (which is the focus of this study), the government has been committed to the promotion of quality basic education as various development programmes have been organized for teachers, issues of low salary payment still remain a staggering issue. This problem is peculiar in light of the fact that Lagos state is a centre of excellence and a known pacesetter in the education sector of the nation and also with the largest number of private schools.

The major concern of this study stems from the fact that these myriad problems facing UBE in Nigeria, particularly Lagos State may pose a greater challenge to the future generation in achieving quality UBE and consequently promoting sustainable national development. It also becomes pertinent to find out to what extent teacher's salaries/fringe benefits can influence sustainable development in Lagos State Universal Basic Education (UBE) teachers. This paper therefore tries to look at the influence of teachers' salaries/fringe benefits on UBE teachers who actually determine what is to be taught, how to teach it) and its attendant impact on sustainable national development. With this, the researchers stand the chance of providing an empirical basis to explore the scientific validity of the variables under investigation.

1.1 Research Objectives

The purpose of the study was achieved through the following objectives:

1. To investigate the relationship between teachers' salaries and sustainable national development in Lagos State Basic schools.
2. To find out the difference in the perception of male and female teachers on the influence of salaries on sustainable national development in Lagos State Basic schools.

1.2 Research Hypotheses

The following hypotheses were formulated to guide the study:

1. There is no significant relationship between teachers' salaries and sustainable national development in Lagos State Basic schools.
2. There is no significant difference in the perception of male and female teachers on the influence of salaries on sustainable national development in Lagos State Basic schools.

1.3 Review of Related Literature

Teachers' Salaries/Fringe Benefits and Sustainable National Development

According to the Incheon Declaration and Sustainable Development Goal4-Education (SDG4-Education) 2030 Framework for Action (2014), a major feature of SDG4-Education is ensuring that children and youth have access to and are able to complete quality education. Another important feature is ensuring that sufficient quality education leads to relevant, equitable and effective learning outcomes at all levels and in all settings. The requirement for this goal is the need to meet the needs of all learners through relevant teaching and learning methods, content, and well-qualified, trained, adequately remunerated and motivated teachers. According to them, teachers are regarded as a major determinant of achieving all of the SDG4-Education 2030 agenda.

However, according to several studies on teachers' motivation, the salaries of teachers especially in Africa have been seen as generally poor. For instance, Jerotich and Box (2015) and UNESCOIICBA (2017) found poor remuneration, ineffective administrative supervision, low government support, lack of teaching incentives, absence of teaching materials, and poor teaching conditions as hindrances to increasing teachers' motivation. Some other researchers also found that teachers' motivation increases with the regular and timely payment of salaries as well as bonus-pay schemes. For example, in India, irregular payment of teachers' salaries was found to be a major source of low motivation (Ramachandran and Pal 2005). Vroom's theory (1964) also emphasized that employee effort will lead to performance and performance will lead to rewards.

Similarly, Bozpolat (2016) also opined that highly motivated teachers are likely to be successful at their jobs as such motivation could energise them to go the extra mile to improve students' performance by ensuring the achievement of learning outcomes. This was why Nyakundi (2012), concluded that an organization's success depends on how the organization continues to motivate its employees. Jerotich & Box (2015), Li et al. (2014) and Ololube (2006) also found that work motivation relates positively to job satisfaction. Similarly, Abdulrahman, Abdulrahman and Xu (2018) found that most teachers in Tanzania are less motivated and this limited their job performance.

However, the study of Michaelowa (2002) does not find a salary structure to be an obvious determinant of teacher job satisfaction. Delannoy and Sedlacek (2000) also note that generally in Brazil, salary increases were not effective measures in increasing teacher's performance. The conclusion reached in this study is that how teachers are paid are more important than how much they are paid if they find a way of supporting themselves and their families. Similarly, the study of Korb and Akintunde (2013), found that monthly salary did not significantly relate to teacher job satisfaction. The study of Judge and Church (2000) also found that across many years, organizations, and types of jobs, employees evaluated the nature of the work itself as the most important job facet. In the same vein, Youlonfoun (1992) while attesting to the importance of good and prompt payment of salaries in motivating employees, he however concluded that there are other factors that hinder commitment to teaching.

Going through the above literature, it is obvious that a lot of studies have been done on the impact of teachers' salaries and effectiveness in Nigeria. However, very few or no empirical studies have been carried out on the present study in Nigeria particularly in Lagos State. Moreover, in spite of the fact that many studies have established the crucial roles of teachers

in the realisation of sustainable development goals (SDG), Goal 4 in particular and having realised the mirage of problems that befell the MDG and UBE in the past, which hampered its full realisation as rightly pointed out in the SDG blueprint of 2015, nothing much has been done to solve these problems. Coupled with this, is the low salary level of teachers.

Gender and Influence of Teachers' Salaries on Sustainable National Development

There is a dearth of adequate research on the perception that male and female teachers have on how their salaries influence Sustainable National Development and this is one of the needs for this study. However, one of the few studies relevant to this study is that of Ofili, Usiholo and Oronsaye (2009) who found that the main cause of job dissatisfaction and reason for wanting to leave the teaching job was poor salary and that although the female teachers were more dissatisfied with the job than their male counterparts, more male teachers had intention to quit than the female. The explanation the researchers advocated for this difference was the mobility of men because of the desire for more financial gains while women are found to be more predisposed to family responsibilities which the teaching job often allows.

Similarly, the findings of Vašková, (2005) showed significant differences in the perception of motivating factors for good work performance and that while women value workplace interpersonal relationships, respectful treatment by the employer, and the ability to reconcile work and family life, men place more value on basic salary and bonuses and this affect their motivation on the job. However, the study of Kalnická (2004) found gender differences only among rank-and-file staff as discovered by some researchers that women in management adapt to male thinking and conduct, whether knowingly or not, and internalize the values prevailing in a male-dominated market. The divergent finding on gender differences in the influence of teachers' salaries on sustainable National Development shows that the literature on this discourse is inconclusive and thus justifies the need for gender differences as one of the variables for this study.

2. Research Design and Methodology

2.1 Research Design

This study made use of a descriptive survey design. This type of design was relevant to this study because data was generated from respondents about their opinions on the influence of UBE teachers' motivation on sustainable national development. The study sought descriptive and self-reported information from teachers in Lagos state primary schools.

2.2 Population

The target population of the study consists of 8,587 teachers in all the 1014 public primary schools and 8,326 teachers in the 349 junior secondary schools in Lagos State (Lagos State Annual School Censors Report, 2019).

2.3 Sampling Procedures and Sample Size

The sample size for this study was calculated through the Research Advisor Table (2006). Thus, for a population of 16,913 UBE teachers in Lagos state a sample size of 378 teachers was used. All the UBE schools (primary and Junior Secondary Schools) in Lagos State were stratified into five geographical zones: Ikorodu, Badagry, Ikeja, Lagos Island and Epe. One

Local Government Area was randomly selected to represent each of the five geographical zones. The schools and teachers used were further selected through a stratified random sampling technique in order to avoid bias in selection.

2.4 Instrumentation

The instruments for data collection were two self-developed questionnaires titled “Teachers’ Salaries’ Questionnaire (TSQ) and Sustainable National Development Questionnaire (SNDQ). The TSQ instrument consisted of two sections. Section A focused on personal and demographic data from the respondents. While Section B comprised eleven items on Teachers’ salaries and fringe benefits, the Sustainable National Development Questionnaire SNDQ comprised twenty items. Both the TSQ and SNDQ were a 4-point Likert type scale (four response options) of Strongly Agree (SA), Agree (A) to Disagree (D) and Strongly Disagree (SD). The construct validity of the instrument was done through average variance extraction measurement while the reliability of the instrument was carried out on the 30 UBE teachers in Ogun State and measured through Cronbach alpha with split-half reliability coefficient which ranged from 0.71 to 0.88 indicating that the instruments were reliable and suitable for the study.

3. Research Findings, Discussions and Conclusions

3.1 Research Findings

The data were collected and analysed through descriptive and inferential statistics of correlation, ANOVA and regression analysis while the hypotheses were tested at 0.05 and 0.01 levels of significance. These methods of data analysis were suitable because of the need to evaluate the mean which is a descriptive statistic and the relevance of estimating the relationship between the variables which was done by Pearson’s moment correlation coefficient and the relative effects of the independent variables on the dependent variable.

The findings of the study are presented according to the research hypotheses as follows:

Hypothesis Testing

Hypothesis 1: There is no significant relationship between teachers’ salaries and sustainable national development in Lagos State Basic schools.

Table 1: Correlation Coefficient of Teachers’ Salaries and Sustainable National Development

N	TSF \bar{x}_2	SND Y	R	P	Comment
378	26.85	52.23	0.49**	0.0001	Ho ₂ is therefore rejected

Source: Researchers’ Field Survey Result (2019)

Interpretation: The mean response of teachers’ salaries/fringe benefits (TSF) is 26.85 while the sustainable national development questionnaire (SND) is 52.23. A moderate relationship exists between TMSF and SND and this relationship is significant at both 0.05 and 0.01 levels of significance ($r = 0.49$). Thus, Hypothesis 1 of no significant relationship between teachers’ salaries/fringe benefits and sustainable national development is rejected.

Hypothesis 2: There is no significant difference in the perception of male and female teachers on the influence of teachers' salaries on sustainable national development in Lagos State Basic Schools.

Table 2: Paired Sample Statistics of Male And Female Teachers' Perception of Teachers' Salaries and Sustainable National Development

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Male Teachers' Perception of Teachers' Salaries/Fringe Benefits	27.55	114	5.366	.503
	Male teachers' perception of Sustainable Development	53.54	114	7.975	.747
Pair 2	Female Teachers' Perception of Teachers' Salaries/Fringe Benefits	26.78	228	5.582	.370
	Female teachers' perception of Sustainable Development	52.07	228	9.483	.628

Source: Researchers' Field Survey Result (2019)

The mean perception of motivation in terms of salaries and fringe benefits by male teachers is 27.55 with a standard deviation of 5.366 while the average for the female is 26.78 with a standard deviation of 5.582. The mean perception for male teachers is higher than that of the female but the responses of the female on the matter are more diverse as shown in table 2. Also, the mean perception of sustainable development for male teachers is 53.54 with a standard deviation of 7.975, while the one for the female is 52.07 with a standard deviation of 9.483 showing that the mean perception of male teachers on the relationship between teachers' salaries and sustainable national development is also higher in male teachers than in female but the more diverse opinion was expressed by the female.

Table 3: One Sample Test of Male and Female Teachers' Perception of Teachers' Salaries and Sustainable National Development

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Teachers' Motivation in Terms -of Teachers' Salaries/Fringe Benefits Male	54.867	115	.000	27.474	26.48	28.47
Sustainable Development- Male	71.890	114	.000	53.626	52.15	55.10
Teachers' Motivation in Terms of Teachers' Salaries/Fringe Benefits- Female	73.35	234	.000	26.728	26.01	27.45
Sustainable Development- Female	78.19	229	.000	51.826	50.52	53.13

In table 3 above, the One Sample Test showed a significant difference in the mean perception of the male and female teachers on the relationship between teachers' salaries/fringe benefits sustainable national development.

3.2 Discussion of Findings

The finding of the first hypothesis revealed a significant relationship between teachers' salaries/ fringe benefits and sustainable national development. This finding agrees with the view of Dintelman (2002), Arubayi (1985) and Church (2000) who maintained that the most basic needs of teachers are met through salaries/ fringe benefits, and also makes teachers perform well on the job. Similarly, the studies of Glewwe et al. (2003); Andrew (2004) and Nyakundi (2012) agree with the findings of this study as they also concluded that salaries/fringe benefits of employees aid the organisation's survival. The reasons for this may not be far-fetched. Firstly, it may be because the standard of living (food, accommodation, clothings, payment of children's school fees and the likes) are on the high side, thus, desire to meet these needs may be the major reason why increased and high salaries may be a major priority of teachers in Lagos State.

On the contrary, the studies of Youlonfoun (1992), Turner (2001), Michaelowa (2002) Delannoy and Sedlacek (2000), do not agree that salaries/ fringe benefits are not what the teachers need most and that it was not significantly related with teacher job satisfaction. This contradiction also shows that as much as the finding of this study has revealed a significant relationship between the provision of teachers' salaries and fringe benefits, other factors can undermine commitment to teaching, thus affecting sustainable national development. The study of Korb and Akintunde (2013) is also contrary to this present study as it concluded that money is not the most important factor for teachers' improved productivity. This divergent literature further justified the need for this study.

The second hypothesis no significant difference in the perception of male and female teachers on the influence of teachers' salaries on sustainable national development showed a significant difference. The study also revealed that the perception of male teachers on the relationship between teachers' salaries and sustainable national development in Lagos State Basic Schools was more than their female counterparts. Although there is a dearth of research on the present study, very few studies like those of Ofili, Usiholo and Oronsaye (2009) found that the main cause of job dissatisfaction and reason for wanting to leave the teaching job was poor salary and that although the female teachers were more dissatisfied with the job than their male counterparts, more male teachers had the intention to quit than the female. This result agrees with the present study and this may be due to the fact that men naturally desire more financial gains and have become more mobile in terms of quitting their jobs more than women.

Similarly, the findings of Vašková, (2005) who found a significant difference in the perception of male and female teachers on motivating factors for good work performance also showed a significant difference where men perceived more relationships on the two variables than women. The implication of these findings is that male teachers value financial gains more than their female counterparts and since they have the privilege of spending more time on the job than women because they do not go on maternity leave, neither do they (male teachers) need to take permission to attend to domestic activities, their responses on the importance of teachers' salaries/fringe benefits in sustainable national development in Lagos state basic schools should be taken seriously.

3.3 Conclusion and Recommendation

From the findings of the study, teachers' salaries as a motivational variable strongly correlated with sustainable National Development. The results further revealed that male and female teachers' perception of the influence of teachers' salaries on sustainable National Development is significant. This agrees with most motivational theories especially Abraham Maslow's theory of hierarchical need structure. By implication, The Federal government (especially the Lagos state government which is the focus of this study) should do all it can to multiply the salaries of teachers geometrically while at the same time, cognizance should be paid to other motivational dimensions. Thus, if quality universal basic education and sustainable national development is to be achieved, the government and other agencies involved in the management of UBE must make adequate provision of financial resources available for increased teachers' salaries.

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Investigating Remote Teaching Through Cultural-Historical Activity Theory: A Case Study in Lebanon

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Abstract

This case study investigates remote teaching in a higher education institution in Lebanon using Cultural-Historical Activity Theory (CHAT). It addresses the lack of cultural-historical studies examining remote teaching, while illustrating and enhancing the fourth generation of CHAT. The choice of Lebanon stems from the country's concurrent financial, banking, and political collapse. These crises that disrupt regular functioning can elucidate the interplay of activities that are often overlooked but play a vital role in the success of teaching. Following a sequential explanatory design, data was collected through a survey completed by 74 instructors of a private university in Beirut, 9 of whom were subsequently interviewed for more in-depth information. Drawing upon Engeström and Sannino's framework (2011), the study analyzed the contradictions/tensions experienced by instructors in online teaching, while also exploring how subjects resolved these contradictions. The most reported contradictions pertained to social interactions, internet connectivity, and demotivation. The most prevalent contradictions took place across activities, with 58 out of 92 contradictions remaining unresolved. The resolution of contradictions primarily relied on adjusting the tools employed in remote teaching. Instructors who went a step further by adjusting the rules governing social interactions or actively engaging with the community were able to overcome additional contradictions. Subjects did not mobilize the division of labor and coalitions of activities to address conflicts.

Keywords: Remote Teaching, Higher Education, Cultural Historical Activity Theory, Contradictions

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Introduction

Two years ago, the coronavirus pandemic had a profound impact on higher education institutions globally. According to UNESCO, as of April 1, 2020, educational institutions in 185 countries were closed, affecting 1,542,412,000 learners, representing 89.4% of the total enrolled learners (IAU, 2020).

In response to this unprecedented situation, remote teaching became the immediate solution to ensure uninterrupted learning and academic progress for students in their homes. While limited attention has been given to the social aspects of this teaching method, existing research primarily highlights two areas: perceptions and the challenges faced by students during the transition. A survey study conducted among Polish medical students¹ in 2021, examined their perception of online learning during the COVID-19 pandemic. Findings revealed several key advantages of online learning, including the ability to study from home, uninterrupted access to online materials, the flexibility to learn at one's own pace and the comfort of learning in familiar surroundings. In the Arab region, a survey was conducted among engineering students at Al-Zaytoonah University of Jordan to evaluate their perspective on online learning². Results indicated that students generally expressed satisfaction with online learning. However, they did identify a few challenges that they encountered with internet speed as the primary difficulty and other challenges associated with using e-learning websites. Although those studies focus on teachers' and students' assessment of remote teaching, they were limited in that they overlook the aspect of adaptation to remote teaching from an instructor perspective and the impact of social interactions among instructors, students & the wider community. Also, they fail to highlight what components facilitated and interfered with such adaptation.

As per Engeström (1999), CHAT is applied in various domains of practice. This theory provides a methodological foundation from which to examine the relations between societal, institutional, and personal dimensions of human development. Baran & Cagiltay (2010) stated that CHAT is a suitable framework for online learning environments because it clarifies the social structure of online environments that portray a learner as an individual as well as a member of a larger community.

The Lebanese Context: Multiple Crises

Since 2019, Lebanon has been facing multiple crises such as rising political instability, the Covid-19 pandemic, an economic and financial crisis and the Port of Beirut blast. This turmoil has severely disrupted the academic years 2019, 2020 and 2021, forcing education institutions to switch to remote teaching in order to save what was left of the academic year. However, this e-learning environment has brought its own challenges, such as the low internet speed, the digital divide and the frequent electricity outages. The economic crisis affected the infrastructure of the country, with fuel shortages and the absence of maintenance leading to the near total collapse of the electricity network which in turn aggravated the situation for the connectivity infrastructure (internet, telephone)³. Those multiple crises forced educators to rethink their teaching practices whilst shifting abruptly to a “relatively

¹ <https://doi.org/10.21203/rs.3.rs-41178/v1>

² <https://doi.org/10.3390/educsci10090232>

³ Source: <https://today.lorientlejour.com/article/1265636/internet-connectivity-the-latest-in-a-line-of-services-falling-victim-to-lebanons-electricity-shortages.html>

new” learning environment for the Lebanese educational system. The main aim of this research is to examine, using Cultural-Historical Activity Theory (CHAT), how instructors adapted and evolved their teaching practices in the context of remote teaching during times of multiple crises. Furthermore, this study aims to investigate the tensions that emerged during remote teaching and explore how individuals resolved them. It emphasizes the significance of coalitions of activities in enabling the success of remote teaching, considering the influence of past iterations of this activity and the surrounding activity systems.

The rest of the paper is organized as follows: Section 2 describes the theoretical framework, Section 3 provides the methodology, Section 4 reports and discusses the main results, and Section 5 offers concluding remarks and proposes implications for future research.

Theoretical Framework

This study focuses on the phenomenon of adaptation and change from a social perspective, following CHAT, which is rooted in Vygotsky’s work and developed later by Leontev and Engeström. According to Engeström, an activity is defined under CHAT as a purposeful, collective, and historically situated human endeavor that involves the interaction between individuals, artifacts (tools), and the sociocultural context in which the activity takes place. He argues also that when multiple activity systems converge and form coalitions, new possibilities for transformative change can emerge. These coalitions of activities involve the collaboration and coordination of different actors, tools, and goals across various activity systems (Engeström, 2021).

Cultural-Historical Activity Theory (CHAT)

CHAT studies human development by focusing on the activities they undertake individually or with each other. Through the mediation of the activity, societies and individuals mutually shape one another. This theory is rooted in Lev Vygotsky’s work on the role of mediation; the latter refers to the process through which society and the individual mutually shape each other. It was subsequently expanded by Yrjö Engeström to include additional components. CHAT highlights that human activities are not static but are deeply influenced by the historical and cultural context in which they occur. In other terms, individuals and societies inherit cultural practices, tools, and knowledge from previous generations. For the purposes of this paper, the extended version of CHAT developed by Engeström will be utilized as the framework of analysis.

Engeström Extended Activity System

In 1987, Yrjö Engeström extended Vygotsky’s model to include additional components: community, rules and division of labor. The extended version is presented in the figure below.

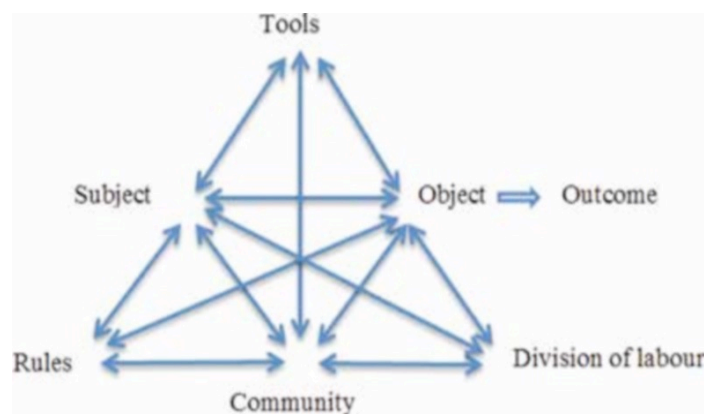


Figure 1: Engeström's Extended Activity System (1987)

The components that make an activity are illustrated above in figure 1. The two-sided arrow implies that the components might shape one another or develop during the process of an activity. (Engeström, 2021). For instance, the relationship between subject and community is mediated through the rules imposed, however the rules also affect the subject who is undertaking an activity and that same subject might accept or reject those rules set by the community.

In 2021, Engeström and Sannino proposed a fourth generation of CHAT that emphasizes coalitions of activities. It focuses on the interconnections and dynamics between different activity systems. Engeström developed this concept to analyze and understand how multiple activity systems can come together and interact to form broader societal changes. According to him, activity systems are not isolated entities but are interconnected and interdependent within a larger social context.

By illustrating Engeström extended version in this study, we defined each component accordingly as the following:

- *Subject*: would be the instructors undertaking the remote teaching activity
- *Tools*: the instruments mediating the activity in question would be the equipment (laptop, cellphone...), the educational platforms, and all the features included in those platforms. These tools have a direct relationship with the subject because they shape how the subjects would use them to execute an activity or task (what can be done and how).
- *Rules*: would be the norms set by the instructors, the institution, or the community, for example instructors require students to raise their hand before speaking, or to open their cameras while undertaking an exam. They shape subjects in the way they're applied but subjects can accept, reject or alter those rules according to their needs.
- *The community* refers to the instructors in the same institution, the students learning remotely, and colleagues in other institutions.
- *Division of labor* is constituted of the distribution of roles, tasks and responsibilities among participants, whether they are students, instructors, staff (IT), or leaders (Dean, department chairs.)
- *Object*: on a macro level, the goal of the activity would be achieving the key performance indicators of the course or the program. On a micro level, the goal would be to finish a specific task assigned by the instructor or something related to the lesson.

CHAT and Change: The Concept of Contradictions

Contradictions constitute a key concept in CHAT and are characteristic of activity systems. They are historically accumulating tensions within and between activity systems (Engeström, 2001).

They are considered crucial for understanding human learning and development as they serve as the driving force for change and development. (Engeström and Sannino, 2021). They create disruptions and conflicts but also spark innovative attempts to address perceived problems. As per Sannino (2018), contradictions are historically emergent and systemic phenomena that must be approached through their manifestation. Murphy and Rodriguez-Manzanares (2008) define contradictions as a “tension, denial, contrast or opposition between two propositions”.

Engeström (1987) classified contradictions into four distinctive levels:

- *Primary contradictions*: within an individual component of an activity system;
- *Secondary contradictions*: between components within the same system;
- *Tertiary contradictions*: between an existing activity system and a culturally more advanced form of it;
- *Quaternary contradictions*: between the central activity system and other co-existing neighboring activities

In their study, Discursive manifestation of contradictions, Engeström and Sannino (2021) discussed four types of manifestation of contradictions along with their respective resolutions, synthesized in the table below. I will be contended with the resolution types only as this study will investigate also how individuals resolved the contradictions within the context of remote teaching.

Table 1: *Types of discursive manifestation and their resolution*

Manifestation	Feature	Resolution
Double bind	Facing pressing and equally unacceptable alternatives in an activity system	Practical transformation (going beyond words)
Critical conflict	Facing contradictory motives in social interaction, feeling violated or guilty	Finding new personal sense and negotiating a new meaning for the initial conflicting situation
Conflict	Arguing, criticizing	Finding a compromise, submitting to authority or majority
Dilemma	Expression or exchange of incompatible evaluations	Denial, reformulation

Throughout this paper, the terms "contradiction" and "tension" will be used interchangeably to refer to the conflicts within the context of remote teaching. This paper answers the following research questions: What tensions arise in the remote teaching activity? How are these tensions resolved in this system? Which components of CHAT were part of the resolutions?

Methodology

Type of Research and Participants

This qualitative study uses a mixed-method approach, specifically employing a sequential explanatory design. The research begins by collecting quantitative data, which is then followed by a qualitative phase with in-depth interviews. The participants in this study are 74 instructors, 46 males and 28 females, from a prestigious private university in Lebanon. These instructors voluntarily agreed to take part in the research.

Data Collection Tools and Analysis Technique

A survey was conducted using a non-probability sampling approach including a total of 19 closed-ended questions, 13 open-ended questions, and additional general information questions. The questions addressed various aspects related to the subject's state and use of spaces and tools at the beginning then at the end of their remote teaching phase.

Out of the 74 instructors who responded to the survey, 9 expressed their willingness to provide more information and were subsequently interviewed. The interview questions were tailored to each individual instructor, focusing on the changes in practices and state throughout their remote teaching experience. The interviews took 45 to 60 minutes.

The analysis technique of the data was predicated on the specific research questions posed. The survey data, consisting of multiple choice and Likert scale questions, was quantitative in nature so we utilized the Statistical Package for the Social Sciences (SPSS). The surveys also included open-ended questions that enabled the collection of qualitative data. This qualitative data was analyzed using the thematic analysis technique. To conduct the thematic analysis, we transcribed all nine interviews and carefully examined instructors' narratives where tensions, contradictions, conflicts, or problems arose during the discussions. 92 problematic instances were identified. The instances of tensions were then classified into major themes. Each instance of tension in teachers' narrative was then analyzed and coded according to Engeström and Sannino's framework (2021), presented above.

Reporting of Results and Discussion

Participants' Profiles

All participants confirmed they have used remote teaching prior to taking the survey. 9 instructors have been using educational technology for one year, 4 for two years, 2 for three years, 47 for more than three years, and 12 instructors did not provide a response regarding this question.

In terms of age, 30 instructors were above 50 years old, 29 fell within the age range of 40-49, 12 were aged between 30-39, and 3 were less than 30 years old. Regarding educational qualifications, 46 instructors held a Ph.D. degree, while 28 held a master's degree.

In terms of weekly teaching hours, 30 instructors taught remotely for more than 6 hours, 31 taught between 3-6 hours, and 13 taught less than 3 hours.

In terms of face-to-face teaching experience, 54 instructors had more than 10 years of experience, 11 had between 5 and 10 years, and 9 had less than 5 years.

Finally, 60 instructors reported having received assistance from their peers or the institution in using the platform for remote teaching while 14 instructors stated that they did not receive any help.

Challenges of Remote Teaching

The survey asked respondents to indicate whether they found challenging a list of social, political, economic, and technological items (see results in Table 1). The survey investigated whether participants overcame the challenges through their remote teaching experience. Hence, respondents were asked to indicate whether the challenges appeared only at the beginning of, only at the end of, or throughout their remote teaching experience.

Table 2: *Percentage of instructors who faced the listed challenges while teaching remotely.*

	Never a challenge	Was a challenge at the start	Was a challenge at the end	Always a challenge
Connectivity/Electricity	10.8	33.8	14.9	40.5
Using the platform	43.2	44.6	2.7	9.5
Social isolation	36.5	36.5	5.4	21.6
Work environment	51.4	32.4	4.1	12.3
Economic crisis	39.1	20.3	20.3	20.3
Political crisis	51.3	20.3	8.1	20.3
Health issues	60.8	20.	6.8	12.1
Psychological issues	78.4	12.2	1.3	8.1
Other	86.5	6.8	1.3	5.4

The majority (89.2%) of the respondents faced challenges with internet connectivity and electricity. While this challenge persisted throughout remote teaching for 40.5% of the respondents, 33.8% of them seemed to have overcome it by the end of remote teaching. It is noteworthy that when the confinement was lifted, instructors at the studied university continued to teach remotely because students could not afford the commute to the campus due to inflation. However, instructors who could afford the commute started teaching remotely from campus, where a reliable internet connection and electricity are provided 24/7.

The majority of respondents found the use of the platform (56.8%), social isolation (63.5%), and economic crisis (59.9%) challenging. While most of them ($7/9 = 44.6\%$ out of 56.8%) became familiar with the educational platform and ($4/7 = 36.5\%$ out of 63.5%) overcame social isolation, only $1/3$ of instructors overcame the challenge of the economic crisis. Additionally, 20.3% of instructors were affected by the economic and political crises throughout the phase of remote teaching. Although these crises were created by other activity systems, such as banking and governing, they affected the subjects of teaching activities and the conduct of remote teaching in some ways.

The work environment was also challenging to 48.6% of the respondents, 32.4% of whom resolved this issue. In the interviews, instructors mentioned the challenges of working from home because the activities of other family members could interfere with the teaching

activity. Some instructors resolved this by going back to teaching from campus after the end of the lockdown or finding solutions to the disturbances they encountered.

The instructors who participated in the interviews mentioned tensions they faced as they taught remotely, which we classified thematically (see Figure 2). Some of the tensions echoed the ones listed in the survey, such as connectivity, electricity, and learning to use the platform. We start by defining the additional challenges as identified in teachers' narratives during the interviews: the tensions about interaction, interference, and factual/virtual.

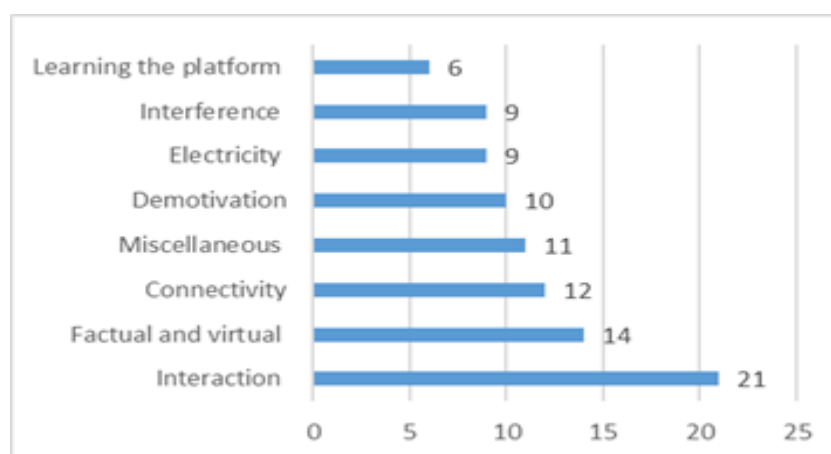


Figure 2: Themes of challenges emerging in instructors' narratives from interviews (by number of instances)

Interaction refers to the reciprocal communication or influence between two or more entities, whether individuals, groups or even between humans and technological systems. In remote teaching, instructors and students interact with each other and with digital interfaces, such as software applications, websites, or electronic devices.

Interference refers to the disruption of a process by external factors, the intrusion that negatively affects the normal course of something. In the context of remote teaching, interference can stem from simultaneous activity systems that exist alongside the remote teaching activity. For instance, the home activity system may introduce interference, with younger children engaged in activities like playing while older children attend online classes and the parents, who are instructors, are involved in the activity of remote teaching.

Factual and virtual Factual is related to reality and is something concrete, and in remote teaching, it means the fact of being present in the flesh. On the other hand, virtual refers to something that exists in a simulated or artificial form, often created or experienced through digital technology. It represents an environment that is computer-generated or digitally simulated, imitating the characteristics or aspects of the real world such as remote teaching environment. In the context of this study, some instructors emphasized the contrast between the factual environment (teaching on campus) and the virtual environment.

The findings indicate that several key contradictions emerged during the study, primarily focusing on social interaction among instructors and students (community) as they occurred in 21 instances, the contrast between the factual and the virtual was identified in 14 instances, connectivity issues in 12 instances, demotivation in 10 instances and electricity in 9 instances (see Figure 2). The following instances illustrate some of these contradictions:

The students got lazy as we were recording the sessions. Because people didn't have electricity or because there was no connection so instead of taking the courses in parallel, they relied on the videos, which meant that they got to a point where they needed to ask questions but it was too late and then in addition they lost the reflex to take notes of the things we say in class, well, they completely forgot. So, for me, I confirm that online teaching is really to help out in extreme cases.

In this case, the instructor initially had a positive attitude towards remote teaching but it gradually turned negative as she encountered challenges related to recording sessions for students with unstable connections or lack of electricity. The instructor was concerned that the students were not taking notes. From the instructor's perspective, remote teaching was seen as a viable option only for extreme circumstances. We have identified four clear contradictions. The first tension centers around the instructor's negative shift in motivation towards online teaching, as revealed through the survey responses (demotivation). The second tension arises from students overly relying on recorded materials, leading the instructor to perceive it as laziness (interaction). The third and fourth tensions relate to the challenges posed by unstable connectivity and electricity, which disrupted online instruction (connectivity & electricity).

The following instance illustrates the tensions between the factual and the virtual:

The goal was to give the students a certain presence in the virtual, the facticity, the body that is there...it is to ensure that for the students. For my part, it was always open, I also always asked students to open their camera and they wanted to use it but sometimes for lack of connection and in addition they were at home and not here on campus so they couldn't use it and it was hard.

In this instance, the instructor wanted to maintain a sense of "presence" in her remote teaching sessions by keeping her camera on at all times and requesting that her students do the same. However, her students encountered limitations due to poor internet connectivity, and some of them were unable to turn on their cameras. Hence, a tension within the tool arises when students' connectivity is not stable. This hinders the objective, set by the teacher as physical presence. The problematic relationship that emerged is between two activity systems "remote teaching" and "connectivity infrastructure system". As a resolution, the instructor used the camera feature as a tool to draw attention to her students and negotiate her presence in the milieu which connected all participants in the activity.

Analysis of Tensions

We analyzed the tensions based on their types, primary through quaternary, as defined by Engeström and Sannino (2021) (see Figure 3). We also studied the resolutions of these tensions and the lack thereof (Figure 4). Then we highlighted the components of Engeström's triad that were used to resolve the tensions (Figure 5). As we report the results of these analyses, we will quote teachers' narratives to illustrate CHAT in the context of remote teaching.

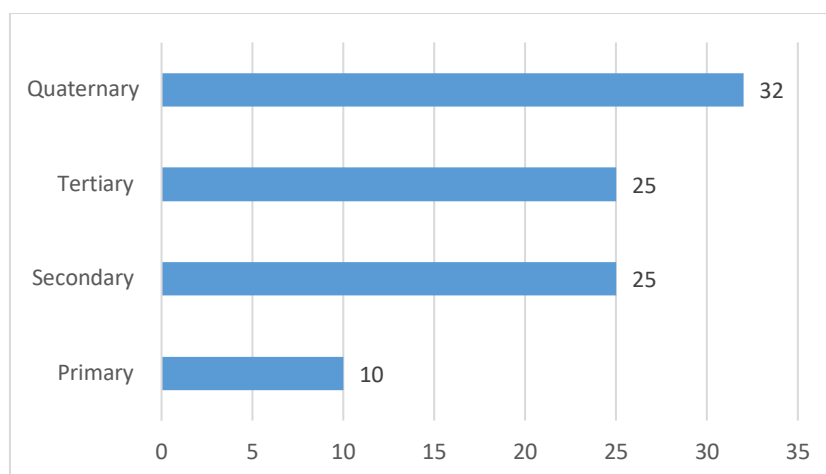


Figure 3: Type of tensions (by number of instances in teachers' narratives)

The most frequent types of tensions were observed to occur across different activity systems, referred to as “quaternary” tensions with 32 occurrences. The tertiary and the secondary contradictions come in 2nd with 25 occurrences each. 10 instances involved primary tensions. We will give examples of these types based on teachers' narratives next. While the types of tensions can be analytically differentiated, teachers' narratives involve interlaced multiple tensions, as the following excerpts illustrate.

The quaternary tensions involved three interfering activity systems: providing internet connectivity, supplying electrical power, and concomitant activities in the spaces where teachers and students were located during the remote teaching sessions. The following quote is an instance of the third quaternary tension, which has not been illustrated yet:

My husband was working in the other room, my children are very young (you probably hear them now in the background), they did not understand that this is serious and I work and they interrupted to go to the bathroom, to eat, to drink so I had such things, crying fits and they hit each other, a bit of everything.

In this case, the instructor is teaching remotely from home, where her husband and children are engaged in other activities: work for the husband and play for the children. The family members had to conduct their activities in the same or adjacent space where the teaching activity is conducted, possibly due to the confinement. The needs of the young children, “to go to the bathroom, to eat, to drink”, interrupted the flow of their mother's online teaching. According to play activity rules, kids reach out to an available trustworthy adult for their needs. When their mother is teaching on campus, she would be out of reach, but now she is at home and thus available. The husband's activity interfered indirectly with the teaching activity, since the father, the other trustworthy adult is present in the house but may not be available.

The following excerpt involves secondary, tertiary, and quaternary tensions:

I want them to turn on the cameras which is very important so I can become familiar with their faces, but once they do that the connection becomes horrible, so they have to turn off the camera so I am teaching like a black screen, I don't know their faces, I can't see the expressions on their faces.

This instance involves several tensions. The quaternary tension is between the activity system of providing connection to the internet and the activity of remote teaching. The failure of providing reliable and affordable internet connectivity to various locations in Lebanon is hampering the teaching activity to proceed according to the teacher's desire. The problem could also arise from the activity systems providing learning platforms that require strong internet connectivity.

The secondary tension is about the relation between the subject and community, namely teacher and students ("I can become familiar with their faces"). Teaching requires teachers to know their students. In remote teaching, the relationship subject-community is mediated through tools, such as cameras and microphones connected to a platform such as Teams. Due to the limited internet connection, teachers cannot maintain good quality voice transmission with cameras of participants open. There is a tension in the subject-community relationship between connecting through audio or visual media. The quaternary tension induced a secondary tension.

The tertiary tension is manifested when the instructor says, "I am teaching a black screen [...] I can't see the expressions on their faces". Teachers commonly rely on gestural cues to check whether students are engaged in the case of live communications. Teaching remotely with cameras turned off blocks the flow of cues from learners, which are expected based on in-person teaching. This tension is tertiary because it is a tension between former and current modes of teaching activity: the subject is used to rely on cues from students which the modified activity (remote teaching) cannot afford. Thus, the visual access to teacher's interlocutors stops at the "black screen", which becomes the interlocutor in remote teaching shaped by stances from former in-person teaching.

The next excerpt illustrates primary and tertiary tensions:

Teaching online itself, maybe it's not my forte, I try to give my best and to get better and all of that, but it doesn't beat having students in front of you in a physical classroom, and at the beginning it was an issue yes, but I eventually got used to it. But it is still a very minor grievance, let us say.

The primary tension is manifested in the subject's struggle with the remote teaching ("Teaching online [...] that"). It concerns one component, the subject, and their emphasis on improving their performance. A Tertiary tension is also involved in this excerpt, manifesting in "but [remote teaching] [...] grievance". The mode of in-person teaching weighs on the teacher's mindset and emotions ("minor grievance") as she adapts to remote teaching. In this instance, the tertiary tension operates around the habit of having a physical classroom with students, carried over from former teaching activity, which the current teaching activity cannot provide.

The 10 instances of primary tensions pertained to the component of subject. The secondary tensions pertained to relationships between three components: subject, community, and tool.

Overall, the analysis of the types of tensions in teachers' narratives shows that the main challenges for the respondents arose from the interference or malfunctioning of other activity systems (quaternary tensions). This finding is aligned with the survey results (Table 2). The typology analysis reveals the salient influence of the former physical teaching in a classroom

on the conduct of the current remote teaching. Teachers might have been addressing the challenges of remote teaching with the mindset of in-person teaching.

Analysis of Resolutions to Tensions

The figure below represents the types of resolutions identified in teachers' narratives during the interviews.

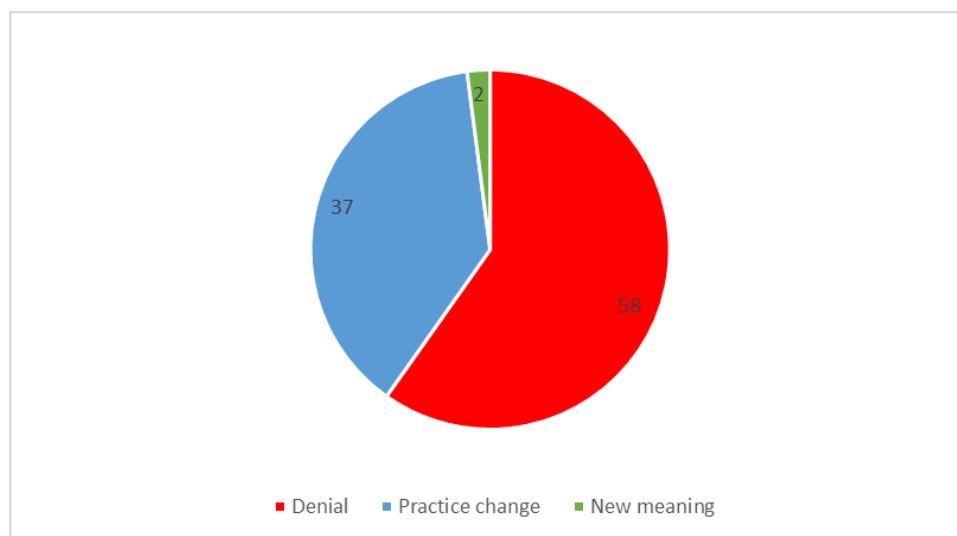


Figure 4: *Type of resolutions (by number of instances)*

In 58 instances, instructors did not mention resolutions to alleviate the tensions. The predominant trick to resolving the tensions was to change practices. There were two resolutions that occurred by changing meanings.

The resolutions by changing practices included instances of turning cameras on or off, recording or stop recording the online sessions, use or not use of the “mute all” button, and changing the place where the online sessions are live streamed. Other resolutions by changing practices also show that subjects creatively mobilized other components of CHAT, such as having recourse to the community for resources, using a tool to regulate subject-community interactions, and changing rules in other activities. The analysis results of these resolutions will be published in a future paper.

Conclusion

In this case study, we examined remote teaching using CHAT and identified contradictions that emerged within or beyond this remote teaching activity system. The major contribution of this paper is to illustrate the fourth generation of CHAT in the context of remote teaching and illustrate its value in the design of resolutions to tensions produced by a system of activities. The fourth generation of CHAT emphasizes that individual activity systems cannot operate in isolation. This implies that multiple activity systems need to work together, forming interconnected networks and relationships to support and enhance their functioning. Engeström and Sannino (2021) suggest that activity systems form coalitions to address tensions and conflicts, and ultimately enhance their overall performance and effectiveness. The investigation of remote teaching in the case of Lebanon revealed the interconnectedness of multiple activity systems, as the quaternary tensions prevailed in the survey and teachers'

narratives. However, resolutions by coalitions to these tensions were not mentioned except for the case of managing the concomitant interfering activities at home, where remote teaching was delivered from home. Respondents could be encouraged to extend the coalitions to the national level to ensure smoother functioning of remote teaching. This call involves a change of identity of the teacher, who is responsible not only for educating in a classroom but also ensuring an optimized coalition of activities for productive teaching.

The tertiary tensions were also salient in the studied sample. The historic in-person teaching mode seemed to weigh on how teachers are adapting to remote teaching. Most interviewed teachers concluded that remote teaching was not productive. In fact, the university reverted to in-person teaching because of instructors' negative report about their experience with remote teaching. On the other hand, some instructors predominantly relied on the tools to resolve their challenges in remote teaching, which will be . Respondents could be encouraged to explore other CHAT components in resolving their challenges. For instance, ongoing formative assessment, which could be accomplished by checking students' facial gestures and probing those who seem struggling with the content during in-person teaching (subject-community relation), could be achieved through small assignments to be submitted individually or collectively to the teacher (subject-division of labor). Work assignments could also resolve the concern of some instructors about checking whether students were actively engaged, sleeping, or absent on the other side of the screen.

As we analyzed remote teaching using CHAT, we struggled with how to classify spaces where participants are located during the online sessions. Teachers, for instance, changed rooms to ensure a productive environment for the conduct of remote teaching. We resorted to considering the space as a tool for the sake of this paper. However, we acknowledge that this question requires further thinking in future work.

Appendices

Appendix A

Table 2. Obstacles to achieving the quality of distance learning under the Corona pandemic.

Obstacles Category (Groups)	Obstacles	Professors Repetition (<i>n</i> = 100)	Students Repetition (<i>n</i> = 300)	Overall Repetition (<i>n</i> = 400)	Overall Percentage (%)
Personal obstacles (self-imposed obstacles)	1-The weak motivation of students to distance learning.	65	112	177	44.3
	2-The difficulty of students' understanding of some subjects in the absence of classroom interaction.	60	175	235	58.8
	3-Get used to face-to-face learning.	61	95	156	39
	4-Some professors are not convinced of the usefulness of distance learning.	20	39	59	14.8
	5-Lack of willingness to implement the distance learning system.	69	105	174	43.5
Pedagogical obstacles	1-Difficulty learning some applied courses and remotely oriented work.	18	47	65	16.3
	2-The lack of clarity of the methods of remote evaluation.	47	48	95	23.8
	3-Lack of preparing the university community (administration, professors, etc.) to deal with distance learning.	64	0	64	16
Technical obstacles	1-Weak internet flow (speed).	80	156	236	59
	2-Security and confidentiality of data and information.	66	63	129	32.3
Financial and organizational obstacles	1-The lack of capabilities to communicate remotely (devices, internet, Apps, etc.).	82	155	237	59.3
	2-Lack of training in the use of technology.	71	69	140	35
	3-Multiple electronic media and the absence of uniform controls between all.	52	42	94	23.5
	4-The home environment is not suitable for distance learning.	46	60	106	26.5

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Education for Democracy: Evidence in Latin America

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Abstract

Education is widely recognized as a catalyst for personal development, social progress, and economic growth. However, the benefits of education extend far beyond the individual level. Such effects give rise to a series of positive externalities, which spread throughout society. The most significant factors of this effect have played a very important role in making democracy a viable system. This conception, which begins with Tocqueville is received in the academic scenario with the work of Lipset, who reports that education is fundamental for sustaining a democratic system. In this sense, the objective of this work is to analyze the causal relationship between education and democracy. Taking advantage of the similarity of the historical-political context referenced by Latin America, we seek to objectively measure whether education improves the recognition of democracy as a social, economic, and cultural condition that allows the free and equal exercise of political self-determination. To identify the causal effects of education on political behavior, we must take into account the factors that jointly determine educational choice and political behavior. Therefore, we will employ the instrumental variable (IV) method, where an individual's educational level is instrumentalized by their exposure to compulsory education reform. Thus, the temporal dimension distinguishes the periods before and after the educational reforms. The results found in this work provide convincing evidence for the causal relationship between education and democracy.

Keywords: Education, Externalities, Democracy, Latinoamerica

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Introduction

In today's interconnected and rapidly evolving world, education is widely recognized as a catalyst for personal development, social progress, and economic growth (MANUELLI and SESHADRI, 2010). However, the benefits of education extend far beyond the individual level and the immediate learning environment. It gives rise to a series of substantial returns, which spill over to individuals, communities, and societies.

Returns to education refer to the economic and social advantages that individuals and societies obtain as a result of investing in education. These returns can be seen in many aspects of life such as job opportunities, income levels, health outcomes, and social well-being. They provide compelling evidence of the value of education as a long-term investment.

However, when estimating returns on education, other factors that go beyond economic relevance must be evaluated, as there are other advantages related to the educational experience that escape monetary evaluation and achieve positive effects for individual and societal well-being. From this non-economic dimension, educational returns are related to a path through which education increases the individual's possibilities of well-being and also generates external benefits, that is, the effects are not extinguished in the individual. From this perspective, these benefits are not fully captured by private returns and produce effects that go beyond private conception and exceed individual relevance, accumulating both private and social issues. Therefore, individual decisions to achieve higher levels of schooling generate impacts that spill over to other agents in society.

A potentially important example of such positive externalities of education is its relationship with political-democratic aspects (MILLIGAN, MORETTI, and OREOPOULOS, 2004; LOCHNER, 2011). The relationship between education and democracy is an issue that has been discussed for a long time and has gained increasing importance in the political and economic scenario. Social scientists have long embraced the belief that democracy is founded on an educated population (DEWEY, 1966). This conception, which began with Tocqueville in 1835, was received by academia with the work of Lipset (1959).

The objective of the study is to analyze the causal relationship between education and democracy, seeking to objectively measure whether education improves the recognition of democracy as a social, economic, and cultural condition that allows the free and equal exercise of political self-determination. For this, we tested the relationship at the individual level between educational level and democratic support, political participation, and political interest.

The objectives proposed in this work will be structured in three sections, in addition to this introduction and the conclusion. In the first section, a brief review of the literature on the subject will be presented. The second section is responsible for the data and procedures of the empirical research carried out; in this study, the Instrumental Variables Method (IV) will be addressed. The third section, in turn, will present and discuss the results measured in the approached models. Finally, final considerations will be made.

Theoretical Approach

The approach, which envisages education as an important channel for promoting democracy, seeks to demonstrate the strong correlation between educational level and political behavior at the individual level (NIE, JUNN, and STEHLIK-BARRY, 1996). Political behavior refers to

the actions, attitudes, and engagement of individuals within a political system. It encompasses a range of activities and behaviors through which individuals participate in the political process, exercise their rights, express their opinions, and influence decision-making. In this sense, political behavior, such as voting, activism, and civic engagement, is essential for the functioning and legitimacy of democratic governments (DAHL, 1989). Therefore, it becomes the cornerstone of democracy and the main mechanism through which citizens influence political authorities and hold their governments accountable (BRADY, VERBA, and SCHLOZMAN, 1995).

Within this micro approach, some interpretations emerge to explain the link between education and political-democratic behavior. The three main theoretical models addressed by the literature are absolute or traditional education, relative education, and pre-adult socialization, which are displayed in the. The first approach refers to a traditional view of the relationship between education and political behavior, in which a direct causal relationship is considered. The last two refer to revisionist views of the traditional model, therefore, they consider education as a substitute factor and not directly related to education. In revisionist views, education is considered a proxy for other factors that are directly related to the political-democratic experience (PERSSON, 2015). In addition to the main models presented, other approaches will be revealed.

The absolute education model is perhaps the simplest to explain the proposed relationship. This approach says that education has a direct causal effect on political participation since the effects of education confer benefits to the individual that increase interest in political behavior (WOLFINGER and ROSENSTONE, 1980). Therefore, from this model, the educational effects do not depend on the educational level of the environment, but on the process at the individual level.

In this model, the focus of education is on the emancipation of the human being, therefore, it strives for the construction of a critical and transformative view of society. In this perspective, the importance of education lies in the fact that it creates a learning environment that is empowered. This includes enabling students to actively engage in critical analysis of the social issues that surround them and to challenge existing power structures, promoting critical thinking, civic engagement, effective participation in political and social life, and the development of a more informed citizenry. and active, who can participate in the democratic process and work for social change (BRADY, VERBA, and SCHLOZMAN, 1995).

The relative education model suggests a different causal path than the traditional model. According to this model, it is not the skills promoted by education that have direct effects on political participation. Rather, education influences individuals' social interaction, which in turn induces political participation (PERSSON, 2011). In this approach, the main objective of education is socialization, therefore, education enables a richer interaction with each other, which makes individuals capture and internalize broader views of the world. According to this vision, democratic societies recognize the importance of diversity and inclusion and education creates an inclusive and participatory learning environment (HELLIWELL and PUTNAM, 2007). Furthermore, education provides individuals with the tools to understand and appreciate diverse perspectives and experiences by enabling the interpersonal exchange of information. In this way, the direct benefit of education arises from interaction and coordination, where the seamless exchange of information provides more efficient communication. The indirect benefit is perceived by the social connection, in which, when communicating, people end up acquiring new useful information for their particular purposes (GRADSTEIN and JUSTMAN, 2002).

An important implication of this model is that the effect of education depends on the educational level of the environment, since in environments with a greater concentration of educated people there is also a greater interaction between them and, therefore, the positive externalities end up having a greater reach.

The pre-adult socialization model holds that the relationship between education and political behavior can be explained by the effects of self-selection attributed to pre-adult factors, that is, factors such as family socioeconomic status, political socialization in the domestic environment, and characteristics such as cognitive ability. From this perspective, the idea supported by this model is that it is these factors, and not education, that affect political behavior. Therefore, education is seen as a proxy, which attributes all the success of more politically active individuals to pre-adult factors, including their demands for education. Implications of this model state that the determining factor is not the skills and knowledge acquired through education, but the innate skills, which are born with the individual, or the skills acquired outside their school context.

Methodology

Based on the Latinobarometer, we considered three main categories of results: Interest in politics, political participation, and support for democracy. Interest in politics is measured using three variables, which are based on respondents' responses to the question about their degree of interest in politics and self-assessment of how often they interact with important political issues. The first, "interest in politics" is a dummy where responses are placed on a four-point scale with 1 representing the strongest (very interested and somewhat interested) and 0 representing the weakest indicators (little interested and not at all interested). The second and third, "frequency with which he talks about politics" and "frequency with which he follows political news", are, respectively, dummies to capture attitudes about the frequency with which each respondent is politically active. Responses are placed on a four-point scale with 1 representing the strongest (very often and often) and 0 representing the weakest indicators (rarely and never).

In the second category, political participation was measured through the voting behavior of the interviewee. For this, electoral behavior is measured by a voting indicator that takes the value 1 if the respondent voted in the last general election and 0 otherwise.

Support for democracy is measured by the preference for a democratic regime over an authoritarian regime, regardless of the circumstances. Therefore, the variable is constructed as a dummy, where responses are placed on a 2-point scale with 1 representing total preference for a democratic regime (Democracy is preferable to any other form of government) and 0 for inconsistent or indifferent responses. (In some circumstances, an authoritarian government may be preferable and is no more a democratic regime than a non-democratic one.)

The main explanatory variable, in this study, is education, which is projected by the number of years of study completed by the individual. The years of study can vary from zero, that is, without formal education, to seventeen years, which is limited to a higher education course of up to 5 years. The study data do not differentiate the aggregated educational levels; therefore, higher education courses, technical courses, specializations, and other educational attributes are accounted for by year of formal education.

Other control variables or covariates (individual characteristics) will also be used, as they are factors that can affect political outcomes and must be taken into account to explain the model results. Individual characteristics include age, gender, marital status, religion, whether the individual lives in a large city, and whether the individual works in the public sector. The control variables are important to give robustness to the model. For example, the literature shows a positive relationship between age and political participation. As people age, the more likely they are to vote in elections. Gender can also differ in the way individuals are engaged in politics, making it an important (BEAUREGARD, 2014), as well as family structure, marital status (DAENEKINDT, DE KOSTER and VAN DER WAAL, 2020), place of residence (CARR and TAVARES, 2014) and religion. Another factor that can influence political orientation is the individual's occupational sector. Since sectoral differences in public sector motivation can greatly influence their political orientation and engagement, civil servants are more likely to participate in political and pro-social activities than private sector civil servants, in addition, civil servant's public depend on government conditions for the improvement and maintenance of their office (ERTAS, 2015).

To instrumentalize education, compulsory education reforms were used. Compulsory education reforms refer to changes or improvements made to the compulsory education system in a particular country or region. Such reforms aim to ensure that all children have access to education. By making education mandatory, governments and policymakers strive to remove barriers that keep children from attending school, such as poverty, discrimination, and social norms. This helps promote equal opportunities and prevents the exclusion of vulnerable or marginalized groups from educational opportunities, as well as playing a crucial role in the social and economic development of individuals and contributing to the overall development of human capital for society by providing individuals with the knowledge, skills, and competencies needed to participate in the workforce.

The specific nature of these reforms may vary depending on the objectives and priorities of the educational system in question. In the case of this study, reforms will be used that have as their main objective the extension of the duration of compulsory schooling. Therefore, reform must aim to extend the age range during which education is compulsory. Typically, this involves lowering the age limit at which children are required to enroll in an educational institution. In this sense, the reforms allow students to enter schools earlier and, consequently, extend the required years within compulsory education. This generates variation in exposure to education between individuals or cohorts within a population, Such variation can be exploited to identify the causal effects of education, comparing results between those exposed to the reform and those who were not, while controlling for other factors. Moreover, this adherence helps to mitigate problems related to selection bias and treatment heterogeneity, as it increases the probability that individuals exposed to the reform receive the intended treatment (education) reasonably.

Compulsory education reforms are sometimes implemented at specific points in time or particular geographic regions, creating a natural experiment scenario. Thus, one can take advantage of these natural experiments to estimate the causal impact of education on various outcomes, exploring the exogenous variation introduced by reforms. In this sense, they are often implemented through policy changes or legal mandates that are independent of other factors that influence the outcomes of interest. This exogeneity makes them suitable as instrumental variables, as they are less likely to be affected by the same confounding factors as the endogenous variable under study. And because they are designed to influence educational outcomes, such as years of schooling or educational attainment, by leveraging

these reforms as instrumental variables, a causal relationship between education and various policy outcomes can be established. This is particularly valuable for addressing endogeneity issues that arise when the relationship between education and political outcomes is influenced by factors such as ability, family background, or self-selection.

Compulsory education reforms increase or establish mandatory years of education for cohorts born after the year of enactment of the normative act, while those who have just passed the age limit of the law are not affected. As a result, individuals born two or three years before the enactment of the normative act are subject to different levels of compulsory schooling, which ends up affecting their school performance. Thus, the treatment cohort is established three years in advance of the enactment of the law.

Empirical Strategy

To identify the causal effects of education on political behavior, we must consider the factors that jointly determine educational choice and political outcomes. For example, family background is an unobserved factor that can concurrently determine both an individual's educational level and political outcomes. Assuming that parents with high socioeconomic status and who are politically engaged can transmit political values to their children, encourage education, and guarantee high-quality schools, then, parents' education and/or family income can be jointly correlated with children's education, children and their political behavior. Given this, the use of simple regression tools, such as the ordinary least squares method (OLS), will lead to a bias in estimates of the impacts of interest. That said, and to overcome the problem addressed, we will use the instrumental variable method (IV), in which an individual's educational level is instrumentalized by his exposure to compulsory education reform. Thus, the temporal dimension distinguishes the periods before and after the educational reforms.

The instrumental variables (IV) method is a statistical technique used to estimate causal relationships between variables when there is concern about endogeneity or omitted variable bias. The basic idea behind instrumental variables is to find an external variable – an instrument – that is correlated with the endogenous explanatory variable, but not directly related to the dependent variable. With this instrument, one can isolate the exogenous variation in the explanatory variable and obtain consistent estimates of the causal effect.

Results

The estimated impacts of education on political behavior are presented in Table 1. Column (1) shows the first stage coefficient. Columns (2), (3), and (4) report the results of the instrumental variables strategy. Columns (5), (6), and (7) display the estimates in a reduced form. Each column is a separate regression and column headings specify the dependent variables.

	First Stage	Second Stage			Reduced Form		
		Support for Democracy	Political Interest	Political Participation	Support for Democracy	Political Interest	Political Participation
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Years of Education		0.22*** (0.038)	0.038*** (0.022)	0.040*** (0.009)			
Reform	0.68*** (0.02)				0.044*** (0.003)	0.016** (0.009)	0.020*** (0.004)

Durbin-Wu-Hausman Test	0.00	0.00	0.00			
F-Statistics	42.16	22.71	53.08			
Observations	323665	297606	42069	63291	297606	42069

Robust standard errors are in parentheses. *, **, *** are the significance levels of 1, 5, and 10%, respectively. All regressions control for place of residence, sector of occupation, gender, marital status, religion, year of birth fixed effects, country fixed effects, and country-specific birth cohort trend.

Source: Study results.

Table 1: Micro analysis results.

Column (1) refers to the strong correlation between the instrument (Reform) and the endogenous variable (Education), subject to the other covariates. This condition can be examined by looking at the coefficient γ_1 in equation (2.9). Therefore, as reported in column (1) of Table 21, the coefficient is statistically significant, so exposure to compulsory education reforms induces an individual to complete approximately 0.7 more years of education, pointing to a strong first stage. This first stage suggests that exposure to compulsory education reforms is a strong instrument for individual educational success.

Considering the estimated impacts of education, columns (2), (3), and (4) provide evidence of the positive and statistically significant effect of education on political behavior. In this sense, I provide suggestive evidence about individual interest in politics, political participation, as well as attitudes in support of democratic regimes.

In particular, comparing individuals whose educational differences are induced by their exposure to exogenous reforms, IV estimates show that an additional year of education increases support for democracy by 22 percentage points. These discoveries are consistent with the studies that support education as a critical social construction tool and as a determining 'cause' for the improvement of democratic aspects in nations (DEWEY, 1966; ALMOND and VERBA, 1963). In this conception, education is seen as a safeguard against the erosion of democratic values and the rise of authoritarianism. Thus, an educated society is less susceptible to manipulation, demagoguery, and violation of democratic norms. Consequently, education improves support for democratic regimes and equips individuals with the tools to recognize and challenge threats to democracy, promoting civic engagement and active citizenship.

Regarding political interest, an additional year of education increases an individual's interest in politics by 3.8 percentage points. My results corroborate the literature, which reinforces that education promotes critical thinking skills, allowing individuals to evaluate and analyze political information, arguments, and ideologies. This ability to critically assess political content can generate curiosity and a deeper interest in understanding political dynamics and engaging in political discussions. Furthermore, as individuals become more educated, they are more likely to have a broader understanding of political issues, and this exposure can broaden their awareness of political issues and stimulate curiosity to explore different perspectives, which can arouse their interest in politics and public affairs.

As for participatory political acts, an additional year of education increases political participation by 4 percentage points. Collectively, my findings on the impacts of education are in line with many previous studies that also detect such a relationship. For example, in the American context, an increase in education has led to an increase in voter turnout (MILLIGAN, MORETTI, and OREOPOULOS, 2004; MAYER, 2011). These findings about the impacts of education on political participation may be because education provides individuals with

knowledge about the electoral process, political parties, candidates, and political issues, in addition to demonstrating the importance of elections and the meaning of their participation. Educated individuals are more likely to understand the value and implications of their vote, fostering a sense of political efficacy – the belief that an individual's actions can influence the system.

The reduced estimates presented in columns (5), (6), and (7) suggest that exposure to compulsory education reform is indeed associated with greater interest in politics. Individuals affected by reforms tend to participate in political processes: voting in elections and choosing their legal representatives. These individuals are also inclined to support a democratic regime, regardless of the situation in the country. Overall, there is a positive and statistically significant association between exposure to compulsory education reform and support for political freedom.

Finally, in columns (2), (3), and (4) the values referring to the F-statistic are presented, which indicate whether the instrument used is strong or not. Thus, in all panels, the F-statistic rejects the hypothesis that the instrument is weak since the values of the F-statistic exceed the limits of the critical value suggesting that exposure to compulsory education reforms is a strong instrument for individual educational success. In other words, the high values of the F-statistic still suggest that the model of instrumental variables satisfies the strong condition of the first stage.

Conclusion

The mobilizing question that led to this study ratified the causal relationship between education and democracy, shedding light on the interconnection and influence of these two fundamental pillars of society. Through an extensive review of empirical studies, theoretical frameworks, and historical evidence, several important findings emerged, affirming the significant impact of education in developing and sustaining democratic systems.

we examine the micro relationship between education and democracy, which refers to the individual effect that education has on political behavior. This approach focuses on the influence of education on the attitudes, values, knowledge, and skills of individual citizens within a democratic system. Thus, to examine the results at the individual level and explain the endogeneity of education, we adopted the instrumental variable (IV) model, exploring plausibly exogenous changes in educational years induced by compulsory education reforms in the context of Latin America. The reforms increase the mandatory years of education by one or more years for cohorts born after a certain year, while those who have just missed the law's age limit are unaffected. In other words, individuals can reach different levels of schooling just because they were born a few years apart, and are therefore subject to different periods of compulsory schooling.

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Addressing the Attainment Gap: Investigating Gaps in Personal Tutoring Provision

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Official Conference Proceedings

Abstract

The department of Biochemical Engineering, UCL, is one of the smallest departments in the faculty of Engineering Sciences, with an average annual intake of approximately 40 undergraduate students on the BEng/MEng programmes. Of that intake, around a third tend to be home students and of that, 40% identify as BAME (black and ethnic minority). With such small numbers, the attainment gap has been seen to fluctuate largely, demonstrating inconsistencies year on year. With relatively high staff to BAME student ratios, it begs the question - can greater staff effort help close the attainment gap consistently? A number of reports have shown the link between inclusivity through personal tutoring and student performance so this project investigates departmental personal tutoring provision, specifically aiming to see if there are any gaps within it that can be bridged through mechanisms that include upskilling personal tutors and cohort building for peer support and finally, its link to academic performance. It uses a phased approach: Phase 1 – survey data collection reflecting student perceptions on personal tutoring. Phase 2 – focus groups/interviews with BAME students. Phase 3 – observations of external practices. Phase 4 – upskilling of personal tutors and observing academic performance. The project is currently coming to the end of phase 1 and so far results indicate that rapport building and reviewing of academic results with personal tutors are desired by the collective cohorts. Phase 2 will look more specifically into the needs of BAME students as a means to address the attainment gap.

Keywords: BAME Attainment Gap, Personal Tutoring, Engineering Education

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Introduction

The BAME attainment gap refers to the disparity in academic achievement between students who identify as Black, Asian, and Minority Ethnic (BAME) and their White counterparts within the education system (Rana, Bashir, Begum, & Bartlett, 2022). This gap is observed in various educational levels, from primary and secondary schools to colleges and universities. The significance of the attainment gap lies in its broader implications for individuals, communities, and society as a whole. According to a report published by The Social Mobility Commission (UK Government advisory group) in 2016 (Shaw, Menzies, Berardes, & Baars, 2016), there are 7 main areas of impact:

1. **Equity and Social Justice:** The attainment gap reflects underlying systemic inequalities in educational opportunities and resources. It can perpetuate cycles of disadvantage and limit social mobility, creating a lack of equal access to the benefits of education. Addressing the attainment gap is crucial for promoting social justice and equal opportunities for all students.
2. **Economic Impact:** Disparities in educational attainment can lead to differences in employment opportunities, income levels, and career prospects. This, in turn, affects economic productivity and contributes to broader income inequality in society.
3. **Educational System Effectiveness:** A significant attainment gap indicates that the education system is not effectively providing equal learning opportunities to all students. This could be due to various factors, such as inadequate resources, biased teaching practices, or lack of support for marginalized groups.
4. **Diversity and Representation:** A diverse and inclusive educational environment benefits all students by exposing them to a variety of perspectives and experiences. When certain groups consistently lag behind, this diversity and representation are compromised.
5. **Long-term Social Impact:** The attainment gap can perpetuate intergenerational cycles of disadvantage. If parents from marginalized groups have limited access to quality education, it can affect the educational outcomes of their children, leading to a continuing cycle of underachievement.
6. **Civic Participation and Social Cohesion:** Education plays a crucial role in preparing individuals for active citizenship and meaningful participation in democratic societies. When certain groups are consistently excluded from educational opportunities, it can hinder their ability to engage fully in civic life.
7. **Global Competitiveness:** In an increasingly globalized world, countries that do not address their attainment gaps may struggle to compete on the international stage. A well-educated and skilled workforce is vital for innovation, economic growth, and maintaining a competitive edge in the global economy.

Addressing the attainment gap requires multifaceted approaches that encompass policy changes, resource allocation, teacher training, curriculum reform, targeted support for marginalized groups, and efforts to create a more inclusive and equitable learning environment. Recognizing and addressing the significance of the attainment gap is essential for creating a fair and just society where all individuals have the opportunity to reach their full potential.

The BAME attainment gap is widely accepted to exist and as such this element will not be debated or evidenced in this section. Instead, the focus will be on addressing the potential causes. There is a focus in this intervention on co-creation (between staff and students) and assessing whether there is a cultural aspect to the differential in attainment. Below, the

context around UCL's and the faculty BAME attainment gap lead's positions on the attainment gap is outlined:

- UCL has committed to eradicating the awarding gap, but from a standpoint that doesn't imply or utilise a student deficit model.
- The wider understanding is that research and interventions that centre on the BAME community, should be led from within that community.
- From 2015 to date the awarding gap within the department has fluctuated, between 13 & 8% (whilst the faculty fluctuates between 4 & 10%) the variation is to be expected in a small department, but its presence is why this warrants investigation.
- During the scale up and scale out phases in years 2 and 3, we will be able to address the issue across the faculty and, if there are other groups willing to share best practice, across the institution.
- Personal tutoring can help (as evidenced by Rogerio, 2019 and Groves & Burden, 2017 from Hertfordshire and Kingston universities respectively). However, these bodies of work enhanced personal tutoring, without considering issues of culture or recognising and rewarding differential social and/or cultural capital, which this intervention would seek to do. One area in which the previous work was successful was in recognising that personal tutors are not able to fulfil all the needs of a student, and where this work would expand on that would be to seek to fill those gaps with more than signposting to other resources.
- The focus on 'cultural competency' is due to the need to scale out the work, as while Biochemical Engineering is diverse in both student and staff populations, the entire faculty is not. An example of this is there is only 1 member of black academic staff in the faculty. Whereas 222 identify as BAME out of 890. These statistics show that there is a potential need for culturally sensitive, specific and competent support.

This project aims to reduce the awarding gap by increasing both inclusivity within the department, but also the sense of belonging within the department/faculty/institution. Improving personal tutoring would enable students to be their entire authentic self within the institution. The project aims to initially reduce the awarding gap within the department through the creation of more competent support structures, but also to create a scalable system that could be applied across faculty/institution. It will take a student-centred approach and focus on specific student support mechanisms, as is highlighted in various bodies of work. The extension this project will have is to ensure that the difference between the demographic of the student and staff body is addressed and cultural competence is ingrained in part of the intervention that is co-designed.

Aims and Objectives of This Study and Methodological Approach

The department of Biochemical Engineering, UCL is one of the youngest (est. in 1998) and smallest departments in the faculty of Engineering Sciences, with an average annual intake of approximately 30 undergraduate students on the BEng/MEng programmes (pre-pandemic figures). Of that intake, around a third tend to be home students and of that, 40% identify as BAME (approx. 13% of entire cohort). With such small numbers, the attainment gap has been seen to fluctuate largely, demonstrating inconsistencies year on year. With relatively high staff to BAME student ratios, it begs the question - can greater staff effort help close the attainment gap consistently? Whilst literature shows that there are a number of indicators of academic performance such as student achievements/awards, academic disciplinary record, attendance and engagement, modular marks and feedback and degree classification, this study largely focuses on modular marks and feedback and degree classification outcomes. An

example of disparities in degree classifications between BAME and non-BAME students can be seen in cohort years 2019-2022. Across the 3 year programme there was an average of an almost 10% difference in average module marks, meaning non-BAME students largely graduated with a first-class degree whilst BAME students graduated with a 2:1. Such statistics reveal a need for action in this area.

This project will investigate the personal tutoring provision within the biochemical engineering department, specifically aiming to see if there are any gaps within it that can be bridged through mechanisms that may include - upskilling personal tutors, cohort building for peer support, creating of a 'super tutor' for specific demographic groups.

By so doing, these gaps may reveal aspects that may limit the inclusivity and full integration of BAME students, thus limiting their academic potential. This project aims to investigate this by doing the following:

1. Gain an understanding of BAME students' perspectives on the gaps that exist that prevent full inclusivity and its link to academic performance
2. Review the data with departmental personal tutors and collate feedback on how to address concerns raised
3. Implement relevant strategies e.g. training of personal tutors, instate a 'super tutor'
4. Review the impact of the changes made by speaking to BAME students and reviewing academic performance

At the point of writing this paper, a survey had opened carried out to address point number one of the aims. The survey, in the first instance, was open to all students regardless of ethnic background in order to prevent biases in responses. The thinking behind having the survey open to all students is such that during data analysis, patterns in responses may (or may not) be observed in accordance with students' backgrounds. The survey has attained approximately a 25% response rate with 31 students in years 2, 3 and 4 participating in the study thus far. A short survey comprising of 6 questions was designed to gather information and patterns in responses related to perceptions of the department's personal tutoring provision (see table 1). The options presented for questions 1, 2 and 5 were obtained from UCL's personal tutoring guidances as well as a collation of literature-based findings.

	Questions	Possible responses
1	What do you think are the essential elements of Personal Tutoring? (Select all that apply)	Academic support, offer support/advice for physical wellbeing, offer support/advice for mental wellbeing, help navigating university systems, careers advice, act as a referee, open communication, open availability, setting goals and challenges, other
2	Which of these does your personal tutor do for you? (Select all that apply)	Same as Q1 options
3	Has the Personal Tutoring you are receiving changed over the time you have been in the department?	Yes/No

4	If you answered yes to Q3, in what way?	Open-ended
5	What parts of Personal Tutoring do you think aren't needed for you? (Select all that apply)	Same as Q1 options
6	What would you add to the Personal Tutoring in year 1, 2, 3 (and 4 if applicable)?	Open-ended

Table 1 – Survey questions

Results & Discussion – Survey Analysis

1. What do you think are the essential elements of Personal Tutoring at UCL?

[More Details](#)

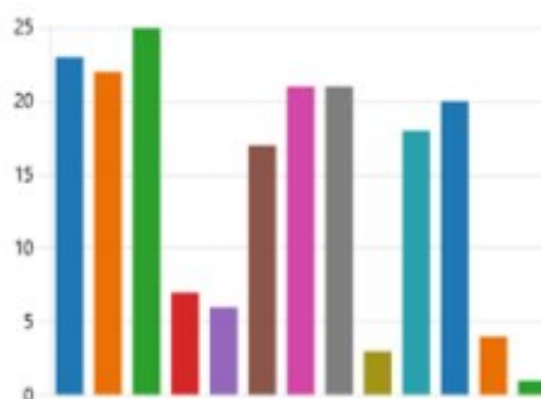


Figure 1 – Bar graph showing most essential elements of personal tutoring according to students in Biochemical Engineering, UCL.

Whilst Figure 1 demonstrates that the top 3 most essential elements of personal tutoring as voted for by the students are – (1) Help in reaching goals/objectives related to career or academic pursuits, (2) Support for mental wellbeing and (3) Academic support, figure 2 demonstrates the top four responses to ‘which of these does your personal tutor do for you’ to be – (1) Help navigating university systems, (2) Providing references, (3) Mental wellbeing advice, (4) Open availability. The results seem to show a discrepancy between what students perceive to be the most essential elements of personal tutoring and what elements of personal tutoring they actually receive. A study conducted by Calabrese et al., 2022 discusses the widespread differences between students’ expectations of personal tutoring vs the personal tutoring they receive and how this affects factors such as student success, student retention and student perception and experience which feeds into National Student Survey (NSS) scores. Whilst the research does acknowledge the link between institutional systems such as

personal tutoring and the success of certain student groups such as those with mental health issues, physical disabilities etc. There is no mention of the link to BAME students and the attainment gap (a prevalent issues in most institutions). Given the widespread acceptance of the impact of personal tutoring on student success, more research is needed on how this impacts BAME student success.

Question 3 responses indicate that the majority of students (74%) feel that personal tutoring provision has not changed during their time in the department, whilst 16% of respondents felt the opposite. Question 4 looked to understand what it is that has changed and respondents reported on an increase of support during the pandemic as well as an increase in support during their final year of studies. Whilst this is expected, given the circumstances presented as a result of the pandemic, it does highlight differences between support provided for different year groups. The results and literature seem to indicate that support is heavily provided for first year students settling into university (Grey & Osborne, 2018) and final year students looking to graduate and start work, implying a dip in support for second year students. This would be an interesting space to explore and it could imply that the type of support needed for second year students is different to that of first year and final year. Further studies are needed to first ascertain the type of support second year students need and then how personal tutors can assist.

2. Which of these does your personal tutor do for you?

[More Details](#)

Academic support	8
Offer support/advice for physica...	4
Offer support/advice for mental ...	11
Help navigating university syste...	17
Careers advice	8
Act as a referee/provide referen...	14
Open communication	10
Open availability/approachability	11
Setting goals and challenges	3
Helping you reach goals/objecti...	8
Providing passion and inspiration	3
Role modelling	4
Other	4

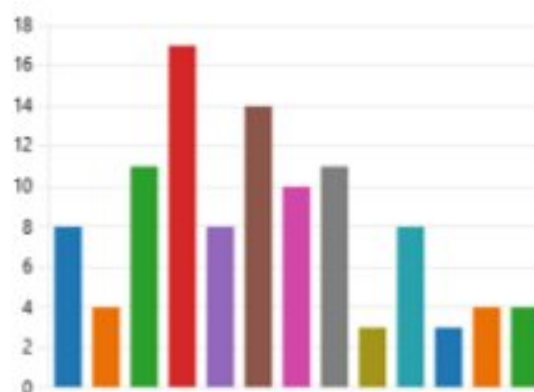


Figure 2 – Bar graph showing results of survey question 2
– Which of these does your personal tutor do for you?

5. What parts of Personal Tutoring do you think aren't needed for you?

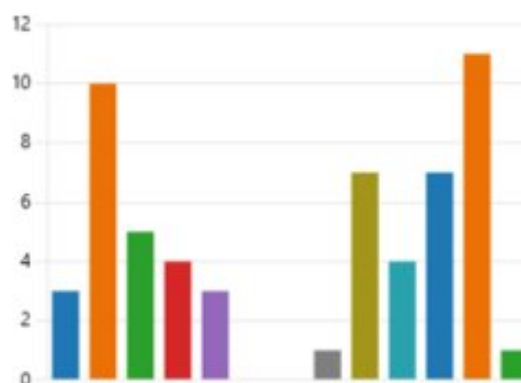
[More Details](#)

Figure 3 – Bar graph showing responses to survey question 5

Figure 3 shows that the top 4 elements of personal tutoring students felt weren't needed for them were – (1) Physical wellbeing support, (2) Role modelling, (3) Setting goals and challenges and (4) Providing passion/inspiration. Whilst it is not entirely surprising that physical wellbeing support was voted least needed by students, it is somewhat surprising that elements such as role modelling, setting goals and providing inspiration were also voted as not needed. This could be due to factors relating to how students view personal tutors in relation to their own life aspirations. It could also be due to a lack of 'buy in' of personal tutors, leading to a lack of quality in personal tutoring by staff. This perspective is supported in a study conducted by Ghenghesh, 2018. A solution proposed was to replace the current system with a personal tutoring unit within each faculty/department. The idea is that this unit works together with existing institutional systems to support e.g. students with learning difficulties, students requiring mental health support etc. One thing to note about this study is that relative to UCL, The British University in Egypt (where this study was conducted) is newly established (since 2005) with a vastly lower number of annual student intake, suggesting that major changes to institutional academic practice/pastoral care would be easier to implement.

Question 6 sought to understand how personal tutoring could be improved and an overwhelming majority of student responses centred on wanting more regular and more structured meetings. This seems to be a common response from students across the country. Wakelin, 2021 conducted a study at Nottingham Trent University's Law School into ways to improve personal tutoring in which students' perspectives were sought on the weaknesses of personal tutoring in their school. Students reported on the lack of clarity or purpose of personal tutoring meetings, indicating the need for more structure in these meetings. The study revealed further interesting findings including ambiguity in the role of personal tutors, which aim number 3 of this study looks to address in the subsequent phase. What literature has shown is that there is room for improvement in personal tutoring across a number of

institutions which may be solved by national collaborations rather than solely relying on local fixes.

Conclusion

Whilst the survey results were generally helpful in providing an insight into student expectations vs student perception of personal tutoring as well as corroborating a number of findings in literature, it was a challenge to pick up on nuances pertaining to BAME students. This could also be partly due to the low sample number at the point of writing this paper. The next phase of the study involves conducting interviews/focus groups with BAME students so this endeavour should provide a better insight into their experiences and its relation with their academic success. The next phase of the study also aims to explore where personal tutoring practices are done better in other parts of the institution and how it compares with best practices reported in literature by other institutions. The UKAT annual conference presents as a good opportunity to observe best practice across a number of institutions nationally and may provide opportunities for collaborations.

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An Investigation Into ChatGPT Generated Assessments: Can We Tell the Difference?

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Abstract

The impact of ChatGPT has been revolutionary in many capacities however institutions are beginning to see the gradual increase in students passing off AI generated work as their own. This has negative impacts for student learning and academic integrity. One way to help combat this is to understand if we can tell the difference between AI generated assignments and original pieces of work. This will help those involved in assessing to distinguish between AI generated work compared to original work. In the initial phase of this study, we use ChatGPT to generate assessments for 3 modules in the department of Biochemical Engineering, UCL. These assignments capture the interdisciplinary nature of Biochemical Engineering as well as the diversity in assignment complexity and include mathematics, business and bioprocess validation and quality control. We then convene academic leads and marking staff to assess scripts, compare them to previous cohorts through use of peer-observation to find out what indicators there are of generated work. Results so far have shown that out of the 3 modules, 2 modules receive a pass mark with minimal prompts and only 1 module lead was able provide indicators to identify generated work. Results also show that ChatGPT was unable to provide solutions for complex mathematical problems, bioprocess piping and instrumentation technical drawings and critical analysis required for M-level bioprocess quality control. Subsequent phases of the study will expand the number of modules tested on ChatGPT, embed its use into the engineering curriculum and upskill academics on the use of AI tools.

Keywords: ChatGPT, Engineering Education, Assessments

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Introduction

ChatGPT is a large language model developed by Open AI. Chat GPT-4 launched on 14th March 2023 and is currently the newest version of the software. It is able to generate human-resembling text responses to the text prompts. It works on a conversational approach generating responses from its wide dataset.

The diverse range of functionalities and applications of ChatGPT includes:

- Answering questions
- Language translation
- Grammar correction
- Writing assistance

ChatGPT serves as an easily accessible knowledge repository, providing quick and comprehensive explanations on a wide array of topics. Its ability to synthesize and present information aids in understanding complex concepts, making it an invaluable tool for students seeking clarification or exploring new subjects (Nikolic et al., 2023). It encourages active learning. By formulating questions and engaging in discussions with the model, students can refine their critical thinking and problem-solving skills. The model can present different perspectives and suggest relevant resources, fostering a deeper exploration of subjects beyond traditional methods. Additionally, ChatGPT can act as a writing assistant, aiding students in composing and refining their academic work. It offers suggestions for structuring essays, improving clarity, and enhancing overall writing quality, thereby boosting students' communication skills (Sánchez-Ruiz, Moll-López, Nuñez-Pérez, Morano-Fernández, & Vega-Fleitas, 2023).

While ChatGPT offers several benefits for student learning, several studies have highlighted notable disadvantages and limitations that need to be considered (Ali, Shamsan, Hezam, & Mohammed, 2023; Muñoz et al., 2023; Sallam, Salim, Barakat, & Al-Tammemi, 2023; Tyson, 2023):

1. **Lack of Contextual Understanding:** ChatGPT may not fully comprehend the context or nuances of a student's question, leading to inaccurate or irrelevant responses that could potentially confuse learners.
2. **Inaccuracies/Hallucinations and Errors:** The model's responses are generated based on patterns in its training data, and it might provide incorrect information or misconceptions, especially in rapidly evolving fields. Further, if told information is incorrect, the model can hallucinate and provide further inaccurate information to support the users prompt/query.
3. **Dependence on Technology:** Overreliance on ChatGPT could hinder students' development of independent research and critical thinking skills. Students might rely on the model instead of exploring diverse learning resources.
4. **Limited Interaction Depth:** ChatGPT's responses can be shallow, lacking the depth that a knowledgeable teacher or peer might provide in a real classroom setting.
5. **Reduced Effort in Learning:** If students find it too convenient to rely on ChatGPT for quick answers, they might skip the effort of critical thinking and problem-solving that is essential for genuine learning.
6. **Stifled Creativity:** Depending on predefined algorithms, ChatGPT might not encourage the same level of creativity and innovative thinking as human interactions and explorations would.

Incorporating ChatGPT into education should be a carefully considered decision, balancing its advantages with the potential drawbacks. To maximize its benefits, educators should encourage students to use ChatGPT as a supplementary tool while fostering critical thinking, independent research skills, and a holistic learning experience.

Aims and Objectives of This Study and Methodological Approach

The use of ChatGPT in assessments carries significant implications particularly in ensuring fairness and preventing cheating in online assessments, as the reliance on ChatGPT can aid in academic dishonesty. Many institutions fear that AI and ChatGPT can potentially obtain a degree, which would lead many to question the efficacy of university institutions in this domain. In this study, we aim to understand how ChatGPT performs in our assessments at UCL Biochemical Engineering with the aim of making the relevant adjustments to assessments whilst still maintaining rigour and learning outcomes.

Our main objectives for this project are as follows:

- Assess whether staff can identify the difference between artificially generated assessments made by ChatGPT and previous student assessments.
- Assess what threat ChatGPT poses to academic fairness
- Provide solutions to change the assessments to ensure academic fairness is preserved under ChatGPT.

The methodological approach for this phase of the study involved selecting 3 modules in the first instance to conduct preliminary studies. In order to ensure breadth in scope, the selection of these modules involved considerations such as level (pertaining to cohort year) and subject area (considering that biochemical engineering is an interdisciplinary field), among other factors. As a result, the 3 modules selected were ENGF0003 Mathematical Modelling and Analysis (a first year module – level 4), BENG0035 Business Planning in Bioprocessing and Life Science (a second year module – level 5) and BENG0041 Bioprocess Validation and Quality Control (a fourth year module – level 7). The next step involved using ChatGPT to generate assignments on these modules. The generated assignments were mixed with real student assignments and were given to module staff to assess. Staff were given 3 pieces of work each. This part of the study was to understand whether staff could identify which pieces of work were generated and which were authentic (by providing minuted feedback) and also for staff to assign grades to the generated assignments in order to understand how these assignments performed.

Results & Discussion

The results in Table 1 summarise the performance of ChatGPT generated assignments. What can be observed is that as the level of difficulty increases, the number of prompts needed for the generated assignment to pass also increases. It should be noted that the pass mark for levels 4-6 is 40% whilst the pass mark for level 7 assignments is 50%. The prompts used relate to the questions posed in the assessment itself. The level 4 and 5 modules required little to no modification of the assignment question in order for a passable answer to be generated. However the level 7 module required significant modifications to be made to the question/s and required an average of 3-4 prompts per question to generate a passable answer. It should be noted that in order to have modified the questions to that extent, the candidate would have had good knowledge of the subject matter and therefore would likely not be using ChatGPT to

fabricate their learning, however this cannot be said with certainty for the level 4 and 5 modules.

Module	Level	Average no. of prompts	Result (%)
ENGF0003 (maths)	4 (1 st year)	1	60-65
BENG0035 (business)	5 (2 nd year)	1-2	55-60
BENG0041 (validation)	7 (4 th year)	3-4	~50

Table 1 – results obtained by ChatGPT generated assignments

Staff then provided feedback on which pieces of work were generated and which ones weren't. Staff on ENGF0003 were least able to identify the generated work, followed by BENG0035 and then BENG0041. There are a number of reasons why this may have been the case. Mathematics as a subject generally requires binary/fixed answers whereas the level 5 and 7 assignments are writing assignments (reports) with a lot more ambiguity in what is considered a right or wrong answer. Staff on the level 5 and 7 modules reported on being able to identify differences in grammar, the overuse of transitional and superlative words as well as the general vagueness and lack of specificity in answers provided. This is corroborated by Waltzer, Cox, & Heyman, 2023 who conducted a similar study but also included the perceptions of students in being able to detect AI generated work. Their study revealed that staff tended to think that better written work (with no grammatical errors) was AI generated and idiosyncratic language was an indicator that the work was produced by a student. These findings may be useful within the faculty of engineering sciences, UCL, as a large proportion of the student body has English as a second language (>70%). However it should also be noted that the use of AI is accepted for the purposes of assistance with correcting grammar, so perfect grammar in itself is not an indicator of a student's misuse of AI.

The last step in this preliminary study was to evaluate assessment rubrics as a way to provide a solution. Figure 1 provides a summary of the steps taken to (for all intents and purposes) ChatGPT-proof the BENG0041 module. It was noticed in figure 1A that where ChatGPT obtained a larger proportion of marks were parts of the assignment required more description rather than critical analysis (such as the executive summary and conclusion where it obtained up to 46% of the marks attributed to these sections, compared to a maximum of 40% of marks for the section requiring the most critical analysis – Impact analysis). The learning outcomes of this module place a large emphasis on being able to critically analyse, given that it is a level 7 module. Figure 1B shows the results of ChatGPT once the weighting of each section is adjusted to place greater emphasis on the Impact analysis section. The results of this show a reduction in the proportion of marks that ChatGPT obtained in all sections, bringing its overall total far below the pass mark. It should be noted that there is the exclusion of a proportion of the total marks pertaining to technical drawings, references and figures due to ChatGPT's inability to generate those items. As alluded to earlier, where ChatGPT does excel in is its ability to generate grammatically flawless prose with a great level of clarity, hence why it scores highly in the Presentation section.

A	Section	Weighting (%)	ChatGPT's mark
	Executive summary	15	5-7
	Description of flow*	25	-
	Impact analysis	30	10-12
	Conclusion	15	5-7
	Presentation**	15 (9)	9
	Total	69	35 (~50%)
*excluded as it is a technical drawing section			
**excludes marks for referencing and figures, includes structure, grammar, writing clarity/conciseness			
B	Section	Weighting (%)	ChatGPT's mark
	Executive summary	10	3-5
	Description of flow	30	-
	Impact analysis	40	10-12
	Conclusion	10	3-5
	Presentation	10 (6)	6
	Total	66	28 (42%)

Figure 1 – A – Summary of BENG0041 marking rubric showing ChatGPT's marks per section and final mark. B – ChatGPT's marks per section and final mark after rubric weighting adjustment.

Conclusion

The findings have highlighted that ChatGPT is able to pass assessments at various levels in the Biochemical Engineering degree, indicating that it may be able to obtain a degree with students who demonstrate limited knowledge. A promising remedy involves revision of assessment rubrics to ensure that the weighting of the most critical elements of an assignment is adequate whilst considering the learning outcomes of the module as well as the level of study. The subsequent steps in this study have and will involve the implementation of ChatGPT and AI classes within the engineering curriculum and the use of the outcomes of this preliminary study to inform a wider study involving more marking staff and more modules in order to obtain more statistically robust data. As this is a project conducted under the auspices of the equality, diversity and inclusion (EDI) committee, the final phase of this project will look to explore the biases of ChatGPT, particularly around concerns with inherent information bias and equitable access. We will be looking to understand how the use of ChatGPT and AI affects vulnerable student populations such as those that are neurodivergent, those with English as a second language and those that are socio-economically challenged.

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Betr Selekt: A University Program Recommender System Utilising Personality Type and Academic Results

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Abstract

The goal of this system is to empower first-year students to make well-informed decisions about their university programs by providing tailored recommendations based on their individual profiles. Selecting the right university program can be a daunting task for first-year students. In response to this challenge, we have developed Betr Selekt, an all-encompassing program recommender system. This innovative system considers both the student's personality type and academic achievements, utilizing the Myers-Briggs Type Indicator (MBTI) framework. By merging this information with the student's high school results, we create a personalized index figure that reflects their unique personality type. This index figure acts as the foundation for recommending degree programs that align with the student's interests, strengths, and educational background. This system has been designed using the waterfall development methodology, employing tools such as Visual Studio Code, SQLAlchemy, Flask, and SQLite. Through various stages, including systems analysis and design, implementation and testing, and the utilization of research methodologies, we have created a comprehensive solution. Betr Selekt offers a user-friendly interface, swift data processing, and precise program recommendations, making it an invaluable asset in the university application process.

Keywords: Betr Selekt, University Program, Myers-Briggs Type Indicator (MBTI) Framework

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I. Introduction

The process of selecting a suitable university program is a critical decision for students entering their first year of higher education. To assist students in making informed choices, university program recommender systems have emerged as valuable tools (Denley, 2012). These systems leverage advanced technologies and data analytics techniques to provide personalized recommendations based on various factors, including academic performance, interests, and personality traits. One such innovative recommender system is Betr Selekt, which combines the use of personality type assessment and academic results to recommend degree programs tailored to individual students. This research aims to develop a system namely Betr Selekt, to support first-year students' decision-making process when selecting a degree program.

Literature reviews have highlighted the significance of personalized recommendations in the university program selection process. The ability to match a student's unique characteristics, strengths, and interests with appropriate degree programs enhances their satisfaction, engagement, and overall academic success (Kemboi et al, 2016). Furthermore, research studies have shown the influence of personality traits on academic performance and career outcomes (Tucker et al, 2016). Incorporating personality type assessment into the recommendation process can provide valuable insights into students' preferences, learning styles, and future aspirations. Betr Selekt adopts the well-established Myers-Briggs Type Indicator (MBTI) framework as a means to assess students' personality types. The MBTI classifies individuals into specific personality dimensions, including extraversion/introversion, sensing/intuition, thinking/feeling, and judging/perceiving. By combining the personality type assessment with academic results, Betr Selekt generates a personalized index figure that serves as the basis for recommending degree programs aligned with the student's profile.

A. Aim and Objectives

To design a system that recommends which university programs a student applicant should apply for considering their personality type as the primary criteria.

The objectives are as follows:

- To create a dataset of the 16 personality types
- To create a dataset of the programs offered by the National University of Science and Technology.
- To create a knowledge base containing the personality types, programs as well as the Sixth Form Second and Final Term academic results of prospective applicants.
- To predict which programs an applicant should choose in line with their personality type but controlled by their Sixth Form academic results.
- To recommend which programs a NUST applicant should put on their application form.

II. Literature Review

We identified two (2) main techniques employed to run recommendation systems.

1. Collaborative Filtering (CF). This is a method of filtering that focuses on the relationships between users and items. (Majidi, 2018)

2. **Content-Based Filtering:** This is a method of filtering that focuses on the property of items (Shahab, 2019)

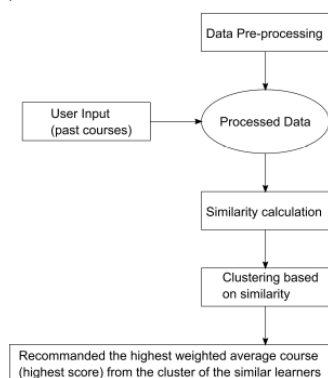


Fig. 1. Collaborative Filtering

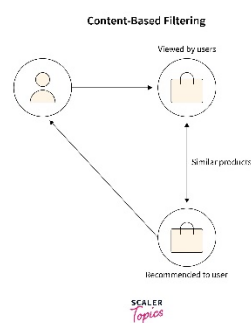


Fig. 2. Content Based Filtering

Collaborative filtering is a technique that relies on user behaviour data, such as past preferences or ratings, to make recommendations (Ricci et al, 2010). It identifies patterns and similarities among users based on their interactions with items or services. The basic idea behind collaborative filtering is that users who have similar preferences in the past are likely to have similar preferences in the future. This approach does not rely on explicit item attributes but rather on the behaviour and preferences of users themselves. It can be further categorized into two types: user-based collaborative filtering and item-based collaborative filtering (Su et al, 2009).

On the other hand, content-based filtering focuses on the characteristics or attributes of items themselves to make recommendations (Mondal et al, 2020). It analyses the features or content of items and matches them with the user's preferences or profile. For example, in the context of movie recommendations, content-based filtering would consider attributes such as genre, director, actors, and plot summaries to find similar movies based on the user's preferences for these attributes. This approach does not rely on user behaviour data but rather on the item's intrinsic features.

A. Limitations of Existing Systems

1. **Based on Grades:** Mondal et al (2020) developed a course recommendation system based on student grades. The very nature of student grades entails the need to use historical and survey data, which is what the researchers endeavoured to use. Mondal's system would classify the learners using the historical data previously

alluded to by finding out the background of the students who managed to attain a higher mark or grade in each course attempted. Each time the system logged a new learner they would be classified according to the system's existing clusters and as a result, a set of recommended courses would then be availed to the user based on the frequent pattern mining algorithm.

Mondal (2020) noted that the personalization of course recommender systems is lagging. Those that exist use content filtering or collaborative filtering and frequent pattern mining without taking a personal approach to users. This is a gap Betr Selekttr aims to fill by proposing a personalized experience. In as much as Betr Selekttr is proposing to use a variant of Collaborative Filtering, it endeavors to hybridize this process.

2. **Based on Fuzzy Logic:** The study carried out by Sulaiman et al (2020), notes that, “a key to a student's success in tertiary education is choosing the right course and the need for a deep interest in each course they would have chosen.” Upon realising the inadequacies of the different systems, they had studied, they decided to use a fuzzy logic approach whilst including multivariate questioning techniques in order to combat or rather fill the gap left by previous researchers. Fuzzy Logic endeavours to mimic human intelligence in solving a specific problem, this is a subset of the broader field of Artificial Intelligence (K. Tanaka 1996 cited in Mondal et al 2019).

Despite the relevance of the study carried out by Sulaiman et al (2019), it was heavily constrained by the narrowed focus and specialisation on just computer science-related courses. Thus, Betr Selekttr is looking to recommend courses or programmes across the board without a heavy reliance and or focus on one field.

3. **Based on Career Goals:** Narges Majidi (2018) designed a course recommender system using career goals as the main basis of its recommendations. The system uses a variety of data mining algorithms simultaneously to enhance the accuracy of the recommendations controlled by the student's career goals. Some of the algorithms they incorporated into their system are the Apriori Algorithm, Greedy algorithm and the genetic algorithm.

The system's shortfall is in its limiting factor, the career choice path. It markedly neglects the pre-existing inbred reasoning why people have those career goals that they have and what pushes them to attain those goals. In the event that the push or motivating factor changes, the career goal will change as well, however personality tends to be a more reliable basis. This makes it such that its reliance on such an unstable and often superficial factor prone to changes.

4. **Based on Graduating Attributes:** Behdad Bankshinategh, et al., (2017) designed a course recommender system based on graduating attributes. It assesses a student's competencies and assigns a course based on those competencies. Within academia, competencies are “multidimensional constructs composed of the skills, attitudes, and behaviours of a learner that contribute to academic success in the classroom” (DiPerna and Elliott, 1999).

The graduating attributes were not limited to just the academic aspect of learning but the deep intrapersonal component of what it takes to actually pass courses. There is a

need for intrapersonal factors in the realm of course recommendation so as to recommend that which speaks to individuals at a personal level.

III. Methodology

A. Research Methodology

The software development methodology chosen for this course recommendation project is the waterfall model. The waterfall model is a sequential development approach that emphasizes a linear and structured approach to software development. It involves several phases, including requirements gathering, design, implementation, testing, and maintenance. Each phase must be completed before proceeding to the next phase. This methodology has been widely used in various software development projects due to its well-structured and systematic approach (Adobe Systems, 2022).

After considering the various options, the waterfall development model was selected as the most appropriate approach for this project. The primary reason for this decision is that the requirements for the system are well-defined and the steps required to build the system can be clearly identified and followed in a sequential manner. The waterfall model is particularly well-suited for projects that have a clear set of requirements and a defined set of steps, as it allows for a structured and organized approach to development. This is important in the context of this project because it allows the team to focus on one stage of development at a time, which helps to ensure that the project stays on track and stays within budget. Additionally, the waterfall model allows for thorough testing at each stage of the development process, which is important for ensuring the quality and reliability of the final product. This is especially important in the context of a course recommendation system, as it is essential that the system provides accurate and relevant recommendations to students (Sherman, 2015).

While the agile and lean development methodologies may be suitable for other types of projects, they are less well-suited for this project because they prioritize flexibility and adaptability over structure and organization. While these qualities can be beneficial in some contexts, they are not as important in the context of this project, which has well-defined requirements and a clear set of steps to be followed.

Overall, the waterfall development model is the most appropriate.

IV. Design and Implementation

A. System Modelling

We used the Unified Modelling Language tools to map out what the system would look like. The Use Case diagram below indicates the main activities of the system from the perspective of the students:

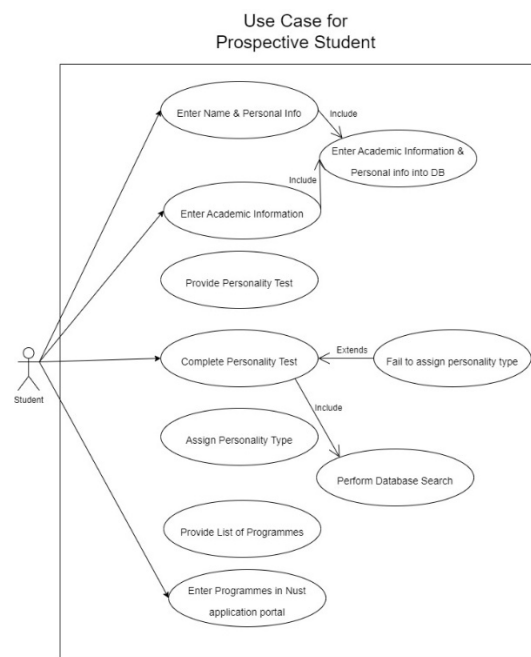


Fig. 3. Use Case Diagram

The figure below shows the flow of activities in a Sequence Diagram:

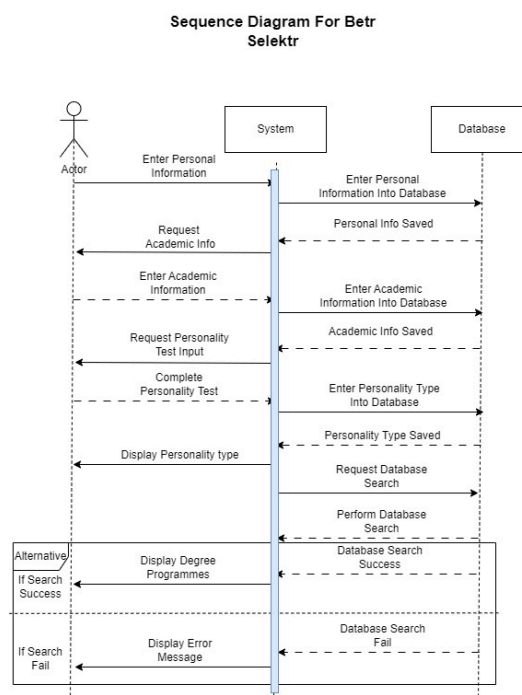


Fig. 4. Sequence Diagram for Betr Selekt

B. User Interface Design

The user interface was designed using HTML via Python's Flask Library.

V. Implementation

A. Code Snippets

The deployment of this system was largely dependent on leveraging web application technology. We used the Python's lightweight web app development library – Flask. Below we will demonstrate key code snippets that show how the web app was implemented and deployed.

Main.py

The main.py module contains the code with the root of the app. It essentially is where the app will be stored:

```
from website import create_app

app = create_app()

if __name__ == '__main__':
    app.run(debug=True)
```

Init.py

The next key module is the init.py module which contains the initialisation of Betr Selekt's modules, objects, classes and routes. This module also creates and initialises the SQLAlchemy database as well as managing its connections with the broader system, for example logins. The SQLAlchemy database is configured here and is run from this module specifically.

```
from flask import Flask

from flask_sqlalchemy import SQLAlchemy

from os import path

from flask_login import LoginManager

db = SQLAlchemy()

DB_NAME = "mydatabase.db"

def create_app():
    app = Flask(__name__)
    app.config['SECRET_KEY'] = 'Zirah08'
    app.config['SQLALCHEMY_DATABASE_URI'] = f'sqlite:/// {DB_NAME}'
    app.config['SQLALCHEMY_TRACK_MODIFICATIONS'] = False
```

```

db.init_app(app)

from .views import views
from .auth import auth

app.register_blueprint(views, url_prefix='/')
app.register_blueprint(auth, url_prefix='/')

from .models import Programme, PersonalityType, User

login_manager = LoginManager()
login_manager.login_view = 'auth.login'
login_manager.init_app(app)
@login_manager.user_loader
def load_user(id):
    return User.query.get(int(id))

with app.app_context():
    db.create_all()

return app

def create_database(app):
    if not path.exists('website/' + DB_NAME):
        db.create_all(app=app)
        print('Created Database!')

```

Auth.py (Personality Test)

This algorithm is the key to this whole project. To figure out which personality type an applicant has. This algorithm is what we have used to test and assign personality types to applicants. It is based on a simple structure of using a scale to assign which attribute a person exhibits more of for example; Extraversion and Introversion.

```

@auth.route('/personality_test', methods=['GET', 'POST'])
def personality_test():
    if request.method == 'POST':
        # Initialize scores for each attribute

```

```
scores = {'E': 0, 'I': 0, 'S': 0, 'N': 0, 'T': 0, 'F': 0, 'J': 0, 'P': 0}
```

```
#calculate the personality score
```

```
for i in range(1, 9):
```

```
    answer = int(request.form['circleE{}'.format(i)])
```

```
    scores['E'] += answer
```

```
    scores['I'] += 6 - answer
```

```
for i in range(1, 9):
```

```
    answer = int(request.form['circleS{}'.format(i)])
```

```
    scores['S'] += answer
```

```
    scores['N'] += 6 - answer
```

```
for i in range(1, 9):
```

```
    answer = int(request.form['circleT{}'.format(i)])
```

```
    scores['F'] += answer
```

```
    scores['T'] += 6 - answer
```

```
for i in range(1, 9):
```

```
    answer = int(request.form['circleJ{}'.format(i)])
```

```
    scores['J'] += answer
```

```
    scores['P'] += 6 - answer
```

```
personality_type = "
```

```
if scores['E'] > 20:
```

```
    personality_type += 'E'
```

```
else:
```

```
    personality_type += 'I'
```

```
if scores['S'] > 20:
    personality_type += 'S'
else:
    personality_type += 'N'

if scores['T'] > 20:
    personality_type += 'T'
else:
    personality_type += 'F'

if scores['J'] > 20:
    personality_type += 'J'
else:
    personality_type += 'P'

flash('Your personality type is: {}'.format(personality_type))

# Retrieve personality description from the database
personality = PersonalityType.query.filter_by(type=personality_type).first()
if personality:
    personality_description = personality.description
else:
    personality_description = ""

# Retrieve programs from the database
programs = Programme.query.filter_by(personality_type=personality_type).all()
```

```

    if current_user.is_authenticated:
        user = User.query.filter_by(id=current_user.id).first()
        user.user_personality = personality_type
        db.session.commit()

    # Retrieve personality description from the database
    personality = PersonalityType.query.filter_by(type=personality_type).first()
    if personality:
        personality_description = personality.description
    else:
        personality_description = ""

    # Retrieve programs from the database
    programs = Programme.query.filter_by(personality_type=personality_type).all()

    return render_template('personality_test.html', user=current_user,
        personality_description=personality_description, programs=programs)

@auth.route('/test_results')
@login_required
def test_results():
    user_personality = current_user.user_personality
    personality_type = PersonalityType.query.filter_by(personality_type=user_personality).first()
    description = personality_type.description
    programs = personality_type.programs

    return render_template("home.html", user=current_user,
        personality_type=user_personality, description=description, programs=programs)

```

The personality test will generate the personality type used to query the database.

B. Screenshots

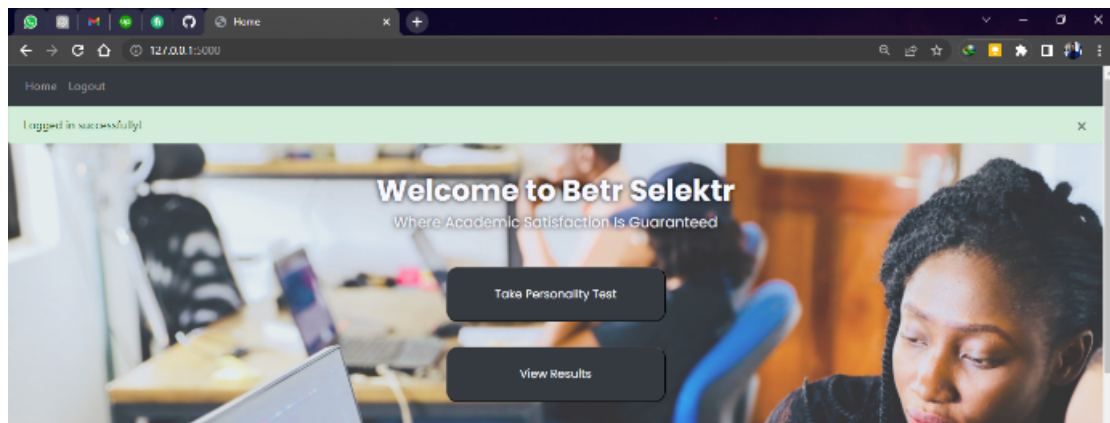


Fig. 5. Home Page

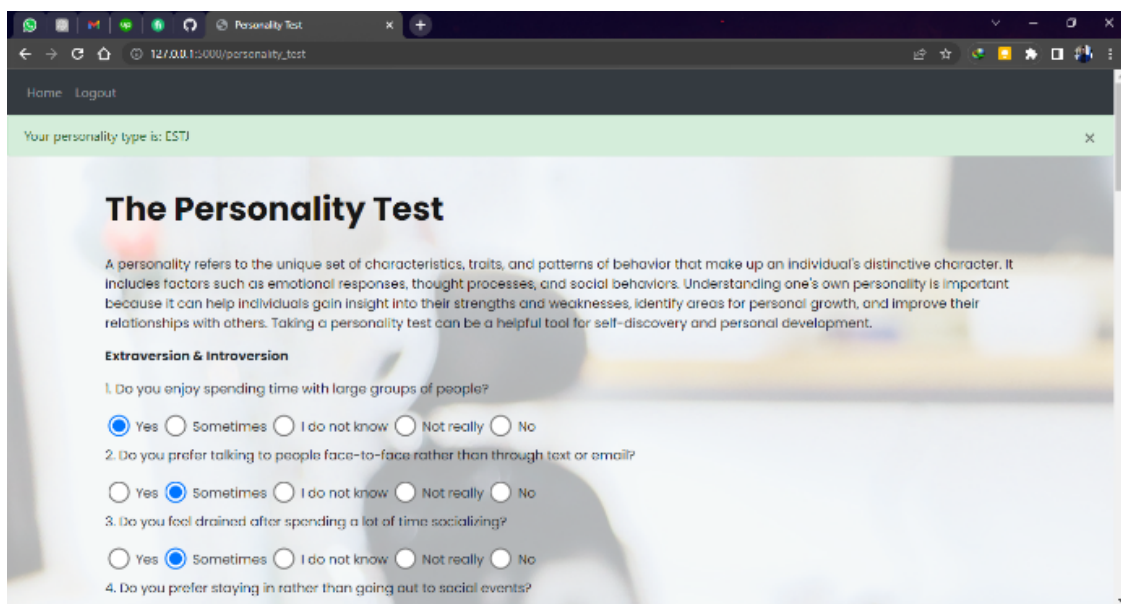


Fig. 6. Personality Test

The personality test is an HTML form with 32 questions divided into the 4 categories that measure a person's personality type as devised by Myers and Briggs. The categories are: 1. Extraversion vs Introversion 2. Sensing vs Intuition 3. Thinking vs Feeling 4. Judging vs Perceiving Each category has 8 questions and each question has 5 radio buttons with assigned values which are used for computing which personality attribute a user has. This is computed by the auth.py module under the route module that handles the submission of the forms data.

In the example above, the user scored an ESTJ personality type and is then redirected to the home page so that they can see their recommendations as well as additional information pertaining to their personality type.

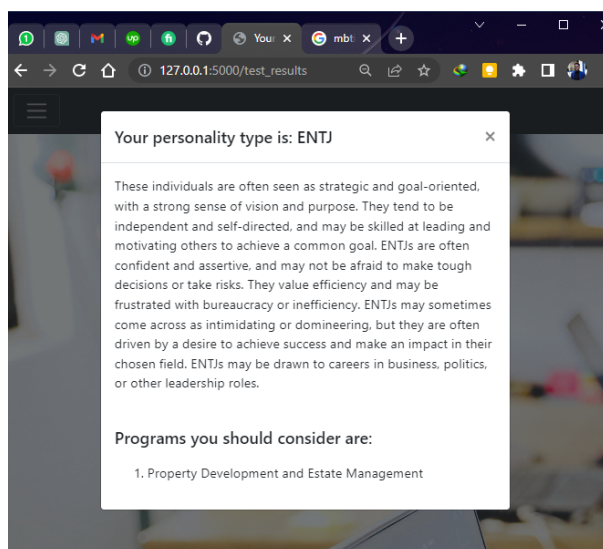


Fig. 7. Results

C. Limitations of the System

The system relies heavily on a personality test that was built by our team with the help of an expert.

The system also in some isolated cases only recommends one programme which does not really give the applicant much choice.

VI. Conclusion

After analysis, design, and implementation, Betr Selekt, a university program recommender system that utilizes personality type and academic results to recommend suitable courses, has been successfully developed. The system was developed using the Waterfall software development methodology, which enabled a structured and sequential approach to the project. The system was built using Python programming language and various technologies such as Visual Studio Code, SQLAlchemy, and Flask. The implementation phase involved building the system's database, creating the user interface, integrating the personality test, and testing the system thoroughly. The system demonstrated its ability to accurately recommend courses based on user input.

In conclusion, the project was successful in achieving its objectives and creating a useful tool for first-year university students to navigate the overwhelming process of choosing courses. Future work on the project could involve expanding the personality test questions to increase accuracy, incorporating additional criteria such as extracurricular activities, and improving the user interface. The project serves as a valuable demonstration of the application of software development methodologies and technologies in solving real-world problems.

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Globalisation of Third Culture Kids: An Analysis of the Subject vs. the Other

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Abstract

Third Culture Kids (TCKs) have been a distinct demographic within the population for over four centuries. However, it is only in recent times that focused studies have provided an avenue for these individuals to articulate their unique experiences. Owing to challenges such as language barriers and cultural misconceptions, this nomadic community has often felt marginalized and detached from the narrative of their own lives. This research endeavors to examine the educational dimension of young TCKs, employing Simone de Beauvoir's *Second Sex* as a framework to elucidate the psychological, emotional, and physical consequences of the "Othering" phenomenon within today's globalizing world. By utilizing de Beauvoir's seminal work, which explores the systemic subjugation and objectification of women, we aim to shed light on the analogous experiences of TCKs. Drawing parallels between the two contexts, we seek to elucidate the profound impact of being perceived as "Other" and its far-reaching implications on the educational development and well-being of TCKs.

Keywords: Globalisation, Beauvoir, Education, Third Culture Kids, Subject vs. Other

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Introduction

The nomadic nature of Third Culture Kids (TCKs) during their childhood presents itself as a barrier to their educational, cultural and emotional development (Pollock *et al.*, 2010). TCKs are described as children of ‘expats’ (Selmer *et al.*, 2004) or professionals in such sectors which require the entire family to constantly move from one geographic location to the next (Tanu, 2015). While the origins of the term ‘Third Culture Kids’ have previously been discussed by Chakraborty *et al.* (2023), this paper focuses on the effects of rapid globalisation on these already nomadic, culturally diverse young adults. These children, who have ‘lived lives of luxury’ (Langford, 2012), would feel distanced and isolated from their own peers and, unless addressed at a young enough age, and would propagate feelings of depression or loss of identity (Fail *et al.*, 2004; Dewaele *et al.*, 2009).

Through the publication and popularisation of the works of Pollock, TCKs have also been given a firm, though biased, definition. That is, a generalised stereotype of their common personality traits and characteristics has been created (Tanu, 2015). In this way, TCKs have become slaves to their circumstance and are unable to rise above this social prejudice. These prejudices become the ‘prison’ that TCKs have to ‘choose to live inside’ (Rao, 2017). In other words, TCKs then begin to live in self-imposed silence. In a society that claims to preach the ideals of globalisation and neo-liberalism, this narrow-minded approach succeeds in practicing a neo-colonialistic approach instead (Pratt, 2019; Castells, 2000; 2008; 2010).

However, the examples in Pollock’s (2010) work discuss TCKs from a mostly American background who have relocated to a different country, most of which have English as one of their national languages. This does not mention the language related problems of many TCKs who have had to move from a country that does not have English as a national language. These TCKs have to first learn a new language and then begin to assimilate themselves into the new, host country (Tanu, 2015). Pollock also tends to generalise and simplify many of the issues that the TCKs face (Ridout, 2009). At the very beginning of the text, Pollock claims that a vast majority of the TCKs around the world ‘identify with’ one particular person (Pollock *et al.*, 2010). While it is possible for a large collection of people to identify with a position, it is an entirely different thing to identify with one, single individual.

After the initial introduction of the phrase in the 1960s and its subsequent popularisation by Pollock in his works, this new area of study held many scholars in fascination. This was a part of the society that had existed since the interaction of civilisations, however, it had been largely overlooked. According to “Just How Big Is the TCK Population?” (2013), researchers estimate the number of TCKs was around 73 million in the 1960s. By 2013, both “Just How Big Is the TCK Population?” (2013) and “Employee benefits & third culture kids” (2018) estimated the global population of the TCKs to have grown to more than 230 million. While the world developed, progressed and connected, due to the inception of the internet, what was once considered to be isolated incidences came to be known as the global phenomenon that it really is (Poni-Lado, 2015).

The community of the TCKs who share a common culture is presented as a ‘strange paradox’ in the works of Pollock. This is so as the word ‘culture’ by definition means the customs, traditions and beliefs shared by a group of people hailing from a similar geographical source (Cheng, 2001; James, 2005). Vidal (2000) then argues that ‘culture’ can be defined as the sharing of experiences as well as the traditional meaning in this modern 21st Century world. He writes that the culture of the Third Culture community is in the shared experiences and the

shared feelings that are at the heart of TCKs and that it cannot be limited by the geography alone. This work investigates:

- (i) the effects of Globalisation on Third Culture Kids (TCKs) and how it affects their further growth and development
- (ii) TCKs feelings of alienation and isolation through the lens of Simone de Beauvoir's Theory of *Subject vs. Other*

Globalisation

Globalization is a multifaceted phenomenon that encompasses the growing interconnectedness and interdependence of global cultures and economies. It represents an intricate process through which a myriad of elements, including ideas, knowledge, information, goods, and services, diffuse and proliferate across the globe, transcending geographical and cultural boundaries. Globalization extends to encompass the seamless movement of financial products, technology, information, and employment opportunities, engendering a complex web of interactions that traverse national frontiers and bridge diverse cultures.

Recent research has underscored the profound impact of globalization on various aspects of contemporary society. Scholars have delved into the intricacies of globalization's influence on economic development, cultural exchange, and the dissemination of technology. Stiglitz (2017) examines the implications of globalization for income inequality and social justice, shedding light on how this global phenomenon can both exacerbate and mitigate disparities within and among nations. However, a large number of recent research shows that globalization and 'interconnectedness' is responsible for reshaping cultural identities and fostering transnational flows of cultural goods and practices Appadurai (2016). In the realm of technology and innovation, Bhagwati et al. (2020) delves into the dynamics of technology transfer and its role in driving global economic toward positive growth.

Here, TCKs possess a distinctive worldview characterized by the perception of the world as a unified global entity inhabited by individuals who share fundamental human needs, shaped by their experiences of living in multiple cultures (Pollock et al., 2010; Chakraborty et al., 2023). TCKs, and Adult TCKs (ATCKs), are also seen to have valuable attributes such as diligence, discipline, and reliability, traits that are highly sought after by employers in today's globalized job market (Useem et al., 1996; Fail et al., 2004). In this case, TCKs are seen to be at an advantage as they are more adaptable and have more cross-cultural competency, which contribute significantly to their success in diverse organizational settings.

Notably, the phenomenon of globalization has not been limited to TCKs alone. Non-TCKs, individuals who have not experienced a similar level of global mobility during their formative years, are also undergoing a significant transformation in their cultural awareness. This transformation is in large part due to the rapid inter-connectivity facilitated by modern media and communication technologies. Recent studies also indicate that the exposure of media fosters a cross-cultural understanding among non-TCKs, further underlining the profound influence of globalization on individuals' cultural perspectives (Matthews et al., 2012).

Education

As mentioned before, there are a few aspects that present themselves as predicaments in the particular situation of the TCKs who have had to constantly change schools up until this point, for example, different education systems follow their own syllabi at every level which makes it harder to transfer in or out of different systems of education. Morales (2015) proposes particular ‘transition programmes’ for schools in order to help transfer students who may need that extra support during the initial stages of resettling into a new education system.

The medium of education is also an incredibly important factor in the life of a growing child (Yaacob *et al.*, 2014; Ng *et al.*, 1993; Nelson, 1998). However, this is often overlooked when relocating to a new region (Ramanathan, 2016). As seen in the case study made by Reay (2002), children in a classroom environment tend to group together according to their intellectual capacities. In some cases – like in the case of Shaun (Reay, 2002) – peers tend to bully the minority who seem different from the masses (Sreekanth, 2009). It is for this reason that it becomes a problem when a TCK relocates to a new school in a new country where the medium or language of study is also different as they would first have to learn the new language in order to be able to communicate and then start acquiring new knowledge using that new language (Pollock *et al.*, 2010; Useem *et al.*, 1996). For many, this process becomes cyclic – this is further explored as well.

Subject vs. Other

Beauvoir (1972) has described in her works a feeling of alienation of one segment of the society from the other that has built up over the years. Her journals chronicle the subjugation of women over the years with the proverbial ‘man’ standing at the head of the patriarchal hierarchy thereby giving the ‘man’ the title of the ‘*Subject*’ and giving the title of the subjugated ‘*Other*’ to ‘woman’. This analogy of the *Subject* versus the *Other* can be carried through to the parts of society where one community feels belittled or inconsequential as compared to its counterpart. In the case of my dissertation, the normal persons of the world, who have a sense of belonging and identity as well as a firm hold on their own cultural heritage, will be referred to as the *Subject* as they represent the majority of the population who may or may not be aware of the trials and tribulations of the Third Culture Community. As such, the Third Culture Community will be referred to as the *Other* as they are the minority of the population who have isolated themselves over the years and have practiced self-imposed silence as a form of subjugating themselves (Pollock *et al.*, 2010).

The parallel between the *Subject* versus the *Other* in both the cases of ‘Man’ versus ‘Woman’ as well as ‘People with a Definite Cultural Identity’ versus ‘TCKs’ can be more easily explained in the following way. According to Beauvoir (1972), throughout history, the community of ‘women’ is seen to be at the peripheries of society, always looking at the activities of the ‘men’, observing and not being able to voice their opinions or being heard. Similarly, TCKs are also seen to exist at the peripheries of societies (Pollock *et al.*, 2010; Walters *et al.*, 2009). Indeed, it was only around the 1960s that scholars and researchers began to take notice of this entire community of people that has existed under the radar of the masses (Gillies, 1998).

That is not to say that there are no benefits to being a part of the Third Culture Community in the modern world. Even though women were the subjugated minority of the collective society, according to Beauvoir (1972), there are many instances in the modern world where

women are seen to enjoy some benefits simply due to their gender. Be it longer life expectancy (Waldron *et al.*, 1973; Holden, 1987), better memory-span (Larrabee *et al.*, 1993; Sundermann *et al.*, 2016) or simply the fact that women are not under any compunctions to hide their sorrow in public (Martin *et al.*, 2000; Doka *et al.*, 2014), women are seen to have some advantages due to their gender. Similarly, the question of the TCK is multifaceted. While there are definitely advantages to leading a nomadic lifestyle, living in the higher echelon of the population in new and diverse countries (Pollock *et al.*, 2010; Tanu, 2015), there are also some major drawbacks, which will be mentioned in the following chapters.

The term ‘*Other*’ as described by Beauvoir (1972) is extracted here not to distinguish TCKs from the masses based on their gender, class, race, sexuality or race. TCKs, from their youths, have disjointed childhoods, feelings of rootlessness and question their very identity (Pollock *et al.*, 2010), unlike the ‘normal’ majority of the world’s young population who experience comparative cultural consistency and have more defined senses of identity (Fail *et al.*, 2009).

Beauvoir condemns this biased approach of the world when she explains that as the *Subject* is seen to be the more ‘active’ part of the society which apparently contributes more to society, they are therefore justified in procuring more rights and privileges in their daily lives. The *Other*, in contrast, is seen to be merely vessels in the society who have to follow the lead of the *Subject*. Similarly, until the introduction of the term ‘Third Culture Kids’, the fact that there was another segment of society – living, breathing, going through different and, at the same time, same struggles on a daily basis – was unknown to the majority of the masses (Pollock *et al.*, 2010). The *Subject* in this case subjugates the *Other* through ignorance and lack of education. My dissertation serves as a modest initial attempt to change this.

Conclusion

Good education is required for the growth of the society, for the progress of the nation as well as for the expansion of the mind. It is extremely important for the population of today – especially for the youth – to understand that there are many smaller, different segments of society that together make up a larger collective community. This is especially true in the 21st Century era of Globalisation (Castells, 2008; 2000; Dale *et al.*, 2002; Pennell, 1998). Where the world used to view TCKs as the more ‘handicapped’ part of the society (Gilbert, 2008; Limberg *et al.*, 2011), people are beginning to recognise that there are characteristics and traits ‘in-built’ within the TCK community which, if honed and harnessed, could become an asset (Fry, 2007). Organisations and business institutes today are seen to covet employees who are more adaptable, open-minded, approachable and flexible rather than those with more rigid, narrow and stringent views of the world (Castells, 2010; Peterson, 2009).

ATCKs are seen to be a ‘powerhouse’ of these traits and are seen to possess these qualities in abundance (Cottrell, 2007; Useem *et al.*, 1996). As the world progresses from a restricted outlook to a more liberal view of the different strata that exist within any given society, the ‘minorities’ of the world have started to garner more focus and freedom. With more research being done on these factions of humanity and more knowledge of their existence being shared, it is becoming possible for these smaller, marginalised parts of the population to have a voice and not only ever feel like the *Other* within their individual spectrum.

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Developing Multimodal Learning in Singapore: Perspectives of Student and Lecturer in a Pilot Study for Hybrid and Hyflex Learning

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Abstract

Now that Covid-19 restrictions have eased in most countries around the world, many universities have returned to full on-campus learning. Some, however, chose to further develop the online or hybrid teaching approaches and move towards new multimodal approaches like “hy-flex”, a portmanteau of hybrid and flexible learning. For this pilot study, a newly retrofitted Hybrid Plus Classroom was used to improve the quality of multimodal teaching. With a mixed methods design, this study documented the experiences of lecturers and students in a private tertiary institution in Singapore, identified challenges, and offers suggestions for improvement moving forward in using the Hybrid Plus Classroom for hybrid and/or multimodal teaching. The sample for this study consisted of 2 courses offered in a Diploma program, comprised of 2 lecturers and approximately 100 students in total. Quantitative instruments included a survey for lecturers and a survey for students, as well as the student ratings given on quarterly course evaluations. Qualitative instruments included lesson observations, and interviews with the lecturers at the end of their course. Initial results showed lecturers and students have a positive attitude towards hybrid and hyflex teaching as well as the potential need for more specialist support for lecturers in lesson delivery. Finally, this paper offers recommendations on roll-out and implementation of multimodal approaches in higher education.

Keywords: Multimodal, Hyflex, Hybrid, Higher Education, Technology

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Introduction

In the ever-evolving landscape of higher education, modes of teaching and learning have undergone profound transformations. The COVID-19 pandemic served as a catalyst for change, prompting universities worldwide to reassess their educational approaches. While some institutions have now returned to full on-campus learning, others have seized the opportunity to explore and enhance multimodal teaching methodologies. In this ever-changing environment, students should be better prepared to for increasing internationalisation and individualisation of a 24-hour economy, increased flexibility in higher education is an essential next step(Jochems, Koper, & Van Merrienboer, 2004).

In the context of this pilot study, a multimodal teaching approach is referred to as the integration of various digital tools and technologies to deliver content and engage students in diverse ways. It goes beyond traditional methods of teaching and incorporates a wide range of multimedia resources, interactive platforms, and (digital) learning experiences to cater to different learning preferences and enhance the overall educational experience, including hybrid and hyflex learning. Approaches like hybrid learning, online and face-to-face students in one synchronous session, and hyflex learning, a portmanteau of hy-brid and flex-ible, answered the need for more flexible approaches than traditional modes can offer and has been successfully implemented in colleges and universities alike (Abdelmalak, 2016; Abdelrahman, 2016; Beatty, 2022). Students have demonstrated to score equally well or even higher in hybrid or online learning modes compared to face-to-face class (Little & Jones, 2020; Miller, 2013; Szeto, 2014). The choices in attendance modes are one of the advantages of hyflex learning but research has shown online students in hybrid sessions experienced challenges in communication and connection with the lecturer and the rest of the class, despite the technical connections working fine (Abdelrahman, 2016; Bashir, Bashir, Rana, Lambert, & Vernallis, 2021; Binnewies, 2019; Lakhal, 2017; Moorhouse & Kohnke, 2021; Visser, 2012).

When implementing any new teaching approach, some factors need to be taken into consideration. Social interaction is an important factor influencing all learning environments, including online learning (Tu, 2000). Another factor to consider in the quality of online learning is that, despite the Covid-19 changes, this format is still relatively new for most lecturers and students. A recent study by Flynn-Wilson & Reynolds (2021) showed there is a learning curve in effective hybrid learning, the more online courses students attended, the higher the learning experience was rated. Lastly, an important factor in implementing successful online, blended, hybrid or hyflex teaching and learning, was found to be the support from the higher education institution for both lecturer and student (Beatty, 2022; Szeto, 2014). When developing their hybrid classroom in King Mongkut's University of Technology Thonburi in Bangkok, Thailand, Triyason, Tassanaviboon, & Kanthamanon (2020) compiled a list of 15 requirements for the system to be successfully implemented. Items included: training for instructors; troubleshooting tech issues; guidance for students on using the online platform; capabilities for document exchange; appointment scheduling; chatting functions; video conferencing capability with content sharing; recording; annotation by the instructor; small group discussions; class participation report; questionnaires, exercises, and grading; support a wide variety of devices; and lastly, be affordable.

Some of the main reasons for implementing these modes of learning and investing in facilities like the hybrid plus Classroom, is “unquestionably” to improve student engagement (Sankey, Birch, & Gardiner, 2010)and to personalize learning in learner-centred teaching

approaches (Philippe, et al., 2020). While in the study by Phillippe, et al. (2020) student achievement did not improve, students reported they felt multimodal learning did support better retention and comprehension.

This pilot study, conducted in an international higher education institute in Singapore, focuses on the perspectives of students and lecturers around the utilization of the Hybrid Plus Classroom, a space meticulously designed to elevate the quality of multimodal teaching experiences. Compared to the requirements mentioned by Triyason, Tassanaviboon, & Kanthamanon (2020), the Hybrid Plus Classroom should be well equipped to support student and lecturer in multimodal learning. The aim is to uncover valuable insights, identify the challenges faced, and offer pragmatic suggestions for refining the implementation of the Hybrid Plus Classroom in multimodal teaching contexts.

This exploratory research paper contributes to the ongoing discourse on the future of higher education by offering a better understanding of the implementation process and its potential pitfalls and successes in developing multimodal practices in a higher education institution.

Methodology

Facility

In 2022, a seminar room has been refurbished into a state-of-the-art Hybrid Plus Classroom with the aim to start facilitating hybrid and hyflex classes from January 2023. It has been outfitted with an incorporated system of a desktop computer, 2 monitors, online classroom facilitation software Zoom, learning management system (LMS) Canvas, 2 cameras, a digital whiteboard, visualiser, projector, as well as microphones and speakers integrated into the ceiling. The system is controlled by the lecturer with a console on the lecturer's desk at the front of the room. For content sharing, the lecturer can choose to use the visualiser, desktop computer or connect another device. Through the console, the lecturer can choose the medium through which to share the content: projector screen, digital whiteboard, desktop, visualiser, or directly from their own device. The system also offers the possibility for online students to share content in Zoom and show that content on the main projector screen. The classroom houses up to 80 on-site students and the system houses up to 400 online students. The cameras include one camera for a full classroom overview, for online students to see their on-campus classmates, and a second, roving camera that captures the lecturer standing at the front of the room, as well as the projector screen. The digital whiteboard can be connected to the projector screen, shared directly in Zoom, or used as a separate tool, offering options for annotation, drawing, highlighting on presented content, as well as a space for calculations, spontaneous notes or examples, etc. for all students (online and in-person) to see clearly. Microphones and speakers are imbedded into the ceiling for an improved audio experience for on-site as well as online students. A frequent complaint from online students is they cannot hear when their classmates ask questions or offer comments. With this integrated system, all sound in the classroom is amplified so online students are able to smoothly follow all proceedings taking place in the classroom. Additionally, all on-site students are able to hear questions and comments made by online students as well. Lastly, due to the microphones being placed throughout the classroom, even a student in the back of the class with a soft voice, can be heard clearly by all.

With the fully integrated system, the lecturer needs only press a button on the central console for the online Zoom session as well as recording to start immediately, allowing the students to

log into the session through the LMS Canvas. Recordings are saved on the LMS, for students who cannot attend the live session to watch later and to use for support during exam preparation.

Sample

The sample for this pilot study comprises two course modules within a Diploma program, featuring two experienced lecturers and approximately 100 unique higher education students. Both courses are taught in hyflex format in the Hybrid Plus Classroom, both with approximately 70 students each. The courses are each taught by a different lecturer, but some of the students attended both courses in the pilot. There were 146 enrolled students in total, for both courses. 65 students responded to the questionnaire, while 139 students rated their lecturer and overall course in the quarterly student evaluation form. No additional data was collected on student background, age, etc. Both lecturers are experienced teachers and have taught for more than 10 years and have taught in the institute for over 4 years.

Instruments and Analysis

Employing a mixed-methods approach, this study draws upon a combination of quantitative and qualitative instruments. Quantitative survey instruments include questionnaires distributed to both lecturers and all students, providing quantitative data on their experiences and perceptions of hybrid and hyflex teaching. A separate questionnaire is administered to lecturers and students. The questionnaire for lecturers investigates their previous experiences teaching (with or without edtech tools), the ease of use of the Hybrid Plus Classroom, and which aspects they use for student engagement, collaboration, and sharing opportunities for all students (online and on-campus). The lecturers' questionnaire consists of 20 questions and an open comments field, with 10 questions covering experiences in (hybrid) teaching, 6 questions focusing on the lecturers' preferences in and opinions on (hybrid) teaching, and 4 questions on their experiences teaching hybrid lesson in the Hybrid Plus Classroom. The questionnaire for students focuses on visual and audio quality, technical issues during class, and which Zoom features they use. For both questionnaires, responses were categorized into four levels of agreement: "Strongly Agree," "Agree," "Disagree," and "Strongly Disagree" to reply to a series of statements. Additionally, student end-of-course evaluations are examined to gauge the impact of these new teaching modalities on their learning experiences. At the end of every term, students fill out an evaluation form for the courses they attend, rating overall of the course (ie "overall course rating") and teacher performance (ie "lecturer effectiveness rating") via an automated system that automatically anonymizes responses. For lecturer effectiveness rating, students rate the lecturer on the following 6 statements: [Lecturer] was able to explain concepts/subject content clearly, [lecturer] was able to link theory to practice through a variety of relevant examples, [lecturer] was able to encourage participation, [lecturer] encouraged me to think critically about the subject, [lecturer] was open to students' questions and concerns, [lecturer] was able to make use of technology to complement his/her teaching. For overall course rating, students rate the following statement: Overall, I am satisfied with [the course]. Students provide their ratings on a scale of "Strongly Agree," "Agree," "Neutral", "Disagree," and "Strongly Disagree" for every statement.

On the qualitative front, lesson observations were conducted to gain a nuanced understanding of classroom dynamics. In total, four 1-hour lesson observations were conducted, 2 per course, each conducted by an independent observer, using the institution's standard form for lesson observations. This form focuses on the range and quality of teaching techniques and

materials, with an additional field for comments, where notes are made on the lecturer-student and student-student interactions, activities, and opportunities created for whole-class collaboration and interaction. The pilot is concluded by in-depth interviews with lecturers at the culmination of their courses. A 30-minute, semi-structured interview is conducted with each lecturer, focusing on the challenges and successes in multimodal teaching and pedagogical opportunities in the Hybrid Plus Classroom, as well as hyflex teaching practices as a mode of instruction. Results from the teacher survey and the lesson observations are also incorporated into the interview to clarify answers and gain a deeper perspective. Analysis of the student questionnaire and lecturer's questionnaire data uses descriptive statistics to determine the frequency and percentage of responses. The comments documented during lesson observations, and the interview data are analysed thematically to identify common themes related to the experiences of the lecturer in the Hybrid Plus Classroom.

The study obtains informed consent from all participants and ensures that their privacy and confidentiality are protected. As there are only 2 lecturers participating in the pilot, anonymity is extremely difficult to ensure. No names are mentioned in the data or the report, but heads of the program and higher management will know who the lecturers are that participated. The lecturers are aware of this. The student data from the questionnaire and end-of-course evaluations is gathered and treated anonymously.

Results

Results from the lecturer and student surveys are reported separately below.

Students

The students completed a questionnaire and rated the course and lecturer in the end-of-course evaluation. A total of 65 students participated in the questionnaire, 62 students attended sessions face-to-face and 3 attended online. The questionnaire encompassed three key aspects of their learning experience: audio-visual clarity, preference for learning mode, and active participation. For face-to-face classroom sessions, a significant majority of students expressed high levels of agreement regarding audio-visual clarity. Table 1 shows 40 students (65.6%) "Strongly Agree," and 19 students (31.1%) "Agree" that they can hear and see the lecturer clearly in this format. The results for students attending through online Zoom also align with these results, all "Strongly agreed"(33.3%) or "Agreed" (66.6%) that they can hear and see the lecturer clearly. When it comes to seeing and hearing their classmates clearly, face-to-face students rated less favourable with 18 students (30%) "Strongly agree", 36 students (59%) "Agree", and 7 students (11%) rating "Disagree", as seen in table 2. Online students felt more strongly they could not see and hear their classmates clearly, with 2 students (66.7%) "Disagreeing".

When asking the students about active participation in class, student generally responded positively, as seen in table 3. Of the face-to-face students, 23 (37.1%) "Strongly Agreed" that they can actively participate in the lessons, while 35 students (56.5%) "Agreed." Only four students (6.5%) expressed disagreement, with three "Disagree" responses and one "Strongly Disagree" response. All three online students (100%) "Agreed" they can participate actively.

The questionnaire also mapped students' preferences regarding the mode of learning, as shown in table 4. Students were given the choice between "Face to face in classroom" and "Online Zoom" mode. Looking at all 65 students, a majority of them (73.8%), expressed a

preference for "Face to face in classroom" sessions. About a quarter (26.1%) favoured "Online Zoom" sessions. Of the online students, the majority (66.7%) also preferred a face-to-face mode. Only one online student (33.3%) preferred to attend classes online.

Table 1. Student questionnaire: I can hear/see the lecturer clearly.			
Count of ID	Column Labels		
Row Labels	Face to face in classroom	Online Zoom	Grand Total
Strongly agree	40	1	41
Agree	19	2	21
Disagree	1		1
Strongly disagree	1		1
Grand Total	61	3	64

Table 1: Student questionnaire: I can hear/see the lecturer clearly.

Table 2. Student questionnaire: I can hear/see all my classmates clearly (online and offline).			
Count of ID	Column Labels		
Row Labels	Face to face in classroom	Online Zoom	Grand Total
Strongly agree	18		18
Agree	36	1	37
Disagree	7	2	9
Grand Total	61	3	64

Table 2: Student questionnaire: I can hear/see all my classmates clearly (online and offline).

Table 3. Student questionnaire: I can participate actively to the lesson.			
Count of ID	Column Labels		
Row Labels	Face to face in classroom	Online Zoom	Grand Total
Strongly agree	23		23
Agree	35	3	38
Disagree	3		3
Strongly disagree	1		1
Grand Total	62	3	65

Table 3: Student questionnaire: I can participate actively to the lesson.

Table 4. Student questionnaire: I prefer joining classes:			
Count of ID	Column Labels		
Row Labels	Face to face in classroom	Online Zoom	Grand Total
Face to face in classroom	46	2	48
Online Zoom	16	1	17
Grand Total	62	3	65

Table 4: Student questionnaire: I prefer joining classes face-to-face/online.

In addition to the questionnaire, students filled out the end-of course-evaluations on lecturer effectiveness as well as overall course satisfaction. The lecturer effectiveness for both courses was rated at an average of 4.2 out of 5. The 21 online students (15.1%) rated their lecturers a 4.6 out of 5 for both courses. The face-to-face students rated their lecturers a 3.7 out of 5 (41.7%) and a 4.0 out of 5 (43.1%). Similarly, the overall course satisfaction was rated an average of 4.2 out of 5. The 21 online students (15.1%) rated the overall course a 4.6 out of 5 for both courses. The face-to-face students rated the overall course a 3.6 out of 5 (41.7%) and a 4.0 out of 5 (43.1%). Table 5 offers a detailed look at the minute differences between the ratings.

Table 5. End-of-course evaluations: Student ratings for lecturer effectiveness and overall course satisfaction.		
Total Respondents	Lecturer Effectiveness	Course Satisfaction
58 (Face-to-face)	3.69	3.57
9 (Online)	4.56	4.56
60 (Face-to-face)	4.01	3.97
12 (Online)	4.56	4.58
139 (Total)	4.20 (Average rating)	4.16863 (Average rating)

Table 5: End-of-course evaluations: Student ratings for lecturer effectiveness and overall course satisfaction.

Lecturers

The lecturers completed a questionnaire, participated in lesson observations and an interview. The questionnaire consisted of 20 questions regarding their experiences in (multimodal) teaching, their preferences in (multimodal) teaching, their experiences teaching in the Hybrid Plus Classroom, as well as one open comments question.

Experiences in (Multimodal) Teaching

When asked which mode of teaching they prefer, one lecturer selected “Traditional physical classroom”, while the other selected “All of the above”, indicating the traditional physical classroom, hybrid teaching and fully online teaching. One lecturer indicated having “No previous experience” with multimodal teaching and learning models using interactive tools,

while the other indicated to have “both experience as a learner and an instructor”. When asked how often the lecturers use interactive tool(s), one lecturer indicated “None”, while the other indicated “Every lesson”. When asked which learning activities, they usually implement to engage students, both lecturers indicated “whole class Q&A or discussion”, one lecturer also indicated “Group and pair work”. For teaching in Zoom, both lecturers indicated using “Annotation”, “Chat”, “Recording to Zoom cloud”, “Screen Sharing”, and “View participant list”. One of the lectures also indicated using “Breakout rooms”, “Hide/ Show Webcam”, “Mute/ Unmute”, “Non-verbal feedback (eg reactions, raise hand)”, “Polling”, and “Virtual backgrounds”. One lecturer indicated using the university “Desktop computer” to facilitate the Zoom session, the other lecturer indicated using a “Laptop”.

Preferences in (Multimodal) Teaching

The lecturers shared the same opinions and preferences on hybrid teaching. Out of the options “Strongly agree”, “Agree”, “Disagree”, and “Strongly disagree”, they both indicated they “Agree” to the statements that “Hybrid Teaching has the potential to improve student satisfaction”, “Hybrid Teaching provides more opportunities for student interaction using chat, breakout rooms, polling, share screen in Zoom”, and “It is significant to give students the opportunity to learn and collaborate in a Hybrid Learning Model because it will prepare them for their future”. Both lecturers also indicated “Yes” to the statement “I would like to implement hybrid teaching practices, the skills and strategies.” Sharing their opinions on using Zoom, both lecturers indicated “Yes” for the statements “Zoom is easy to use”, “Zoom is easier to use than my previous meeting solution”, “Zoom is reliable”, “Zoom is more reliable than my previous meeting solution”, “I like that recording is seamless as it is set as automatic recording”, and “Overall, I am satisfied with Zoom's performance”.

Experiences Teaching in the Hybrid Plus Classroom

Using the Hybrid Plus Classroom, both lecturers indicated the ease with which to schedule and start the Zoom session was “Very Easy” and rated “Excellent” for ease with which to conduct lessons in the Hybrid Plus Classroom. Neither lecturer experienced any technical issues while teaching with Zoom and indicated “No” or “Non applicable” for the potential technical issues of “Audio (Online students cannot hear you. You cannot hear online students)”, “Online students unable to view Screen share/ teaching content”, “Online students unable to join Breakout sessions”, “Recording does not automatically show up in my Canvas Course after lesson”, “Recording corrupted (no audio, no teaching content etc)”, and “Online students unable to view polls”. When asked which of the teaching aids featured in the Hybrid Plus Classroom enhanced their teaching experience, they both indicated using the “Ceiling microphone”, “Zoom control on Touch Panel”, “Seamless switching between teaching content”, and the “Visualizer”. One lecturer also indicated to have used the “Gallery view of Online students on Monitor 2”. For the open comment section at end of the questionnaire, one lecturer mentioned the “Need to understand how the equipment works and connect to each other e.g. the link to the digital whiteboard and the projector.”

For qualitative instruments, four 1-hour lesson observations and 2 interviews were completed.

Lesson Observations

Reoccurring themes observed in the lesson observations included content delivery, student engagement, and use of the facilities in the Hybrid Plus Classroom. Both lecturers devoted a significant portion of the session, approximately three hours, to presenting information. The subject content of the 2 pilot modules is numerical in nature. The focus of the classes was a step-by-step breakdown of formulas and calculations, to allow students to write along with the correct calculations to the problems presented in the course content. The extended lecture duration left little time for students to interact with the material independently or engage in any team or applied learning activities. It also restricted the lecturer's ability to assess student learning. Despite the lecturer's attempts to engage students through questions and discussions, there was limited interaction from the students, particularly online participants. The class consisted of a mix of face-to-face and online students, with a majority of students attending in the face-to-face mode. Online students were not actively addressed during the class. The lecturer's interactions, questions, and clarifications were primarily directed towards face-to-face students. The observed class seemed to lack activities and discussions, despite the extensive information delivery. The Hybrid Plus Classroom offers various facilities for content delivery. One of the lecturers used the digital whiteboard for annotations, the other lecturer focused primarily on using the visualizer and printed materials, seemingly underutilizing the available technology. During the session, as part of the system, the light at the front of the classroom turns off to emphasize the projector screen. This causes the online students to see the lecturer less clearly, as they are standing in the dark. Findings from the lesson observations were incorporated into the interview questions during the lecturer interviews at the end of the module.

Lecturer Interviews

During the 30-minute semi-structured interviews, the following themes were discussed: technical issues and benefits; student interaction; hyflex teaching; and pedagogical approaches for teaching in the Hybrid Plus Classroom.

The evaluation of the technical aspects revealed a notable balance between benefits and challenges associated with the Hybrid Plus Classroom system. Both lecturers found the system to be user-friendly, particularly emphasizing the ease of use for audio, visual components, and integration with LMS Canvas and Zoom. With some practice, the system proved to be readily accessible and operable through the console. Challenges emerged concerning connectivity and accessibility, particularly for students in countries with limited internet access and for students with certain brands of devices. Additionally, the system's reliability was crucial, as disruptions in operation could induce stress and pressure on both lecturers and students. Instances where students faced disconnection or lengthy waiting times were particularly highlighted as stressful. The evaluation of student interactions underscored several key observations. The enhanced audio quality and the system's annotation and illustration features were identified as advantageous by lecturers. These capabilities allowed for clear instruction delivery and additional examples, benefiting both in-person and online students who could hear and see the content clearly. Identified challenges emerged concerning student engagement, particularly in the online environment. Lecturers encountered difficulties in motivating online students to activate their webcams and participate actively. Concurrently, they faced challenges in ensuring punctuality and attendance for in-person classes. Integrating additional online tools, such as polls, to enhance engagement posed a potential complication, leading to a cautious approach of not

incorporating further tech tools at that point. In hindsight, this decision was recognized as a missed opportunity, as one of the lecturers expressed the desire to utilize such tools for improved engagement. The evaluation of the hyflex teaching approach highlighted several benefits and challenges. Both lecturers vocalised a positive view of hyflex learning options, offering student the freedom of choice on which mode to attend classes in; online, face-to-face, or watching the recordings. The recording options in the Hybrid Plus Classroom provided a valuable opportunity for students to access high quality session recordings if they were unable to attend live sessions. However, both lecturers suggested that younger students, particularly fresh first-year students, might face challenges in adapting to the self-directed learning skills needed for hyflex learning. Lecturers expressed concerns related to the impulse control and discipline of these students, particularly in terms of class attendance and reviewing session recordings. In their view, hyflex learning appeared well-suited for adult learners who are mature, confident, and self-directed. In this pilot, there was an opportunity for lecturers to adapt their teaching approaches to the hybrid teaching format and the Hybrid Plus Classroom's capabilities. Instead, lecturers adhered to traditional lecture-style teaching approaches, which presented a noteworthy contrast with the potential of the hybrid format. When asked whether they made any changes to their delivery to adapt to hybrid sessions and the availability of the facilities in the Hybrid Plus Classroom, both lecturers indicated they made no changes. One of the lecturers indicated the Hybrid Plus Classroom facilities allowed for optimal delivery of the content as was intended, suggesting the previous classrooms used did not offer a learning experience for the course as it was designed.

Conclusion and Recommendations

The main findings in this pilot study on multimodal teaching in a Hybrid Plus Classroom, indicate that students perceived they had a positive, and equitable learning experience, similar to the findings by Philippe, et al. (2020). Online and face-to-face students could hear and see the lecturer clearly and indicated they could participate actively in the sessions. Lecturers appreciated the clear audio and video facilities and the technological facilities, offering multiple ways to deliver course content. Where a lower level of active teaching approaches stood out during the lesson observations, students overall rated the courses and lecturer highly. The lecturers indicated the Hybrid Plus Classroom is easy to use and both appreciated the audio and visual facilities for content delivery, but they also indicated the technology requires some training and practice to fully and fluently control.

To build on the findings of Triyason, Tassanaviboon, & Kanthamanon (2020) and their Hybrid plus Classroom requirements for successful implementation of multimodal teaching in a Hybrid Plus Classroom, 3 recommendations are presented, based on the outcomes of this pilot: preparation, pedagogical approaches, and institute-wide support. Firstly, when preparing for implementing multimodal teaching a Hybrid Plus Classroom, after the required facilities have been put into place, an integrated training for lecturers should be facilitated as well as onsite support for any technical issues. Training should include the technological facilities and possible pedagogical approaches as recommended by Triyason, Tassanaviboon, & Kanthamanon (2020), as well as practice rounds. Also, ensuring technological infrastructure is easily accessible for all students, both on-campus and online. Secondly, pedagogical approaches need to be formulated to facilitate learning, making use of the facilities available. Suggestions can include breaking up long segments of lecture by introducing interactive activities within lectures, such as small group discussions, case studies, and problem-solving tasks. Interactive activities offer students opportunities to engage with the material and apply it practically. Interaction between online and face-to-face

students can be improved by targeted group activities by means of breakout rooms, group discussions, or online collaboration software, e.g. Google Jamboard, Google Doc, Padlet, etc. Encouraging students to use the chat function for asking questions creates an alternative channel for participation, especially for those who may be reluctant to speak verbally. This works for online, but also for on-site students and can contribute to improving connection and learning as a social construct (Abdelrahman, 2016; Bashir, Bashir, Rana, Lambert, & Vernallis, 2021; Binnewies, 2019; Lakhal, 2017; Moorhouse & Kohnke, 2021; Tu, 2000; Visser, 2012; Vygotsky, 1934). Effective communication ensures that students are informed and engaged from the beginning of the class, e.g. notifying students about a delayed start of the session. Lastly, a broad base for support and implementation (Beatty, 2022; Szeto, 2014), including head of program, course designer, teaching and learning centre, lecturer, student representatives, etc., to develop a blueprint for effective teaching practices, attainable for all parties involved, including approaches, materials, modes offered, level of freedom in choosing mode of attendance, and support for students adjusting to self-directed learning. This will improve institute-wide investment in the process and the outcomes. By implementing these recommendations, higher education institutions can effectively harness the potential of multimodal teaching approaches, creating inclusive, engaging, and adaptable learning environments that benefit lecturers and students alike.

Keep in mind not all solutions that work in a Singaporean setting will work everywhere else. Cultural differences, education levels, access to and experience with technology, are all factors to be considered when setting up and implementing a multimodal teaching approach.

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Unlocking Potential: Understanding Pathways to Professional Identity Development for Prisoners in a Missouri Jail

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Abstract

Thousands of individuals reenter society from the U.S. incarceration system each year. Reentry involves challenges in social integration, stigma and discrimination, psychological well-being, and essentially, finding and maintaining employment. Research illuminates the potential of professional identity development for vocational success and reducing recidivism. In this study, a series of professional identity workshops were conducted as a pilot study with a cohort of participants in a Missouri jail. Participants completed a pre- and post-assessment Likert-scale survey. Data was analyzed with an independent t-test between attendees who attended the first workshop (n=19) and those who continued with the second workshop (n=6). Results indicate that three items were significantly different between those who stayed in the workshop and those who dropped out. These were the opportunity to get paid utilizing one's talents; strong interest in one's job; and satisfaction with one's employment. The findings indicate the necessity of giving incarcerated individuals the skills and assistance they need to effectively re-enter society.

Keywords: Incarceration, Professional Identity, Recidivism

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Introduction

The United States confronts a critical problem in its criminal justice system with the highest global incarceration rate, hosting 25% of the world's prisoners despite representing just 5% of the world's population (Alexander, 2012). There are approximately 600,000 individuals that reenter society from prison each year in the U.S. (Bronson & Carson, 2019). Reentry involves reconnecting formerly incarcerated individuals with community through stable housing, education, employment, and avoiding further contact with the criminal justice system. However, reentry includes substantial obstacles such as adverse policies, social stigma, systemic inequalities, and social conditions hindering integration and increasing the risk of reoffending (Mears & Cochran, 2015). In this study, we examined challenges to reentry, risk factors, and the role of professional identity in reducing recidivism. A professional identity pilot study was conducted in a Missouri jail, with participants taking a pre- and post-assessment that was subsequently statistically analyzed.

Reentry Challenges

As noted, reentering society from incarceration is one of the most difficult processes facing individuals in the criminal justice system. Oftentimes, due to the substantial social and economic barriers, many individuals re-offend and thus face reentry numerous times. First, previous studies have shown that the negative stigma labeling of ex-offenders interferes with their successful reintegration into the community following release (Moore et al., 2016). Once a person is labeled as a deviant by society, opportunities in the hemisphere of economics and sociality tend to decrease.

Additionally, disparities in reentry challenges exist along demographic lines. While our research did not collect or analyze demographics, it is critical to acknowledge these disparities and how demographics may have impacted study results. For instance, research indicates that women face greater challenges after their release, including higher rates of both social and financial instability (Agboola, 2017). Furthermore, there are significant racial disparities in incarceration rate, length, and reentry challenges. In the 2010 Missouri Census, Blacks and Whites accounted for 12% and 81% of the general population respectively. Yet, in Missouri prisons, 39% of the jails were Black individuals while White individuals accounted for 57%. Rucks-Ahidiana et. al (2020) find that the formerly incarcerated are most likely to find work in a small number of "felon-friendly" industries, with formerly incarcerated whites having higher employment rates than blacks.

Employment for formerly incarcerated individuals is especially crucial to a successful transition. However, most states have restrictions that prevent people with drug-related felony convictions from qualifying for publicly funded assistance programs, including food stamps (Rubenstein & Mukamal, 2003). Released prisoners often find employment and work in low-skill jobs in food service, wholesale, maintenance or the manufacturing industry (Visher et. al, 2011). This type of employment tends to be low-pay and offers very little upward mobility, as well as lacking essential benefits such as health care, union protection and retirement funds.

Further, a prisoner interview study by Sheppard, A., & Ricciardelli, R. (2020) determined aspects of post-prison employment. Beyond the low pay, the formerly incarcerated individuals described their job as non-gratifying. Some individuals noted that working in low-satisfaction and low-pay jobs was more likely to push them towards criminal behavior (Sheppard, A. &

Ricciardelli, R, 2020). Individuals ultimately hoped to find a stable job with somewhat gratifying work and a livable wage.

Professional Identity

Job satisfaction relates to professional identity. Essentially, professional identity refers to an individual's sense of self that is shaped by their dedication to performing competently and ethically within their profession. This identity can continue to evolve and develop throughout a person's career, and those who possess it strongly identify with the values and role of their profession (Tan, Van der Molen, & Schmidt, 2015). In the formerly incarcerated population, developing a sense of professional identity and self-efficacy can be particularly challenging due to the social and economic barriers they face upon reentry into society. However, it can play a crucial role in enhancing confidence, satisfaction in labor, and sustainable employment. Additionally, it is key to understand that the responsibility of professional self-efficacy does not rely solely on the individual but diffuses to others (employers and society). Interventions such as mentoring, educational training, and experiential learning all can be beneficial for this population while reducing stigma and discrimination.

Methodology

This research explored the efficacy of a professional identity development workshop, implemented in a jail in Missouri, USA. The assessment of this efficacy was segmented into four main themes for the individuals: assessing their own professional identity strengths and awareness, understanding how previous experience relates to employment and professional identity, impact of social support received and needed in their career, inclusion of outside self-defined and specific support for a successful career. The data was collected through a pre- and post-survey that measured the effectiveness of the workshop in enhancing the participants' professional identity.

Target Population and Sampling

A set number of incarcerated individuals (n=19) participated in the pre-assessment data collection of enhancing professional identity. For the post-assessment collection, there were a total of six incarcerated individuals (n=6). The measurements that were used in this study were knowledge about professional practices, professional role model, profession, reference for a specific profession, and professional self-efficacy. The sampling methods utilized in this study included convenience and purposive sampling. The researcher who implemented the data collection had personal connections with the jail's administration, making it simpler to gain access to the prisoners and thus apply the professional identity survey.

Operationalization

The survey was operationalized through a Likert scale and open-ended questions. The Likert scale questions invited individuals to score a series of items on a scale of 1 to 5, with 1 denoting strong disagreement and 5 denoting strong agreement. The open-ended questions included topic areas of motivation and workshop interest and satisfaction.

Analysis

While paired t-tests for pre- and post-assessments are the best statistical method, independent t-tests were conducted for the scores of pre-assessment between those who participated in the workshop and those who did not. This is due to random drop out from the workshop among the participants.

Conclusion

We found that three items were significantly different between those who stayed in the workshop and those who dropped out. They were the opportunity to get paid utilizing one's talents ($t = -2.174$, $p = 0.043$), strong interest in one's job ($t = -2.884$, $p = 0.010$), and satisfaction with one's employment ($t = -2.884$, $p = 0.010$).

The purpose of this study was to explore the efficacy of a professional identity development workshop in enhancing this identity among inmates. The study also aimed to investigate how prisoners view their own professional identity strengths and awareness, as well as their prior experiences with work and professional identity. Furthermore, the study examined the social support offenders have had and need in their careers. The results indicate that the professional identity workshop was effective in enhancing prisoners' professional identities. In particular, the opportunity to get reimbursed for one's abilities, a high degree of enthusiasm in one's work, and having a mentor to assist with professional progress were all statistically significant. A t-test also showed a statistically significant difference between the means of these three factors.

Our findings support the existing literature on barriers to reentry, including social capital, perceived structural opportunities, and occupational identity. Providing attention and guidance until financial and social independence was considered equally important. The study's findings emphasize the necessity of giving these individuals the skills and assistance they need to effectively re-enter society, such as pay based on one's talents, a strong interest in one's job, and mentorship.

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Reducing Māori Student Disengagement in Education: Profiling the Critically Conscious, Culturally Responsive Educator

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Abstract

Māori learners as minority students in New Zealand are over-represented in the negative disengagement indices in mainstream secondary education, despite Māori only representing 17.4% of the New Zealand population. Compared with non-Māori students, Māori are more likely to receive disciplinary action excluding them from mainstream. Te Tiriti o Waitangi (The Treaty of Waitangi) as New Zealand's underpinning constitutional document, New Zealand legislation and educational policy stipulate that schools must be culturally responsive to the needs of Māori learners 'as Māori'. Research suggests a secure cultural identity is a buffer for negative learning experiences and can positively impact Māori student inclusion in education. Drawing on research with Māori learners excluded from education, a critical theory lens provides a better understanding of how schools as microcosms of society can perpetuate inclusive or exclusive environments for Māori. This paper argues that a teacher is better equipped to be culturally responsive when critically conscious of the social, political, and historical impacts on Māori students. These educators know their positionality, beliefs, and assumptions as they have prepared themselves with a cultural tool kit to influence the student/teacher pedagogical relationship. Highlighting, culturally responsive pedagogies for Māori learners, this paper illustrates how pūrākau (traditional Māori story-telling and stories) can be used as a pedagogical strategy to enhance Māori cultural identities. In finishing, critically conscious, culturally responsive educators are more effective when they can confidently reflect on systemic privilege and address pedagogical practices to create a culturally safe environment where Māori learners can flourish.

Keywords: Critical Pedagogy, Culturally Responsive, Exclusion in Education, Māori as Minority Learners

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Introduction

The New Zealand educational context can be fraught with complexities that threaten the meaningful participation of Māori students as minority learners in education. New Zealand has a population of 5.2 million, of which Māori represent only 17.4% of the population (Stats NZ, 2022; Stats NZ, 2023). Despite the relatively small statistic, Māori learners are more likely to receive disciplinary action leading to exclusion in education than any other ethnic group. Statistics reveal that Māori students in mainstream secondary schools represent 50% of suspensions and exclusions and 49% of expulsions (Education Counts, 2022). Addressing these abominable statistics is fundamental to ensuring equitable access to education for Māori students. Drawing on findings from two empirical studies (a PhD and a Master's study), this paper discusses the need for educators to be critically conscious and culturally responsive to Māori as minority learners to support educational inclusion. Where this paper discusses Māori students in the New Zealand context, the reader is encouraged to consider the principles more broadly for minority students in their own country/cultural-specific context.

The paper first situates exclusion within a brief overview of Māori history regarding the social, political and historical contexts. Next, an introduction of the lens used; kaupapa Māori theory couched within critical theory. Through a critical theory lens, we consider how schools as microcosms of society can perpetuate inclusive or exclusive environments for Māori as minority students. The paper then canvasses the legislative and policy context and how these requirements aim to meet the needs of Māori learners. Following, the paper expands on the empirical research to illustrate key issues impacting Māori student inclusion in education, this is contextualised within the social, political, and historical movements impacting Māori student exclusion in education. The last part of this paper considers how educators can act in culturally responsive ways. We consider keys to pedagogical practice which can create a culturally responsive learning environments to ensure that Māori learners (or minority students in your contexts) can succeed in education. To illustrate, we look at pūrākau (Māori stories and storytelling) as a culturally relevant pedagogical strategy to support Māori learners to develop a positive Māori identity (Cliffe-Tautari, 2020). By including culturally relevant contexts, we improve their overall educational experience, which can contribute to better overall engagement in education.

A Brief Overview of Māori History

Māori as the indigenous peoples of New Zealand navigated from the Pacific approximately 1300 A.D. The British entered the New Zealand landscape in the 1800s, leading to the signing of New Zealand's constitutional document Te Tiriti o Waitangi. There was an English version named The Treaty of Waitangi and there are discrepancies in the English translation. It is worth stating that before the signing of Te Tiriti o Waitangi, Māori people were the majority population. As iwi-based (tribal) people, Māori had their mana (authority) in different regions in Aotearoa (New Zealand). Therefore, there was no one rangatira (chief) over New Zealand. Further, not all rangatira (chiefs) from the different iwi (tribes) signed these treaty documents. Importantly, Māori believe they never ceded sovereignty. Unfortunately, there have been untold breaches to Te Tiriti o Waitangi, leading to the negative impacts on Māori through the colonial process. In this short history, Māori have become culturally displaced through the confiscation of land and the loss of language and culture.

Before the 1800s, te reo Māori (the Māori language) was the dominant language, and the Māori language and culture flourished. The colonising experiences of Māori following the signing of the Treaty are evident in educational policy from the 1800s. The 1847 Education Ordinance Act established that English was to be the language of instruction in schools with the underlying intent to ‘assimilate’ Māori into the English language and culture. Whilst not set in policy, on the ground, Māori children were physically punished for speaking their mother tongue. These abominable acts in the education system have left scars and intergenerational trauma for Māori families and communities and have undoubtedly impacted how the Māori language has been transferred within families and Māori communities.

The 1970s saw steps towards the reclamation and revitalisation of te reo Māori (the Māori language). In 1972, Ngā Tamatoa, Victoria University's Te Reo Māori Society, and the New Zealand Māori Students Association took a petition with 30,000 signatures to parliament to call the government to action to teach Māori language and culture in schools. Other Māori community groups were activating other movements including the 1975 land march to address land confiscation. From these ongoing resistance movements, we have seen the establishment of the Waitangi Tribunal, a government initiative set up under the 1975 Treaty of Waitangi Act to facilitate hearings on the breaches of the Crown in respect to Te Tiriti o Waitangi.

In terms of the revitalisation of the Māori language, grassroots-led initiatives prompted the establishment of Māori immersion schooling initially as kōhanga reo (language nests) which were set to preschool levels then later on kura kaupapa Māori (primary level), kura ā iwi (tribal-based) and wharekura (secondary levels). Māori language is available now in mainstream schools, but learning te reo Māori is still not compulsory in New Zealand and mainstream schools. Providing culturally responsive education in mainstream schools is extremely important given that this is where the majority of Māori learners attend education in New Zealand.

Despite the positive revitalisation movements of te reo Māori (the Māori language), we have not seen major shifts to the extent needed. Volatile socio-political agendas can be driven by populism and racist agendas can hinder policymaking for te reo Māori (the Māori language) regeneration. When political parties do not maintain a long term view of the revitalisation te reo Māori (the Māori language) there are also risks in harming positive race relations and a just education system for Māori learners. It is critically important for educators of Māori students to understand that these issues exist in our society, and to be cognisant of the impact on education for Māori learners. The research discussed in this paper shows that the devaluing of language and culture negatively impacts Māori adolescents (Cliffe, 2013; Cliffe-Tautari, 2021).

New Zealand's Policy Context

Māori learners all have constitutional rights under Te Tiriti o Waitangi. In Article Two of Te Tiriti o Waitangi, Māori are guaranteed protection of their language and culture. Article Three of Te Tiriti o Waitangi guarantees Māori equal rights as other New Zealanders including equitable access to education. Ensuring the principles of Te Tiriti o Waitangi and the rights of Māori are upheld in both legislation and policy is important given that Māori student academic achievement and engagement are lower than non-Māori.

The New Zealand Education Training Act (2020) is the underpinning legislative document for the New Zealand education sector and gives effect to New Zealand's constitutional document Te Tiriti o Waitangi. Section 127 of the Act states that schools and Boards of Trustees (made up of parent representation) must make reasonable steps to give effect through:

- i) working to ensure that its plans, policies, and local curriculum reflect local tikanga Māori [Māori cultural practices], mātauranga Māori [Māori knowledge], and te ao Māori [Māori worldview]; and
- ii) taking all reasonable steps to make instruction available in tikanga Māori and te reo Māori [Māori language]; and
- iii) achieving equitable outcomes for Māori students.

The Ministry of Education ensures that educational strategy supports this legislation. The Ministry of Education's Māori education strategy Ka Hikitia (2013; 2019) positions that Māori learners are served best when they can succeed 'as Māori'. Research reveals that a secure cultural identity and culturally inclusive environments can positively affect Māori learners' achievement and engagement in education (Cliffe, 2013; Cliffe-Tautari, 2021; Webber, 2011).

A Secure Cultural Identity as a Buffer for Negative Schooling Experiences

Prior research has indicated that a secure cultural identity can buffer negative schooling experiences (Cliffe, 2013; Cliffe-Tautari, 2021; Webber, 2011). Webber (2011) found that resilience and a positive Māori identity enabled Māori students to buffer negative schooling experiences, such as stereotype threat. Steele (1997) has suggested that stereotype threat can affect any group member where a stereotype exists. Stereotype threat could affect how Māori students perform academically, particularly where a stereotype may infer intellectual inferiority. Steele (1997) argued that stereotype threat either acts as a motivational factor for students to 'disprove' such stereotypes, or it can cause the student to 'avoid' performance; consequently, underperforming and affirming the stereotype. Stereotype threat can undermine or support the academic achievement of Māori students, depending on whether their racial-ethnic identity and achievement are promoted as positive or negative. Webber's (2011) investigations into the influences on adolescent identity development for Māori and other ethnic students in urban mainstream secondary schools found that multiple identities, particularly positive ethnic identities, allowed students to cope with pressures at school, such as stereotype threat (Webber, 2011). The students in Webber's study consciously and constantly looked for ways to overcome the pressures associated with negative stereotypes about their ethnicity in academic and social contexts.

Methodology

The research discussed in this paper (Cliffe, 2013, Cliffe-Tautari, 2021) employed kaupapa Māori theory as aligned with critical theory. "Critical theory interrogates the social, economic, and political structures that privilege the achievement and success of some students at the expense of others." Carrington, MacArthur, Kearney, Kimber, Mercer, Morton, Rutherford, 2016, p.10). Graham Smith (2003) used critical theory and theorised kaupapa Māori theory as a transformative praxis that challenges dominant and hegemonic Western structures. The theoretical positioning of kaupapa Māori (as aligned to critical theory) assumes that the hegemonic paradigm, derived from the dominant group, exercises power over other groups, particularly Māori. In the context of both the PhD and Master's

study, kaupapa Māori was used to make space for mātauranga Māori (Māori knowledge) and kaupapa Māori, is a Māori way of thinking, or doing things based on Māori principles and a Māori worldview (Marsden, 2003). Kaupapa Māori as it aligns with critical theory in this paper acknowledges that Māori student exclusion is not necessarily inherent within the individual, but, in the broader societal structures which impact their engagement in education.

As is fitting with kaupapa Māori, sharing my positionality and who I am is essential to positioning myself within the research space and is an act of decolonising research methodologies in action. I first briefly share my pepeha (tribal saying) and then my interest in the research.

Ko Pukepoto te maunga

Ko Waingaehe te awa

Ko Rotokawa te roto

Ko Te Arawa te iwi

Ko te Ure o Uenukukōpako te hapū

Ko Pikirangi te marae

Pukepoto is my mountain

Waingaehe is my stream

Rotokawa is my lake

Te Arawa is my tribe

Te Ure o Uenukukōpako is my subtribe

Pikirangi is my gathering place

Whilst I am a lecturer in Te Puna Wānanga in the School of Māori and Indigenous Studies at the Faculty of Education and Social Work at Waipapa Taumata Rau - the University of Auckland, New Zealand, I have over 20 years of background in working with Māori learners marginalised in education as well as teaching in Māori immersion education. My background includes working in two secure youth residences, one youth justice and one care and protection residence. These experiences were the impetus for the research areas for the Master's and PhD studies.

The Master's study involved 5 Māori learners aged 13-15 who had also been excluded from mainstream secondary school in Rotorua New Zealand. The PhD study involved 29 participants, including 11 Māori youth aged 15-17 who were engaged with the justice system for offending behaviours and had previously been excluded from mainstream education. The PhD study occurred in two regions in New Zealand (Northland and Auckland). Both studies were underpinned by the tenets of kaupapa Māori theory, where semi-structured in-depth interviews were used to capture student voice and thematic analysis was used to generate the overarching themes. Ethical provisions were met according to the University of Auckland Human Participant Ethics Committee, and the study's validity was achieved through member checking, peer debriefing and reflexivity. Based on both of these studies, the idea of the critically conscious, culturally responsive educator is discussed in this paper.

Framed Identities and Reframing

In the Master's study (Cliffe, 2013), I theorised the notion of framed identities and the need to reframe teacher beliefs and attitudes. In this study, the participants ($n=5$) perceived that teachers impacted their access to the curriculum. "Framing in this study referred to a deficit-based and limited perception that teachers and professionals can hold of a young person, based on past or current behaviours" (Cliffe, 2019, p. 211). Participants spoke about how negative teacher attitudes became a barrier to accessing the curriculum education as the teachers who 'framed' them according to their past and current behaviours also inhibited their access to the curriculum. One participant said:

I really wanted to change and then when I got there (back to school) he (teacher) still put me at the back of the class. One time he was like “you should just leave the school altogether just like last year” and I was like “no”. When he sent me to the back I was like “nah I want to sit at the front Sir” and he said “no” and I was like “why?” and he said “because I said so”. I was like “oh, but I want to learn” and he was like “not eh you’re still the same, you should just get out of my school” and I said “catch you up”.

Framing the participants’ identities in this way led to deficit theorising, which had far-reaching implications and as illustrated the participant's access to education was inhibited. Teacher beliefs and attitudes have a huge impact on student engagement in education. The students perceptions demonstrate that teachers can frame students through ascribing a label. The problem with ascribing a one-dimensional ‘label’ as indicated above highlights the negative behaviours but also the positive qualities of a person (Cliffe, 2013; 2019). It further ignores that ‘complex needs’ or being ‘at risk’ for some students may be more fluid, circumstantial and sometimes ecologically bound. This kind of teacher belief and attitude is limiting and does not provide scope for fluidity; homogenising a wide spectrum of students and their needs (Cliffe, 2013; 2019).

The critically conscious, culturally responsive teacher can reflect on their pedagogical practices and relationships with Māori learners and consider how their actions may impact on Māori learners. Reframing is a conscious act whereby teachers acknowledge that students are more than the sum of their behaviour (Cliffe, 2013; 2019). A critically conscious culturally responsive educator reframes how they perceive students and does not allow perceptions of behaviour to override the positive qualities that students possess. This act enables positive relational-based connections which are fundamental to educational inclusion for Māori learners.

Whakapapa (Genealogical) Pride to Resist Racism

In the 2021 PhD study, an overarching theme with the Māori youth participants ($n = 10$) were experiences of racism, racial profiling, poverty, marginalisation, and exclusion from education. For these participants, experiences of racism impacted their desire to engage in mainstream education. The following participant shared how bullying alongside perceived negative and judgemental attitudes from some teachers because they were Māori impacted them. They said:

It’s like sometimes hard. Because like people judge us, like really bad. It’s like when I was little, I think around seven or eight or something, I was like always bullied because I was Māori. People are like rich and stuff like that, have everything and I had nothing. But I still like, I didn’t really care that I had nothing because like Pākehā people [New Zealand settlers] like stuff like that. I didn’t really care but like it still affected me because I’m like Māori and I can’t help it.

In this study, participants also spoke about how they were proud to be Māori and how their ability to connect through whakapapa (genealogy) was not only important to their sense of self but also it provided a resilience mechanism to resist racism and negative schooling experiences (Cliffe-Tautari, 2021). The following participant said:

Like people would say stuff like oh “you Māori’s, are ta ta ta ta da”. I don’t care, I was like I’m proud to be Māori, think what you like. It’s not going to stop me from thinking what I think about my culture.

When I asked this participant who had bullied them, they said:

Mostly kids but sometimes even adults. There was this one teacher that didn’t like me. He was a man. He didn’t like Māori kids, like Māori people. I didn’t know why, but like he just really hated me. I didn’t know why, and I was too young to even know why he hated me and stuff, because when I was little, I thought Māori was like a normal thing.

The above participant spoke about racism and negative attitudes. These findings align with other research about the salience of a positive cultural identity such as Webber’s (2011) study. However, Webber (2011) reported that a positive racial-ethnic identity allowed Māori students in her study to overcome negative stereotypes. This positively affected their sense of belonging and connectedness to the collective (Māori). As above, some participants in this study were more likely to reject the stereotypes assigned to them and resist racism. In this instance, cultural pride provided them with resilience and fortitude to buffer such negative attitudes.

Pūrākau as a Pedagogical Strategy With Māori Learners

By including pūrākau (Māori stories or story-telling), educators are enacting a culturally responsive approach that positions Māori ways of knowing in the classroom. Lee (2008) argues that pūrākau are meant for pedagogical intent and hold key messages that have the potential to provide guidance that help us to understand human behaviour. Through studying pūrākau, as Māori students seek to understand the behaviour of their tupuna (ancestors) and Māori heroes, they can learn about themselves.

Take the pūrākau about my tupuna Tamatekapua. He was the navigator on the Te Arawa waka (canoe) and was regarded as a “...lad of spirit and in time was regarded as a chief of more than ordinary importance” (Stafford, 1967, p.62). In the migration of Te Arawa to Aotearoa (New Zealand), Tamatekapua kidnapped both Ngātoroirangi (the high priest) and Kearoa and Ruao’s wife Whakaotirangi. On learning of the seduction of Kearoa, Ngātoroirangi retaliated with incantation called Te Korokoro o te Parata, which almost destroyed everyone on board.

In analysing the behaviours of Tamatekapua, his actions at times lent to not-so ‘conventional’ deeds. For example, he is remembered for chasing beautiful women and for finding ways to get what he wanted. While Tamatekapua often paid the price for his deeds, this pūrākau illustrates the complex nature of people; their behaviours, and the human psyche - the brave, the mischief and the risky methods employed by people.

Much like the pūrākau of Tamatekapua, the stories about other tūpuna (ancestors) from other iwi (tribes) are also re-told and they are remembered for their multiplicity of attributes, qualities, traits, characteristics and deeds. Yet, when these pūrākau are re-told, tūpuna are not stigmatised for negative behaviours or actions, nor are they labelled as ‘criminals’ or according to deficit descriptors. In fact, their persona or identity remains intact as a tupuna (ancestor) and these behaviours are understood within the context of the time, and the

different qualities inherent within individuals are the consequences of both negative and positive actions common to the human experience.

Profiling the Critically Conscious, Culturally Responsive Educator

The first point to consider: what is a critically conscious, culturally responsive educator and why it even matters for Māori as minority students. The critically conscious culturally responsive educator considers the socio-political contexts of Māori (minority) students. In settler colonial countries, the historical and ongoing impacts of colonisation are recognised as impacting Māori (and other minority students) engagement in education. In broader educational theory, the well-known philosopher and educator Paulo Freire (first grounded the idea of critical consciousness in his seminal work “Pedagogy of the Oppressed”). In this work, he argued that oppressed individuals often internalise and accept this oppression as status quo. He argued that we need to recognise and understand this oppression within the wider social, political and economic contexts in which oppression exists. Freire (1973) contended that educators can have a powerful impact on student's lives through engaging in meaningful dialogue and reflection with learners to analyse their experiences and how society impacts their lives (Freire, 1973). However, rhetoric and dialogue alone are not enough. For impact, educators must be transformative and take action (Freire, 1973).

In building on this idea, educators have a key responsibility in the context of education to understand the socio-political contexts of Māori (minority students in your context), whose experiences can be laced with multiple layers of historical complexities. For Māori learners in New Zealand, colonisation has impacted access to their language, culture and history in mainstream education. Being the first indigenous people to New Zealand the struggle for the reclamation of language, and culture whilst having the poorest statistics regarding justice, health, education and other determinants is a reality that must be addressed. As discussed in this paper, Māori students are more likely to receive disciplinary action, leading to exclusion and disengagement in education. Knowing, and being responsive to these statistics and this reality is foundational for the critically conscious, culturally responsive educator's toolkit.

The Toolkit of the Critically Conscious, Culturally Responsive Educator

A critically conscious educator is equipped with a cultural tool kit that enables them to evaluate their own teacher beliefs and pedagogical actions to support the inclusion of Māori learners. Using an acronym ‘keys’, this paper outlines four areas of the critically conscious and culturally responsive educator: 1) **Keeps Mindful**; 2) **Educates themselves**; 3) **Yearns to Understand** and 4) **Seeks Opportunities**.

Keeps Mindful

The critically conscious culturally responsive educator recognises the inequities in mainstream education for Māori as minority learners. A critically conscious educator will acknowledge the historical, social, and political impacts on Māori as minority learners in the mainstream education system. They recognise the importance of acknowledging that access to education can be filled with complexities for some Māori learners as historically systemic practices have been a tool of colonisation and a pathway to inequity. Critically conscious, culturally responsive teachers, therefore are mindful of these inequities and are responsive to reducing them in tangible ways to improve access for Māori learners. They can move beyond

stereotypical views of Māori and investigate and seek to understand the factors that lead to the exclusion of Māori learners in their schools.

Educates Themselves

Critically conscious, culturally responsive educators investigate what the research details and statistics reveal, which is the uneven playing field for Māori compared to non-Māori learners regarding educational achievement, inclusion and engagement. Critically conscious culturally responsive educators ask the hard questions that lead to inequities in the education system. They critically assess access, practices, policies and pedagogy. They check in regularly to see their responses in classrooms, collective responses in departments and overall school-wide practices. They look beyond the surface of behaviour to try and understand what led to a suspension, exclusion or expulsion. They collaborate with others in the school to address such issues which can lead to exclusion for Māori learners.

Yearsns to Understand

A role of the critically conscious and culturally responsive educator is to be self-aware about their own identity, worldview, identity, attitudes, beliefs, assumptions, and biases and how this impacts on their own pedagogical practice. By being aware of their own positionality, they can consider their own teacher beliefs and attitudes and whether they can impact positively or negatively on Māori as minority learners in their classrooms. In understanding themselves, they are better equipped to understand their Māori learners.

Seeks Opportunities

Critically conscious, culturally responsive educators provide culturally relevant learning and cultural contexts for Māori as minority learners. They challenge deep-seated notions about who decides what normal is and how do we determine whose knowledge counts. They recognise the value of mātauranga Māori (Māori knowledge), te reo Māori (the Māori language) and tikanga (cultural practices) to develop a secure cultural identity and so, they seek opportunities to include all of these aspects into their classroom and pedagogical practice. They move beyond Māori 'iconography' and upskill themselves to do their best to pronounce Māori words/names correctly and to create a culturally safe and responsive space where Māori learners see themselves reflected in the learning and the classroom (Webber & O'Connor, 2019, Cliffe-Tautari, 2020).

Conclusion

As mentioned at the beginning of this paper, Māori compared to non-Māori students, are overrepresented in the suspension, exclusion, and expulsion statistics. To create inclusive environments for Māori as minority learners, we need to ask ourselves how we know if what we do as teachers matters for Māori learners in our classroom. Although Māori students represent a small cohort in our mainstream schools, many remain silenced and on the fringes of the mainstream education system. The issues may be systemic and permeate the education system at all levels such as the policy, school, and classroom levels, however, accepting the statistics despite the complexities is not an option. Educators have the power to make a difference to these students and their trajectories through supporting the development of a positive cultural identity. Pūrākau as a pedagogical strategy is one way that Māori learners can connect with their culture. Supporting the development of a secure cultural identity must

therefore be a goal of educators. Critically conscious culturally responsive educators must therefore have the skills, knowledge and disposition to both access and draw on mātauranga Māori (Māori knowledge), te reo Māori (Māori language), culture and practices in their pedagogical practice to support the development of a positive Māori identity to acknowledge Māori ways of knowing as being just as important in education.

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Facilitating Brave Space Through Transformative Virtual Learning in and Beyond Post-secondary Academic Settings

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Abstract

In this paper, we reflect as a community on the significance of virtual learning and the need to foster the concept of brave space within academic environments. Focusing on the importance of flattening hierarchical constructs and respecting individuals' lived experiences to cultivate truly transformative learning, together we explore elements of creating an inclusive and collaborative setting where educators and learners can freely contribute their perspectives, driven by their own axiologies, ontologies, and theoretical frameworks, and are motivated by a deeper purpose in learning. By recognizing and challenging the conventional hierarchy prevalent in academia, we suggest, a more egalitarian learning environment can be promoted that values equity, diversity, inclusion, and decolonization with the incorporation of lived experiences. While virtual platforms sometimes render personal connections more arduous to achieve, through acknowledging diverse backgrounds, identities, and personal narratives, the learning community can create a richer, more transformative learning environment. In our experience, transformative learning opportunities promote personal growth, self-reflexivity, and the development of inclusive mindsets. Fostering transformative learning and a deeper engagement with knowledge encourages participants to connect their learning to real-world contexts. Through reflexive inquiry, we examine the role of inclusive pedagogical approaches, the promotion of dialogue and active listening, and the integration of diverse perspectives into approaches fostering brave spaces in transformative learning. Implementing such strategies allows the creation of a learning environment that values and nurtures transformative learning journeys, ultimately fostering a true brave space for personal and collective growth.

Keywords: Transformative Learning, Virtual Learning, Reflexivity

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Introduction

The authors of this paper met through an online class during the completion of graduate work. Since completing graduate studies, the authors have continued to extend each other's learning and academic and professional development. Through reflexive inquiry, particularly dialogic reflexivity (Sherman et al., 2023) and interdependent reflexivity (Case et al., 2023), we explore how teacher-learners in community can facilitate a space that encourages brave engagement with topics and each other through transformative virtual learning and how we continue to create an ongoing space of learning, collaboration, and professional and personal support. Each member of the learning community we created together takes a turn exploring an aspect of transformative virtual learning: including learner-learner relationships; holistic and integrated learning approaches; self-reflexivity; diversity, equity, and inclusion; and facilitating this learning process, and reflecting on the experience.

1. Transformative Learning and the Learner-Learner Relationship

Hanna Thu Huong Ha

Exploring transformative learning in adult education for me has meant embarking on a profound educational odyssey. In my academic journey, the transformative dimensions of learning within a virtual academic community deeply resonated with my personal experiences. As Mezirow (1991) elegantly outlined, transformative learning is not just about content assimilation. Mezirow's transformative learning theory emphasizes the role of meaning in perspectives in shaping how adults interpret and assimilate new experiences. It involves a profound shift in one's understanding and perception of the world. This approach, steeped in a deeply personal metamorphosis in perspective and attitude, resonates profoundly for me. Extending Mezirow's foundational concepts, Kroth and Cranton (2014) wove in the intricate threads of emotions, spirituality, and human connections. This enriched perspective bridges the individual and collective experiences in adult education, underscoring the necessity of addressing the learner's holistic self.

Navigating the Reflective Labyrinths of Learning

Freire's (2005) concept of critical reflection illuminates the importance of challenging the status quo. For Freire, transformative learning is deeply rooted in the liberation of the oppressed, asking learners to critically assess and challenge hegemonic ideologies. Freire's (2005) focus on challenging and re-evaluating traditional norms and systems resonated deeply with my evolving worldview. Similarly, my experiences within the virtual community required us, as learners, to reconsider and often dismantle pre-existing beliefs that no longer served our evolving identities. Lyle (2018) aptly complements this by highlighting the inward gaze of self-reflection. As I navigated the nuanced corridors of my thoughts, feelings, and experiences, I realized that transformative learning is akin to taking a mirror to one's soul, reflecting on the past to shape the future. Then there is Palmer's (1998) enriching perspective on intuitive and imaginative exploration; weaving together, the emotional, spiritual, and creative facets of our psyche.

Harvesting the Fruits of Transformative Endeavors

My journey was punctuated by myriad moments of revelation and transformation. These transformations, as Mezirow (1991) suggests, led to an evolved cognitive framework.

Engaging with diverse peers in the virtual learning community fostered an openness to multifaceted perspectives, encouraging the cultivation of a receptive mindset. Additionally, our acquired ability to discern subtle distinctions enhanced our decision-making prowess. We became adept at justifying our beliefs and decisions, grounding them in cogent evidence - a testament to our rigorous academic training and deep self-reflection.

The Heartbeat of Learning: Emotional Intersections

Fensie's (2023) insights resonate deeply with my experiences, which emphasize the emotional pulse driving adult learning. The virtual interactions with my peers transcended traditional academic discourse. The interactions were deeply emotional, anchored in a mutual quest for meaning and resonance. Every discussion or collaborative endeavor was an exploration of shared experiences, a confluence of diverse life trajectories in an academic context. As Fensie elucidates, these emotionally charged interactions transform traditional learning spaces into vibrant arenas of shared narratives. In this rich tapestry of experiences, every learner becomes both a teacher and a student (Kaasila et al., 2023), a duality I vividly experienced in our virtual learning community.

Ha Reflection

Collectively, these processes sparked developmental changes, which I, alongside my peers, experienced as cognitive and emotional metamorphoses. Reflecting on my academic journey, it is evident that my experiences have been deeply rooted in the transformative learning paradigm. As a member of the online learning community, my academic and personal encounters consistently echoed the transformative shifts described by esteemed scholars in the field.

As I grappled with novel ideas and paradigms, I could palpably feel the shifts in my own understanding and perspectives. These frames of reference, influenced by personal, cultural, and social factors, play a pivotal role in determining an individual's understanding and interaction with the world. As such, a shift in these perspectives signified a profound transformation in my worldview and pedagogical beliefs.

The intricate weave of emotions and human connections described by Kroth and Cranton (2014), whose narratives provided a window into the deeply personal stories of adult learners, mirrored my own evolving perceptions of self. As I delved deeper, taking personal inventories, reflecting on past experiences, and understanding the evolution of my beliefs and values became integral to my academic pursuits.

Engaging with Palmer's (1998) work on the inner journey of the adult learner added another layer to my understanding. His focus on tapping into the emotional and spiritual realms resonated profoundly with my own introspective voyages. Palmer's proposition that education should not be just about the accumulation of information, but a journey into the self, became a guiding philosophy for me.

Recognizing that our engagements were not just academic but were deeply emotional and laden with the search for meaning added a layer of authenticity to my academic interactions. I found myself forging deep bonds with my peers, where shared experiences and insights became potent catalysts for collective growth.

My journey through the transformative learning paradigm has been a profoundly enriching and enlightening experience. As I reflect on my trajectory, I am filled with gratitude for the invaluable lessons, connections, and personal growth. My experiences have not only shaped my academic stance but have also profoundly influenced my personal worldview, instilling in me a deep-seated belief in the transformative power of education.

2. Holistic and Integrated Learning Approaches

Marie-Audrey Simard

A holistic and integrated learning approach creates a transformational learning community. It intertwines cognitive, emotional, and social dimensions, fostering a learning environment that is informative and transformative. Mezirow (1991) expresses that meaningful teaching and learning opportunities for the learner are both connected to their past experiences. In essence, the approach paints a vivid picture of transformational learning landscapes, where the dual identities of teachers and learners intertwine in a dynamic dance of co-creation. Empowerment is crucial for both students and educators in both the learning environment and in the relationships they co-create. The hierarchy of traditional tertiary education should be viewed as responsibility in the sense that we each have different responsibilities, but we are collaborating on this learning journey and experiencing teaching moments from an educator and student perspective.

The Effects of Hierarchies and Positive Speech

To break down hierarchies in post-secondary education, it is important to address the microaggressions that are well and alive between scholars, departments, and students. Brewer and di Gennaro (2017) utilized the context of English literature studies and how many employ microaggressions when comparing themselves and their subjects, focus studies, and disciplinary differences. Microaggression creates levels of condescension expressed towards the field of study, knowledge, and even ideas. Hierarchical prejudice limits the facilitation of brave spaces as microaggressions are often not taken seriously by individuals in power, nor are consequences always visited upon those who commit them. It all comes down to the speech act (Brewer & di Gennaro, 2017), for the way we speak about a particular subject – wording, actions, tones, questioning – can cause or close divisions.

Simard Reflection

In our class, we were open, focused on motivating each other. Our professor learned alongside us and took in our perspectives. In our experience during our virtual sessions, we utilized positive speech acts that allowed no room for microaggressions or the feeling of judgment. We respected each other's beliefs, and if we did not agree with a specific comment or idea, we would question it positively through phrases such as: "Can you explain your idea further?" "How does it relate to your experience?" "I appreciate your point and respect your view; tell me more." In the end, this broke down the hierarchy of communications but also facilitated a positive space where we did not feel judged, disrespected or even in competition with one another. The self-reflexivity modeled by our professor created this experience as, even though we were not aware, she undermined traditional hierarchy by modelling positive speech acts. Her actions led to a more inviting and positive experience where we all felt a sense of belonging very early on in our virtual class setting. Including positive speech acts in

a virtual learning setting can support self-reflexivity, which is essential in building a safe space.

3. Self-Reflexivity

Rajesh Verma

It is interesting that we hear about creating safe spaces; however, Arao and Clemens (2013) argue that the notion of a “safe space” is problematic because it is impossible to completely remove risk from challenging discussions on controversial topics. They believe that claiming to create a “safe space” can be misleading and even counterproductive, and therefore, shifting to the concept of creating a “brave space” not only sets a tone for engagement but also encourages a particular mode of engagement. Brave space welcomes open dialogue and it recognizes the vulnerability of participants by actively listening and sharing responsibilities.

Educators need to practice self-reflexivity to create effective “brave space”. Self-reflexivity in teaching adults is a crucial aspect of effective teaching and facilitating adult learning experiences. When working with adult learners, educators must be attuned to their own teaching methods, attitudes, and behaviors to create a supportive and empowering learning environment. Cercone (2008) shares the key characteristics of adult learners and considerations for practicing self-reflexivity in teaching adults:

Awareness of Beliefs & Biases

Adult learners often come with diverse life experiences and perspectives. Teachers should be aware of their own beliefs, biases, and assumptions that might affect their interactions with adult students.

Reflecting on Teaching Strategies

Effective adult educators must continually reflect on their teaching methods. They consider what is working well and what might need some improvement.

Adaptability

Self-reflexivity involves recognizing the adjustments needed for lesson plans or teaching approaches to accommodate the varied learners.

Cultural Sensitivity

Educators need to be mindful of cultural differences and ensure that their teaching practices are culturally sensitive and inclusive.

Assessment & Evaluation

Self-reflexive educators must reflect on assessment methods and grading criteria to ensure they are fair and aligned with learning objectives. Also, they must consider whether their assessments accurately gauge adult learners’ understanding and skills.

Verma Reflection

The shift from the idea of a safe space to that of a brave space resonates with our own virtual classroom practice. Our Brave Space was an inclusive space where differences were (and are) welcome and we had to be brave because along the way we were going to be asked to be vulnerable. In essence, self-reflexivity in teaching adults involves a continuous process of self-awareness, adaptability, and improvement. It enhances the learning experience for adult students by creating a supportive and respectful educational environment that acknowledges their unique needs and backgrounds and diminishes any potential discrimination.

4. Diversity, Equity, and Inclusivity Within the Teacher-Learner Community

Peter K. Arcand

As Freire (2009) brilliantly stated, too much of what is described as learning is “Education [that] is suffering from narration sickness. . . . Words are emptied of their concreteness and become a hollow, alienated, and alienating verbosity” (p. 163). The pandemic changed the way education was being done for me, moving me to more virtual classrooms and alienating me from so many people for so long that I truly wanted to have an experience with people.

One of the key principles in transformative education is valuing diversity (Magee, 2017). Our diversity was through cultural backgrounds, gender, and age. Our recognition of our classmates’ diversity and their experiential learning slowly created a brave space and an ability to embrace vulnerability that made learning impactful. As we came together weekly to reflect on our course readings, I found myself intrigued during and after class about how we could engage with the same readings and have differing points of view. This critical thinking not only enhanced my desire to learn and understand the curriculum but also increased my critical thinking about my teaching and my impact on my students.

Mezirow believed that adults need to experience a disorienting dilemma, arguing that “thinking begins in what may be called a fork in the road, a situation which is ambiguous, which presents a dilemma, which proposes alternatives” (Fleming, 2018, p. 124). My frustration with education became my fork in the road. I wanted to get more out of my learning and had a hunger to challenge myself. As an educator, I found my students going through the motions in similar ways as I felt in my own learning journey previously. I encouraged them to learn to apply the curriculum to their lives and not to worry about the testing components. Many of them stated that it helped, which left me wondering why I was not applying my own advice as a learner myself. My new way of learning was going to change, and the opportunity presented itself in the course that developed the virtual community that has us here today. My focus became the application of the material I was learning. I wanted to hear my colleagues in their understanding of the curriculum and use not only my experiential learning but also to learn from their experiences.

Arcand Reflection

I began reflecting on what education meant to me and the more I thought about it the more I realized it needed to be more moving and rewarding. Celebrating diversity and inclusivity within the dynamics of our teacher-learner community was transformational for me because it changed the way I learn. I always believed that if I listened in class, read the material, and

studied that I would receive the marks that I deserved. Yet I found this learning approach to be unmotivating and did not apply any of the curriculum to my education or utilize the material for my students as an educator. As an educator I have always strived to make my classrooms inclusive. I have reflected and debated on this for years and thanks to my colleagues and our virtual learning, I now have an appreciation for the power of creating a brave space and believe meaningful inclusion in the classroom is a possibility. Overall, our virtual learning course that provided this opportunity for me today only increased my appreciation of my colleagues. It has allowed us to move beyond our virtual class and become part of each other's lives. We are now a community for learning in which we share our good times and support each other through our challenging times. None of this is possible in my opinion without this being modeled by classroom leadership. Our classroom leadership implicitly and explicitly highlighted the desire to see growth and development. As educators I believe that should be our goal.

5. Facilitating Transformative Virtual Learning

Joanie Crandall

As a professor seeking to shape a supportive and open online learning environment, my work is informed by equity, diversity, inclusivity, and decolonization - EDID (Yoon & Kerr, 2023). As much of my formative teaching and leadership experiences occurred in Indigenous communities - places occupied by the First Peoples, who include First Nations, Métis, and Inuit people, who live in what is now known as Canada - I work consciously to be a good ally and to walk my path in education in a good way. I often draw explicitly on the idea of *apooqmatultl'k jiksktuali'lk* or learning together by learning to listen to one another, as articulated by Mi'kmaw Elder Albert Marshall (2018), and the work of Donald (2021), who explained *wâhkôhtowin* as walking together in relationship. One of the ways I enact these concepts in the learning I facilitate is through modeling active listening and asking clarifying questions. I encourage learners to be self-reflexive in their engagement with the topics we discuss, and model and support extending their interpretations of texts and frameworks through dialogic reflexivity (Sherman et al., 2023) and interdependent reflexivity (Case et al., 2023). In effect, what I am seeking to create in the virtual space we share is a transformative space (Gunnlaugson et al., 2023), where learners are supported in being brave enough to engage with challenging topics and ideas. Because of my experiences with Indigenous learners and colleagues, my own approach is underpinned by the 7 Sacred Teachings as articulated in Anishinaabe culture: Truth, Humility, Respect, Bravery, Wisdom, Honesty, and Love (McMillan, 2023).

Crandall Reflection

In my experience, when the members of a learning community feel cared for and supported, they are willing to take brave steps forward together, knowing that their success depends on each other rather than being independent of it. As I reflect on how to replicate the successes this collection of learner-teachers created in supporting each other, I think of how reluctantly I came to virtual teaching, uncertain of how I could replicate the kinds of caring relationships I tried to foster previously in face-to-face learning environments. What I came to discover is that listening - visibly through online platforms or verbally through email check-ins - can occur in different ways and still be valuable. Sometimes, even offering listening through the written word in chat comments or text-based messages helped to create a space in which learners could see and engage in opportunities to be brave. As I close my reflection here, I

think how proud I am of each of the individuals who decided to create their own community of brave learner-teachers and how they inspire me to continue this work for, as Elder Albert Marshall (2018) has stated so powerfully, “We must share our stories and we must learn to listen to stories other than our own...our knowledges live in our stories” (p. 6).

Conclusions

As in the learning space together, we worked to be concise and to increase the space we created together to learn in dialogue. Here is where we would seek out overlap and points of mutual interest in our individual reflection and engage each other through dialogic reflexivity and interdependent reflexivity. The main findings of our collaborative reflective inquiry are that virtual learning environments are rendered more inclusive through the fostering of brave space and the conscious flattening of traditional hierarchical constructs. We believe that truly transformative learning must be cultivated through inclusive and collaborative approaches to equity, diversity, inclusion, and decolonization that recognize and make a place for lived experience. In our experience, transformative learning opportunities promote personal growth, self-reflexivity, and the development of inclusive mindsets. Fostering transformative learning and a deeper engagement with knowledge encourages participants to connect their learning to real-world contexts. The implications of our reflection here suggest that inclusive pedagogical approaches, promoting dialogue and active listening, and integrating diverse perspectives fosters brave spaces. Creating a learning environment that values and nurtures transformative individual learning journeys ultimately fosters a true brave space for both personal and collective growth.

The limitation of this work is that it occurred with mature learners with professional experience in a small online class context who chose to remain in contact well beyond graduation. This paper grew organically out of our reflections since our formal class time together, which did not fully capture the processes of community building that fascinated the group as we engaged in retrospective dialogue.

In our experience, transformative learning is dependent on building relationships, learner to learner and teacher to learner, through holistic and integrated learning approaches. Ensuring an environment of positive speech acts builds a space that is not just safe but encourages individual and collective bravery. Then teacher/learners-learner/teachers can engage in the depth of dialogic reflexivity and interdependent reflexivity needed to recognize the strengths diversity and inclusivity in the classroom brings to the process of building a lasting learning community.

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Ensuring Test Validity and Accountability in Omani Higher Education Institutions: Findings, Implications, and a Modified Framework

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Abstract

This qualitative study examines the roles, obstacles, and strategies employed by educators and policymakers in pursuit of test validity and accountability in Omani higher education. The study provides an insider's perspective on the process of test validation based on in-depth, semi-structured interviews with a small, diverse sample of exam committee members and policymakers. The findings highlight the central role of instructors in assuring the validity of tests, as well as the supporting roles of policymakers and exam committee members. The absence of comprehensive assessment literacy is identified as a significant challenge, prompting the proposal of a customized Accountability Interpretive Use Argument (IUA) framework. This revised IUA supports a collaborative, iterative validation process, highlighting the need for ongoing professional development in the assessment field and the recognition of expertise. While the study focuses on the Omani context, the proposed solutions may be applicable to other educational contexts with similar characteristics. The implications of the research contribute to the ongoing discussion about effective assessment practices in higher education, providing a foundation for future research on test validity and accountability.

Keywords: Test Validity, Interpretive Use Argument (IUA) Framework, Accountability

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1. Introduction

Classroom assessment (CA) is a crucial, systematic procedure that allows for the accumulation, analysis, and application of information regarding students learning. It seeks to disclose student capabilities and areas for refinement, monitor progress, designate grades, and facilitate communication with parents (McMillan, 2013, p. 4). The interdependence of language instruction, learning, and evaluation highlights the significance of evaluating students, a fundamental educator responsibility requiring specialized expertise and knowledge. According to multiple studies (Coombe, Vafadar, & Mohebbi, 2020; Latif & Wasim, 2022), the burgeoning field of assessment literacy encompasses these necessary skills and knowledge for designing and evaluating assessments.

Validity remains a crucial metric in assessment, with significant implications for decision-making processes such as course completion, student placement, and accurate diagnoses (Brown & Abeywickrama, 2010). In fact, since the 1960s, scholarly discourse on the validity of language testing and the development of models to operationalize the concept has gained momentum and continues to evolve (Lado, 1961; Cronbach, 1988; Messick, 1989; AERA, APA, & NCME, 1999; Chapelle, 1999; Kane, 2001; Embretson, 2007; Hovee, 2020).

Traditionally, validity is defined as the capacity of a test to measure its intended construct accurately (Heaton, 1975; Henning, 1987; Hughes, 1989). For example, when assessing reading comprehension, the valid test should evaluate the students' reading skills and not their background knowledge. Nonetheless, this definition of validity is more nuanced than it initially appears. Messick (1989) and Glass & Metternich (2020) argue that it is difficult to measure and assess competencies directly and precisely. Moreover, Chapelle (2021) argues that validity is not inherent but rather depends on the expertise of professionals. This demonstrates the need for professionals to establish a shared comprehension of validity, continuously revise these definitions, and assume responsibility for attaining validity and accountability in assessment.

In the realm of higher education in Oman, accountability, symbolizing quality assurance and accreditation, is essential to education policy. Assessment has come to be associated with accountability, which has become associated with the quality of education because of the significant role test results play in determining the quality of outcomes (Smith, 2016). The quality of education is mandated by the Oman Authority for Academic Accreditation and Quality Assurance of Education (OAAAQA), which was established by Royal Decree No. 9/202. This authority employs quality indicators that align with Higher Education Institution (HEI) and program standards. This study specifically meets criterion 2.8 regarding "Assessment Methods, Standards, and Moderation," as outlined in the OAAAQA's Institutional Standards Assessment Manual. In order to fulfill this criterion, the Higher Education Institution (HEI) possesses efficient mechanisms to guarantee the rigorous implementation of assessment procedures, thereby ensuring the validity, reliability, and effectiveness of assessments in upholding academic standards.

Despite the exhaustive description of this criterion, the responsibility for ensuring rigorous assessment procedures varies across Oman's higher education institutions. Notably, the quality of each standard in HEIs is made accessible to the public prior to being archived on the website (<https://oaaaqa.gov.om/>). The outcomes range from 3 to 0, with a value of 0 indicating that the institution does not meet the specified criterion. The aforementioned website provides a total of twenty-six reports on various institutions of higher education. The

results indicate that one institution did not meet the criteria, six institutions partially met the criteria, 18 institutions met the criteria, and one institution received the highest score of 3. The selection of institutions for this study is based on an analysis of these reports, specifically those with a score of 2 (2 out of 3). This investigation centers on a comprehensive examination of assessment accountability in Oman's higher education institutions.

This study seeks to investigate and comprehend the processes and strategies employed by exam committee members and policymakers in Oman's higher education institutions in order to ensure test validity and accountability. Specifically, this research intends to:

- 1) Investigate how exam committee members in Oman's higher education institutions ensure test validity;
- 2) Determine how policymakers assure accountability and evaluate the validity of these institutions;
- 3) Apply and refine the Interpretive Use Argument (IUA) framework for Accountability within the Omani context.

This research is an exhaustive examination of the validation process and accountability mechanisms in Omani higher education institutions with the intent of proposing a modified IUA framework that improves these processes. Understanding the practices, challenges, and shared understanding of validity among the main stakeholders is emphasized. This research not only contributes to the Omani context, but also to the larger literature on test validity and accountability in higher education.

2. Literature Review

Extensive research has been conducted on the multidimensional concept of validity, eliciting a variety of perspectives and numerous validation methodologies (Brown & Abeywickrama, 2010). In lieu of a dichotomous classification (valid/invalid), validity is viewed as a continuum (Messick, 1989; Reeves & Marbach-Ad, 2016), encouraging researchers to consider the extent to which a test is valid. Importantly, validity is not inherent to a test; rather, it refers to the use of a test for a particular purpose (Sireci, 2007). This perspective suggests that the validity of the same test may vary depending on its intended application. Consequently, understanding validity entails determining whether the correlation between intended and accomplished knowledge justifies the use of measurement for decision-making (Hughes, 2018).

Brown and Abeywickram (2010) emphasize the diversity of the evidence supporting validity, which has led to the identification of various categories of validity. Face validity, for example, refers to the appropriateness of a test for examiners and test-takers, whereas content validity ensures that the test accurately reflects the curriculum on which it is founded. Criterion validity, subdivided into concurrent validity and predictive validity, requires statistical analysis of student scores (Cronbach & Meeh, 1955; Davies, 1968). Construct validity refers to a test with a valid rationale founded on theories. Modern validity theories, however, tend toward a unitary validity concept, rendering it unnecessary to provide evidence for each category of validity (Reeves & Marbach-Ad, 2016).

Carlsen and Rocca (2021) argue that traditional methods for validating abstract constructs may not be accurate. They propose divorcing validity from whether or not the test measures the construct and concentrating more on whether test developers or test users are able to construct a convincing argument for their use. Consequently, a test's validity depends on its

intended use (AERA et al., 1999, cited in Sireci & Faulkner-Bond, 2014) and should not be deemed valid or invalid in and of itself.

Existing literature has a tendency to emphasize psychometric characteristics, reliability, and traditional test validity while disregarding stakeholder input (Im, Shin, & Cheng, 2019). Consequently, traditional quantitative methodologies predominate in validity research (Liskinasih, 2016; Hashemi & Daneshfar, 2018; Furwana, 2019). However, Bonner and Chen (2019) caution that research findings on validity may not be entirely applicable to classroom assessments due to their specific requirements.

Several frameworks for validation have emerged to elucidate the concept of validity and establish systematic validation methods. Notable approaches to testing validity include Argument-Based Validity (ABV) by Kane (2006, 2013, 2017), the Integrated Framework for Construct Validity by Embreston (2007, 2008, 2017), and the recently developed Accountability Interpretive Use Argument (IUA) validity framework by Hovee (2022). Hovee's IUA framework, designed with the American context in mind, requires further examination of its applicability in other contexts, such as higher education in Oman, to assure robust, systematic procedures (Hovee, 2022).

Research employing qualitative methodologies to investigate validity emphasized validity from multiple perspectives. Some studies focused either on the perspectives of test takers (e.g., Cheng & DeLuca, 2011; Sato & Ikeda, 2015; Zhan & Wan, 2016; and Hamid, Hardy, & Reyes, 2019) or test designers (e.g., So, 2014; Buckley-Walker & Lipscombe, 2022; and Al Lawati, 2023), as well as the scrutiny carried out by researchers (e.g. Al Fraidan, 2019; and Bax and Chan, 2019). The perceptions of exam committee members, who play vital roles in ensuring test validity, are rarely addressed in these studies. In addition, studies examining the practices of these stakeholders in Omani higher education institutions are uncommon. Some studies focused on a type of validity (face validity like in the studies of Tsagari, 2014, and Sato and Ikeda, 2015; consequential validity like in the study of Saglam and Tsagari, 2022; construct validity like in the studies of Xie, 2011; Sun, Wan, and Kim, 2022; criterion validity like in the study of Clemente et al., 2022); or different types of validity (e.g., Pellegrino, DiBello & Goldman, 2016; Runalika et al., 2023). Some studies used a particular test validity framework. Al-Buraiki's (2020), for example, study employs Weir's socio-cognitive framework, which was developed in 2005, to analyze the overall validation procedure of the reading questions in the Oman General Education Diploma of English Language Test (GEDELT) for the academic year 2016–2017 using a checklist and document analysis. Weir (2005) delineated five distinct categories of validity, namely: context validity, theory-based validity, scoring validity, consequential validity, and criterion-related validity. Several other studies have incorporated widely recognized and significant contributions towards establishing validity, without adhering to a particular framework. For example, Buckley-Walker and Lipscombe (2022) argue that instructors' assessment processes must be thoroughly examined before analyzing classroom assessment. The educators engaged in discourse that centered on overarching concepts that contribute to the establishment of validity, which include: (1) alignment with curriculum and instruction, (2) catering for student abilities, (3) the scoring rubric; and (4) using CA data to meet students' needs.

Chapelle (2012) argued that the notion of validity as an argument places significant emphasis on the involvement of the socio-academic community. *“if validity entails demonstrating the meaning of test scores and justifying their use, the issues are how one goes about doing this and who is responsible for getting it done. In other words, what are the rules of the validity*

game?” (p. 21). Chapelle and Lee (2021) present an extensive overview of argument-based validation in the context of language testing. They examine the fundamental elements of a validity argument and explore various factors that may pose a risk to validity, along with strategies to mitigate them. Bai (2020) argues that validity studies in the domain of language testing should take into account the complex and evaluative relationships between factors such as test takers' motivation to learn, their attitudes toward test use, and other test-related elements in relation to their test performance in order to assist test users and other interested parties in making equitable decisions based on test scores, promoting positive outcomes, and ensuring test accountability. That is to say, one of the fundamental elements of test validity, that is directly related to this study, is the multi-part argument about the interpretation and use of the test scores.

2.1. Accountability Interpretation and Use Argument (IUA) Validity Framework (Hoeve, 2022)

Hoeve's framework provides valuable contributions and practical implications for test validation, rectifying a deficiency in Embreston's framework, which disregards the significance of aggregate scores and their implications for the accountability system. As outlined by Hoeve, the IUA framework provides a standard procedure for authenticating tests, beginning with the identification of the intended interpretation and applications of the test and test scores. This emphasizes the significance of contemplating the test's intended purposes and applications during the design phase. The validity of inferences and actions based on test scores should be adequately supported by identifying the evidence required to support these interpretations.

Significantly, the IUA framework acknowledges the accountability system's function in test validation. It suggests collecting evidence for both student-centered and group-centered factors to support the validity of conclusions drawn from accountability indicator data. This indicates that the framework recognizes the importance of both individual and aggregate scores and emphasizes the need for test developers and policymakers to collaborate.

The IUA framework promotes stakeholder collaboration by integrating the accountability system into the validation procedure. This ensures that testing needs and objectives are aligned, resulting in a more consistent and locally pertinent interpretation of test validity, especially in the context of higher education in the Sultanate of Oman.

The integration of Hoeve's Accountability Interpretive Use Argument (IUA) validity framework provides additional insights into resolving the shortcomings of existing models and highlights the need to consider both individual and aggregate scores within the accountability system. This collaborative approach between test developers and policymakers can lead to a more robust and contextually relevant interpretation of test validity.

As Moss (2013) suggests, it is essential to evaluate the framework's applicability in real-world settings. Different stakeholders may have diverse data requirements and interpretations of test validity, which should be addressed in a transparent manner during the validation process. Effective implementation of the IUA framework and attainment of a shared understanding of test validity require policymakers, test developers, and instructors to have a shared understanding of test validity.

In this research, the perspectives of policymakers and instructors will be explored to determine the best methods to implement Hoeve's framework in practice. The purpose of this study is to contribute to the practical application of the IUA framework and its congruence with the context of Omani higher education by examining their perspectives and experiences. This research will cast light on the framework's strengths and weaknesses and provide recommendations for its successful implementation in the field of language assessment in Oman.

3. Methodology

In order to better understand how exam committee members and policymakers in Oman's higher education institutions actually ensure test validity and accountability, the current study employs a qualitative case study approach using semi-structured interviews. The researcher made the decision to use this method of data collection as the qualitative method is better used for comprehending social phenomena like people's views, beliefs, experiences, attitudes, behavior, and interactions, as well as for viewing the data more extensively (Banister et al., 1994; Pathak, Jena, & Kalra, 2013). Thematic analysis was used to identify patterns and themes from the elicited data (Braun & Clark, 2006) in a pragmatic and reflexive manner whilst placing the needs of the local context at the heart of the research (Braun, Clark & Hayfield, 2022).

3.1. Study Design and Participants

This study selected participants from four universities in Oman, including both public and private institutions, to ensure a diverse sample. From the cohort, fifteen individuals were chosen, including ten members of the examination committee and five policymakers. The selected universities all received a score of 2 on criterion 2.8 (Assessment Methods, Standards, and Moderation), ensuring a consistent foundation for handling sensitive data. This diversified yet interrelated participation will facilitate a comprehensive understanding of assessment procedures and cast light on the practices of test validity and accountability within the Omani higher education framework.

Purposeful sampling was used to identify individuals directly involved in shaping the design and validation of teachers' tests and making important decisions based on test scores. In light of the limited number of exam committee members and policymakers within these institutions, fifteen was regarded as a sufficient sample size for attaining data saturation in this context. This is consistent with the opinion of researchers like Bertaux (1981), who contend that fifteen participants are sufficient for qualitative research studies. It is essential to observe that the members of the examination committee also teach at their respective institutions.

The responsibilities of participants within their respective institutions have a significant impact on the assessment procedure. Exam committee members, who are also instructors, perform essential academic and assessment duties that are only stated within the institution and are not generalized to all institutions. Their primary responsibility is to evaluate and approve mid-semester and final examinations administered by instructors.

On the other hand, the policymakers, as members of the institution's council, are responsible for approving students' evaluations after department councils have given their approval. The diverse yet interdependent roles of these participants guarantee a comprehensive

comprehension of the assessment procedures, casting light on the practices of test validity and accountability in these Omani higher education institutions.

3.2. Data Collection

This qualitative investigation was based on a methodology of semi-structured interviews. The interview questions were derived from Hoeve's (2022) Accountability IUA validity framework, ensuring a solid and trustworthy foundation for the interviews. These queries were then divided into two categories: one for evaluation committee members and one for policymakers. The interviews were conducted online via Zoom and lasted between 40 and 50 minutes, providing a comprehensive look at the experiences and perspectives of the participants.

The interviews were digitally recorded and then transcribed using Otter.ai, an online transcription service, which assisted in converting the spoken words into text and thereby facilitated data analysis. This process was conducted over the course of three months, yielding a large corpus of data for subsequent analysis.

3.3. Data Analysis

NVivo, software for qualitative data analysis, was utilized for the data analysis. Utilizing Braun & Clarke's (2006) six-step procedure, a systematic and exhaustive analysis of the data was conducted. This process began with acquainting oneself with the data, was followed by initial classification, the search for themes, the review of themes, the definition and naming of themes, and ultimately the production of the report.

The initial phase of coding consisted of perusing through the transcripts and labeling significant sections with pertinent codes. Based on their similarities, the codes were then categorized into potential themes. These potential themes were evaluated, refined, and renamed to reflect their underlying concept.

NVivo was used for categorizing and identifying themes, and the entire process was routinely double-checked for consistency and accuracy. This process of double-checking ensured the accuracy of the analysis and enhanced the credibility of the research findings.

4. Results

The analysis of the interviews with members of the examination committees and policymakers at Oman's universities has yielded a number of significant findings regarding the approach to testing validity and accountability in these institutions. Five major themes emerged from the data, each revealing significant aspects of the current assessment landscape.

4.1. Assessment Literacy

The first important conclusion concerns the significance of assessment literacy. All participants highlighted the significance of instructors' ability to devise legitimate assessments and accurately interpret test results. According to one participant, "*.. a teacher may have a PhD in linguistics, but that doesn't mean that that teacher knows much about education... We presuppose that everybody who teaches in universities is a teacher, that's not*

correct. Very few teachers in education are actually teachers..." (Participant S). Another example is *".. somebody may have a PhD in education, but if that person doesn't have a PhD in assessment or a PhD in curriculum, it doesn't mean that that person understands how the curriculum works. It doesn't mean that I don't want to say that the person is a bad teacher or something as the person may be the best in the college"* (Participant Q). The comments highlighted the distinction between academic knowledge and pedagogical and assessment expertise. This understanding was shared by all participants, indicating a shared belief in the need for assessment-specific training or professional development. Regarding writing on a test blueprint, which makes it easier to match different skills with the course material and the right type of evaluation, which increases its validity (Patil, et. al., 2015; Raymond & Grande, 2019), all exam committee members mentioned that when they receive exams to be reviewed, they are not attached with blueprints or any certain details like objectives and question types. M. mentioned that *" teachers only bear these details in mind when designing their exams"*. That is due to the lack of guidelines from exam committee members themselves and policymakers to attach blueprints along with exams for reviewing, as stated by one of the exam committee members, *"We can review only what they give us."*

4.2. Professional Development in Assessment

A second major theme was the significance of professional development in assessment. Participants suggested that instructors would benefit from seminars that facilitate discussions on curriculum development, assessment, and other crucial issues. For instance, one participant stated, *"...I believe we should hold seminars that include curriculum-related dialogues about how to plan and evaluate courses. We should not assume that everyone knows this"* (Participant S).

4.3. Teacher Autonomy

Regarding teacher autonomy, a third main motif emerged. Teachers at these universities resisted external evaluation or review of their evaluations, citing the uniqueness of their courses and their specialized knowledge. For instance, one participant stated, *"We are problematic people, we do not like to follow instructions, and teachers do not follow instructions. And we will always respond affirmatively, but my course is unique. This is my coursework"* (Participant M). Another quotation by one participant is *"We are difficult people, teachers, so it's I don't feel comfortable sometimes telling each teacher as a teacher. I find that your exam is too one-sided. Because we don't have rules. So for example, in, we I sent, I sent a couple of times a model, using Bloom's Taxonomy and allotting the marks in line with Bloom's Taxonomy, only 10% from memory, maybe 20% for application, blah, blah, blah, blah. So, if we did this, only very few students would have an A, which would be the normal situation, only a student that has met the whole has gone up the ladder of Bloom's Taxonomy should get A"*. This finding suggests a potential barrier to the institution-wide implementation of standardized practices to ensure test validity.

4.4. Teacher Collaboration

However, the fourth finding revealed that a substantial quantity of teacher collaboration is occurring. One participant explained that instructors of the same course collaborate in the test creation process: *"We have a coordinator for the course, so I was the coordinator last term, and we sit together and put together the exam. And we ensure we are aligned with the learning outcomes at the same level as the students."* (Participant M).

4.5. Institutional Framework for Assessment

The need for an institutional framework was the fifth recurring motif. Participants emphasized the significance of a precise, well-communicated set of assessment guidelines or frameworks. They believed that the current practice was less formal and lacked specific directives: *"We are simply managing the situation." Therefore, I continue to assert that we require an institutional framework. That is evident. It must originate from the bottom up, from us through consultation, and also from experts. This is then the framework, which we adhere to"* (Participant F).

The interviews revealed that teachers play a crucial role in policymaking, which is an intriguing finding given that this is traditionally the responsibility of administrators and policymakers. One policymaker participant stated, *"We refer to the teacher's work/test if we suspect that the students' grades are uniform."* The data revealed that instructors have considerable control over their assessments, suggesting that they play a larger role than previously believed in ensuring test validity and accountability.

These results disclose a complex picture of test validity and accountability in universities in Oman. While there are challenges associated with assessment literacy, professional development requirements, and institutional guidelines, there is evidence of effective collaboration among teachers, and teachers play a significant role in policy-making. Future efforts to enhance practices in these areas should take these aspects into consideration.

5. Discussion

This discussion sheds light on the answers to the research concerns, illuminating how exam committee members and policymakers ensure test validity and accountability.

5.1. Ensuring Test Validity: Exam Committee Members' Perspective

The findings indicate that exam committee members encounter substantial obstacles in ensuring test validity due to a variety of factors. First and foremost, the data indicate that not all instructors possess the pedagogical expertise required to design valid and reliable assessments, corroborating the results of previous research (Stiggins, 2004; Xu & Brown, 2017). Members of the examination committee appeared to perceive this difficulty and express the need for additional assessment literacy training and seminars.

In addition, examination committee members appeared to grapple with teachers' resistance to having their assessments reviewed, which is consistent with findings from a larger body of research on professional autonomy and resistance in education (Ingersoll, 2006). This opposition appears to hinder the examination committee's ability to assure the validity of institution-wide assessments.

Nonetheless, it was also discovered that exam committee members and instructors engage in some collaborative processes when constructing exams. This is encouraging and in line with research (Voogt, Pieters, & Handelzalts, 2016) highlighting the benefits of teacher collaboration in devising assessments. That might be related to the different terms held by different people, "reviewing from the exam committee" and "discussing from other teachers".

5.2. Ensuring Test Validity and Accountability: Policymakers' Perspective

The role of policymakers in ensuring test validity appears less clear-cut. The data indicate that policymakers rely significantly on teachers and examination committee members, suggesting a lack of active participation in the validation process. They appeared to be more involved in problem-solving and data collection for quality assurance.

Their reliance on instructors and examination committees may be indicative of systemic deficiencies. Policymakers have expressed the need for additional training to better support instructors and stakeholders in the assessment process, indicating that they may be unprepared to carry out their responsibility of ensuring test validity.

In accordance with research on teacher leadership (York-Barr and Duke, 2004; Danielson, 2007), it has been observed that teachers play a central role in shaping test validity policies. Even though this finding is encouraging, there is cause for concern if teachers lack the assessment literacy required to make informed decisions about test design and validity.

5.3. Proposed Interpretive Use Argument (IUA) Framework for Accountability

This study proposes an Accountability Interpretive Use Argument (IUA) framework specific to the Omani context in order to resolve these challenges and improve the assessment procedure. This framework recognizes the central role of instructors in ensuring test validity, the supporting roles of policymakers and exam committee members, and the critical need for ongoing professional development in the assessment field. The IUA framework encourages an iterative validation process initiated by teachers and supported by policymakers and exam committee members, with a focus on effective communication and collaboration to ensure valid assessments and accountability.

Implementing the IUA framework could potentially improve the administration of accountability and test validity in Oman's higher education system. It could cultivate a culture of accountability that respects disciplinary norms and local customs, thereby encouraging continuous progress. Future research should seek to validate and alter this framework for use in a variety of educational settings.

This study examines the extant obstacles and possible solutions for ensuring test validity and accountability in Oman's higher education institutions. By addressing these challenges and implementing the proposed framework, institutions will be able to improve the validity of assessments, cultivate stakeholder collaboration, and promote effective assessment practices that are aligned with global standards. This study contributes to the field of educational assessment in Oman and possibly beyond by providing valuable insights and proposing a context-specific assessment framework.

6. Pedagogical Implications

The findings of this study and the existing literature suggest a number of universally applicable, yet Omani-specific pedagogical implications:

1. The critical role of teachers in test design and ensuring validity necessitates an in-depth understanding of assessment procedures (Sultana, 2019; Stiggins, 2004). Therefore, emphasis should be placed on introducing professional development programs geared toward enhancing the assessment literacy of teachers.

2. Given policymakers' critical role in ensuring test validity and accountability, their participation in initiatives to improve assessment literacy is essential. Their participation can contribute to the validation of test design and scoring procedures, as well as cultivate a nuanced comprehension of the complexities of test validity and accountability.
3. Validation and accountability procedures require effective communication and collaboration between instructors, exam committee members, and policymakers. This research demonstrates that a lack of precise guidelines and communication hinders the validation process. These issues can be mitigated by adopting a systematic validation approach in which responsibilities are clearly defined and understood.
4. Encouraging Parallel Validation Processes: Although instructors frequently use their own validation methods, a parallel, collective validation process should be encouraged to maintain consistency in assessment criteria without compromising individual autonomy.
5. Iterative IUA Validity Framework Implementation: According to Hoeve (2022), the Accountability Interpretive Use Argument (IUA) validity framework should be iterative. Teachers should initiate the validation procedure, and the process should include a continuous feedback cycle. Policymakers should validate the process before delineating the consequences, whereas evaluators can validate in the opposite direction, with the two groups meeting in the middle to determine the consequences.

These implications, which resolve the identified challenges in the Omani context, can have far-reaching benefits in the field of education. When instituting adjustments to pedagogical practices, it is essential to take into account the specific context and requirements of educational institutions.

7. Conclusion

This study illuminates the crucial role instructors play in ensuring test validity and accountability in Oman's higher education sector. In addition, it emphasizes the need for knowledgeable and well-prepared policymakers who can guide the process in collaboration with instructors and exam committee members. The proposed modified Accountability Interpretive Use Argument (IUA) framework provides an innovative strategy for promoting knowledge exchange, nurturing consensus, and augmenting assessment validity in Oman's higher education sector.

The fluid nature of validity, which is a dynamic process requiring the active participation of various stakeholders, is a key finding of this study. The active involvement of instructors as evaluators and policymakers as validators is essential for optimal test validity. In addition, the validation process should be conceptualized as a collaborative, two-way endeavor in which decisions and repercussions are deliberated upon after extensive consultation.

Based on these findings, this study advocates for instructors, exam committee members, and policymakers to participate in assessment practices-centered seminars. Such seminars could promote enhanced comprehension, stimulate validation practices, and promote assessment uniformity. As Chapelle (2021) suggests, it is possible to cultivate a culture of test validity

that adheres to disciplinary standards, regional traditions, and the philosophy of continuous improvement.

The study also suggests the introduction of assessment qualification certificates as a means of recognizing the proficiency of those involved in the process of test validation. In accordance with Oman's Vision 2040, such recognition could further professionalize the education sector by highlighting essential pedagogical competencies.

Although the context of this study was uniquely Omani and the sample size was relatively small, it provides the groundwork for future research in other contexts. Additional research could substantiate the applicability and adaptability of the Accountability Interpretive Use Argument (IUA) framework across diverse educational environments and geographies.

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Abbreviations:

ABV: Argument-Based Validity approach

CA: Classroom assessment

HEIs: Higher Educational Institutions

HoD: Head of Department

IUA: Accountability Interpretive Use Argument

OAAAQA: Oman Authority for Academic Accreditation and Quality Assurance of Education

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Development of Tools to Support the Creation of Programming Test Questions

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Abstract

The purpose of this research is to support the creation of programming test questions. Source code, class diagrams, specification tables and execution results are often used in programming test questions. In this case, these are related. Therefore, when these are created, the contents must match. However, when correcting a part, it is easy to make mistakes such as forgetting to correct. Therefore, we try to solve it by describing the information of the test questions in the answer source code. This paragraph describes programming test question creation support tools. This research targets Java language programs. First decide on the subject of the test question. Next, create the source code for the answer and write the test questions and specifications in Javadoc. Finally, run the tools. The tools automatically create class diagrams, specification tables, and execution results from the source code for the answer. In addition, these contents are combined into one and output as a PDF. The software used in this tool is Java, JavaParser, and LaTeX. The LaTeX macros "listings" and "pgf-umlcd" were also used. JavaParser analyzes the source code. The analysis result is converted to a class diagram in pgf-umlcd format. Javadoc method comments are converted to specification tables. Javadoc class comments are converted to LaTeX-style test question text. The developed tools made it possible to output programming test questions in PDF format. The test questions consist only of the source code with Javadoc.

Keywords: Programming Education, Source Code, Programming Practice Support System

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Introduction

In recent years, the demand for programming education has been increasing. At primary educational institutions, education is provided to develop "programming thinking skills." In middle and higher education institutions, education on problem solving through programming is provided. From 2022, programming education will be compulsory in high schools. In universities, programming education has begun as part of general education.

In information science departments, there are many subjects for programming education. Information science students aim to become programmers or software engineers. Programming experience and programming skills are also required. Programming courses often include not only lectures but also practical training. In programming practice, it is effective for the instructor to provide appropriate guidance depending on the learner's level of proficiency and the progress of the task. However, when there are many learners, desk-based instruction alone is insufficient. Therefore, various programming practice support systems have been proposed (Azuma, H., et al., 2020; Zaffalon, F., et al., 2022). Also, regarding the test questions used in the practice, it is considered effective to tailor the questions to the learners. Systems based on item response theory have been proposed for some time. Such a system requires test questions of various difficulty levels.

In this research, we support the creation of test questions in a programming exercise support system. The target test questions are descriptive.

When creating programming test questions, source code, class diagrams, specification tables, and execution results are often used. In this case these are related. Therefore, when creating these, it is necessary to match the contents. However, when making partial corrections, it is easy to make mistakes such as forgetting to make corrections. Therefore, we will try to solve this problem by writing the test question information in the answer source code.

This paper describes a method for supporting test question creation and its results.

Overview of Programming Practice Support System

The programming practice support system is shown in Figure 1. This system consists of creating test questions, testing, evaluation, feedback, creating practice questions, and practice. The test confirms the learner's level of proficiency. In evaluation, learners' answers are scored. The evaluation results are feedback to the learner. When creating practice assignments, explanations and assignments are created according to the learning level of the learner. Learners solve practice tasks and submit them for evaluation. By repeating these exercises, learners' understanding of programming will be improved.

Previously, the authors attempted to automate grading and feedback to support learners' practice (Takano, T., et al., 2023).

This paper describes the creation of test questions.

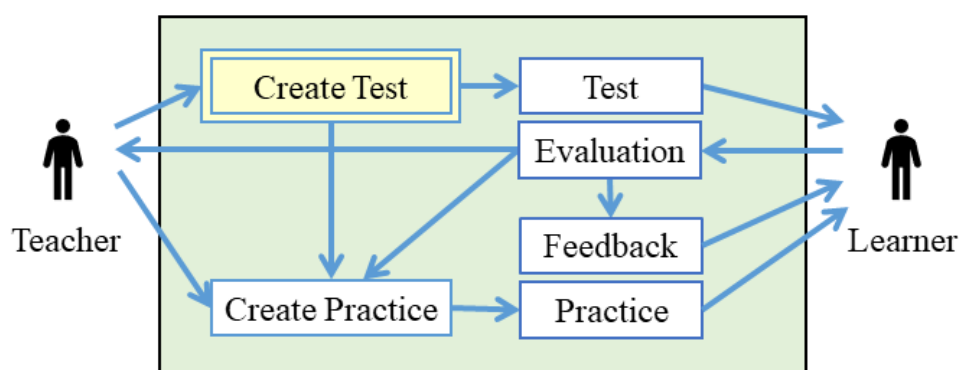


Figure 1: Overview of programming practice support system.

Creating Programming Test Questions

The target programming test question is to write a program from a specification. In the proposed test question creation method, test question information is written in the source code. The reason is to centrally manage test questions and source code. Then, it generates a class diagram, specification table, and execution results from the source code.

Previously, when including class diagrams in test questions, the source code and class diagrams were created separately. Therefore, when modifying a test question, it was necessary to modify both the source code and the class diagram.

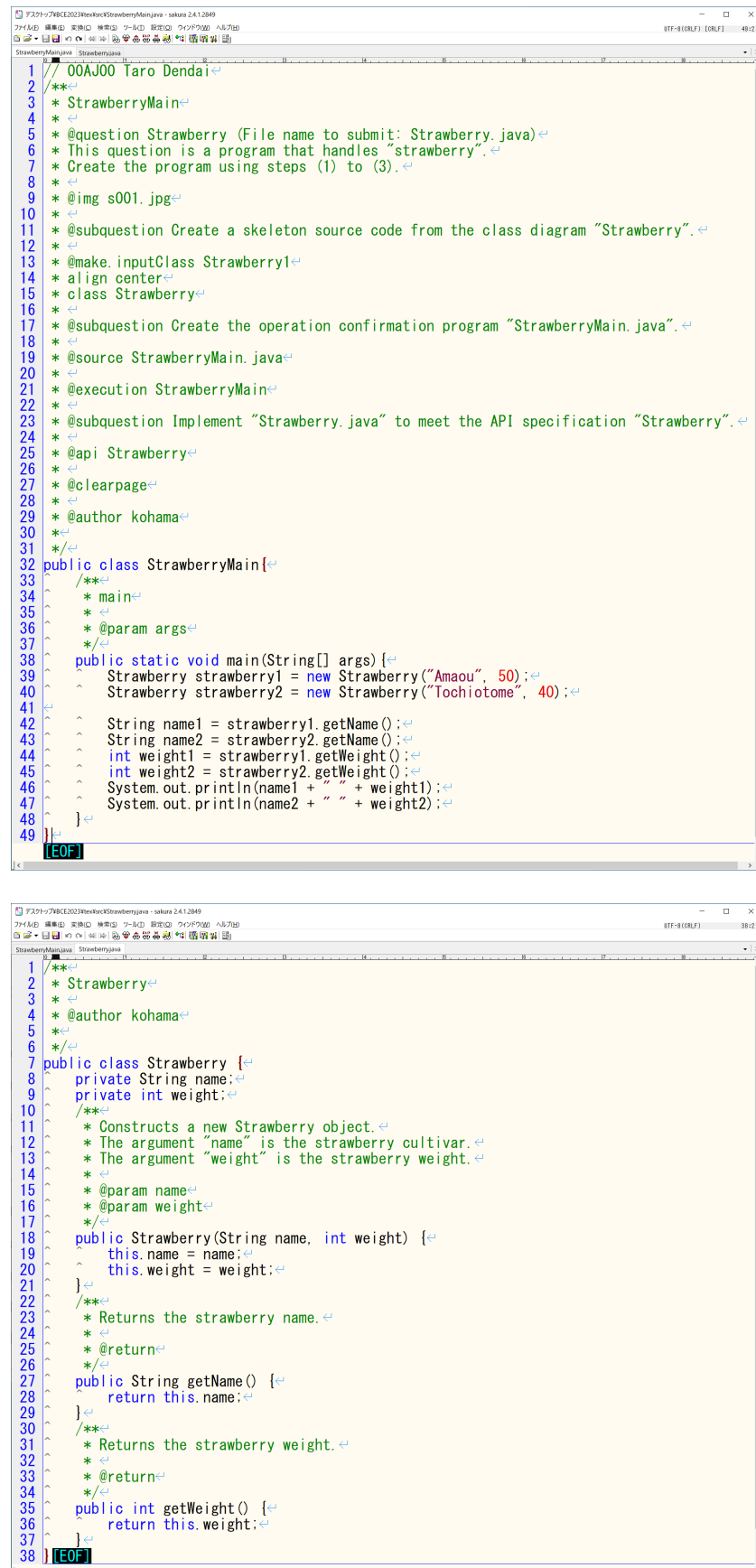
The proposed method maintains the consistency of the source code, class diagram, specification table, and execution results. The text of the test question is written in a comment in the source code. At this time, attributes are added to the comment by using "tags." This attribute makes it possible to specify test question headings, class diagrams, etc.

The advantage of the proposed method is that test questions can be created using only text. Also, since information about test questions is written in comments, the source code can be compiled and executed.

How to Use the Tools

This section describes how to use the tools. First, decide on the subject of the test question. Next, create the source code for the answer and write the test questions and specifications in comments. An example of the source code is shown in Figure 2. Finally, run the tool.

The tool automatically creates class diagrams, specification tables, and execution results from the source code. Then, the contents are combined into one and a PDF file is output. Figure 3 shows an example of the generated PDF.



The figure consists of two screenshots of a Java IDE window titled 'デスクリップボード20230506\StrawberryMain.java - sakura 2.4.1.2849'. The top screenshot shows the 'StrawberryMain.java' file with the following code:

```

1 // 00AJ00 Taro Dendai
2 /**
3  * StrawberryMain
4  *
5  * @question Strawberry (File name to submit: Strawberry.java)
6  * This question is a program that handles "strawberry".
7  * Create the program using steps (1) to (3).
8  *
9  * @img s001.jpg
10 *
11 * @subquestion Create a skeleton source code from the class diagram "Strawberry".
12 *
13 * @make.inputClass Strawberry1
14 * align center
15 * class Strawberry
16 *
17 * @subquestion Create the operation confirmation program "StrawberryMain.java".
18 *
19 * @source StrawberryMain.java
20 *
21 * @execution StrawberryMain
22 *
23 * @subquestion Implement "Strawberry.java" to meet the API specification "Strawberry".
24 *
25 * @api Strawberry
26 *
27 * @clearpage
28 *
29 * @author kohama
30 */
31
32 public class StrawberryMain{
33     /**
34      * main
35      *
36      * @param args
37      */
38     public static void main(String[] args){
39         Strawberry strawberry1 = new Strawberry("Amaou", 50);
40         Strawberry strawberry2 = new Strawberry("Tochiotome", 40);
41
42         String name1 = strawberry1.getName();
43         String name2 = strawberry2.getName();
44         int weight1 = strawberry1.getWeight();
45         int weight2 = strawberry2.getWeight();
46         System.out.println(name1 + " " + weight1);
47         System.out.println(name2 + " " + weight2);
48     }
49 }

```

The bottom screenshot shows the 'Strawberry.java' file with the following code:

```

1 /**
2  * Strawberry
3  *
4  * @author kohama
5  *
6  */
7 public class Strawberry {
8     private String name;
9     private int weight;
10
11     /**
12      * Constructs a new Strawberry object.
13      * The argument "name" is the strawberry cultivar.
14      * The argument "weight" is the strawberry weight.
15      *
16      * @param name
17      * @param weight
18      */
19     public Strawberry(String name, int weight) {
20         this.name = name;
21         this.weight = weight;
22     }
23
24     /**
25      * Returns the strawberry name.
26      *
27      * @return
28      */
29     public String getName() {
30         return this.name;
31     }
32
33     /**
34      * Returns the strawberry weight.
35      *
36      * @return
37      */
38     public int getWeight() {
39         return this.weight;
40     }
41 }

```

Figure 2: An example of the source code for the answer.

2

Question 2: Strawberry (File name to submit: Strawberry.java)

This question is a program that handles "strawberry". Create the program using steps (1) to (3).



(1) Create a skeleton source code from the class diagram "Strawberry".

Strawberry
-name:String -weight:int
+Strawberry(name:String,weight:int) +getName():String +getWeight():int

(2) Create the operation confirmation program "StrawberryMain.java".

```

1 // 00AJ00 Taro Dendai
2 public class StrawberryMain{
3     public static void main(String[] args){
4         Strawberry strawberry1 = new Strawberry("Amaou", 50);
5         Strawberry strawberry2 = new Strawberry("Tochiotome", 40);
6
7         String name1 = strawberry1.getName();
8         String name2 = strawberry2.getName();
9         int weight1 = strawberry1.getWeight();
10        int weight2 = strawberry2.getWeight();
11        System.out.println(name1 + " " + weight1);
12        System.out.println(name2 + " " + weight2);
13    }
14 }

```

3

Execution image

```

>java StrawberryMain
Amaou 50
Tochiotome 40

```

(3) Implement "Strawberry.java" to meet the API specification "Strawberry".

API Strawberry	
Strawberry	Constructs a new Strawberry object. The argument "name" is the strawberry cultivar. The argument "weight" is the strawberry weight.
getName	Returns the strawberry name.
getWeight	Returns the strawberry weight.

Figure 3: An example of the generated PDF.

Implementation of Tools

This section describes the implementation. The language of the programming test questions is Java. As an existing technology, we use the idea of Javadoc. The software used is Java, JavaParser, and LaTeX. Also, use the LaTeX macros "listings" and "pgf-umlcd."

- **Java**
Java (version 8) is used for tool development. Basic file operations, reading and writing files are done using standard libraries. Other software is called from processes.
- **Javadoc**
Javadoc is a documentation system. Author adds comments to Java source code according to Javadoc rules. Javadoc generates HTML-format API documentation from Java source code. The tools use extended Javadoc tags.
- **JavaParser**
JavaParser is a library that creates abstract syntax trees from Java source code. Application software uses JavaParser to parse Java source code and process syntax elements.
- **LaTeX**
LaTeX is a document processing system that is an extension of the typesetting system TeX. LaTeX creates reports, books, etc. from text written in markup languages. It is possible to import figures, tables, etc. using macro. The tool is used to output test questions to PDF. The LaTeX macro "listings" is used to display source code. Additionally, "pgf-umlcd" is used to create class diagrams.

Test Question Generation Details

Details of data conversion by the tools are described below. An example of data conversion is shown in Figure 4.

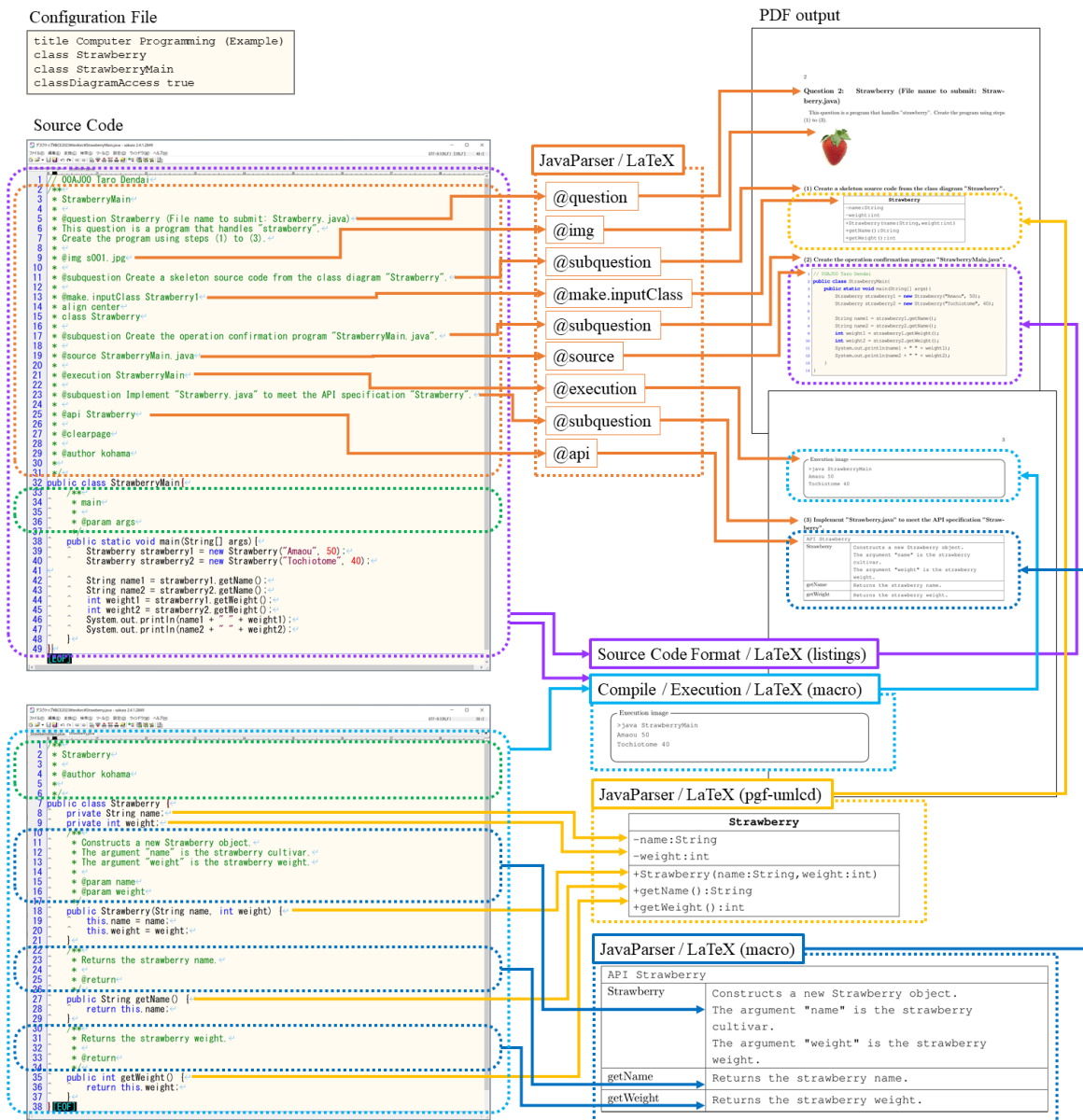
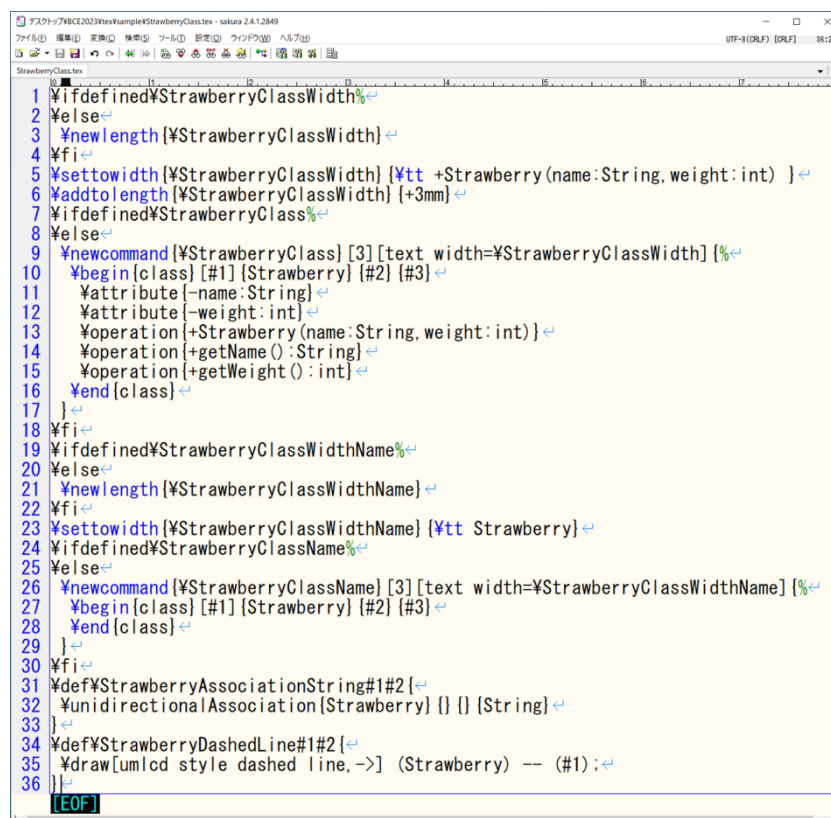


Figure 4: An example of data conversion by the tools.



```

1 \ifdefined\StrawberryClassWidth%
2 \else
3 \newlength{\StrawberryClassWidth}
4 \fi
5 \settoheight{\StrawberryClassWidth}{\tt +Strawberry (name:String, weight:int) }
6 \addtolength{\StrawberryClassWidth}{+3mm}
7 \ifdefined\StrawberryClass%
8 \else
9 \newcommand{\StrawberryClass}[3][text width=\StrawberryClassWidth]{%
10 \begin{class}[#1]{Strawberry}[#2][#3]
11 \attribute{-name:String}
12 \attribute{-weight:int}
13 \operation{+Strawberry (name:String, weight:int)}
14 \operation{+getName():String}
15 \operation{+getWeight():int}
16 \end{class}
17 }
18 \fi
19 \ifdefined\StrawberryClassWidthName%
20 \else
21 \newlength{\StrawberryClassWidthName}
22 \fi
23 \settoheight{\StrawberryClassWidthName}{\tt Strawberry}
24 \ifdefined\StrawberryClassName%
25 \else
26 \newcommand{\StrawberryClassName}[3][text width=\StrawberryClassWidthName]{%
27 \begin{class}[#1]{Strawberry}[#2][#3]
28 \end{class}
29 }
30 \fi
31 \def\StrawberryAssociationString#1#2{
32 \unidirctionalAssociation{Strawberry}[]{}{String}
33 }
34 \def\StrawberryDashedLine#1#2{
35 \draw[umlcd style dashed line,->](Strawberry) -- (#1);
36 }
[EOF]

```

Figure 5: An example of a TeX file.

- Generate Class Diagram

The source code is parsed by JavaParser. After that, the instance variables and method information are extracted, and a TeX file is generated in the LaTeX macro "pgf-umlcd" format. An example of a TeX file is shown in Figure 5. TeX files are used to generate text for test questions.

- Generate API Specification Table

The source code is parsed by JavaParser. Then, the information in the Javadoc method comments is extracted and a TeX file is generated in LaTeX tabular format. TeX files are used to generate text for test questions.

- Generating Execution Result

The source code is compiled. If the class file contains a main method, it will be executed and the standard output will be output to the file. A TeX file is generated in the LaTeX "execution result" format. The "execution result" format is defined separately using a LaTeX macro. TeX files are used to generate text for test questions.

- Generating Source Code Diagrams

The Javadoc part of the source code will be deleted. A TeX file in the LaTeX macro "listings" format is generated. TeX files are used to generate text for test questions.

- Generation Text for Test Questions

The source code is parsed by JavaParser. Then, the information of the Javadoc class comments is extracted. The tag in the comment (keyword written with "@" at the beginning) is analyzed. Details of the tags are shown in Table 1. The text of the test question is constructed according to the tag information, and a TeX file is generated. The

TeX file is compiled with LaTeX. Class diagrams, specification tables, execution results, and source code are integrated. A PDF file of the test questions will be generated.

Table 1: Details of the tags.

Tag	Detail
@question	Write the question heading and question text. The question number is automatically counted and auto-incremented.
@subquestion	Write the sub-question heading and question text. The sub-question number is automatically counted and auto-incremented.
@make.inputClass	Describe this when arranging a class diagram. The position and size of the figure can be adjusted using parameters. For example, "align center" causes centering. "scale 1.5" makes the figure 1.5 times larger. Also, multiple class diagrams can be placed.
@source	Write this when placing the source code. Specify the file name with the parameter. The view of the source code can be specified using the LaTeX macro "listings".
@execution	Describe this when placing the execution results. Specify the class name as a parameter. The view of the execution results can be specified using a LaTeX macro.
@api	Describe this when placing the API specification table. Specify the class name as a parameter. Table views can be specified using LaTeX macros.
@img	Describe this when placing an image. Specify the png or jpg image file name with the parameter.

Experiment

It was actually used in the programming subjects shown below.

- Computer Programming III Assignment Exercises (2022/10/31)
- Computer Programming III Achievement Test (2022/12/22)
- Computer Programming III Supplementary Examination (2023/1/16)
- Computer Programming II Comprehensive Exercise 3 (2023/5/25)
- Computer Programming I Comprehensive Review 1 (2023/7/4)

Figure 6-8 shows an example of test questions actually used in computer programming (Japanese) (PDF).

Access modifiers (visibility notation) in class diagrams can be omitted. The class diagram in Figure 3 includes access modifiers. The class diagrams in Figures 6 and 7 omit the access modifiers in the class diagram.

In the PDF of the test questions, there were no mistakes between the source code, class diagram, specification table, and execution results. The results used in the exercise had a typo in the text of the test question, but there were no other flaws.

3

問題1 クラス図からソースプログラムの機械的導出
(提出物 StrawberryFrame.java)


クラス図 StrawberryFrame からソースコードを機械的に導出しないさい。

StrawberryFrame
name:String
weight:int
StrawberryFrame(name:String,weight:int)
getName():String
getWeight():int

4

問題2 いちご (提出物 Strawberry.java)

この問題は、「いちご」を取り扱うプログラムです。(1)～(3)の手順にしたがって、プログラムを完成しないさい。



(1) クラス図 Strawberry からソースコードを機械的に導出しないさい。

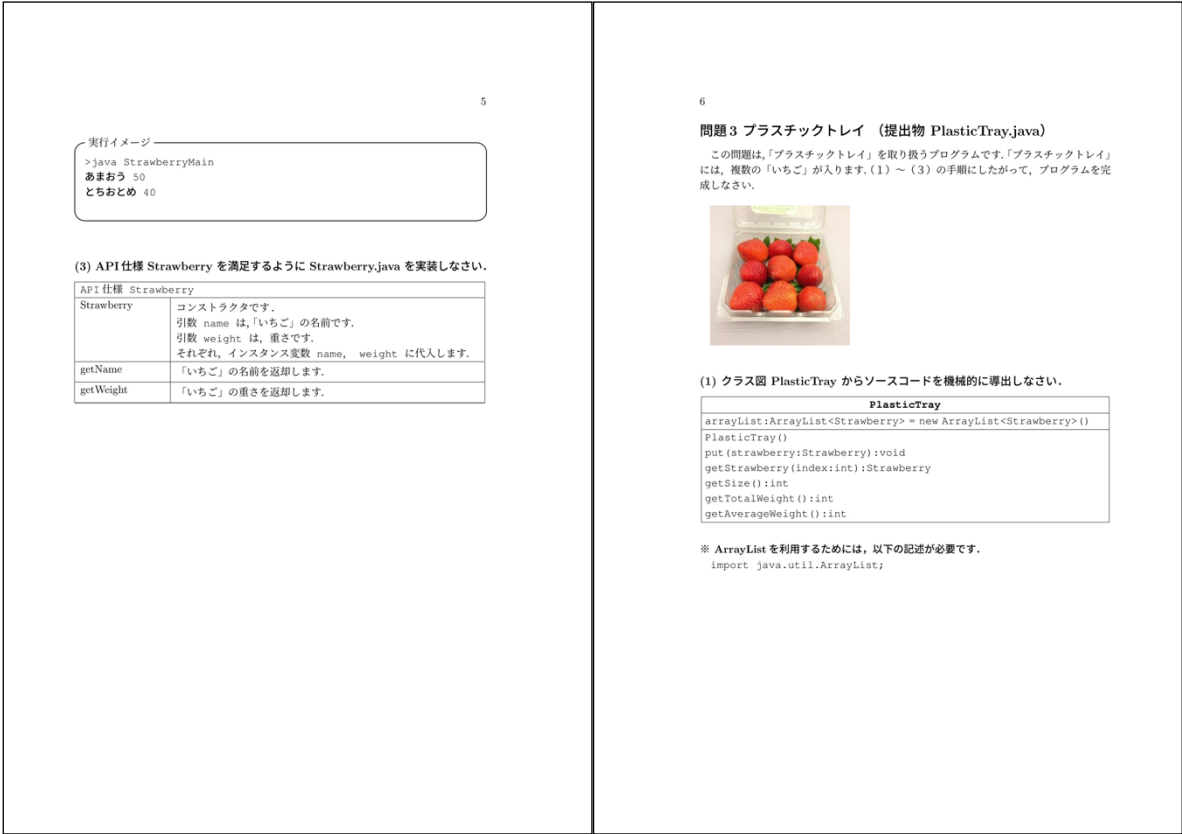
Strawberry
name:String
weight:int
Strawberry(name:String,weight:int)
getName():String
getWeight():int

(2) 動作確認用プログラム StrawberryMain.java を作成しないさい。

```

1 // 00A300 電大太郎
2 public class StrawberryMain{
3     public static void main(String[] args){
4         Strawberry strawberry1 = new Strawberry("あまおう", 50);
5         Strawberry strawberry2 = new Strawberry("とちおとめ", 40);
6
7         String name1 = strawberry1.getName();
8         String name2 = strawberry2.getName();
9         int weight1 = strawberry1.getWeight();
10        int weight2 = strawberry2.getWeight();
11        System.out.println(name1 + " " + weight1);
12        System.out.println(name2 + " " + weight2);
13    }
14 }
```

Figure 6: An example of test questions actually used (Japanese) (PDF) (page 1,2).



Conclusion

The purpose of this research is to support the creation of programming test questions. In the proposed test question creation method, test question information is written in the answer source code. The test questions are only source code with Javadoc. Then, it generates class diagrams, schedules, and execution results from the source code.

The developed tools have made it possible to output programming test questions in PDF format. The created test questions were actually used in programming exercises. As a result, there were some typos, but there were no defects.

A future challenge is to create practice questions tailored to the learners for the programming practice support system.

Acknowledgements

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- LaTeX. <https://www.latex-project.org/>
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Increasing Teacher Capacity in Trauma-Informed Practices for Multilingual Learners: Implications for Professional Learning & Development

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Abstract

This study addresses the challenges posed by mass migration and its impact on K-12 schools, especially in New York, where diverse students, including refugees and asylum seekers, require specialized support. The primary objective is to enhance the capacity of in-service teachers to support Multilingual Learners (MLs) and immigrant students who have experienced trauma through trauma-informed pedagogies. A professional learning initiative was implemented in Spring 2023 to strengthen teacher capacity in culturally and linguistically diverse classrooms. Qualitative case studies were conducted with 12 New York in-service teachers who participated in four trauma-informed pedagogy workshops. Analysis of their written reflections revealed key themes that inform the refinement of professional development in trauma-informed pedagogies. The findings also have implications for incorporating this approach into teacher preparation programs. This research bridges the gap between trauma-informed practices and the needs of Multilingual Learners, particularly in the context of increasing migration. The insights gained in this study offer valuable tools for educators to create more inclusive learning environments. Additionally, the research has the potential to influence policies, practices and teacher training programs, ultimately leading to improved educational experiences for students in diverse and evolving classrooms.

Keywords: Trauma-Informed Pedagogies, Multilingual Learners, Mass Migration

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Introduction

The purpose of this study is to delve into the intricate landscape of trauma-informed pedagogies within the context of Multilingual Learners. As educators grapple with the diverse needs of students who may have experienced trauma in the midst of the contemporary era's mass migration, understanding and implementing trauma-informed practices have emerged as critical components of effective classroom instruction (Sherwood et al, 2021). The study involves 12 in-service teachers in New York, who actively engaged in professional development workshops during the Spring 2023 semester. Through qualitative analysis, this research has uncovered six overarching themes that encapsulate the teachers' experiences and perspectives, offering valuable insights into the application of trauma-informed practices in their classrooms. These themes address diverse aspects, ranging from redefining trauma to the immediate implementation of trauma-informed practices, all while considering the distinct challenges faced by teachers in supporting Multilingual Learners. In this introductory exploration, the study has endeavoured to bridge the gap between research and practice, creating a cohesive narrative that paves the way for understanding the impact of trauma-informed pedagogies and charting the future direction of this essential research.

Mass Migration and the Impact on K-12 Schools

In recent years, the world has witnessed a significant surge in mass migration driven by a variety of factors, including natural disasters, armed conflicts, political instability, and economic hardships. This global phenomenon has placed unprecedented demands on the United States' education system, challenging educators to adapt swiftly to evolving circumstances (González, 2021). Refugees and asylum seekers have arrived in the United States from diverse geographic regions, each compelled by unique reasons for migration. Notably, in 2021, the largest numbers of individuals granted asylum in the United States hailed from Venezuela, China, and El Salvador, while the majority of refugees originated from Congo, Syria, and Afghanistan (Baugh, 2022). More recently, New York City has grappled with an asylum seeker crisis, with over 130,600 migrants estimated to have arrived in the city as of mid-October since the spring of 2022 (Meko, 2023). In light of these complex migration patterns and the continuous influx of refugees and asylum seekers, the educational landscape in the United States faces an ongoing and dynamic transformation, necessitating educators to remain flexible and responsive in meeting the evolving needs of their students.

Providing adequate services to the expanding culturally and linguistically diverse student populations has long been a challenge for many schools, primarily due to the shortage of teachers and personnel trained in these specialized areas (Garcia & Weiss, 2019). Multilingual Learners, comprising students whose primary language is not English, now constitute one in five students in the United States (Thompson & Kieffer, 2018). Among these, English Language Learners (ELLs), who are in the process of acquiring proficiency in English, represent one in ten students in the U.S. (Thompson & Kieffer, 2018). It is essential to note that all ELLs fall under the category of Multilingual Learners, although not all Multilingual Learners are ELLs (Midgett & González, 2023). The ELL population is rapidly expanding across the United States (National Center for Educational Statistics, 2017). However, a critical shortage of teachers certified in Bilingual Education and English as a New Language (formerly known as English as a Second Language) persists, exacerbated by the nationwide shortage of general teachers (Fortin & Fawcett, 2022). As a result, current in-

service teachers are engaging in professional development to create inclusive content and instruction accessible to Multilingual Learners across different levels of English proficiency.

Trauma and Trauma-Informed Pedagogies for Multilingual Learners

In the work of ensuring equity and access to content and instruction for Multilingual Learners in the process of acquiring proficiency in English, educators encounter an additional challenge: providing support to students in classrooms who may be experiencing traumatic stress. Trauma, in this context, encompasses a broad spectrum of events, experiences, and their ensuing effects (St. Andrews, 2013). These events or circumstances can encompass actual or perceived threats of physical or psychological harm, as well as severe deprivation of resources necessary for healthy development. What constitutes trauma can vary from person to person and is heavily influenced by cultural beliefs and the individual's developmental stage. Adverse effects may manifest immediately or evolve over time, impacting the physical, mental, emotional, cognitive, behavioral, and social dimensions of those affected. For individuals experiencing forced migration, Foster (2001) identifies three stages laden with traumatogenic potential: premigration, trauma during transit, and resettlement. Events, experiences, and their associated effects can manifest at any of these stages or span multiple stages throughout the migration process. Midgett and González (2023) shed light on the current New York State (NYS) Multilingual Learner-related traumatic events (Figure 1), emphasizing how trauma can be a consequence at various stages of migration.

When K-12 students find themselves in a triggered state due to trauma, their access to the higher cognitive functions of the prefrontal cortex, the region responsible for learning, can be impaired (St. Andrews, 2023). This impairment may lead to reduced concentration, memory, and language abilities—key elements for a successful educational experience. Gaining insights into the profound impact of trauma enables educators to better comprehend the underlying causes of certain children's learning difficulties, behavioral issues, and relationship challenges. A survey conducted across 11 U.S. states revealed that 98% of educators believed that training in trauma-informed classroom practices should be an essential part of every teacher's skill set. Paradoxically, seven out of ten educators reported feeling inadequately prepared to implement trauma-informed approaches in their teaching (Ezarik, 2020). Notably, there exists a research gap in the realm of trauma-informed education, specifically pertaining to immigrant Multilingual Learners, as well as within teacher preparation programs.

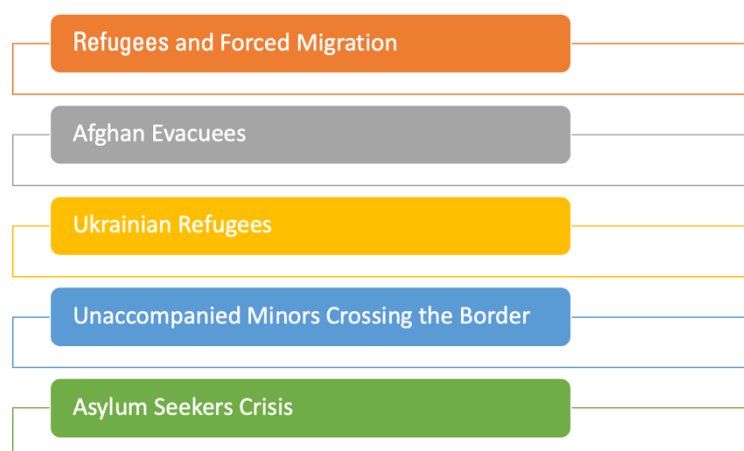


Figure 1. Current NYS Multilingual Learner-Related Traumatic Migrations (Midgett & González, 2023).

Study Design

Given the pressing need to enhance the capacity of in-service teachers to effectively support Multilingual Learners who may have experienced trauma, this research seeks to address the following key inquiries. These inquiries primarily revolve around uncovering and comprehending teachers' beliefs, perceptions, and definitions concerning trauma-informed pedagogies and their application within classroom settings for Multilingual Learners.

Research Questions: The following research questions guided this study:

1. Research Question Number One: How do teachers conceptualize trauma and trauma-informed practices within the context of Multilingual Learners?
2. Research Question Number Two: Which trauma-informed pedagogies do teacher perceive as readily integrable into their classrooms for Multilingual Learners?
3. Research Question Number Three: In what aspects of trauma-informed pedagogies do teacher feel the need for additional professional development opportunities to effectively serve Multilingual Learners?

Intervention

During the Spring 2023 semester, a professional learning program was implemented to support in-service teachers in New York as they sought to enhance their capacity in Trauma-Informed Pedagogies for Multilingual Learners. These four professional development workshops were designed to complement the ongoing graduate-level coursework in Teaching English to Speakers of Other Languages (TESOL) that many of the participants were concurrently pursuing to gain additional certification for serving English Language Learners in New York State. Table 1 outlines the workshop topics offered, each of which was accompanied by a designated reflection prompt for participants to complete.

Workshop Titles
Understanding Trauma, it's Impact on Learning, and ELL Strategies
Trauma-Informed Student -Teacher Relationships
ELL Strategies for Building a Trauma Informed Classroom Environment (Part 1)
ELL Strategies for Building a Trauma Informed Classroom Environment (Part 2)

Table 1. Trauma-Informed Workshops, Spring 2023.

Each workshop session was conducted over the course of one hour and facilitated through a synchronous telecommunication platform, allowing active participation and engagement. To accommodate participants' varied schedules and accessibility, all sessions were recorded and made available for review. This feature served as a valuable resource for both revisiting the content and addressing the corresponding reflection questions, ensuring that all attendees, including those unable to attend in real-time, could benefit from the workshop. Table 2 contains the reflection writing prompts that accompanied each session.

Session	Workshop Reflection Prompts
1	Based on the presentation and discussion on trauma, its effects on learning, and practices for ELLs, what is one major take away for you that will directly impact your work as a teacher moving forward? Explain why.
2	Based on the presentation and discussion on trauma-informed student-teaching relationship building, what is one practice that you think would be easy for you to implement. Name one practice from today's session that would be challenging for you to implement. Discuss why for both.
3	Based on today's session, what does a trauma-informed classroom environment mean? How can we build a classroom environment that support students who have experience trauma? Why is this important?
4	Considering today's session, as well as the 3 other sessions, what are two major take ways from this series that have increased your capacity to support ELLs who have experienced trauma? What 2 areas or topics reviewed across the 4 sessions would you like further professional learning opportunities and mentoring? Explain why.

Table 2. Participant Workshop Reflection Prompts, Spring 2023.

Participants

This study engaged a cohort of 12 in-service teachers certified in New York State, all of whom were actively enrolled in a post-master's graduate program with a dual focus on Teaching English to Speakers of Other Languages (TESOL) and school building administration. These participants offered a diverse range of teaching experiences, with some boasting as much as 25 years in the field, while all met the program's admission requirement of possessing a minimum of three years of classroom teaching experience.

Method

This research adopts a qualitative approach aimed at exploring the unique perspectives and experiences of current educators, a hallmark of qualitative inquiry. Qualitative research, particularly within a case study framework, prioritizes the pursuit of profound insights into a specific phenomenon within its authentic real-world context (Creswell & Creswell, 2018). In this instance, the focus is on the intricate dynamics of teaching and learning with Multilingual Learners who may have undergone traumatic experiences. To achieve this, we employed a case study methodology, whereby each participating teacher composed a reflection paper following each of the four workshops. Participant reflections were collected via file upload unto a Learning Management System. Consequently, the dataset comprises a collection of four written reflections from each participant, offering a multi-faceted view of their experiences and insights. Participant information was redacted and placed into a case file. Each case was given a code for anonymity.

Analysis

The data analysis encompassed the examination of 12 individual cases, with each case consisting of four written reflections. The objective was to scrutinize these reflections to gain deeper insights into the participants' experiences and viewpoints concerning the application of trauma-informed pedagogies within their specific classroom settings. The analysis unfolded in two distinct cycles. The initial cycle involved the systematic reading of case profiles and the iterative labelling of data segments until discernible themes surfaced. This

process enabled us to engage in activities such as pattern recognition, explanation construction, categorial consolidation, intra-case investigation, and direct interpretation, as outlined by Yin (2013).

Subsequently, the second cycle of analysis entailed comparisons—both within cases and across cases—among the 12 participants to identify common patterns and themes that directly addressed the research questions. To bolster the credibility and robustness the analysis, a triangulation approach was employed. This involved cross-referencing evidence drawn from the 12 unique cases, reinforcing the support for emerging themes. This comprehensive triangulation process was critical for enhancing the trustworthiness of the data analysis. It enabled us to seamlessly integrate inter-case analysis, synthesize findings across cases, consolidate categories, construct explanations, recognize patterns, and engage in direct interpretation (Yin, 2013).

Results

The data analysis unveiled six distinct and overarching themes that resonated across the 12 individual cases. These themes provide a comprehensive and multi-faceted view of the participants' experiences and perspectives with trauma-informed pedagogies and their implementation within the context of Multilingual Learners. These themes serve as pivotal touchpoints in the exploration of the intersection between trauma-informed pedagogies and the needs of Multilingual Learners, offering valuable insights and considerations for educational practice and policy. Table 3 contains the 6 themes that emerged from the data analysis.

Theme Number	Themes
1	Redefining Trauma and Understanding Children's Perspectives
2	Impact of Trauma on Learning and Relationships
3	Trauma's Impact on Second Language Development
4	Trauma-Informed Practices for ELLs
5	Immediate Implementation of Trauma-Informed Practices
6	Challenging Trauma-Informed Practices Requiring Further Professional Learning

Table 3. Themes in Student Written Reflections.

The alignment between the research questions and the emergent themes is evident, reflecting the depth and relevance of the investigation. This connection ensures that the study comprehensively addresses the central inquiries that guided the research. Table 4 illustrates which themes directly correspond to each research question, providing a clear and structured overview of the intricate relationships between the inquiry and the resulting themes. This alignment serves as the linchpin in the pursuit of a comprehensive understanding of trauma-informed practices and their application within diverse classroom settings.

Research Question	Themes
1	Theme 1: Redefining Trauma and Understanding Children's Perspectives Theme 2: Impact of Trauma on Learning and Relationships Theme 3: Trauma's Impact on Second Language Development Theme 4: Trauma-Informed Practices for ELLs
2	Theme 5: Immediate Implementation of Trauma-Informed Practices
3	Theme 6: Challenging Trauma-Informed Practices Requiring Further Professional Learning

Table 4. Alignment between Research Questions and Themes.

Table 5 offers a reference point for the empirical underpinnings of each theme. Within this table, readers will find direct references to students' written reflections that played an instrumental role in shaping and defining the emergent themes. These exemplar data excerpts provide concrete evidence, drawn from participants' own words, illuminating the nuanced and multifaceted facets of trauma-informed pedagogies within the context of Multilingual Learners. By grounding the themes in the authentic and diverse experiences of the participants, Table 5 reaffirms the robustness and authenticity of the findings, strengthening the credibility and depth of the research outcomes.

Themes	Data Evidence
1	I was naive in my notion of what should/could be considered 'trauma,' [the pd] helped me to redefine and clarify that, 'Trauma is defined by them (children) to us (adults.)' Our job is not to judge their behaviors/reactions, but to help them learn the tools/strategies to enable them to 'regulate' their mental state to maximize learning.
2	A major takeaway that will directly impact my work as a teacher moving forward is understanding that student responses to trauma can be covert or overt—some may fidget, become reclusive, have an outburst, etc." "Students are more than their struggles.
3	It's interesting to have learned that trauma significantly impacts brain development, and carefully thinking about how it connects to language acquisition, I have been able to make some connections.
4	As teachers, many of us have received additional training and 'compensatory services' to provide assistance for Special Education students that missed instructional sessions during the pandemic lockdown. Yet, newly arrived multilingual learners have not received the same amount of support.
5	One of the many, great practices I have already begun to implement in my classroom are the 'Brain Breaks,' (especially the paper/name/bounce knee break), they are a fun and easy way to help students regulate their mood when needed.
6	Creating a student support plan (written document) due to time... threatens to exceed the realities of everyday teaching, wherein I am responsible for 140 students (on average).

Table 5. Exemplar Data Evidence for Each Theme.

Implications and Future Directions

In the findings, one can observe a noteworthy distinction between trauma-informed practices that can be readily integrated into classrooms and those that present more significant

challenges, especially in large class settings. Practices like quick 'brain breaks' and other time-efficient strategies emerged as immediately implementable and well-received by participants. Many educators discussed their swift incorporation following the workshops, signifying their potential to enhance classroom environments. However, more intricate strategies, such as co-writing individualized student support plans, were identified as potentially demanding, particularly within larger classrooms. This revelation underscores the need for clarification in professional development programs, emphasizing that trauma-informed practices should be approached as tiered interventions. Time-efficient practices are suited for whole-class use, offering universal support, while more time-intensive strategies should be reserved for targeted application to a few or individual students, ensuring tailored support where it's most needed. Additionally, this study underscores a prevalent conflation among teachers, perceiving trauma-informed practices as mandatory for all Multilingual Learners, whereas the intention is to offer a means of enhancing differentiation in instruction. Looking forward, the findings have significantly influenced the subsequent Fall 2023 professional learning series, which builds upon the insights gained in the Spring 2023 sessions. This study also serves as a foundation for further research on professional learning on trauma-informed practices, specifically tailored to the unique needs of Multilingual Learners, in an ongoing effort to advance inclusive and supportive educational practices.

Conclusion

In examining the profound intersection of trauma-informed pedagogies and the needs of Multilingual Learners, this study has revealed a rich tapestry of insights that holds significant implications for both the practice and research of education. The findings underscore the significance of tiered approaches in the implementation of trauma-informed practices, distinguishing between those readily integrable for the whole class and those more time-intensive strategies tailored for individuals. This clarification not only enhances differentiation but also empowers educators to better support students who have experienced trauma, particularly in the midst of mass migration. Furthermore, the outcomes of this study have paved the way for the subsequent Fall 2023 workshop series, building upon the insights gained in the Spring 2023 sessions. As we look to the future, the invaluable insights unearthed here beckon for further research, aimed at refining and expanding trauma-informed practices centered on Multilingual Learners. Ultimately, the findings presented here provide a stepping stone toward the creation of more inclusive and supportive educational environments, not only for Multilingual Learners but for all students.

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Slam Poetry, Voice of Identity and Resistance: Possibilities in Socioeducation

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Abstract

This article discusses the processes of research that sought to analyze the contribution of Slam poetry to recognizing and understanding Human Rights and to building political and emancipatory life projects for adolescents and young people in compliance with socio-educational internment measures. We carried out the research in a Socio-Educational Assistance Center for Adolescents in the State of São Paulo/Brazil; anchored in the assumptions of historical and dialectical materialism. To develop the investigation, we used action research, in which workshops were held using Poetry Slam techniques. The action research included 17 workshops, which were structured into 4 phases. To analyze the data, we used the methodological procedures of the Meaning Cores (Aguar & Ozella 2006, 2013). Given this, this article aims to discuss the triggers of movements that occurred in the fourth phase of action research. At this stage, teenagers and young people, in possession of their original poems, constructed their performances to be presented in a great poetic event, a Soiree! In this scenario, the fourth phase proved to be significant, as the adolescents revealed their existence through their bodies and words in a unique way. This process contributed to breaking stigmas that inferiorize, marginalize and segregate these social groups, opening spaces for emancipatory movements of being.

Keywords: Slam Poetry, Socio-Education, Life Projects

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Introduction

This article aims to discuss the triggers of the 4th phase of the research that analyzed the contribution of Slam poetry for us to recognize and understand Human Rights and for the construction of political and emancipatory life projects for adolescents and young people in compliance with a socio-educational measure of internment.

Initially, it is worth explaining that Poetry Slam is a competition movement for poetic performances (spoken poetry battles), which originated in the United States of America at the end of the 20th century. Marc Kelly Smith was looking for a welcoming and accessible poem reading environment when he became responsible for creating the Slam poetry event. The word Slam “is an onomatopoeia in the English language used to indicate the sound of a door or window slamming, whether this movement is light or abrupt. Something close to our “pah!” in Portuguese” (Neves, 2017, p.93). Marc Kelly Smith, appropriated the term Slam from baseball, tennis, bridge and basketball tournaments to name his poetic event.

In this context, we created three main rules for the construction of poems and for the performance in Slam battles, they are: the poems must be unpublished, written by the slammer (poet) who will present it, the presentation must have at most three minutes and no costumes, props or even musical instruments must be used during the performance. In the beginning, public demonstrations did not directly interfere with the results of the poets' performances, which changed over time, as currently the audience's evaluation was placed as paramount in slams, mainly for the appreciation of the poems” (Martin & Bueno, 2021).

In the first decade of the 21st century, Poetry Slam entered Brazilian territory on the initiative of slammer Roberta Estrela D'Alva, also responsible for creating the first Slam in Brazil, the Zona Autônoma da Palavra (ZAP) in 2008. In view of this, other Slams emerged on national soil, such as the so-called Guilhermina Slam and the Resistência Slam. It is important to note that these collectives are held outdoors in a public square, without any type of facilities to help carry out the event.

In this scenario, young people, especially those from peripheral regions, begin to occupy public spaces where they seek to coexist, dialogue, poetize and fight for their literary, political, economic, social and cultural rights. “Setting up in environments of sociability and critical and creative cultural production” (Martin & Bueno, 2021, p.60).

In view of this, the mobilizing force of the Slams movements becomes evident. Therefore, it was decided to appropriate the techniques of poetry battles to hold a poetic event in a Socio-Educational Service Center for teenagers in the interior of the state of São Paulo with the aim of provoking (re)meanings, providing new forms of being and being in the world.

For the construction of this poetic event with teenagers and young people deprived of liberty, it was guided by issues involving Education in Human Rights and the construction of a Life Project, with which we dared to carry out an experiment with the Poetry Slam, having considering that it is an authorial writing, which triggers the triggering of identity processes, bringing awareness and new needs to the subjects, guaranteeing means for a human life with mastery regarding the history of life (past-present-future), preventing things from reaching them in a coercive way (Boutinet, 2002).

Therefore, during the investigative processes, we sought to build political and emancipatory life projects that, like Slam, were revolutionary and insurgent, causing a break with the inhumane frameworks and stigmas imposed on peripheral bodies in the exclusionary contexts of neoliberal capitalism. Since Slam poetry is significant in terms of the processes of recognition and affirmation of peripheral identities and powerful for the development of citizenship (Freitas, 2019), as it drives a connection between art and activism, guaranteeing a creative and poetic political intervention from stigmatized sectors of society.

Action Research – Methodological Issues

The understanding of the phenomenon under study took place through the method of historical and dialectical materialism, with which it becomes possible to overcome superficiality to reach the reality of the facts. In this way, adolescents and young people in hospitalization began to be seen within a historicity, as individuals develop in a dialectical relationship with the social and with history, constituting themselves simultaneously as unique, singular and historical (Aguar & Ozella, 2006).

In this context, we sought through action research, in which participants are involved in a cooperative, active interactive, dialogical and dialectical way in the investigative process (Thiollent, 1997), to develop workshops with the techniques used in poetic battles of Slam in a Socio-educational Center for Adolescent Services, jointly undertaking issues related to Human Rights, identity processes and the construction of a life project.

Given these foundations, the action research was structured into 4 phases, as shown in the table below:

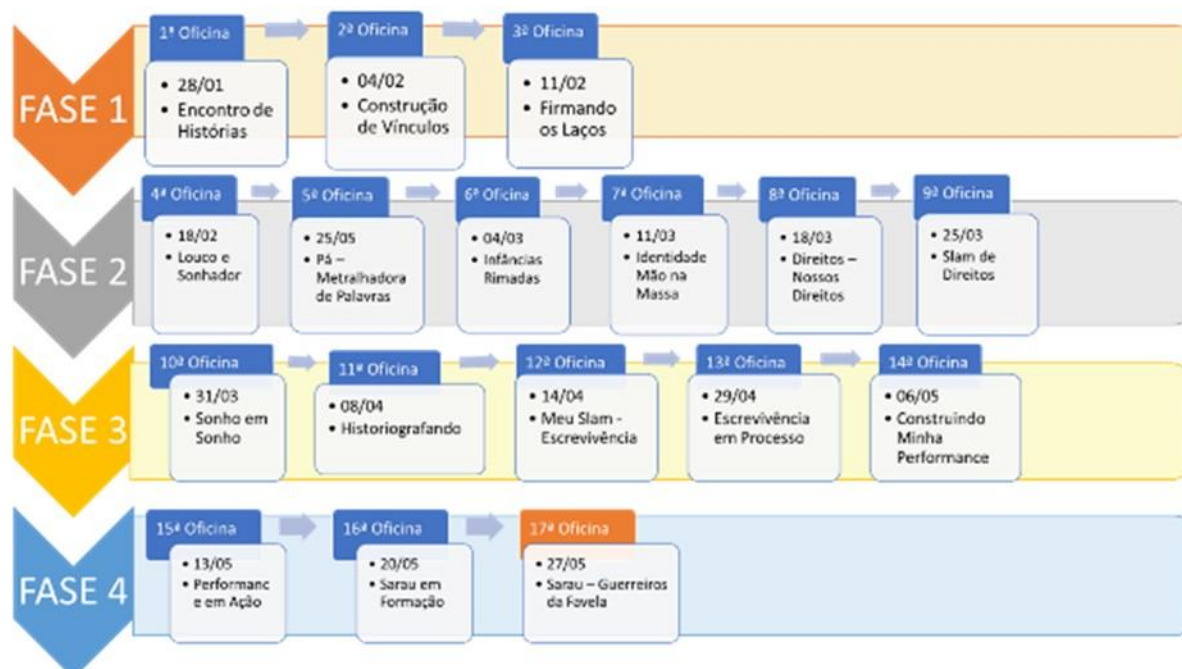


Figure 1: Source: Personal archive. Prepared by the authors.

The first phase included 3 workshops and aimed to build bonds between research participants. At this stage, exploratory questionnaires were also administered to the teenagers with the aim of getting to know them and creating strategies for the next workshops. The

second phase included 6 workshops and was intended, initially, to present the Poetry Slam to teenagers and young people. Later, at this stage, activities related to identity construction and issues related to Human Rights were carried out.

The third phase consisted of 5 workshops, which were dedicated to writing Slams (poems). These productions were built based on the life stories (writings), dreams, desires, future perspectives and life projects of the participants. The fourth phase consisted of 3 workshops aimed at building the participants' poetic performances, ending with the big soirée. At that moment, the boys performed their slams to the audience. At the end of each phase, a focus group was held. These moments were powerful, as they guaranteed the systematization of knowledge constructed at each stage, as well as the apprehension of the meanings constructed by adolescents and young people.

To analyze the data, data analysis procedures called meaning cores were used. These procedures were developed by Aguiar & Ozella (2006, 2013), who sought to build a means in which one could have coherence and basis for analyzes through historical and dialectical materialism, something that was not merely descriptive or classificatory, but that could account for of apprehending reality in movement, going beyond the limits of appearance. In this sense, the processes for elaborating the cores of meaning were constructed linked to historical and dialectical materialism, in the assumptions of socio-historical psychology.

For this, the poems constructed by the adolescents were a reference to guide the data analysis, as they represent a document summarizing the meanings of the research process of young people and adolescents, enabling greater consistency for analysis. However, other materials collected and produced during the research were also considered to construct the meaning cores.

Given the analytical corpus, the procedures for constructing the meaning cores began. Firstly, a floating reading/re-reading of the researched materiality was carried out. At that moment, with the research objectives in mind, the speeches and sentences written by the adolescents were extracted, with which the pre-indicators were created. For this, the criteria of similarity, complementarity and contradiction were used.

With the pre-indicators organized, the elaboration of their respective indicators (theses) began and subsequently the construction of the meaning core of each adolescent, paying attention to the contradictions in the processes of constitution of the subjects.

The 4th Phase: Poetic Performance

In this space, our focus is to discuss the triggers of the 4th phase of this action research, a moment in which, with all the knowledge built throughout the 14 workshops and, mainly with their poems (slams) in hand, teenagers and young people began the construction of their performances to be presented at a Soiree that marked the end of the investigative processes.

Thus, during the course of the workshops prior to this phase, there was the appropriation of Poetry Slam techniques, the main one being the authorial production of the poems that were presented in the poetic battles, with this, the productions were composed of the experiences of the slammers (poets) who strongly expressed their constructions.

Therefore, Poetry Slam can be identified as a contemporary performance art, as it is the performance that gives life to the Slam, being the performance of poets (slammers), encounters of bodies, expressiveness and life stories. In this sense, performance consists of full poetic realization, as it is in the body and through the body that poetry is entirely realized (Cardoso, 2009, p.62). Configuring itself in living and transformative action (Zumthor, 2007). In this way, it enables an experience that involves a truly poetic energy, which requires openness and surrender to the movement, both by the poet and the audience.

It is worth mentioning that there is no fixed rule for performance, with each presentation being unique, “each new performance puts everything into question. The form is perceived in performance, but with each performance it changes” (Zumthor, 2007, p.35). In this action, the presence of the voice goes beyond the linguistic sense of communication through speech, as it emerges from a vivid body in the context of full action, as Zumthor points out:

[...] The voice is a subversion or a rupture of the body's enclosure. But it crosses the limit of the body without breaking it; it means the place of a subject that cannot be reduced to personal location. In this sense, the voice dislodges the man from his body. While I speak, my voice makes me inhabit my language. (Zumthor, 2007, p.83-84)

Therefore, the main function of the voice is not to inform, but rather to seek attention through all the senses, both as a voice and as a bodily presence, in each tone, in each word, in each gesture and in each silence, demanding attention and concentration. Therefore, the sound that emanates from the body is essential for the plenitude of the poem, as it only becomes a finished work when the voice lends it its authority (Cardoso, 2009). The mediation of the voice, in the orality scenario, enables the concreteness of poetic making, which is carried out by “the person and the interpreter’s game, the audience, the circumstances, the cultural environment, the intersubjective relationships between what is represented and what is experienced, at the moment of performance” (Zumthor, 2007, p.18).

In this context, we sought to guarantee poetic plenitude, promoting the breaking of the dark atmosphere of the prison at the Socio-Educational Center: “overcoming the real world, favoring the creation of new worlds within the world” (Zumthor, 2007). In order to provoke this overcoming, a scenic environment was created with a carpet, light globe, speaker, microphone and many poetry books.



Figure 2: Researchers' collection.

The construction of this environment ensured the enthusiasm for teenagers and young people to get involved in the poetic atmosphere for the creation of their performances. At that moment, the microphone was the big highlight, the teenagers lined up to have access to the instrument to vigorously recite their verses, “freely” expressing their bodies in that space of deprivation, which was a contradiction that the young people took advantage of with intensity.

In this process, the teenagers began a powerful movement of reading and re-reading their Slams (poems), a moment that they took advantage of to make some changes, mainly adding new rhymes that sprouted all the time from their powerful minds.

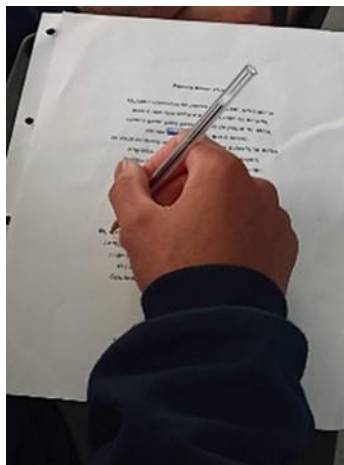


Figure 3: Source: CASA Foundation Social Communication Department
– Photo taken during the workshops.

In this process of writing and rewriting their poems (slams), when they felt confident with their verses, they energetically went to the center of the carpet amidst the play of light, grabbed the microphone and read their slams, building their performances in a unique way, which little by little gained pace. As a result, teenagers increasingly had control over their bodies. This represented a dynamic and significant movement, in which teenagers were able to reflect on their authorial poems marked by their own life stories and enlivened by their bodies.

Given this, the force of poetic mobilization was so intense that even young people with a higher level of shyness did not surrender to inhibition and gave themselves over to the creativity and energy of rhymes. Even teenagers who were not fully literate performed powerfully.

As the writing of a Slam is part of the experience of the Slammer (poet), spaces were opened for teenagers and young people to reflect, know and understand their own existences in the contexts in which they develop humanly. This process was linked to recognition regarding human rights, specifically the Rights of Children and Adolescents provided for in the Child and Adolescent Statute (ECA), (Article 121 of Law No. 8.069, 1990).

In this scenario, through art, poetry and the performance of their bodies, they turned their gaze towards themselves, stripping themselves of the frames that stigmatize them and those inferior, opening gaps for emancipatory movements of the being. In view of this, the possibilities for “dreaming” increased and consequently for new needs in and for life, opening up to a new social birth: the subject of law.

Therefore, Slam assumes a sociopolitical function, insofar as “the slammer, when giving his testimony, is situated in a performative instance in which art and life are part of the same plane and there is no dissociation between ethics and aesthetics” (D’Alva, 2011, p.122). And, this movement allows subjects to understand the forces in disputes in the contexts in which their “self” is being formed. In this sense, when teenagers create a Slam production, they are at the same time (re)constructed by this production. With this, Slam poetry carries, in every written and proclaimed word, human lives marked by movements of identity construction, in a dynamic collective intertwining between the performer and the audience who recognize each other dialectically. As we can see from the report of a reference professional for teenagers after participating in the Soiree (performances) for young people in the cafeteria of the Socio-Educational Center:

It was important to observe the movements of reflection and playfulness that made the teenagers feel comfortable speaking, listening and reflecting. Thank you for allowing us to be present. I was moved by each poem read (recited). It was a wonderful experience.

Through the words of this employee we can see the importance of the performance, as a living and active presence, which overflows with energy that also reaches the listener. The performance “exists to be seen and during this existence all factors contribute and show themselves completely, making a performance an unparalleled visual, sound and sensorial spectacle for both the performer and the spectator” (Cardoso, 2009 p.32).

Therefore, in a poetic Slam battle, bodies become living machine guns of words. Sharp expressions that cut, wound, scar and mark bodies. In this context, adolescents deprived of liberty expressed their learning in relation to Human Rights, their life stories and future perspectives. Without a doubt, a powerful moment of collective reframing in which everyone present was strongly affected.

Conclusions

In view of the above, it is clear how those who go through the experience of a Slam poetry battle, through the completion of a performance among other performances, come away modified, as they enter into a powerful movement of self-reflection and self-knowledge, processes that provoke the construction of a social and historical conscience.

Process built from writing and orality, configuring poetic completeness, in which full realization occurred through the word, the body, the voice, the presence, the living and active force of adolescents and young people deprived of liberty. The pulsating expression of subjects who break with the dispositions of things, turning erasures, compulsory silencing into poems, which when recited out loud, resonated vibrations of identities and resistances, a collective force, which drove trans(formation).

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Strategies for Improving Education Quality

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Abstract

Many factors influence the quality of education, but teachers are the most dominant factor. The problem in education development in Indonesia is that teachers' competencies have not reached the expected competency standards. This has an impact on the low quality of education in Indonesia as seen from the low achievements of Indonesian children at the global level. The low quality of teachers is strongly suspected to be due to the low quality of prospective students admitted to Teacher's Colleges. In addition, Teacher's Colleges do not meet the standards set to produce quality graduates. This study aims to (i) analyze the quality of prospective students admitted to Teacher's Colleges, and (ii) evaluate the fulfilment of national standards for teacher education by Teacher's Colleges. The method used in this study was mixed quantitative and qualitative. Data collection was conducted through Focus Group Discussions with the heads of Elementary School Teacher Education and Professional Teacher Education study programs. Data collection from students was carried out by distributing questionnaires in the form of google forms that were filled in online. In addition, secondary data on the accreditation of Teacher's Colleges was also collected. Data were analyzed using descriptive statistics. The results showed that some prospective teacher students are neither those who aspire to become teachers nor are they the best graduates of high school. Another finding of the study is that most Teacher's Colleges do not meet the national standards set for conducting teacher education.

Keywords: Quality of Education, Prospective Teacher Students, Teacher's College

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Introduction

Many factors influence the quality of education, but the primary determinant of students' academic success is the caliber of their educators (Adel, 2019). The issues in educational development in Indonesia are primarily related to the low competence of teachers. This is evident in the results of the teacher competency test conducted by the government in 2015. The test covered two competency students': pedagogical and professional. The data analysis of the test results showed that the average score for teachers on this test was only 53.02 out of 100 (Directorate General of Teachers and Education Personnel, 2015). Bhakti and Maryani's (2017) study in 2016 focused on the low pedagogical competence of teachers as a result of the competency test. They placed the Teacher's Colleges (TCs) as the institution most responsible for the low competency of teachers because teachers are products of TCs. Therefore, TCs are more responsible for this situation.

The low competence of teachers is strongly suspected to have led to the low quality of education in Indonesia, as indicated by the low achievement of Indonesian students on a global scale. According to the Program for International Student Assessment (PISA) and Trends in International Mathematics and Science Study (TIMSS) assessments, Indonesian students' proficiency in mathematics continues to be at a lower level (Dwita & Retnawati, 2022). Another study on the PISA, which assesses reading, mathematics, and natural science proficiency, reveals that Indonesia ranks 10th among the bottom performers out of 65 countries (Zaini, 2018).

Based on this data and information, the question arises as to why the quality, particularly the competence of teachers, is so low. The low quality of teachers is believed to originate from the low quality of prospective teacher students accepted into TCs. In addition, TCs are suspected of not meeting the standards set for producing quality graduates. Based on these two hypotheses, two objectives of this study are formulated as follows. The first objective is to analyze the quality of prospective students accepted into TCs, and the second objective is to evaluate the fulfilment of national teacher education standards by TCs.

Many studies have examined the factors influencing the quality of education, but there hasn't been specific research on the quality of input teacher candidates who study in TCs to become professional teachers. The quality of inputs aspiring to become teachers may be excellent, but emphasizing input quality alone is not sufficient. They must also study in good or excellent TCs to become professional teachers. Therefore, this research is of great importance as it can offer policy strategies to improve the quality of education in the future.

Determining Factors of Education Quality

According to Hidayat (2017), there are two factors that significantly determine the quality of education: the teaching performance of teachers and the utilization of learning resources. His research on factors influencing the quality of education, particularly in primary education, specifically in primary schools in the Indramayu District, Indramayu Regency, West Java Province, showed that both factors, individually and together, have a significant impact on school quality.

Muhammad's study (2018) also emphasizes the pivotal role of teachers as the primary determining factor of education quality. In his research on factors contributing to low-quality education at a secondary school in Tigo Lurah, Solok Regency, West Sumatra Province, he

identified four factors causing low school quality: (i) the quality of educators, (ii) student factors, (iii) infrastructure, and (iv) the school environment. It was found that teachers sometimes taught subjects unrelated to their fields of expertise, leading to a lack of mastery and professionalism in teaching. Student factors contributed to low school quality due to students not taking the learning process seriously and displaying a lack of discipline in adhering to school rules. Additionally, insufficient infrastructure affected students' motivation to engage in effective learning. The school environment also played a role in low-quality education, with poor relationships between the school community and parents affecting educational quality.

Both studies reveal that educators play a central role in determining the quality of education. High-quality educators are essential for the success of educational development. However, not just any teacher can enhance educational quality, as found in the second study, where teachers not qualified in their respective fields led to poor education quality. Therefore, professional teachers are the ones who have a significant impact on education quality. Prihono et al. (2022) conclude that there are seven key factors throughout the study from 2012 to 2022 that correlate with the quality of teachers in Indonesia. These factors encompass work motivation, the leadership style of school principals, adherence to work discipline, the working environment, the prevailing work culture, and overall job performance.

In contrast to determining factors in school education, higher education quality comprises at least ten factors. These ten factors have been designated by the Directorate General of Higher Education as determinants of quality. Research by Singgih and Rahmayanti (2008) regarding factors influencing the quality of higher education concluded that these ten factors, which include governance, community service, curriculum, learning processes, human resources, academic atmosphere, research and publications, student affairs, finances, and infrastructure, have a significant impact on quality.

One of the components of higher education's human resources, in addition to lecturers, is students. The quality of incoming students significantly determines the quality of graduates from higher education institutions (Sumarno, 2012). Sumarno's study found that the quality of incoming students is problematic, as many private higher education institutions admit students without proper selection. Consequently, the quality of the output is compromised, and the institutions produce less-than-qualified future teachers. Currently, many private higher education institutions, especially those offering teacher education programs, only achieve accreditation status C, as discovered in Agung and Santosa's (2017) study. This situation undoubtedly lowers the quality of education in schools. High-quality education in schools cannot be expected when the educators are not of high quality, especially if they graduate from low-quality TCs.

The situation is exacerbated by the fact that many top-performing high school graduates are not interested in pursuing a career as teachers. The low salary for teachers is one of the main reasons behind this reluctance. According to Mansir's (2020) teacher salaries in Indonesia are still relatively low, especially for most private and contract teachers. Mansir compared Indonesian teacher salaries to those in Japan, where teachers earn an average of IDR 38 million per month. Even novice teachers in Japan earn around IDR 17 million per month. Mansir argued that Japan recognizes the importance of teachers as a key element in development, which is why they reward teachers with suitable salaries that ensure their well-being. In contrast, the Indonesian government appears less concerned about the fate of its teachers, as evidenced by the economic instability of many teachers, especially contract

teachers. This, in turn, reduces interest in teaching, as salaries and overall well-being are low. Furthermore, the current generation, especially millennials, prioritize prestige and are therefore less inclined to become teachers in Indonesia. Mansir also suggested that improving teacher welfare could change the public perception of teachers, as people often compare teacher salaries with those of doctors or engineers. Higher teacher salaries and improved well-being would likely increase interest in teaching.

This research aims to analyze the quality of students currently pursuing education in TCs to become professional teachers. Bhakti and Maryani (2017) emphasized that high-quality human resources are only produced by high-quality educational institutions. However, as mentioned earlier, many low-quality teacher education institutions still exist. Sumarno (2012) also concluded in his study that the quality of higher education in Indonesia is low, partly due to the low rankings of Indonesian universities on a global scale. For example, in 2011, the highest-ranked Indonesian university, the University of Indonesia, was ranked 217th out of the top 600 universities in the world according to THE-QS World University Ranking. There are also many low-quality private TCs. Therefore, this research will also evaluate the quality of TCs, responsible for producing high-quality future teachers.

Until now, society has relied on accreditation status or the accreditation status of specific programs to assess the quality of TCs. Accreditation is a government-regulated assessment of program suitability within educational institutions based on established criteria. The Ministry of Research, Technology, and Higher Education's Regulation No. 44 (Minister of Research, Technology, and Higher Education of the Republic of Indonesia Regulation on National Higher Education Standards. , 2015) established eight National Education Standards (NES) that must be met by higher education institutions, including (i) graduate competency standards, (ii) learning content standards, (iii) learning process standards, (iv) learning assessment standards, (v) faculty and staff standards, (vi) learning facilities and infrastructure standards, (vii) learning management standards, and (viii) education financing standards. Based on these standards, the National Accreditation Agency for Higher Education (NAA-HE) developed instruments for assessing institutions and determining their accreditation status.

NAA-HE is a government agency with the authority to accredit higher education institutions, including TCs. During the accreditation process, NAA-HE uses an assessment instrument. This instrument measures four dimensions of assessment, as specified in Regulation of NAA-HE No. 4 of 2017: (i) the quality of leadership and governance performance, (ii) the quality and productivity of outcomes, (iii) the quality of processes, and (iv) the performance of input quality, including human resources (faculty and staff), students, curriculum, facilities, financing, and cooperation.

Research Method

The research method involves a combination of quantitative and qualitative approaches. This approach is employed to evaluate the accreditation of TCs and the quality of incoming students at TCs. The study population includes all public and private TCs offering both Elementary School Teacher Education (ESTE) and Teacher Professional Education (TPE) study programs. The research subjects consist of the Heads of ESTE and TPE study programs from four TCs located in and around Jakarta, as well as their senior-level students from both education study programs. The four TCs are The State University of Jakarta, The Muhammadiyah University Prof. Dr. Hamka, The College of Pedagogy and Educational

Sciences (CPES) Kusumanegara, and CPES Arrahmaniyah Depok. The first two colleges offer both ESTE and TPE study programs, while the latter two only provide ESTE study programs. Quantitative analysis involves secondary data obtained from the Higher Education Data Center (HEDC), Ministry of Education and Culture, focusing on the accreditation status of TCs. Primary data are collected through student questionnaires to assess the quality of incoming students when they enroll in TCs. Qualitative data analysis is conducted on information obtained from Focus Group Discussions (FGD) with the Heads of ESTE and TPE study programs. These discussions are aimed at gathering their opinions and insights on how to improve the quality of teachers and TCs.

Result and discussion

1. General Finding

Minister of Education and Culture (2013) has issued Regulation No. 87 regarding Teachers Professional Education (TPE) program, with the aim of producing professional teachers for various educational institutions. Since then, the teacher education system has undergone changes. To become a professional teacher, a prospective teacher must first complete a bachelor's degree and then participate in a 1-year TPE program to earn the professional teacher title abbreviated as 'Gr.' Therefore, graduates with an education bachelor's degree cannot immediately become professional teachers; they must pursue further education through TPE program. The learning system in the TPE program includes workshops, teaching practices, and competency assessments. To pass the TPE program, students must achieve a minimum passing grade of 80 %. Students who do not meet this minimum criterion are given the opportunity for additional training until they attain the required minimum score.

2. Special Findings

a. Student Input Quality

Student input plays a crucial role in determining the quality of graduates from TCs. Therefore, it is necessary to conduct strict selection processes for prospective students to ensure the recruitment of high-caliber teacher candidates.

1) Student Rankings in High School Grade 12

Information about student rankings during their time in high school can provide an insight into the quality of student input. The following figure presents a visualization of student rankings.

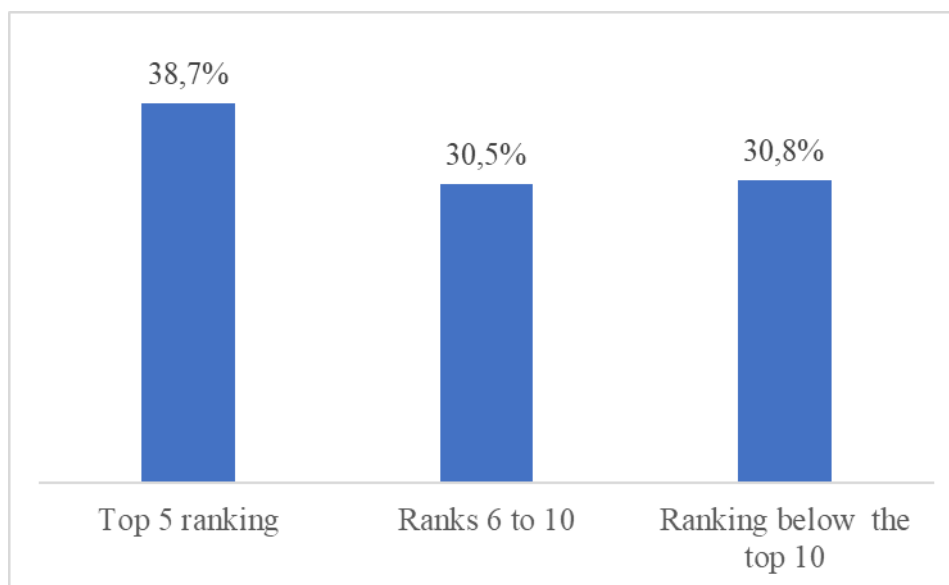


Figure 1. Student Rankings While Still in High School Grade 12 (N=499)

From the chart, it can be seen that out of 499 students, 38.7% ranked in the top 5 in their class during high school, 30.5% ranked between 6th and 10th, and the remaining 30.8% ranked outside the top 10. Based on this data and information, it can be concluded that the quality of student input is quite good because the majority ranked in the top 10 during their high school education. It has been frequently heard that those with high rankings in high school often choose to major in non-education faculties. This shift is a result of teacher certification, as this policy has made the teaching profession highly promising.

2) Student Interest in Entering TCs

Information about students' interest in entering TCs is obtained directly through student questionnaires. In recent years, ESTE Program has become one of the favorite choices for high school graduates. The following figure presents the results of an online survey on the reasons why students choose to enter TC.

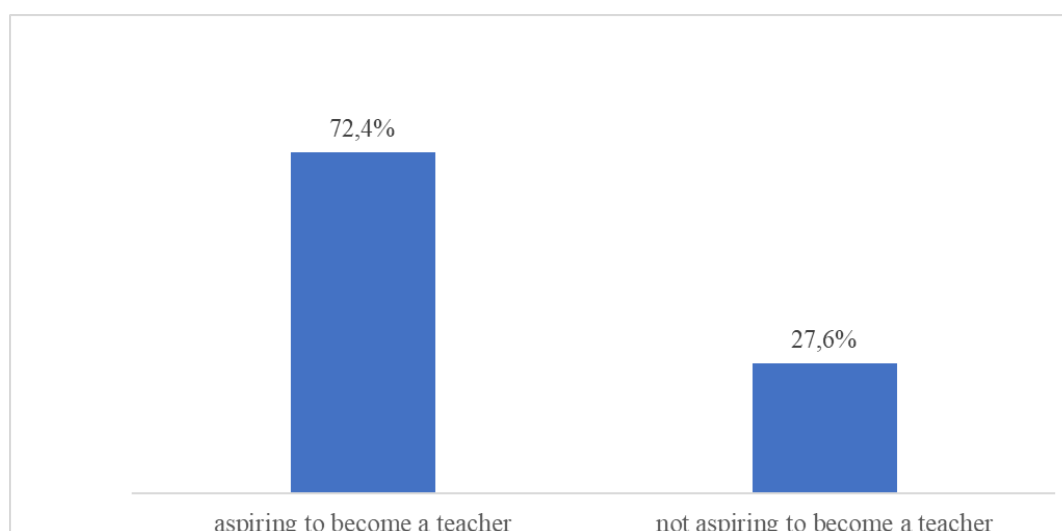


Figure 2. Reasons for Students Choosing to Enter TC (N=499)

From the chart, it is evident that the majority of students (72.4%) choose to enter TC because they genuinely aspire to become teachers. This information provides an insight into the teaching profession being highly promising, which can attract high school students' interest. This serves as a strong basis since TCs can select outstanding prospective students.

Regarding student input, it is evident that TCs have been able to attract students of choice due to the relatively high level of public interest in entering TCs. It can even be observed that a significant number of students who enter TCs are those who ranked in the top 5 during their time in high school. However, it is essential to approach this observation with caution as the student sample comes from well-known TCs in Jakarta and surrounding areas, where the teaching profession is especially appealing, notably in the Special Capital Region due to the high income of teachers in Special Capital Region Province. Regarding teacher input, the study team compared it with student input in other countries who are selected to become teachers. For instance, in Singapore, teaching is among the top 5 favorite professions because of the rigorous selection process, as mentioned by Herususilo (2021). This is because the teaching profession in Singapore undergoes a stringent selection process, resulting in skilled and creative teachers in performing their duties. According to Easyuni's guidelines (Easyuni, 2019), teachers in Singapore are known for their quality because they are selected from the best students during their high school years. While the situation in Indonesia is not entirely the same, the findings from this study provide hope as a significant number of the top-performing high school students are starting to show interest in pursuing higher education at TCs.

b. Quality of TCs

So far, to understand the quality of a TC or a study program, one can obtain information through accreditation status and the accreditation score it has achieved. Data from HEDC in 2020 shows that there are currently 595 TCs in Indonesia, consisting of 43% Religious TCs, 11.1% State TCs, and 45.9% Private TCs (Figure 3). Therefore, the majority of TCs offering the ESTE Program are private institutions. Among all the TCs, only 40.3% are accredited, meaning that over half of the existing TCs are not accredited.

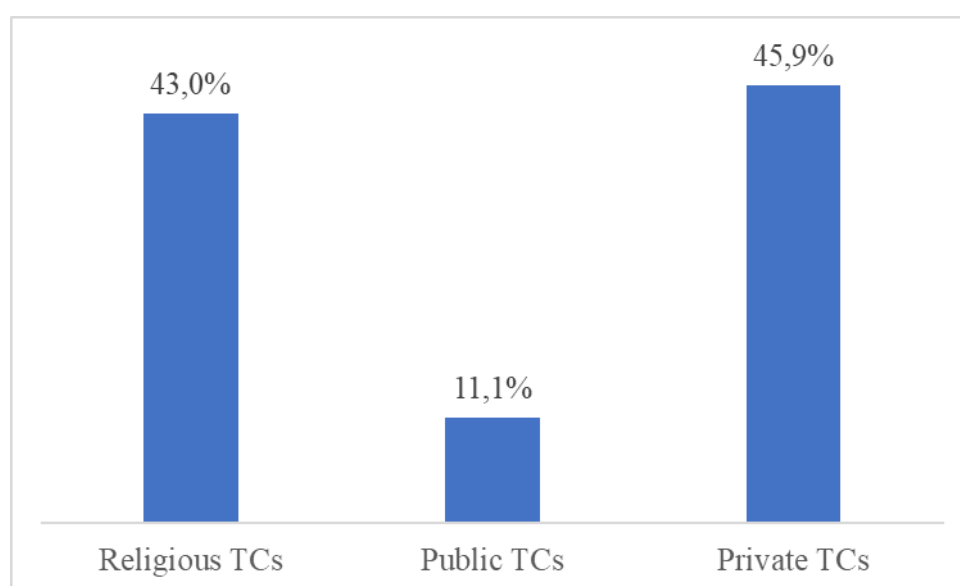


Figure 3. Number of TCs (N=595)

All these TCs offer a total of 603 ESTE programs; this number exceeds the count of TCs because some institutions offer ESTE programs at multiple locations or campuses. Out of the 603 ESTE programs, only 41.1% have achieved accreditation (Figure 4).

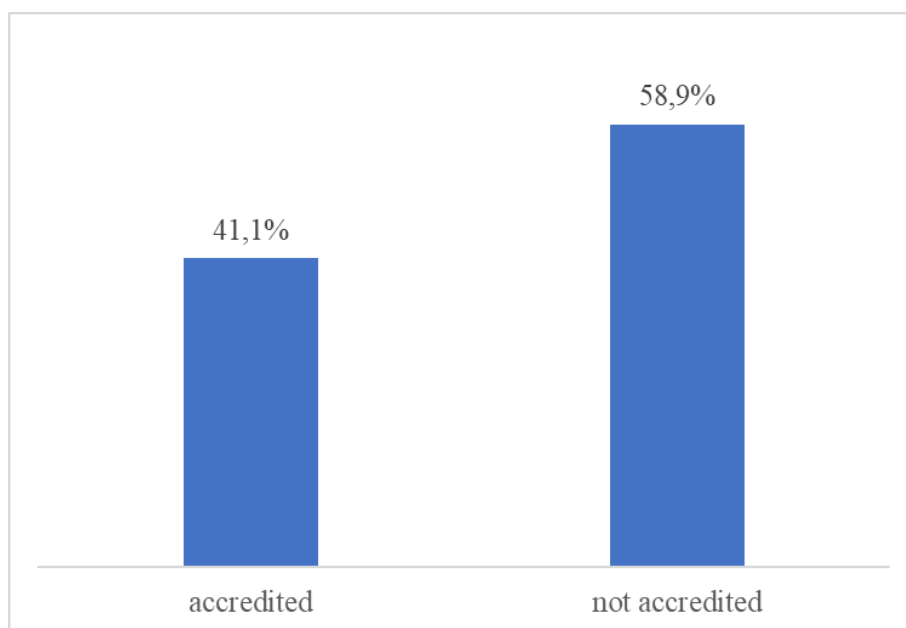


Figure 4. Accreditation Status of ESTE Programs (n=603)

It can be seen that less than half of the ESTE programs are accredited. Among the accredited ESTE programs, only 11.7% have received an A accreditation, 52.4% have received a B accreditation, and 35.9 % have received a C accreditation (Figure 5).

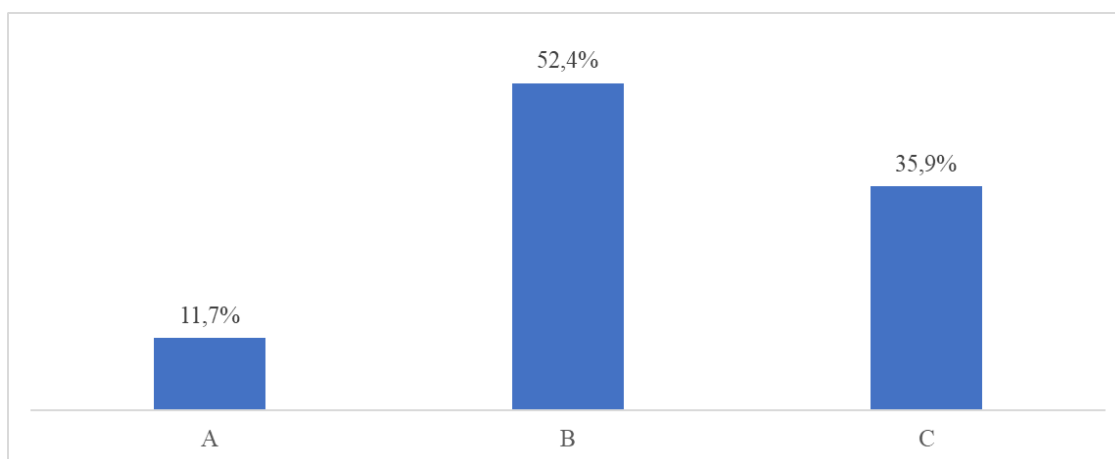


Figure 5. The Accreditation Level of the Accredited ESTE Programs (N= 248)

It is evident that many ESTE programs are accredited at the C level. This undoubtedly affects the quality of prospective teacher graduates. TCs that are accredited at level C should strive to improve themselves as soon as possible to achieve level B accreditation to produce high-quality graduates.

Among the TCs, approximately 21.2% have been designated by the Ministry of Education and Culture to provide TPE programs. TCs offering TPE programs actually provide a total of 145 TPE programs, and only 24.8% of them have achieved level B accreditation, which is the minimum accreditation status required for a TC to offer TPE programs. The fact that many

TCs, and then ESTE and TPE programs remain unaccredited indicates that many TCs have only recently obtained operational permits to offer ESTE and TPE programs. From this, it can be understood why many prospective teachers graduate from TCs with either newly acquired level C accreditation or those that remain unaccredited.

There is a red thread indicating the relationship between teacher competence and the quality of education, or in this case, the low performance of Indonesian children at the global level. Low teacher competence is marked by the low scores on the teacher competence test conducted by the government in 2015. This low teacher competence is, among other things, caused by the low quality of TCs as institutions that produce teachers. Most TCs are still accredited as C, as found in this study and previous studies. Many of them even operate based on operational permits from the government, specifically the Directorate General of Higher Education, Ministry of Education and Culture in this case. Additionally, the quality of incoming students is also low, as indicated in the previous study that many private TCs admit new students without rigorous selection. Furthermore, from primary data, it is evident that most students were not ranked in the top 5 during their time in secondary school.

Ideally, teachers should be those who ranked in the top 5 during their secondary school years, as is the case in Singapore. Unfortunately, the salary for teachers is not attractive enough to attract the best secondary school graduates to pursue education to become teachers. With the current teacher certification policy, teacher salaries are becoming more competitive with other professions, which has led to an increasing number of secondary school graduates showing interest in becoming teachers. This is, of course, very beneficial for TCs to implement strict selection processes to ensure the quality of incoming students. Furthermore, TCs should also maintain a high level of quality, with a minimum accreditation of B being allowed to offer ESTE and TPE programs. It's important to have high-quality incoming students studying in high-quality TCs.

Conclusion

In conclusion, this study reveals intriguing patterns in the career choices of high school students and the subsequent qualifications of future teachers. While the majority of high-achieving students, often within the top 10 rankings, are inclined to pursue careers in education, the pool of potential teachers extends beyond this group. Notably, many aspiring teachers do not hail from the highest-ranking students during their secondary school years. Additionally, a concerning trend is observed where a significant number of teacher candidates fail to meet the necessary prerequisites for conducting teacher professional education, signaling a need for enhanced qualification standards in the field of teacher certification. These findings underscore the complexity of teacher recruitment and the imperative to foster a diverse and well-qualified teaching workforce.

The recommendations put forth in this study have significant implications for the government's role in shaping the education sector. Firstly, offering scholarships to the highest-achieving graduates for teacher education implies that financial incentives could attract top talent into the teaching profession, potentially raising the overall quality of educators. However, it also necessitates a well-structured scholarship program that can identify and support the most promising candidates effectively. Secondly, the proposal to revoke a TC's operational permit for failure to meet standards implies a crucial need for stricter quality control measures in teacher education. This policy could help maintain high standards within TCs, ensuring that future educators receive adequate training. Nevertheless,

its implementation requires a clear and transparent system of standards and evaluation, which should be well-defined and consistently enforced to prevent any undue disruption in teacher education programs.

One limitation of this study is that it was conducted in the midst of the COVID-19 pandemic, which led to the study location being restricted to only TCs around the Special Capital Region of Jakarta province. Another limitation of the study is that the teacher salaries in the Special Capital Region of Jakarta province, are indeed high, making it quite attractive for high school graduates to pursue a teaching career. Therefore, caution is needed when interpreting the conclusions of this study before applying its recommendations to other provinces.

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Innovative Technologies for Multidisciplinary Design Teaching and Learning in Higher Education

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Abstract

This research delves into the innovative integration of two emergent digital collaborative platforms, Miro and Padlet, within higher education pedagogy, concentrating on their application in design-centric courses at Sunway University, Malaysia. The study encompasses two distinct student cohorts: one, a collective of seventy-three students from the Design Enterprise module, engaging with Miro and enrolled in either BA (Hons) in Design Communication or BA (Hons) in Interior Architecture; the other, a group of thirty-eight Design Communication pupils utilizing Padlet in a Design and Typography course. The purpose of this research is to explore how these technologies influence student engagement, communication, and the acquisition of multidisciplinary skills within a social constructivist framework. Utilizing methodological triangulation encompassing student surveys, interviews, and observations, the study assesses the platforms' effectiveness through various collaborative activities. Principal results indicate that while both platforms enhance engagement and skill acquisition, students' initial reception differs due to the perceived complexity of the tools; Padlet's user-friendly nature facilitates immediate utilization, whereas Miro's sophisticated functionality sometimes initiates reluctance, emphasizing the importance of formal orientation sessions. The integration of such digital tools represents a transformative potential for pedagogical strategies in design-related fields in higher education. However, the research underscores the necessity of proper guidance and support in their implementation to ensure optimal student experience and learning outcomes, thereby influencing curriculum evolution both within Sunway University and globally. This study's findings are pertinent not only for curriculum enhancement but also for broader pedagogical innovation in higher education sectors worldwide.

Keywords: Social Constructivism, Higher Education, Design Education, Padlet, Miro

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Introduction

This study underscores the imperative in higher education to nurture individual prowess, teamwork, and cross-disciplinary approaches, vital for success in the rapidly evolving, interconnected global market. These skills are paramount in Design Communication and Interior Architecture, fields demanding innovation, effective communication, and visionary execution.

Centered on BA (Hons) Design Communication and Interior Architecture programs, the research investigates the employment of cutting-edge technologies like Miro and Padlet in courses including Design Enterprise and Design and Typography. Within the social constructivist pedagogy context, it examines how these digital tools can enhance learning, address students' distinct requirements in specialized design disciplines, and ready them for prosperous careers in a digitally forward, interconnected environment (Vygotsky & Cole, 1978).

Social constructivism posits that learning is a socially facilitated process, with knowledge constructed through interaction. This theory champions learner independence, reflective cognition, problem resolution, cooperative learning, scaffolding, and open discourse elements profoundly advantageous in the creative and fluid realms of higher education.

The paper explores how collaborative digital platforms can revolutionize higher education by augmenting student involvement, nurturing multifaceted skills, and refining pedagogical techniques, particularly in fields necessitating teamwork and visual inventiveness. It recognizes the demand for comprehensive training for diverse platform proficiencies and posits that these technologies can significantly modernize global curriculum design and teaching methodologies.

The burgeoning role of technology in education offers avenues for the efficacious application of social constructivist tenets. Tools like Miro and Padlet support instantaneous, visual teamwork, boosting student interaction and engagement. Their strategic utilization fosters an immersive learning milieu that encourages active involvement, analytical thought, and artistic freedom.

Analyzing Miro and Padlet's application in Sunway University, Malaysia's design courses, the study assesses their influence on student engagement, cooperative interaction, and the development of multidisciplinary capabilities. It concludes that these digital resources, when integrated with social constructivism, can deeply enrich academic syllabi, advocating their adoption to substantially innovate educational practices in our digital era.

Theoretical Framework

In design education, social constructivism posits learning as a socio-cultural process birthed from dialogue, collaboration, and critical reflection, aligning perfectly with design's interactive, iterative, and people-centric ethos.

Under this approach, design education should nurture spaces where students dive into active discussions and joint projects, reflecting Vygotsky's theory of learning through social engagement. It's a realm where peer-to-peer learning thrives, with ideas consistently

evolving, being challenged, and reformulated through group brainstorming and problem-solving (Vygotsky & Cole, 1978).

Instructors in this landscape act more as facilitators than traditional teachers. They pinpoint each student's Zone of Proximal Development (ZPD); the space between solo achievements and potential accomplishments with help and customize their mentorship to bridge this divide. This tailored guidance enables students to grasp advanced design concepts or skills beyond their independent reach.

Furthermore, educators employ scaffolding, offering varying degrees of support that escort students toward deeper understanding and skill mastery in design. This method involves guided practice, demonstrations, or feedback, with the support receding as students gain autonomy, reflecting the skill mastery process in Vygotsky's theory.

Social constructivism in design education also propels students toward reflective practice, where they critically assess their work and their peers'. This collaborative, social exercise involves students, mentors, and industry professionals exchanging critiques and insights to polish and iterate design solutions (Bamberger & Schön, 1983).

Recognizing that design operates within broader cultural, social, and economic spheres, this approach underscores real-world projects that immerse students in these diverse contexts. It urges them to contemplate the end-user and societal repercussions, molding designers who are more conscious, empathetic, and adaptable.

This paper delves into the intricate role digital collaborative tools play in higher education, framed by social constructivism, advocating for learning experiences that are socially vibrant and intellectually stimulating. As these platforms weave into the educational fabric, educators are prompted to embrace social constructivism principles to cultivate an educational climate that is inclusive, dynamic, and reflective. The insights presented seek to influence curriculum development at Sunway University and elsewhere, proposing a revolutionary shift in teaching methodologies, especially within design and entrepreneurship disciplines.

Literature Review

In today's digital age, with the prevalence of multimedia tools, learning is not only more accessible but also enhanced in quality, accommodating a broader spectrum of individuals. Education hinges on two elements: information dissemination and communication skills development, with technology being central to boosting these aspects. Online platforms like Padlet and Miro, pivotal in higher education, facilitate robust collaboration among educators and students.

Studies have evaluated Padlet's efficacy in higher education, yet few have focused specifically on design education. Research encompassing 16 journals from 2017 to 2022 indicated positive impacts of Padlet on class dynamics, performance, and student perceptions (Musayaroh, 2022). Zainuddin (2020) found Padlet beneficial for augmenting student engagement. Likewise, Padlet enhanced critical reading skills in higher education (Prastya, 2019). Investigations into Miro's use, particularly by Ahmmad et al. (2022), identified it as a superior Online Collaborative Whiteboard Platform (OCWP) after analyzing several platforms' educational benefits.

Kabil and Ilyas (2023) demonstrated Miro's effectiveness in nurturing innovative idea generation, critical thinking, and negotiation skills, while also bolstering students' digital proficiency. These findings echo Magen-Nagar and Shonfeld (2018), who documented reduced technology-related anxiety and increased confidence among students engaged in online collaborative learning.

The role of educators in technology integration is crucial. Herrington and Kervin (2007) argued for purposeful technology integration in education, seeing it as a cognitive tool that engages students in authentic learning experiences. Hew and Cheung (2013) stressed that the positive impacts of Web 2.0 technologies stem not from the tools themselves, but their strategic use within learning contexts. Similarly, Bower et al. (2015) highlighted the need for advanced multimedia synchronous technologies in traditional classrooms, considering communication needs and cognitive load.

Numerous scholarly investigations have focused on the transition towards online learning, primarily employing technology as a medium of communication between educators and learners. Nevertheless, an important gap exists in the existing body of scholarly work concerning the imperative nature of adapting the educational framework in order to align with the rapid progressions in technology within the realm of design higher education. To address this gap, it is crucial to investigate how adopting online collaborative platforms for higher education impacts the learning environment for students in the design fields. In consideration of this need, our ongoing research endeavours to elucidate instructional approaches that successfully integrate technological resources within the framework of social constructivism theory, with the aim of establishing and maintaining student-centred learning environments.

By undertaking this study with a specific focus on design higher education, our objective is to address a notable gap in the existing literature, while underscoring the integration of technology within the framework of social constructivism. Our aim is to contribute to the advancement of innovative educational practices that harness the transformative potential of technology within the design higher education context. Through this approach, we aspire to provide educators with valuable insights and strategies to create student-centred, technology-enriched learning environments within design education, thereby promoting active participation and success among higher education students within the realm of social constructivist principles.

Using Technology for Engaged Student-Centered Learning Environments

In modern education, lecturers evolve into facilitators and leaders, essential in design higher education that forms the next generation of creatives. Central to this is guided learning, blending self-directed learning with instructor assistance (Zimmerman, 2002).

This method is lecturer-focused, with educators shaping experiences and steering course trajectories. They adhere to a set curriculum with clear goals, illustrated in the Design and Typography module's inaugural hybrid class using Padlet. Students follow a distinct path, with materials, tasks, and evaluations guiding them.

Lectures impart crucial insights, punctuated with hands-on tasks for sustained interest and deeper comprehension. For example, a typography lesson featured a kerning game, offering students practical application and a platform for sharing on Padlet. This engagement

enhances learning and supports task fulfillment. Guided learning maintains a harmony between independence and systematic aid, prompting students to take charge of their learning under comprehensive supervision. They transition into self-regulated learners, establishing objectives, strategizing, tracking their advancement, and introspecting on their journey. Feedback underscored the structured and efficient course design, with comments like, “The subject is well organized and structured,” and gratitude for prompt, insightful feedback, applicable even for online attendees. This methodology received a 92% approval rating, surpassing traditional in-person classes by 4%.

Nonetheless, design education grapples with 21st-century market demands for extensive, flexible expertise. Stressing quick prototyping and repetitive processes can address this need (Meyer & Norman, 2020), a goal pursued by both Design and Typography and Design Enterprise through practical project implementation within guided learning. Inherent in design is creative problem resolution, necessitating organized, inventive methods. Guided learning bestows these abilities, with instructors offering essential, immediate critiques, and promoting cross-disciplinary inquiry to broaden outlooks and enrich the design voyage.

Integrating PBL and social constructivism, guided learning in design academia nurtures artistic superiority. It transforms students from mere audience members to proactive, self-regulated learners, preparing them for the dynamic realm of design with emphasis on active involvement, decisive critiques, and readiness for professional triumph. As design adapts, guided learning persists as a key educational approach in nurturing future creative experts.

Guided Learning

In contemporary education, lecturers transcend traditional roles, becoming facilitators and leaders in student learning, critical in design higher education, which moulds future creative minds. Guided learning, merging self-directed learning with instructor support, is central to this process (Zimmerman, 2002).

This approach is lecturer-centered, with educators structuring experiences, guiding, and setting course directions. They follow a fixed curriculum with defined objectives, as exemplified in the Design and Typography module's first hybrid classroom setting using Padlet. Students navigate a clear path with specific materials, assignments, and assessments directing their progress.

Lecture sessions deliver key knowledge, interspersed with practical activities to maintain engagement and deepen understanding. For instance, a kerning game was integrated into typography lessons, allowing students to apply concepts practically and share experiences on Padlet. This interactive approach scaffolds learning, aiding assignment completion.

Guided learning balances autonomy and structured support, encouraging students to assume responsibility for their education while benefiting from established guidance. They become self-regulated learners—setting goals, planning, monitoring progress, and reflecting on outcomes.

Student feedback highlighted course organization and effective structure, with remarks like, “The subject is well organized and structured,” and appreciative notes regarding timely, constructive feedback, even in online settings. The approach yielded a 92% positive response, outperforming pre-pandemic face-to-face sessions by 4%.

However, design education faces the 21st-century challenge of aligning with market complexities, necessitating broad, adaptable knowledge. Emphasizing rapid prototyping and iterative practices can bridge this gap (Meyer & Norman, 2020), an aspect both Design and Typography and Design Enterprise classes strive for through real-world project execution in guided learning.

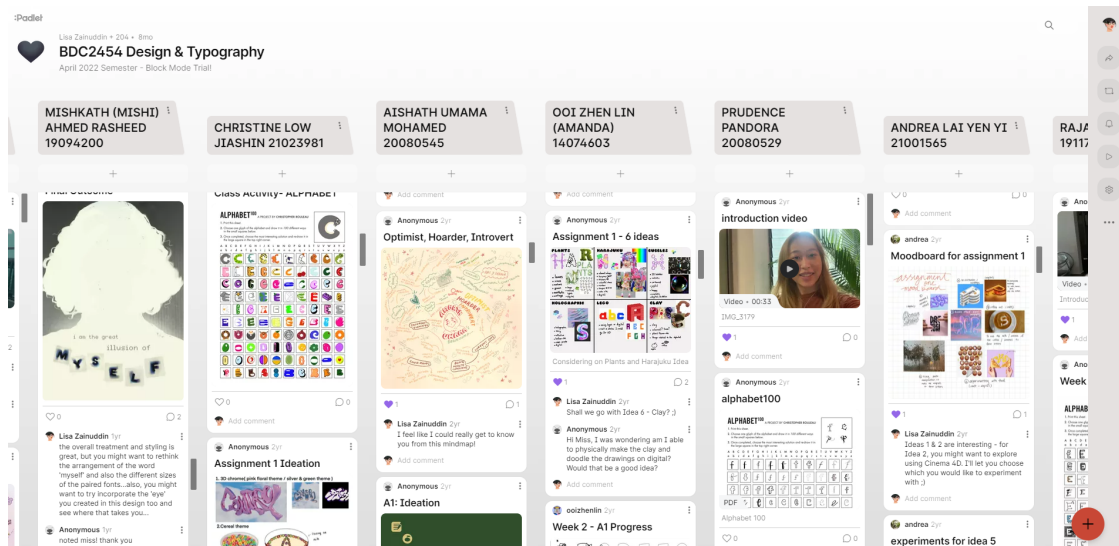


Figure 1: Padlet interface showing various students' progress and feedback

As a field rooted in creative problem-solving, design demands systematic, innovative approaches. Guided learning equips students with these skills, with lecturers providing crucial, timely feedback, urging interdisciplinary exploration to expand viewpoints and enrich the design journey.

Combining PBL with social constructivism, guided learning in design education fosters creative excellence, enabling students to evolve from passive listeners to self-regulated learners. This framework is instrumental in preparing students for the ever-evolving design field, emphasizing active participation, critical feedback, and a mindset poised for industry success. As design progresses, guided learning stands as an essential pedagogy in cultivating the upcoming creative professionals.

Active Learning

Active learning involves students actively participating in their education rather than passively receiving information. It's a student-centered approach, emphasizing tasks like reading, writing, discussing, and engaging in higher-order cognitive activities (Lee, 2018) (Bonwell & Eison, 1991). This method aligns with social constructivism theory, underscoring the importance of engagement and collaboration in learning. Incorporating technology, especially in blended learning environments, has been effective in enhancing these engaged experiences (Sahni, 2019).

Teaching strategies promoting active learning include problem-solving, cooperative learning, project-based tasks, and simulations, all of which have shown positive impacts on student attitudes and academic achievement. The use of digital tools like Miro and Padlet supports these strategies by offering spaces for real-time, collaborative problem-solving and idea-

sharing, fitting within the constructivist learning environments as described by Wilson (1996).

The COVID-19 pandemic accelerated the adoption of such tools in courses like Design Enterprise. Miro, for instance, facilitated hands-on learning experiences, consistent with social constructivist principles, in a virtual space. It allowed students from different programs to interact, collaborate, and co-design, fostering a sense of community and joint ownership over projects. Initial activities on Miro included creating mind maps and analysing movie themes to encourage familiarity with the platform and peer connectivity.

Throughout the semester, Miro's features were integral for students to conduct design sprints, develop business concepts, and engage in market analyses. The approach was personalized, acknowledging individual student inputs while emphasizing collective effort. For accountability, students attached their names to contributions, enhancing critical thinking and team skills.

The pedagogy employed was grounded in Social Constructivism and Vygotsky's Zone of Proximal Development (ZPD), offering incremental support and underscoring the role of social interaction in cognitive development. Activities were structured into manageable segments to facilitate gradual competence building.

This strategy aimed to foster autonomy and self-directed learning, enabling students to actively navigate their educational paths and deeply engage with the design process. It recognized the essential role of social interaction, aligning with Vygotsky's theory, and harnessed technology to facilitate this interaction amidst modern challenges (Papert, 2020).

Digital technologies, like Miro and Padlet, offer substantial capabilities for promoting collaborative learning (Jeong & Hmelo-Silver, 2016). These platforms embody constructivist learning environments, where learners collaboratively use various tools and resources to achieve learning goals and problem-solve (Wilson, 1996).

This study examines the outcomes of using Miro for group work in active learning, a key aspect of collaborative learning in social constructivism, and Padlet for guided learning in hybrid classrooms. It focuses on their application in activities like ice-breaking, brainstorming, flipped classrooms, peer learning, and project-based learning in design higher education.

Ice-Breaking Activity on Padlet

Amidst transitioning to hybrid teaching post-COVID-19, Sunway University faced the challenge of nurturing connectivity in a Design and Typography class of thirty-eight students who had previously never met in person. Employing Padlet as an ice-breaking tool proved instrumental. Under the lecturer's real-time guidance, students learned to construct their Padlet walls, populating them with multimedia content that encapsulated their weekly activities, research, and design progress.

Students introduced themselves through videos, sharing their names, origins, and aspirations in design, bridging the divide between online and in-person participants. This innovative approach not only alleviated the disconnect stemming from a lack of physical interaction but also established a vibrant platform for peer engagement. By visually communicating their

motivations for pursuing design, students enhanced their sense of community, pivotal to social constructivism.

This exercise unearthed common interests, forging camaraderie and a sense of belonging, crucial for comfortable participation in discussions. Moreover, it honed students' digital literacy, with a significant 90.3% acknowledging Padlet's user-friendliness despite occasional technical setbacks. Such digital proficiency is indispensable for future academic and collaborative ventures.

Brainstorming With Miro

Incorporating interactive strategies such as discussion forums and group brainstorming in education spurs active participation, enhancing critical thinking and subject comprehension, reflecting constructivist theories by Piaget, Vygotsky, and Dewey that underscore active, reflective, and communal learning facets (Azhari et al., 2020).

Particularly in social constructivism, brainstorming is potent, echoing Dewey's practical learning and Vygotsky's emphasis on social interactions for cognitive expansion, viewing knowledge construction as an interplay of personal experiences and social interactions (Mascolo & Fischer, 2005).

In the realm of hybrid education, Miro emerges as a crucial asset, providing a cohesive digital environment for collaborative endeavors, essential for cognitive growth as theorized in Vygotsky's Zone of Proximal Development. However, hurdles like technological proficiency, internet connectivity, and session management persist, prompting Design Enterprise educators to facilitate Miro orientations to alleviate apprehensions.

Students responded affirmatively, with 80% endorsing their educational journey. Metrics reflected a 73% satisfaction rate in instructional quality and a 77% recognition of substantial intellectual engagement, noting an 11% uptick in contentment relative to the pre-social constructivism and Miro era.

This data attests to the efficacy of the hybrid format, augmented by Miro and social constructivism principles, in fostering a vibrant and productive learning milieu, preparing pupils for entrepreneurial ventures. In essence, when adeptly applied, interactive techniques anchored in social constructivism and facilitated by platforms like Miro have significant impact, propelling a dynamic educational experience in hybrid frameworks, provided potential barriers are conscientiously navigated.

Flipped Classroom for Collaborative Learning

The flipped classroom is a progressive educational strategy that deviates from conventional lecture-based teaching. Rather than being passive recipients, students in this model access learning materials, such as online video lectures, before class. This advance preparation allows class time to be dedicated to more interactive and experiential activities, fostering active learning and effective collaboration among peers (Playfoot, 2023).

This method is particularly impactful in multidisciplinary design education, emphasizing collaborative learning. Technology is vital here, offering platforms for interaction, group discussions, and shared reflection. Peer learning emerges as a significant advantage, enabling

students to collectively deepen their understanding of design principles, thereby enhancing productivity and sharpening crucial skills such as communication and problem-solving (Pawson, 2016).

Within this framework, tools like Miro are game-changers for group projects. For instance, in a Design Enterprise course, students prepared for classes by studying materials like the Business Model Canvas, a strategic management template. This approach transformed them from passive listeners to active learners, ready for in-depth, application-based class sessions.

Miro, an interactive platform, enriched the in-class experience. Students used specific templates from Miroverse to apply their theoretical understanding to practical scenarios, crafting detailed startup concepts. Miro's dynamic features supported real-time feedback and discussion, enabling students to visually draft business ideas, and engage deeply with all aspects of the Business Model Canvas, from value propositions to customer interactions.

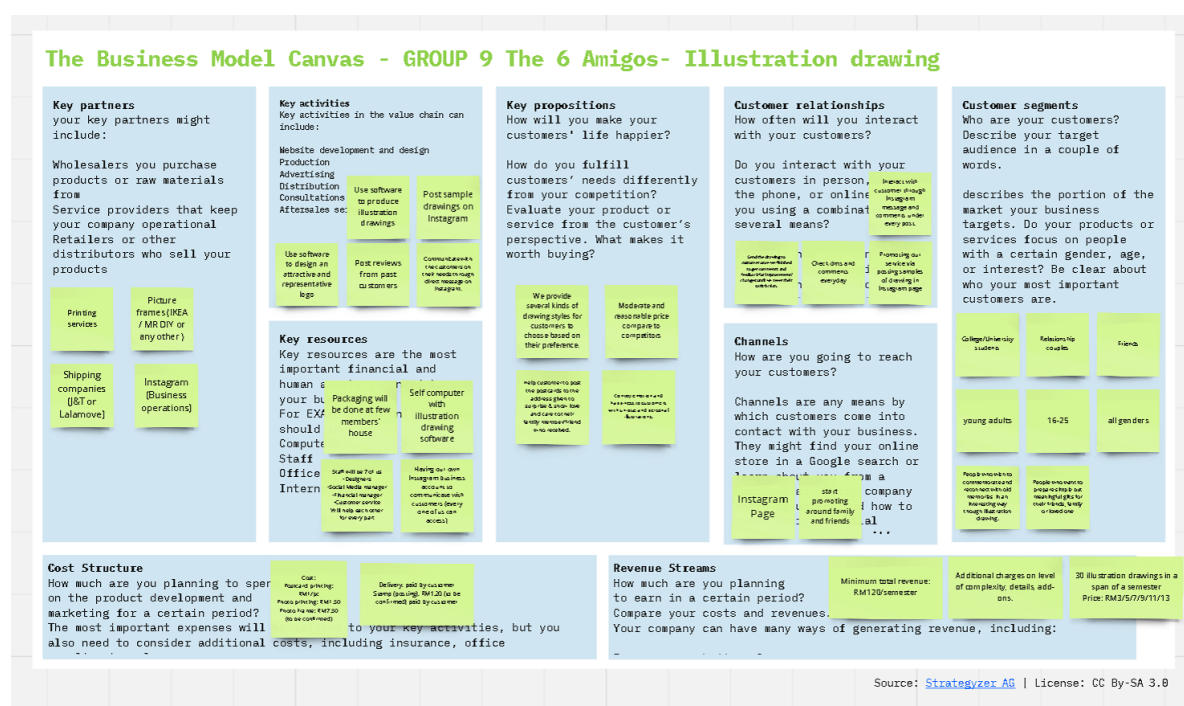


Figure 2: Business Model Canvas on Miro used to assist group brainstorming session

Through these methods and tools, the flipped classroom and collaborative learning are redefining the landscape of modern education, making learning more interactive, student-centred, and aligned with the demands of contemporary fields.

Utilizing Padlet in educational settings aligns with social constructivism theory, emphasizing knowledge construction through social interaction (Vygotsky & Cole, 1978). Padlet's user-friendly interface allows students and lecturers easy access to work and feedback, fostering collaborative learning. From a survey, 93.5% of students acknowledged Padlet's convenience for tracking progress and receiving feedback. However, a limitation is its lack of notifications for recent interactions. This platform, similar to Miro, serves as a digital archive, documenting students' design processes throughout a course. It enables critical analysis of progress and identification of areas needing improvement, resonating with social constructivism's emphasis on introspection and understanding one's learning processes (Vygotsky & Cole, 1978).

Moreover, the visibility of work on Padlet encourages accountability, responsibility, and active participation, crucial elements of social constructivist learning. Survey feedback highlighted the motivational aspect of this transparency, with one student noting the communal display of work fostered a sense of class unity. Furthermore, continuous lecturer feedback on these platforms enhances learning management effectiveness (Kryukov & Gorin, 2017) and promotes a shift from isolated to dynamic, continuous learning processes, increasing student engagement beyond traditional classrooms (Borba et al., 2016).

Padlet's role in compiling weekly progress engages students in knowledge construction through sharing, interaction, and peer feedback, core tenets of social constructivism. In a survey, one-third of participants reported increased inspiration and motivation from viewing peers' progress, emphasizing the platform's positive impact on student development and the overall learning experience in design classes. This method not only supports individual growth but also fosters a collaborative and socially interactive educational environment, substantiating the principles of social constructivism in practical application.

Project-Based Learning

Project-based learning (PBL) is a dynamic educational strategy characterized by student-centered learning through real-world projects (Krajcik & Shin, 2014). PBL, especially when augmented by digital tools like Padlet and Miro, facilitates active, experiential learning and collaboration beyond geographical constraints—a crucial adaptation amid the pandemic's hybrid classroom models. These platforms enable diverse forms of student expression, enhancing comprehension and engagement.

PBL's significance in higher education is undeniable, promoting deep learning, critical thinking, and skill acquisition (Vygotsky & Cole, 1978). Through a social constructivism lens, PBL bridges theoretical learning with practical application, emphasizing collaborative knowledge construction and "learning by doing" (Jonassen, 1994).

During the COVID-19 crisis, Design Enterprise students engaged in an ambitious experiential project, creating socially responsible startups. The hybrid learning model, necessitated by the pandemic, provided an unconventional opportunity to apply social constructivism, blending physical and digital interactions to foster collaborative learning. Miro facilitated this, offering a shared space for idea exchange and project development, accommodating synchronous and asynchronous contributions.

This methodology actualized social constructivism principles, with students collaboratively navigating challenges, refining ideas, and learning through social interaction, akin to Vygotsky's "Zone of Proximal Development" (Vygotsky & Cole, 1978). Despite facing pandemic-induced challenges, students acquired practical skills, balancing academic knowledge with real-world application.

The integration of PBL, digital tools, and social constructivism enriched the learning experience, developing students into adept, socially conscious individuals. Reflecting on the course, student feedback was positive, with all meeting sales targets in a condensed timeframe, showcasing this educational approach's efficacy.

Contrastingly, traditional learning is more rigid, focusing on unilateral knowledge transfer. PBL, however, encourages practical application of learned concepts, as evidenced in design assignments where students applied theoretical knowledge creatively and pragmatically.

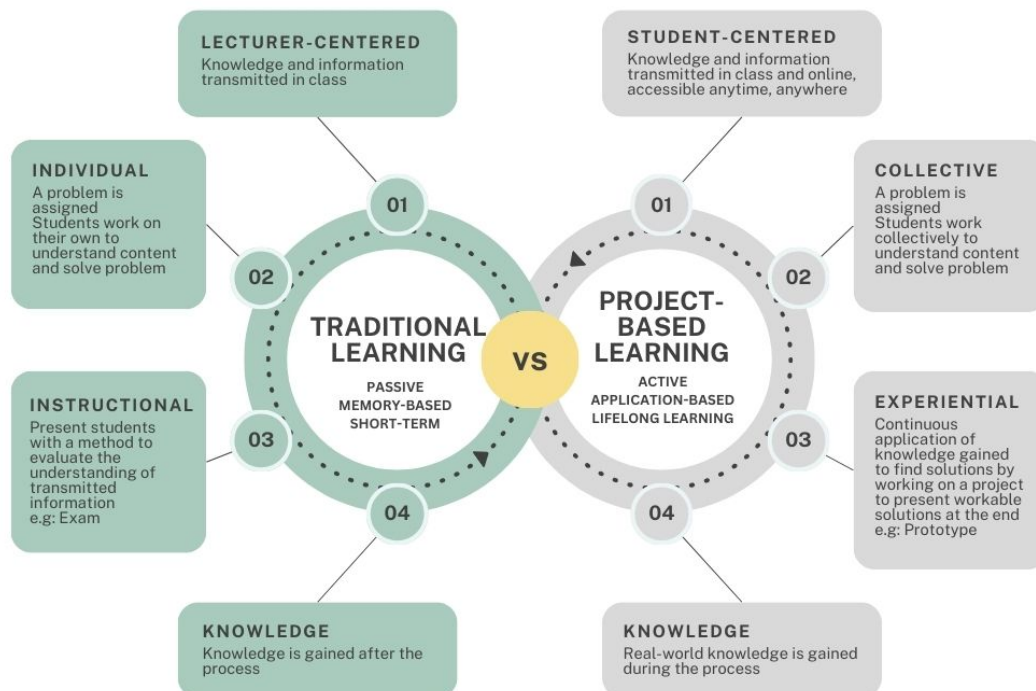


Figure 3: Comparison chart between traditional learning and project-based learning

PBL encourages skill integration, cooperative problem-solving, and iterative development based on feedback and self-reflection. Tools like Padlet and Miro not only document this journey but also stimulate motivation through peer inspiration. A survey revealed that 32.3% of students felt encouraged by their peers' progress on Padlet.

In summary, PBL, supported by social constructivism, fosters critical thinking and problem-solving through social interaction, effectively bridging academic learning with practical industry demands (Jonassen, 1994). This approach prepares students not just as skilled individuals, but as innovators aware of the societal contexts of their discipline.

Conclusion

Integrating Padlet and Miro in education, influenced by social constructivism, project-based, guided, and active learning, is pivotal for modern education, meeting evolving needs and the specific demands of future design education. Implementing Miro in Design Enterprise and Padlet in Design and Typography proved effective in hybrid classrooms for Design Communication and Interior Architecture students, as reflected in high student satisfaction surveys. These platforms facilitate dynamic interaction, idea sharing, and collective knowledge building, essential for digital-era community and collaboration. They enable practical, industry-linked project work, promoting self-regulated learning and skill development for future workforce complexities.

Key future steps involve crafting assessments aligned with social constructivism in collaborative design learning spaces and promoting interdisciplinary cooperation to boost creativity and problem-solving. However, ensuring educator training in project-based, guided, and active learning is vital for successful integration and meeting learning objectives. Sharing specialized strategies and best practices will enhance technology and pedagogy use, preparing design students for a future-ready education (Kryukov & Gorin, 2017).

By adopting these measures, educational institutions can fully exploit technology and innovative teaching methods, navigating the shifting educational terrain and equipping students with a comprehensive, forward-thinking education.

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Understanding Agile: A Case Study in Educational Complexity

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Abstract

As the nature of engineering concepts, products and processes becomes more intricate and detailed, so the task of understanding, managing and implementing them becomes more complex. This paper takes one such development concept, Agile, and examines how the orthogonal, multi-faceted nature of both the concept and its application makes it difficult to understand and employ and considers in this context the andragogical difficulties posed when trying to teach it to level 7 students. The practice of Agile is often considered to be either the application of methods such as Scrum, extreme programming (XP) or Scaled Agile Framework (SAFe), or the implementation of agile values or principles. In practice, however, a greater level of complexity exists and many more facets need to be considered, such as organisational structure, suitability of project and product, skill set of individuals, and even the mind set of those involved, because the adoption of agile requires more than the use of a technique as part of normal business procedures. In order to understand the complexity of a concept such as agile and the implications which it poses for andragogical teaching and learning strategies, the nature of the concept is first considered to identify the challenges that it creates for education, before a mapping of teaching strategies to agile facets is produced, and thought is given to the creation of an andragogical mechanism which will promote and engender student understanding of the concept and how it can be applied across a range of topic areas in context.

Keywords: Agile, Agility, Andragogy

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Introduction

The practice of Agile, frequently taken to encompass ideas of agility or implementing agile principles, methods, or methodologies, is a topic that is often misunderstood or simplified to reduce the level of complexity and consequent difficulty in understanding implied by the concept. It can in fact encompass many factors that need to be considered before agile can be introduced and implemented successfully, and unless a more holistic view is taken on whether agile is an appropriate concept for use, at best intended benefits will not be realised, whilst at worst attempts to employ agile might result in disruption to organisational structure and processes. ‘Agile’ and ‘agility’ are concepts that include different ideas such as a manifesto (agile manifesto, 2001a), principles, approaches, methods and methodologies, some of which are presented as high-level structures or approaches, whilst others such as SCRUM (Schwaber, 1997; Sachdeva, 2016), XP (eXtreme Programming; Bryant, 2004; Stray et al, 2022), and SAFe (Scaled Agile Framework; Scaled Agile, 2023a). These mechanisms tend to promote the benefits of agile (Planview, 2023; Wrike, 2023a) and explain what agile is and how it can be achieved, but frequently they do not do so in context meaning that unless a specialist organization is contracted to implement an agile technique, these mechanisms can be both difficult to understand and difficult to implement. Essentially, whilst there are well-established and documented descriptions of what agility is, there is a lack of advice on how to tailor agile methods to particular problem situations in context or to specific project realities, and perceptions of how to do this tend to differ, which can only increase uncertainty as to which is the best way in which to proceed. Thus organisations (and individuals) tend not to either fully appreciate the nature of the task of ‘doing’ agile, or the issues in understanding how agile can be implemented.

In the face of these factors, it can be seen that agile has certain benefits, and it might be beneficial in certain circumstances. What those circumstances are, however, varies by factors such as context, need, project type and maturity, understanding and experience. The problem presented by this is therefore in determining:

- (a) How can agile and agility – and its understanding – be understood?
- (b) How can this be taught?

As such there is a need to examine the nature of agile, factors which characterise it and effect its understanding, what benefits it might bring, and when – crucially how – it is suitable for adoption. In pursuit of this understanding, this paper will endeavour to analyse concepts of agility comprising definitions and the various mechanisms for its achievement to understand their structure, advantages and benefits, before considering the potential pitfalls and disadvantages of adopting agile, and finally putting this in the context of how such factors can be best understood, and from the perspective of an educator, how they can be taught and what a suitable andragogical strategy might be to overcome issues of understanding and to provide a hopefully clearer understanding.

Concepts of Agility

In considering the nature of agile it can be seen that there are many definitions of ‘agile’, ‘agility’ and similar concepts, and there is a good deal of information available as to what agile is. Moreover, much has been written to advance theories which describe different approaches, methods, and methodologies which can be used to achieve it. If we first consider definitions of agile, the Oxford English dictionary (OED, 2023a) describes ‘agile’ as an

adjective: “Able to move (esp. to climb or manoeuvre) quickly and easily; nimble, dexterous. Also figurative and in extended use.”, and ‘agility’ as a noun: “The ability to think and understand readily and quickly; quick-wittedness, alertness; mental dexterity; (also) an instance of this” (OED, 2023b). Other dictionaries provide similar definitions; for example, for ‘agile’, the Cambridge Dictionary (Cambridge Dictionary, 2023) suggests “[physically] able to move your body quickly and easily” and “[mentally] able to think quickly and clearly”, whilst Dictionary.com (2023a) offers “quick and well-coordinated in movement”. In a business sense, the Cambridge Dictionary gives us: “able to deal with new situations or changes quickly and successfully” (Cambridge Dictionary, 2023). Each of these definitions offers similar ideas of quickness, flexibility, clarity, involvement of individuals in understanding and reacting, and rapidity of reaction. These factors are also reflected in the principles of the Agile Manifesto for Software Development (agile manifesto, 2001b), as described at table 1 below.

Manifesto Principle	Rationale/method
Our highest priority is to satisfy the customer	Through early and continuous delivery of valuable software
Welcome changing requirements	Even late in development. Agile processes harness change for the customer's competitive advantage
Deliver working software frequently	From a couple of weeks to a couple of months, with a preference to the shorter timescale
Business people and developers must work together	Daily throughout the project
Build projects around motivated individuals.	Give them the environment and support they need, and trust them to get the job done
The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.	<i>Ensure efficient and effective conveyance of information</i>
Working software is the primary measure of progress	<i>As left</i>
Agile processes promote sustainable development.	The sponsors, developers, and users should be able to maintain a constant pace indefinitely
Continuous attention to technical excellence and good design	Enhances agility
Simplicity is essential	The art of maximizing the amount of work not done
The best architectures, requirements, and designs	Emerge from self-organizing teams
At regular intervals, the team reflects	On how to become more effective, then tunes and adjusts its behavior accordingly

Table 1: Principles of Agile Manifesto (Agile Manifesto, 2001b) split into principle and rationale

The principles at table 1 are based on the core values of the agile manifesto (agile manifesto, 2001a) as described below.

- (a) Individuals and interactions over processes and tools
- (b) Working software over comprehensive documentation
- (c) Customer collaboration over contract negotiation
- (d) Responding to change over following a plan

These principles set out a series of steps by which the values can be achieved, but it should be noted that they are software-focused and there are a series of assumptions and pre-requisites for successful adoption of these ideas not only in software development but also if they are to be adopted across a wider range of organisations and industries. Potential examples of this are described at table 2.

1.	Whilst having the customer as the highest priority is laudable, contractual value may result in prioritization of work and therefore response to customer (Hooles, 2017)
2.	Welcoming change to requirements is good, but may result in requirements creep, which in turn could negatively impact upon cost, workload, timelines and resourcing (Manos, 1993)
3.	Availability and workload may hinder or prevent business people having the time to work closely with developers especially on a daily schedule (Powl & Skitmore, 2005)
4.	Building projects around well supported motivated individuals is a good idea, but it assumes that people are enfranchised and motivated, and this is dependent upon factors such as workload and organizational culture (Milne, 2007; Kumar & Sundareshan, 2015)
5.	Most projects and organisations have a number of key performance indicators (KPIs), not just working software (i.e., project outcome)
6.	Agile processes are unlikely to promote sustainable development in isolation; other factors – and constraints – must be considered
7.	Simplicity – in product design and project performance – is an aim that is not always achievable due to pre- and post-requisites, project structure, risks, constraints etc
8.	The best architectures, requirements, and designs may well emerge from self-organizing teams, but not all organizational teams are capable of self-organisation (Weerheim et al, 2019), nor in context is this necessarily desirable
9.	Team reflection is a really good idea with significant benefits, but experience suggests that reflection and ‘learning from experience’ are activities for which there is often little time (Busby, 1998)

Table 2: Potential issues to adoption of agile principles

The qualities described by the agile principles can be seen as desirable should absolute speed of project or product development be necessitated, but these have to be balanced against the structure required for rigorous project practices, and these may well mitigate against the adoption of agile, especially if the project in question has interdependencies with other projects (or organisations), or is of a complex nature due to the type of procurement or development being undertaken. As such, it might be seen as unlikely that an organization could wholly adopt principles given the issues identified at table 2 unless it is entirely agile practices facing in its structure. Agility may therefore be considered as something that can be adopted either only in part, or for specific periods of project work or project tasks.

Agile Methods and Methodologies

A number of methodologies and methods have been proposed as approaches to agile project management and product development. These tend to be broadly linked to values and principles set out by the agile manifesto (agile manifesto, 2001b). Dictionary.com (2023b) describes agile development thus: “a philosophy of modular software development that delivers multiple successive versions of a working product that is improved after each iteration and evolves based on empirical evaluation of previous version”, and agile methodologies are usually described as an iterative approach to delivering a product through a lifecycle (APM 2023; Wrike 2023b). These methodologies typically involve a number of stages e.g. Ideation, Development, Testing, and Operations, or some variation upon these. There are many organisations which promote such methodologies, describe what they are and their perceived benefits, and even provide case studies (Adaptovate, 2023). Whilst these demonstrate application of agile methodologies, however, they do not tend, in any great detail, explain the process of application, meaning that it is difficult for organisations to adopt such approaches for themselves and apply them independently to their own circumstances and contextual situations.

In addition to these methodologies, there are agile methods – and the terms ‘methodology’ and ‘method’ are sometimes conflated. There are many methods, but perhaps among the most well-known are SCRUM, eXtreme Programming (XP), and Scaled Agile Framework (SAFe). SCRUM involves devolving decision-making activities to the operational level of project hierarchy (Schwaber, 2004) and calls for project teams to work through specified goals in iterative, time-limited periods known as sprints. Each sprint involves a complete development activity, and progress is assessed via short ‘stand-up’ team meetings. This intensive form of development has been shown to produce results, but has also been subject to criticism, with it being suggested that the adoption of SCRUM does not constitute agile in itself and indeed the method can ignore agile principles (Fowler, 2018). Moreover, de Souza Santos et al (2023) opine that the method might not have any impact, either positive or negative, upon project success. XP is a related concept which suggests that frequent, iterative, development of product artifacts in short cycles will improve productivity through frequent code reviews, introduction of artifacts only when required, and frequent liaison with the customer. This is closely linked to agile manifesto principles (agile manifesto, 2001b), but has been subject to criticism, it being suggesting that practices such as pair programming and collective ownership of code can be problematic (Copeland, 2001). SAFe, meanwhile, is a framework and set of principles based around lean and agile practices (Scaled Agile, 2023b). The principles are wide ranging and there has been criticism that the scope and intent of SAFe is too ambitious (Eklund et al, 2014), but the core idea is that the framework can be scaled to whatever circumstance is necessary – and to this end, it has four configurations: essential, large, portfolio, and full (which encompasses the other three). The guidance – framework and principles – are described in terms of what they are, and what they are intended to achieve, but there have been some concerns raised about the ability to scale agile, especially in large organisations (Kalenda et al, 2018). Having looked at the nature of agile and the ways in which it can be applied, we will now consider some of the difficulties in understanding and characterising these ideas.

The Difficulty With Agile

There are many factors which agile difficult to understand, adapt, and implement, some of which have already been identified at table 2. These range from the cognitive through to the

realities of organizational behaviour. The above section illustrates that some individuals or organisations have expressed concerns with the ease by which methodologies/methods can be adopted and applied, but we can also identify wider issues around understanding what agile actually is, whether it is beneficial in context, and if so, what approach might be most suitable. These issues might be classified as follows:

- (a) Difficulty with understanding agile
- (b) Difficulty with selecting an agile approach
- (c) Difficulty with implementing agile

To deal with each of these in turn, it can be seen that the definitions and ways of describing agile could be confusing and could also affect understanding of the concept; approaches are described as frameworks, methodologies and methods, and sometimes interchangeably as such: SCRUM, for example, is described in different quarters as both a methodology and a framework, whilst it can also be seen as a method linked to a wider methodology. In addition, whilst different organisations promote their own versions of agile methodologies and even demonstrate through case studies how such methodologies can be applied, anecdotal evidence suggests that there is a significant variance between being shown a case study and being able to apply the methodology oneself in the particular context of specific organisational need. The ability to understand methods is also impaired by bespoke terminology – SCRUM, for example, employs terms (Scrum.org, 2023) such as sprint, SCRUM master, burndown chart, definition of done, backlog, which may not be clear to many beyond the circle of agile expertise and is the language of technical specialists rather than users. Furthermore, it can be argued that the more intricate and complicated – or complex – a project or organisational structure is, the more difficult it will be to implement a concept such as agile.

If understanding of agile concepts and terminology can be achieved, the next difficulty might be in selecting which framework, method or methodology is most appropriate in context; different providers will champion their own offerings, but without expert knowledge it can be challenging to decide whether agile is appropriate at all given a lack of impartial guidance on the subject, and if so to differentiate amongst these offerings and choose the most appropriate approach to adopt and implement. Part of the problem with such a decision is that a wider context must be considered. Due to the nature of orthogonal nature of agile itself, and the potentially complex nature of both organisational and project into which agile might be adopted and implemented. Many additional issues must be considered. These are detailed at table 3. The variation of factors described illustrate the breadth of issues that need to be considered before agile should be adopted and implemented. The mindset which suggests that such decisions can be predicated on the simple or binary analysis of agile principles and their suitability or application of an agile method does not consider the necessary wider context. Adoption of agile approaches is likely to require a rethinking of organisational culture which might encompass consideration of organisational structure, philosophy and practices, and the skillsets of employees. Even if benefit is seen in the introduction of agile approaches and the organisation and its staff are enthusiastic at the prospect of agile, the organisation must still be made ready for adoption of the concept (Grossman et al, 2004). This in turn could necessitate the outlay of expenditure in reorganisation, retraining, and potentially recruitment of suitably qualified staff before agile can be successfully adopted – and this is a sizeable consideration and undertaking. Moreover, different levels of knowledge and thinking about agile will be required at different levels of organisational hierarchy. At a strategic level, there will exist the need for those suitably qualified and experienced to gauge whether agile is a

good fit for the organisation at all, and if so, what changes will be needed to accommodate it, whilst at a project level, staff will need experience of agile methods, knowledge of how to apply and implement them, together with experience of different project and product needs, scenarios, and even customer behaviour in order to achieve successful adoption of agile. The nature and structure of projects, and type of product or service being procured, will also have a significant bearing on how – and if – agile can be applied.

Organisational structure and processes <ul style="list-style-type: none"> - Agile may require restructuring procedures - Agile will require new practices and adoption of new ideas and ways of working 	Need for suitably qualified and experienced personnel <ul style="list-style-type: none"> - An understanding of the implications of agile - Ability to decide if agile will add value
Type and nature of project <ul style="list-style-type: none"> - Project scope - Product type - Project dependencies - Project maturity - Inherent complexity 	Mind-set of project team members <ul style="list-style-type: none"> - Skills - Experience - Knowledge - Mental model - Systems thinking skills

Table 3: Organisational factors concerned with adoption of agile

A further factor that needs to be considered is scaling – the overarching principle behind SAFe (Scaled Agile, 2023b). Even if an organisation undertakes the activities necessary to embrace agile and understands how to select and apply an appropriate agile approach, that approach must be scaled and tailored to the specific organisational context required, and little in the way of impartial advice exists to support this activity. Therefore there is a heavy reliance upon the skills, experience and expertise of those within the organisation. Having now considered issues presented by understanding, adopting and implementing agile, we now endeavour to analyse how these factors can be addressed andragogically from an educational context.

The Challenges of Educating Agile

Having considered the nature of agile concepts and the issues which might affect the adoption and implementation of those ideas, we can postulate a number of reasons why concepts of agile and agility might be difficult to relate from an andragogical perspective. These are listed at table 4. These are separated into four key areas which broadly encompass issues already considered within this paper. Understanding the essence of agile covers not only the philosophy and rationale behind the concept, but also what it is, what its potential benefits are – and indeed what any negative aspects might be – and whether it is the right option for adoption given the individual context of organisation, project and product. Preconceptions about agile tackles the possibility of pre-defined ideas which may be erroneous as well as any assumptions and cognitive barriers to adoption, variety of techniques covers the wide choice of different approaches on offer, their individual structure and requirements, as well as how to differentiate between them, whilst ‘no one size fits all’ addresses the potentially dark art of tailoring and scaling to project scope and

scenario/circumstance, and finally, the lack of impartial guidance on how to adopt and implement agile is considered.

Reason	Factors to be concerned with
Understanding of the essence of agile	<ul style="list-style-type: none"> - Understanding what it is and - Whether it is relevant
Preconceptions about agile	<ul style="list-style-type: none"> - The idea that Agile is the straightforward application of either <ul style="list-style-type: none"> - A set of principles or - A technique
Variety of agile techniques	<ul style="list-style-type: none"> - Approaches - Frameworks - Methodologies - Methods
No 'one size fits all' solution	<ul style="list-style-type: none"> - Need to tailor and scale to suit product type and project maturity and context
Lack of advice on how approaches and techniques are to be implemented	<ul style="list-style-type: none"> - Heavily reliant on expertise of the systems developer - Multi-faceted nature: - Multiplicity of competing/conflicting factors needing consideration

Table 4: Factors requiring consideration when educating agile

Having given thought to factors which pose a challenge when teaching agile, consideration will now be given to an andragogical strategy which might address these issues.

Thoughts on an Andragogical Strategy for Agile

It occurs that the biggest single task from an andragogical standpoint is dealing with the orthogonal nature of agile, its understanding, adoption and implementation. It is important that a correct blend of teaching mechanisms is found which both encompass the necessary understanding of agile facets and relates to the learning styles of students so to facilitate comprehension. A conventional means of teaching concept understanding might be to employ soft systems modelling and other techniques to achieve holistic problem situation appreciation before employing 'harder' modelling methods to specify structural and behavioural needs and setting this within the construct of a systems lifecycle. This systemic approach is embodied within the discipline of systems engineering (SE). With agile, however, there is a wider context as described at tables 2, 3, and 4. This can be seen to spread across multiple domains, notably business, management and leadership, and engineering. In order to encompass to totality of agile from philosophy through to implementation, it would therefore be advisable to structure the andragogical approach to include not only SE but also information from other disciplines as necessary. A variety of teaching methods and approaches can then be employed to relate understanding of agile to students, and examples of this are provide at table 5. Given the diversity in concepts and perceptions of agile, careful consideration must be given to how this is balanced with individual learning preferences. Honey and Mumford (1982) and Barker (2021) have described how individual learning styles are vital to good understanding of an educational offering; there are many ways to understand

the preferences of individuals, and it is important that this is done in order to maximise takeaway from the learning experience – whilst at the same time offering the ability to learn from others via mechanisms such as group work and peer-to-peer discussion (Garside, 1996).

Agile consideration	Potential teaching mechanism
Approaches and methods	Explain approach or method in overview, walk through each of the stages; provide examples and demonstrate application to a real life case study; assess understanding formatively and summatively via reflective assignment
Selection of appropriate approach	Class discussion as to whether agile might be appropriate; scenario-driven workshop on choice of approach; formative feedback. Possible thesis topic.
Organisational structure and adoption of new skills and practices	Explore using ‘before and after’ examples of how this has been done, relate this to student experience and knowledge
Agile working and developing an agile mind set	Walk through of a representative project where agile has been successfully applied. Discuss how people can focus on and adapt to a rapidly changing environment
Mapping agile to a product development lifecycle	Illustrate difference between traditional and agile lifecycle management. Demonstrate tailoring of lifecycle stages to suit application to an agile approach. Workshop agile lifecycle management to examples of student choosing
Complexity of the problem situation	Examine complexity theory and approaches to map and characterise complex problem situations. Discuss case studies, and workshop understanding of complex adaptive systems to consider changes of problem scope, customer needs and requirements upon a project over time. Formative exercises and feedback

Table 5: Mapping Agile to teaching techniques

It is also essential to focus upon a variety of teaching techniques to allow students to place their understanding within context. As such, real-life case studies, scenarios, use cases and other means of exploring alternative solution realities are likely to be vital to holistic understanding. Group work should be promoted agile understanding and implementation is multi-stakeholder endeavour, and this also facilitates cross-domain dissemination of ideas and learning amongst students.

Conclusions and Further Work

The key to understanding – and educating – agile is the taking of a complete and holistic understanding not only of agile, but of the organisational environment and context into which

it is introduced. Agile should not, given its multi-faceted nature, be treated as an initiative or as a panacea; it is by its nature difficult to understand and cannot rightfully be reduced to the application or otherwise of a set of methods or principles. It is important to understand where and when agile might be appropriate – and indeed if it is appropriate – before any consideration is given to what methodology, method or framework is to be used. Although definitions of agile and agility are well-established, understanding of them is still variable in some quarters and it is therefore important that a means to further understanding and provide a basis for judgement on the appropriateness of agile and its implementation is developed. Additional work is required to provide guidance on where and when agile is suitable, as well as what kind of agile is most applicable. From an andragogical perspective, this paper outlines ideas for providing education on agile, but a suitable strategy encompassing the required breadth, variation, and educational rigour for the subject matter must be constructed and put into practice before being subject to review and improvement over time.

Note: No new data was created or analysed in this study. Data sharing is not applicable to this article.

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Public Libraries – Hubs for Recovering and Valuing Renewable and Imuable Knowledge

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Abstract

This paper addresses the public libraries evolution from the conservative concept of collective memory repositories to an updated concept, based on the knowledge reusing process, as the basis for knowledge operationalization, including via digital tools. Due to the increasing expansion of technology at all levels of digital literacy, today, libraries have become - by incorporating modern technologies and by applying the premises of the Service Dominant Logic - spaces for and actioning renewable knowledge. The main aim of this paper is to demonstrate the uniqueness of public libraries in driving renewable knowledge and to lead LIS users and specialists to consider these spaces as innovative service ecosystems, part of the process of knowledge reform in general and digital literacy in particular, with the support of technology. Starting from exploring the shared knowledge flows in library spaces, the current paper intends to demonstrate the growing role of libraries as a trigger for change, through the continuous symbiosis between users' needs and modern library services. On the one hand, libraries encompass broad bases of knowledge, skills, networks, resources etc. and allow users explore new areas of knowledge in a participatory and stimulating manner. On the other hand, libraries give users the legitimacy to propose their own value propositions connected to today's increasingly refined digital literacy needs. At the basis of the current article argumentation will stay a sociological research of the Questionnaire type, focus groups and structured interviews with leaders from the public libraries in Romania and Europe.

Keywords: Library Ecosystems, Hubs for Knowledge Sharing, Innovative Services, Knowledge Repositories, Service Dominant Logic, Co-creating and Actioning Renewable Knowledge

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Introduction

Increasingly aware of the importance of activating renewable knowledge flows through libraries, the author aims to explore and substantiate the growing role of these institutions of information, education and culture as a trigger of change, through the continuous harmonization of user needs and services modern library.

Libraries manage and capitalize on complex knowledge bases, cutting-edge skills, access to heterogeneous resources, etc. and allow users to navigate to new horizons of knowledge in a collaborative manner, centered on user needs. Libraries operate with knowledge, heritage assets and open resources that contribute to the lifelong education of heterogeneous categories of users. In the public consciousness, librarians are considered expert information managers, but also experienced facilitators in the process of guiding users in identifying and exploring qualitative information resources.

In the last decades, libraries in Romania have understood to enroll in strategic partnerships with governmental entities, exponents of the NGO environment, but also with business operators active in the sustainable consolidation of library ecosystems at the national level and responsible for the adaptation of communities to the transformation digital is increasingly present in all environments of activity.

LIS professionals from the public library system in Romania have learned the lesson of partnerships and are increasingly convinced that they contribute to a better management of resources, with a considerable impact at the community level. In addition, through partnerships, libraries can ensure a more economical distribution of costs and resources. Thus, the approximately 3000 public libraries in Romania have agreed multi-year partnerships with different social actors: from local and central public administrations, non-profit organizations or educational institutions, to important social actors or business exponents.

The Transformative Impact of Libraries

The libraries in Romania, both through their own management and through the leading professional organizations in the field of training, permanently prepare the professional force of librarian specialists, focusing in a particular way on strengthening their relationship with their social partners, in order to determine a transformative impact on community well-being.

Partnerships are the most cost-effective and efficient approach to increasing impact and empowering public libraries as hubs of collective knowledge. This approach is gaining more and more scope, both in Romania and in other European countries. Many library managers actively involved in the restructuring of the public library system in Romania are of the opinion that the conclusion of agreements and protocols not only facilitates the improvement of relations with the authorities, but also creates the legal and administrative premises for carrying out more substantial collaborative activities with minimal expenses.

Partnerships – Resources for the Sustainable Evolution of Libraries

In the context of public libraries in Romania, partnerships can be found in various forms and configurations, from interlibrary loan contracts, centralized acquisition programs, shared catalogues, consortia alliances for fundraising, project based, support agreements in

campaigns initiated by third parties, involvement in cultural or social activities of community interest and even initiating regional consortia for the sharing and common use, much more judicious, of different categories of resources. The complexity of these partnerships is directly proportional to the creativity and openness to innovation shown by library managers, as well as the diversity of development opportunities available at the local or regional level.

In practical terms, partnerships bring with them tangible benefits in terms of financial and leadership performance, as well as additional resources, attracting and retaining new audience segments, increasing social impact, increasing transparency of activities, determining favorable reactions from decision-makers and, last but not least, the diversification of the range of services made available to users of cultural goods and services who currently access public libraries.

The Public Library – The Solution Bank of the Community

The public library can be involved in a wide range of activities of general interest, including public administration, health, education, leisure, public procurement, tourist information, entertainment, funding opportunities, social protection and community involvement, among others. By tradition, the library is probably the most vital public institution for informing citizens. Here, users have access to documents of various categories in printed or electronic format, can address a number of personal issues, receive guidance in interactions with the authorities, read periodicals, browse the Internet and a host of other services, including more refined, in accordance with the increasingly sophisticated requirements of different audiences.

With an adequate and visionary management, public libraries could be empowered to get involved in solving or improving a good part of the current problems of library users, from the needs of documentation and research for professional or study purposes, to the launch of start-ups, ideas of social reintegration, identifying job offers or accessing agricultural or other subsidies. The public library can also be prepared to provide certain e-government services, such as submitting online declarations, obtaining or submitting authorizations, accessing medical investigations, or electronic payment of some services.

Libraries of the Future or About the Power of the Network and Collaboration

According to the recent evolution at the European level, the library is going through a new stage of development, marked by an eminently community role and centered on the collective interest of the users. It is widely recognized that the library institution serves as a space for social interaction and cultural vitality. However, the role of the library can be much deeper when viewed in the context of community development. Currently, the library is a social binder and an aggregator of community initiatives. The realization of this immense potential of the libraries depends, however, on the visionary spirit of the library managers, as well as of the authorities, of the credit orderers, of the patrons, sponsors and supporters of the public libraries.

From Systems Theory to Innovative Library Services

This research had as its starting point the approach initiated by Paul P. Maglio regarding the theory of service systems, seen as "a configuration of people, technologies and other

resources that interact with other service systems to create mutual value", proposing a personalization and a specific location in the field of public libraries.

This article discussed the abstraction of the library service system in order to understand, at a conceptual level, how value is created, how the library institution intervenes in the process of value creation and who are the main actors in the flow of creation and sharing of assets of knowledge.

To enhance their contribution to the sustainable progress of society, libraries must incorporate modern, technology-based services that encourage innovation and co-creation. A comprehensive process of collective knowledge development must be initiated to facilitate the real empowerment of libraries, achieved by creating new tools to support and cultivate renewable knowledge through service infrastructure, all geared towards the benefit of the general public.

Despite having sporadic and isolated contributions to knowledge creation, libraries are not adequately involved in the knowledge renewal process. Case studies from the field of libraries show that they face challenges when adapting their services to the increasingly demanding demands of modern users.

The SHIFT User Case for Libraries – Inspiration for New Renewable Knowledge Constructs

The continued expansion of web-based knowledge and the unprecedented growth of data volumes, together with robust investigative techniques and statistical data analysis, have revealed a potential for significant transformation in all facets of life. This transformation has given rise to new categories of services within libraries, promising substantial improvements in both the quality and efficiency of services.

Demonstrating the critical utility of libraries in renewable knowledge management and data science, particularly from a Library and Information Science (LIS) perspective, this article outlines the need for a conceptual framework based on S-D Logic and the Service Science Canvas to lay the foundations for more research broad regarding the various processes of collaborative value creation and the promotion of renewable knowledge in libraries.

This approach focuses on a research methodology aimed at creating innovative artifacts, structures, models, methods and their practical applications to address current challenges in the library field. In this sense, the present article uses the use case dedicated to public libraries conceived within the project SHIFT - MetamorphoSis of cultural Heritage Into augmented hypermedia assets For enhanced accessibiliTy and inclusion, the consortium initiative financed under the Horizon 2021-2027 program.

SHIFT partners are committed to developing a suite of technology tools designed to encourage cultural heritage institutions, including libraries and museums, to adopt and integrate the latest technological innovations into their day-to-day operations. The main technologies proposed by the project include areas such as artificial intelligence, machine learning, multimodal data processing, digital content transformation methodologies, semantic representation, linguistic analysis and the use of haptic interfaces to effectively deliver new experiences to a wide audience, including people with disabilities.

Specifically, as a partner within the SHIFT consortium, the National Association of Public Librarians and Libraries in Romania (ANBPR) made available to the technical team a wide base of digital stories that reflect the cultural identity of the ethnic communities in Romania. It is about pre-existing audio-video constructs, which thus gained a new life and a new destiny of use, much more attractive, as part of the renewal process of renewable knowledge.

Based on digital stories used as training resources, technical partners explored the potential of using text-to-speech (TTS) synthesis technology enhanced by language models based on natural language processing (NLP) techniques to create narrative scenarios accessible and emotionally charged, accessible including to vulnerable groups. For many vulnerable groups, such as the visually impaired, access to cultural heritage available in libraries and museums often remains limited due to the language barrier and the lack of compelling emotional narratives. This is why using TTS technology enhanced with NLP models to generate synthetic speech has considerable potential for engaging disabled people in heritage institutions.

In selecting representative digital stories, ANBPR took into account both their relevance to the SHIFT project reference area and their adaptability to be shaped and enriched semantically and emotionally through the proposed technological tools. Starting from the collection of pre-existing digital stories produced by librarians and users of library services in Romania, the technical partners focused mainly on two key aspects:

- the use of NLP natural language processing techniques to model language and create improved and engaging narratives, adapted to the cultural and linguistic context of digital story creators, narrators from Romania;
- the operationalization of the methods and tools by which, based on the pre-existing audio-video files representing the digital stories produced in Romania, to create acoustic correlations of the emotions to be integrated in the voice synthesis to communicate emotions and subtext in the newly created digital narratives.

Conclusion

Knowledge itself has no shelf life. In order not to become obsolete or useless, knowledge elements must be constantly renewed through the interaction between different actors in the knowledge exchange process. To meet the need for constant knowledge updating, people and organizations have an imperative need to invest in a coherent knowledge development process, maintaining a stable balance between process design, product development, skills, values and human factors as recipients of knowledge. . According to the knowledge literature, studies have revealed the utility of “combining three resources—material, human, and symbolic—in organizations to enhance knowledge renewal between product and process development (Urso & Vacher, 2004). It is what the intelligent libraries, in their turn, replicate, in their attempt to make the process of renewable knowledge continue for the communities of the future benefit.

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Ontology Definition for University Knowledge Graph

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Abstract

Finding the required information to succeed in the organisation of everyday study life is not always easy for a student. Ontologies are an instrument to define a domain by illustrating its concepts and thereby presenting knowledge in a structured way. In this paper, our aim is to design an ontology that is suitable for the higher education environment of a German university to build a Knowledge Graph for a conversational AI. As a research context, the Ansbach University of Applied Science is used. The paper is organised into five sections. After a brief introduction in Section 1, Section 2 reviews previous work of conducted ontologies within the higher education environment, whereas Section 3 outlines the methodology for developing the ontology and presents the final result. The development procedure is thereby partly based on the ontology framework provided by Stanford University (Noy & McGuinness, 2001). The presented ontology, which delivers possible classes for the development, and transferability to other universities will then be discussed in Section 4. Finally, the conclusion and approaches for future work with ensuring a constant up-to-dateness of the classes are given in Section 5.

Keywords: Higher Education, University, Ontology, Knowledge Graph

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Introduction

Finding the required information to succeed in the organisation of everyday study life is not always easy for a student. Various sources and communication channels like the university's homepage, the student portal, learning platforms like Moodle as well as the IT service portal make it difficult to recognise which information can be found where. An evaluation of the enrolment and application process conducted at the Ansbach University of Applied Science 2020 showed that students already have difficulties in obtaining information at the beginning of their studies (Studierendenservice Abt. 1-Imma, 2020). This leads to advisors who otherwise are responsible for individual study belongings being frustrated and losing valuable consulting time by answering routine questions with easy-to-find information.

Against this background, Ansbach University of Applied Sciences would like to use an innovative, digitally supported approach to better integrate its information and counseling services for students, make them clearly available, and further expand them. Therefore, the solution is also designed to relieve advisors by answering routine questions with easy-to-find information. Students have such questions around the clock, but until now it has often taken days to receive a mail response or professional advice.

To address this, an intelligent chatbot based on conversational AI is being developed. The chatbot is intended to provide students with quick answers to routine questions at any time. To provide meaningful responses, an approach must be developed to represent the information from the various sources. In this context, Knowledge Graphs (KGs) represent an instrument to display knowledge in a structured way (Ji et al., 2021). In order to build such a KG, ontologies can be used as a base to define a domain by illustrating its concepts, their relations, and structural constraints (Stancin et al., 2020).

In this paper, our aim is to design an ontology that is suitable for the higher education environment of a German university. As a research context, the Ansbach University of Applied Science is used. The University of Applied Sciences accommodates approximately 3,200 students in 19 bachelor's and 17 master's degree programmes. The rest of the paper is organized as follows. Section 2 reviews previous work, whereas Section 3 outlines the methodology for developing the ontology. Section 4 presents the final result, which will then be discussed in Section 5. Finally, the conclusion and approaches for future work are given in Section 6.

Previous Work

KGs enable the connection of heterogeneous data from different sources. For this reason, they are particularly useful to apply at universities, which have to combine many different information sources (Chen et al., 2018). (Ji et al., 2021) define a KG as structured representation of facts, consisting of entities, relationships between the entities, and semantic descriptions. Application domains of KGs within the higher education environment range from course content visualisation and learning resource recommendation to encompassing student profiles (Hubert et al., 2022) as well as the illustration of educational events or opinions in society that may have an influence on the university's actions (Sun et al., o. J.). KGs, however, can not only be used as the basis for a recommendation program, but also serve to provide data for natural language understanding (NLU), for example question answering (Ji et al., 2021).

Ontologies serve as a tool to manage and present knowledge from various sources (Tapia-Leon et al., 2018). They can be described as a way of representing a domain with its essential concepts, its relations, and limitations. In the context of information science, ontologies create a machine-readable representation of a domain that includes entities, attributes, relationships, and axioms (Stancin et al., 2020). Within the higher education environment, various studies on the development of comprehensive ontologies have been conducted, of which some examples are presented in the following. In his work, (Hadjar, 2016) describes an approach to developing an ontology that represents institutions, individuals, and study programs in classes and subclasses using the tool Protégé. Similarly, (Abu Naser et al., 2015) build an ontology for the university of Palestine using protégé 4.1. editor by first defining university related classes and then a hierarchy of classes. Afterwards, object properties are defined according to the relationships between the classes. Finally, (Fleiner et al., 2017) seek to model course information represented by categories like curricula, subjects, courses, personnel, etc. Whereas the three previous examples are limited to the application of a specific university, the Ed-Fi Unifying Data Model can be used as base to define a model for attributes and associations within the education domain with categories like staff, students and organisational entities which can be transferred to a broader target group (Ed-Fi Alliance, o. J.).

Methodology

The purpose of this paper is to design an ontology that is applicable for a typical German university within the higher education environment. The development procedure is thereby partly based on the ontology framework provided by Stanford University (Noy & McGuinness, 2001):

1. Determine the domain and scope of the ontology
2. Consider reusing existing ontologies
3. Enumerate important terms in the ontology
4. Define the classes and the class hierarchy
5. Define the properties of classes—slots

All steps will be performed and described in more detail in the following sections.

Determine the Domain and Scope of the Ontology

In order to define the scope of the ontology, (Noy & McGuinness, 2001) advise determining the application area, the purpose, the users and the types of questions to which the information in the ontology should provide answers.

As already stated during the introduction, the ontology will be used to create a KG that serves itself as a collection of knowledge providing an intelligent chatbot with the ability to answer routine questions of students concerning their everyday study life. The application area will therefore cover the university and its institutions, study programs, services, and activities in order to be able to retrieve information to answer questions like “Where can I find my certificate of enrollment?”

Consider Reusing Existing Ontologies

Several attempts to define ontologies for the university domain can be found in the literature. A small research was conducted to identify suitable studies that have developed ontologies

for a similar use case. Using the search strings 'ontologies_educational_domain' and 'ontologies_for_university' Google Scholar was browsed. The search was framed by the following inclusion and exclusion criteria (Table 1).

Inclusion Criteria	Exclusion Criteria
Studies from 2011 to 2021	Studies older than 2010
Journal and Conference Articles	Literature reviews and book sections
Studies in higher education environment	Studies not in higher education environment
Studies developing university ontologies	Studies developing ontologies for specific application scenarios within the educational domain

Table 1: Inclusion and exclusion criteria

Finally, a set of five papers was selected to serve as a foundation for the definition of the ontology classes (Table 2).

Author / Year	Classes
Alrehaili et al. 2021	Course; Date_Time_Duration; Education_Organization; Experience_Since; Keywords; Person; Position; Program_of_Study; Publications; Resources; Student performance
Abu Naser et al. 2015	Work; Publication; Person; Organisation.
Hadjar & Chanane 2013	Bookstore; Colleges; Committees; Conferences; Courses; Department; Gym; Labs; Library; Person; Programs; Publications; Research; Restaurant; Website
Ameen et al. 2012	Courses; ExaminationBranch; Laboratory; Library; ManagementStaff; Placement; Student; TeachingStaff
Malviya et al. 2011	Course; Department; Examination; Person

Table 2: Overview of the set of papers used

In addition, three additional standards were discovered that include the following classes (Table 3).

Standard	Classes
Academic Institution Internal Structure Ontology	Centre; College; Course; Department; Division; Faculty; Institute; Institution; KnowledgeGrouping; Module; Programme; Research Group; School; Subject; Code; Description; Name; Organisation; Organisational Unit; Part of; Responsibility of; Responsible for; Teaches
ED-FI DATA STANDARD V3.2	Course; Course Offering; Location; Section; ClassPeriod; EducationOrganization; LearningStandard; Program; School; Session; Staff; Student; Calendar; Grade; StudentAcademicRecord
Academic Institution Internal Structure Ontology (AIISO)	Centre; College; Course; Department; Division; Faculty; Institute; Institution; KnowledgeGrouping; Module; Programme; Research Group; School; Subject; Code; Description; Name; Organisation; Organisational Unit; Part of; Responsibility of; Responsible for; Teaches

Table 3: Overview of the ontology standards used

The retrieved classes will serve as basis to define the ontology classes suitable for the application example of the Ansbach University of Applied Science in a further step.

Enumerate Important Terms in the Ontology

The next step focusses on the collection of all terms that might be relevant to include within the ontology. Besides the classes that were retrieved during the literature research, the

sitemap from the university was used to identify possible topics and corresponding subtopics (HS Ansbach, 2022). Moreover, a topic modelling was performed from the data collected from the chatbot. Different topics are categorised into main areas which can be used as relevant classes for the ontology definition:

- study program
- application
- DIAS chatbot
- student data
- phrases
- study phases (semester abroad, internship, exams)
- student service
- university

Define the Classes and the Class Hierarchy

After collecting potential terms, the class definition can be performed. In order to define classes, three main approaches have been discovered (Noy & McGuinness, 2001):

1. **Top-Down:** Starting with the main topic and dividing it into more detailed parts, which means that the most general concept will be divided into subsequent areas and then further categorised into even more specific types.
2. **Bottom-Up:** Using the most specific type and finding superordinate classes for them. This process should be applied until the main concept is reached.
3. **Combination of Top-Down and Bottom-Up:** Using the most important and clear to define classes and splitting them into sub-classes, while having more specific classes and discovering the superior classes for them. With this combination, it can be ensured that significant high-level classes as well as low-level classes will be applied and combined in the most suitable way.

To ensure that all aspects of the educational environment according to the needs of the knowledge graph development will be fulfilled, a combination of the Top-Down and Bottom-Up is used. The results of the literature review mentioned in Step 2 are an overview of classes from a top-down point of view (see Table 2, 3). Additionally, the sitemap mentioned in Step 3 is used for the structure of the main information. To compare these results with the specific case of Ansbach University, a detailed look on the already existing intentions of the current version of the chatbot is used as a Bottom-Up perspective. All terms are now summarised into categories, which simplifies the suitable classes. The occurrence of terms in the previous steps as well as the number of requests for a specific topic derived from the usage data of the chatbot serve as an indication to create the hierarchical order.

Combining all information, the following classes could be obtained as part of the ontology:

- university
- institution
- organization
- study program
- contact details
- student
- service
- application
- contact details

- research
- continuing education
- location
- chatbot

Define the Properties of Classes – Slots

To design the ontology to be able to answer queries about study related topics, the properties of the defined classes have to be further described. For this purpose, possible properties of the classes are collected considering the first and second level subtopics as well as results of the topic modelling mentioned in step 3. The final ontology and the included connections are presented in Table 4.

New Ontology	Included Connections
University	<ul style="list-style-type: none"> • has_news • has_publications • has_offices • has_faculties • has_research • has_organization • has_labs • has_partnerships • has_events • has_address • has_parking_facilities • has_alumni • has_institutions • has_study_program • has_location • has_continuing_education • has_jobs • has_scholarships
Institution	<ul style="list-style-type: none"> • has_opening_hours • has_consultation_hours • has_address • has_contact_person • has_offers • has_events • has_tasks • has_forms • has_service
Organization	<ul style="list-style-type: none"> • has_employees • has_tasks • has_contact_details
Study program	<ul style="list-style-type: none"> • has_degree • has_abbreviation_study • has_location

	<ul style="list-style-type: none"> • has_semester • has_course_advice • has_study_program_advice • has_language • has_studienart_study • has_study_type • has_duration • has_admission_limit • has_application
Contact details	<ul style="list-style-type: none"> • has_address • has_email • has_phone • has_time • has_url • has_function • hat_gender
Student	<ul style="list-style-type: none"> • has_study_program • has_study_type • has_time_table • has_financing • has_service • has_health_insurance • has_language • has_moodle • has_primus • has_feedback • has_study_tips • has_changes • has_exams • has_start_of_semester • has_intership • has_application
Service	<ul style="list-style-type: none"> • has_student_services • has_prospective_student_services • has_high_school_graduates_services • has_accreditation • has_consultation
Application	<ul style="list-style-type: none"> • has_deadlines • has_approval • has_documents • has_restrictions • has_procedure • has_enrollment • has_study_program
Contact details	<ul style="list-style-type: none"> • has_address • has_email • has_phone

	<ul style="list-style-type: none"> • has_time • has_url • has_function • has_gender
Research	<ul style="list-style-type: none"> • has_research_profile • has_research_professorships • has_projects • has_publications • has_cooperative_doctorate • has_funding_advice
Continuing Education	<ul style="list-style-type: none"> • has_format • has_degree • has_location • has_duration • has_contact_person • has_language • has_admission_limit
Institution	<ul style="list-style-type: none"> • has_opening_hours • has_consultation_hours • has_address • has_contact_person • has_offers • has_events • has_tasks • has_forms • has_service
Location	<ul style="list-style-type: none"> • has_apartments • has_activities • has_weather • has_events • has_infrastructure • has_inhabitants • has_study_program
Chatbot	<ul style="list-style-type: none"> • has_name • has_hobbies • has_creator • has_information • has_joke • has_conditions • has_favorite

Table 4: Properties of the defined classes

Discussion

The presented ontology delivers possible classes for the development of a knowledge graph within the educational environment of a German university of applied science. Even though the whole process is documented and supported by scientific research, the results can be seen

as specific for the use case presented here. Due to the usage of the chatbot data, the questions at the German University are the main source for verification, which might lead to different results in different locations or with different universities. The consideration of additional studies could have improved transferability to other universities. Furthermore, the limited frame restricted the implementation of further iterations in the development process. Still, it is a first hand example of a possible solution, that can help with further investigation and a further alignment of the here presented procedure. Future implementation and usage of the ontology and the knowledge graph can give further details regarding the diversity and completeness of the developed approach.

Conclusion and Future Work

In this paper, an university ontology was established. The ontology provides the essential classes to create a KG suitable for information retrieval to answer questions of students and applicants about their study organisation.

In a multistage process, relevant ontologies were first searched for in the literature and also on the Internet, and further potential classes were identified on the basis of the university's website. With the help of an analysis of the topics that were most frequently the subject of conversations with the university's own chatbot for answering questions from students and prospective students, the ontology was finally defined. The topic analysis will also be used in the future to ensure a constant up-to-dateness of the classes, e.g. by adding further classes when the main topics change. The next step is to complete and implement the KG in the chatbot.

Although the ontology was created on the basis of a specific university, it is to be seen as a transferable construct, since many of the included categories can be transferred to other German universities and can be used there as a basis for the development of further tasks in connection with the representation of information.

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***Project-Based Learning for Sustainable Development:
An Open Educational Research Framework for Design***

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Abstract

Education systems around the world are struggling to transform to better engage students in all their diversity, incorporate and adapt to transformative technology, build real-world sustainability competencies, and recalibrate to provide an education that is relevant for rapidly evolving circumstances. Project Based Learning is an approach to both K-12 and adult education that is designed to extend beyond knowledge acquisition and into competency development, enabling real-world action coupled with a focus on authenticity, inclusiveness, and community impact. This research utilized a literature review to analyze design considerations from a variety of PBL design frameworks and integrate them into a whole, including foundational concepts from Education for Sustainable Development and technology education, such as digital citizenship and emerging guidelines on academic integrity that anticipate and even encourage use of generative AI such as ChatGPT. Digital citizenship, digital academic integrity, project impact analysis, and both sustainability competencies and vision were noted to be underrepresented in previous frameworks.

Keywords: PBL Design, Inclusivity, Digital Citizenship, Generative AI, Education for Sustainable Development

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Introduction

Education reform and adaptation is an ongoing process that helps keep education relevant as the needs of individuals and societies transform over time (Reimers, 2017). Much of the current dialogue on educational reform combine knowledge, skills, attitudes, and values into real-world competencies that meet the evolving needs of individuals, the workforce, and the societies (OECD, 2018). One of the forces transforming society and impacting education is technological transformation. Rapid technological transformation has resulted in a need to extend discussions on technology in education beyond technological utilization and into the digital citizenship competencies (Jackman et al., 2021) and an understanding of hybrid human-machine composition, academic integrity, and plagiarism in a post-generative AI world (Kumar et al., 2023).

Another important concern is how to embed sustainability competencies across the curriculum. Most countries are now signatories to initiatives to work toward the Sustainable Development Goals (SDGs) and embed Education for Sustainable Development (ESD) throughout K-12 and adult curricula (UNESCO, 2015). As part of SDG 4, there is a need to transform pedagogy to better engage and meet the needs of diverse learners while still supporting attainment of learning goals (UNESCO, 2020).

Project Based Learning (PBL) has been identified as an adaptation that is useful across K-12, university, and adult education age groups and has unique promise for making education more efficacious, inclusive, relevant, and engaging (Mergendoller, 2018). PBL is an inquiry driven, student-centered approach to teaching and learning that involves students solving real world problems; meeting design challenges; exploring abstract questions; conducting investigations; and taking evidence-based positions on real issues (Larmer et al. 2015). PBL teachers support acquisition of disciplinary and interdisciplinary learning goals through a variety of learning activities that include direct instruction organized under an inquiry, typically with significant student voice and choice granted to respond to student diversity (McDowell, 2017). Authentic links between the classroom and real world provide opportunities to engage in real world changemaking while building self-efficacy, resilience, internal locus of control, and socio-emotional competence (Almeida & Steinberg, 2001).

Combining knowledge, skills, and attitudes to create real-world impact means that PBL is increasingly recognized as a model vehicle for transformative 21st century learning incorporating reforms such as sustainability education (UNESCO, 2020). Given increasing recognition that PBL is one of the pedagogies most suited to current reforms, the purpose of this research was to synthesize a range of older PBL design considerations from across the literature and link them to emerging work in digital competencies and digital academic integrity as well as foundational ideas from the literature on sustainability education.

Method

The research question was: What key PBL design dimensions can be synthesized from the diverse range of international PBL frameworks currently being used and how can these be enriched by emerging sustainability and digital competency concepts?

The method of utilizing an analysis of the literature and synthesizing findings into design categories is well established for exploring different facets of PBL such as general PBL design considerations (Kokotsaki et al., 2016), linking cognitive, affective and behavioral

competency frameworks to PBL design (Stolk & Martello, 2018), PBL design for specific age groups such as in adult education (Helle et al., 2006; Melin et al., 2009), and PBL design with particular curricular needs such as for STEM studies across age groups (Erdogan & Bozeman, 2015).

PBL design framework searches were made on academic databases including ERIC, Academic Search Complete (EBSCO), ResearchGate, Education Research Complete, and Google Scholar utilizing keywords PBL design, PBL design framework, project based learning design, and project based learning design framework. The search range was 2000-2023. Additional sources were located in the reviewed papers and books. Sources which did not relate specifically to PBL design were rejected. Key PBL design sources reviewed included: Almeida and Steinberg (2001), Du et al. (2013), Erdogan and Bozeman (2015), Hung (2016), Kokotsaki et al. (2016), McDowell (2017), Melin et al. (2009), Miller and Krajcik (2019), Larmer et al. (2015), Laur (2013), and Stolk and Martello (2018).

The results were combined with foundational ideas from several key texts on Education for Sustainable Development that were created as guidance by the United Nations Educational, Scientific and Cultural Organization (UNESCO) on ESD issues and trends (Leicht et al., 2018), learning objectives (UNESCO 2017), priority action areas and implementation issues (UNESCO, 2020), and recent implementation case studies (UNESCO MGIEP, 2017). UNESCO was chosen as the source for the foundational ESD documents because it is a designated lead agency for ESD by the United Nations as well as by member states (UNESCO, 2015). The decision to keep the number of ESD related documents limited was taken as the objective of this research is simply to provide a launch point for interested teacher-designers. Issues raised by technological innovation such as digital competency and citizenship frameworks and academic integrity frameworks in the post-generative AI world were also incorporated into the categories by searching key technology in education frameworks that align with the SDGs.

This method was used to organize the design concepts found in the in the various literature sources into emergent coded categories then used to generate overarching themes (Creswell, 2012) called design dimensions for the purposes of this research.

Results/Findings

This section discusses the design consideration clusters synthesized from the reviewed literature.

Target Knowledge, Skills, Attitudes & Values as Competencies at the Center of Design

There is agreement across the PBL design frameworks that design should start with the learning goals as competencies composed of some combination of knowledge, skills, values, and attitudes rather than knowledge acquisition alone (Almeida & Steinberg, 2001; Larmer et al., 2015; McDowell, 2017). Curricular alignment between these learning goals and every phase of a project serves to keep the focus on learning goal development over engagement in interesting activities that do not result in required learning. As with the backward design process used by Wiggins and McTighe (2005), Melin et al. (2009) note that these learning goals give rise to the assessment strategies and learning activities in PBL and that it is important that both teachers and students remain clear that the purpose of the project is to achieve the learning goals, not to produce a product.

PBL designers may give coherence and meaning to the learning goals by interweaving them under the central big ideas of a disciplinary or interdisciplinary unit (Miller & Krajcik, 2019). As well as the affordances provided by PBL in supporting multi/interdisciplinary studies, project management and socio-emotional learning goals are important targets (Larmer et al., 2015). This is particularly so when embedding an ESD orientation as many of the necessary skills and attitudes come from the development of empathy, compassion, affective regulation during conflict, conflict resolution, and their contributions to collaboration, self-awareness, and normative competencies (UNESCO, 2017). Utilizing frameworks such as Education 2030 (OECD, 2018) that differentiate target knowledge, skills, attitudes, and values that compose competencies can help designers clarify non-disciplinary learning goals.

Authenticity, Contexts of Learning, & Sustainability Vision

Authenticity is a central consideration in PBL design because it is part of what supports student buy-in, engagement, and perseverance as authenticity helps link learning to ideas and issues that are important to students (Mergendoller, 2018). It therefore provides both a contextual hook and a sense that the understandings being developed are meaningful and transferable throughout the lifespan (Miller and Krajcik, 2019). From an ESD perspective it teaches how to create real world change. Almeida & Steinberg (2001) place authenticity at the top of their 6A's of design and assess it by asking whether the project investigates an issue that is meaningful for the students, whether it is representative of tasks that real people in a target community do, and whether the project results in value beyond the school setting. To ensure authenticity Laur (2013) includes linking the investigation to a clear community or career connection in her framework. Melin et al. (2009) also note that high authenticity increases perceived relevance and was central to student and faculty perceptions when ranking projects in their adult education context.

Considering study contexts that range from local to global such as different geographical, cultural, and identity levels, offers the opportunity to examine issues holographically, such as water quality in the community, across the nation, and internationally so that a deeper understanding can be developed as well as an appreciation of systems approaches which, especially when used with anticipatory competency or future thinking, is important for sustainability education (UNESCO, 2017). Considering and valuing multiple levels of identity and action that span the personal, local, regional, national, global is articulated in the Education 2030 competency framework (OECD, 2018) and is an important overarching feature of sustainability oriented education in part because it may support a sense of connectedness and therefore a sense of being an active and invested citizen with both an opportunity and a responsibility to contribute to solutions to problems at these various levels (Leicht et al., 2018).

Although related to both authenticity and contexts of learning, the sustainability vision design dimension is about combining authentic issues, empathy, systems thinking, notions of interdependence, and local-global realities into a changemaking stance. Although ESD goes far beyond exploring the SDGs, they are a common entry point to help organize concepts for teachers and students (Rieckmann, 2018). Another entry point for sustainability vision is through themes, such as homelessness, school garden projects, or social enterprise design which relate to SDGs but may be more accessible (UNESCO, 2017). This dimension can add meaning and Hung (2016) describes the process of students taking ownership over projects and becoming affectively involved in them through exposure to course content but also to

situations, people, places, or things that engage both them both intellectually and emotionally.

Intellectual Challenge, Depth of Inquiry, & Structure

Intellectual challenge and accomplishment is implied by utilizing grade appropriate learning outcomes. However, Laur (2013) and other PBL designers note that this dimension goes beyond meeting an adequate standard and expresses the vision of students striving to achieve the highest possible quality of work from an internally located sense of motivation. Mergendoller (2018) expresses the need for depth over breadth and to “grapple with the concepts and understandings fundamental to the subject and discipline” (pg.3). However, deep thinking is not guaranteed to happen without support and this process of thinking about content is supported by learning to talk about thinking, notice opportunities for different kinds of cognition and metacognition, and engage in the appropriate kinds of thinking for a given task (Ritchhart et al., 2011).

Of course, it is important to make sure that the challenge is appropriate to the age group and supported through the application of teacher coaching, direct instruction, and other scaffolds (Miller & Krajcik, 2019). It is also part of the PBL ethos that the process is more important than final products as there are many valuable investigations to be done on topics for which there are no perfect solutions (Hung, 2016). McDowell (2017) argues that PBL shows weak efficacy in content learning if applied when students are developing foundational knowledge in an area and are not given support. He suggests recognizing the difference between surface learning, deep learning, and transfer learning and structuring the PBL program accordingly, with sufficient support early in the process and progressively deeper intellectual challenges to create mastery of foundational knowledge and eventual intra-interdisciplinary transferable competence over time.

Project-based learning is an approach to teaching and learning that is driven by ongoing inquiry with an emphasis on students formulating new subquestions as opposed to the remembering of answers (Almeida & Steinberg, 2001). The challenging question or problem is a therefore a key characteristic of project and problem-based learning and is one of the pivotal design considerations across frameworks. The inquiry is framed with a question to create the initial inquiry and is often called the driving question, inquiry question, problem statement, or research question (Hung, 2016; Larmer et al., 2015; McDonnell, 2017). Hung (2016) argues that the structure of the question or problem statement must be deliberately and carefully designed as one of the core design tasks which shapes the entire learning experience. Helle et al. (2006) note that it is crucial that the prior knowledge of the students is not sufficient for them to answer the question in a single research effort, forcing a cascade of questions to be generated to drive ongoing inquiry. Miller and Krajcik (2019) state that the question or problem should also have many possible ways to solve it acceptably.

Key Artifacts of Learning & Meaningful Audience

This design dimension considers both the product and the audience, as well as how the two will be brought together (such as in online versus offline). This is a process which Laur (2013) describes as creating a meaningful outside audience. Although presenting projects to school peers and parents is better than no public audience, Laur (2013) suggests genuine stakeholders relating to the project such as community members, professionals in the field, local to international organizations, and others who have knowledge of the project inquiry

area, provide the benefit of having a stake in the outcome and, preferably, the capacity to instigate change based on the project findings.

Public products (Larmer et al., 2015) or learning artefacts (Helle et al., 2006) are well known features of PBL. Combining a meaningful audience with authentic learning artifacts generates the potential to create real world change through interaction with parents, the community, local and national governments, corporations, and other organizations. As well as making learning meaningful, the potential to create real impact is part of what makes PBL a unique vehicle for Education for Sustainable Development (UNESCO, 2020).

Student Voice, Choice, Diversity & Inclusion

Student voice describes the ability for students to express their ideas both in terms of content and how a project proceeds through debate, consensus building, and democratizing the classroom (Helle et al., 2006). Student voice, among other affordances, is thought to support students in developing an understanding of the learning process and the ability to discuss, plan, monitor, and support others through that process (McDowell, 2017). Student choice is asks designers to consider where and how projects can be guided by age-appropriate choice. Depending on the needs of the course this can be extremely broad, such as in the case of a project in which students can choose any concept they wish to drive their project, to within-lesson choices about activities, project pacing, and so on (Larmer et al., 2015).

However, Mergendoller (2018) advises that using voice and choice as a design consideration is not meant to imply that choices should always be available and that teachers should force student interaction with key ideas, tasks, or obstacles when appropriate. McDowell (2017) argues that engineering deep thinking on content is central to PBL creating high-impact learning for required disciplinary knowledge and notes that designing to build a culture in which students gain confidence in their ability to guide their own learning is one of the most crucial design features for high-impact PBL. To this end, he argues that students need to be trained to planning, monitoring, and evaluating their learning as a means of creating a class culture of learning and developing the metacognitive processes that will support individuals.

Supporting student inclusion is built into the SDG 4 and a goal of many education systems, though research into curricula demonstrates that it is often not present or overwhelmed by narrow visions of nationalism, communalism, and moral correctness (UNESCO MGIEP, 2017). It is often up to teachers and designers to anticipate how to create an atmosphere of inclusion in their classroom by supporting the voice and choice of students coming from diverse backgrounds, interests, and ability levels, providing appropriate scaffolding, and potentially also by means such as modelling democratic processes, consensus building, and conflict resolution in the classroom.

Layers of Collaboration & Assessment Plan

Kokotsaki et al. (2016) note a collaboration design dimension that highlights the need for considering individual, pair, small group and larger group work. When designing this, Mergendoller (2018) notes the parallels between project work in classrooms and the real world in which team members approach common projects as a true team, developing a synthesis that includes the views and contributions of all team members as well as the potential for outside collaborators such as students in other schools or countries, community members, and subject matter experts. Learning to become effective in different team roles is

also noted by Almeida and Steinberg (2001) who also advocate for the inclusion of adults outside the classroom to be an explicit design consideration.

It is therefore often desirable to create multiphase workflows in which different phases require individual work, pair work, group work, and whole class work that facilitate a mixture of individual accountability, interdependence, equal participation, and social skills (Cheng et al., 2008). These decisions on grouping during different phases of a PBL workflow also mean decisions on formative and summative assessment as the various phases of a workflow can be formally assessed/graded to create accountability or informally assessed to create opportunities to correct misunderstanding as well as uncovering when just-in-time direct instruction is appropriate (Hell et al., 2006). Stolk and Martello (2018) suggest formative assessment should regularly include communication between students and instructors not only on the learning goals but also their relative importance. Direct instruction is a high impact teaching technique and recognized as an important component of PBL when the teacher acts as a subject matter expert to synthesize information, present alternative viewpoints, clarify confusion, or demonstrate skills among other possibilities (Mergendoller, 2018).

Summative assessment can also be spread throughout the project with weightings assigned to various milestones rather than using a single weighting at the end of the project (Larmer et al., 2015). Almeida and Steinberg (2001) suggest that students should be brought into the assessment process by contributing to the success criteria early on and using these criteria as benchmarks throughout. Grades or mastery checks can be assigned to individuals, pairs, small groups, or an entire class depending on the needs of the program (Melin et al., 2009). The design of the assessment structure is also where project management support for students can be instituted by building in checkpoints, milestones, deliverables, process tracking, success criteria, coaching, feedback, and revisions that are transparent and monitored by students as well as teachers (Almeida & Steinberg, 2001).

Technology Use, Digital Citizenship, & Digital Academic Integrity

Many PBL design frameworks do not consider technology use in the design process. Though technology has been documented as highly effective as a tool in PBL classrooms it is important that it be used with clear purpose as a pedagogical tool (Larmer et al., 2015; Laur, 2013; Patton, 2012). For example, a SAMR audit can be used to explore where digital technologies might augment, modify, or redefine learning activities, formative assessments, or learning artifacts (Puentedura, 2010). The most common level of technology use as a design consideration includes both the pedagogical affordances of technology for the project design and the need to build student competency in technology use.

There is also an increasing need to consider digital citizenship in design as this is a dimension that is distinct from decisions on technology use for safe and effective participation in the digital commons (Isin & Rupert, 2015). Becoming aware of digital citizenship frameworks such as the International Society for Technology in Education (ISTE) or Digital Quotient (DQ) frameworks can allow designers to choose what components to integrate into projects. For example, DQ offers an aggregate of digital competencies for international use from across a spectrum of technological competency frameworks and agreed upon by numerous international bodies (Jackman et al., 2021). These are both examples of useful frameworks to consider in the design process as they are research-based and already linked to the SDGs for sustainability vision.

Though academic integrity may not at first seem to belong with this design dimension, researchers such as Kumar et al. (2023) note that new technologies such as generative AI have resulted in dramatic changes to how academic integrity must be dealt with. Eaton (2023) also raises the issue of normalization of hybrid human-machine composition and the ramifications of this including the need for fact-checking AI composition, modifications to attribution and plagiarism policy, and the necessity of an overall understanding of human responsibility for finished products.

Revision, Reflection, Criticality, and Reflexivity

Planning for critique, revision, and reflection cycles in PBL is found across frameworks PBL. Due to the sustained nature of PBL it requires checks at set points in the project to ensure progress is on track and to cement learning (Larmer et al., 2015) as well as to support revision (Kokotsaki et al., 2016). Miller and Krajcik (2019) further note the links between these iterative cycles of improvement and both national science standards and the scientific paradigm PBL is rooted in. Feedback for revision can come from the teacher, peers, be self-critique, or come from other sources that have been incorporated into a project such as mentors or community members (Almeida & Steinberg, 2001). McDowell (2017) suggests that students be given instruction and protocols for providing effective feedback based on success criteria for the depth of learning that is being targeted (surface, deep, transfer).

This design cluster highlights the need to plan when and how students will be guided to reflect to cement their learning throughout the PBL experience, which is distinct from the critique and revision of work for higher quality (Almeida & Steinberg, 2001). Helle et al. (2006) note that systematic reflection on learning has become a defining feature of modern PBL. However, efforts for effective reflection are difficult without criticality. Criticality is central to Education for Sustainable Development as it allows people to take a variety of perspectives that are necessary for comprehensive analysis of issues and impacts, such as those of different stakeholders; present and future; local, national, and global, and so on (UNESCO, 2017). Although criticality in terms of critical thinking and problem solving may be generally encouraged, applying a critical stance toward society, dominant economic systems, nationalist narratives, education systems, or the classroom environment itself are often not included in critique though they are important components criticality in ESD (UNESCO MGIEP, 2017). Importantly, Rieckmann (2018) suggests actively critiquing contradictions in ESD. Criticality is therefore a key sustainability competency but is a more complex design consideration than problem solving alone (UNESCO, 2017).

Reflexivity is the critical examination of one's own feelings, thoughts, biases, and beliefs and is therefore a precondition for effective criticality and also a crucial component of ESD (Leicht et al., 2018) that contributes toward normative and self-awareness competencies (UNESCO, 2017). UNESCO MGIEP (2017) has noted that truly transformative education is unlikely to be successful or impactful without a commitment to criticality that is supported by reflexive self-awareness.

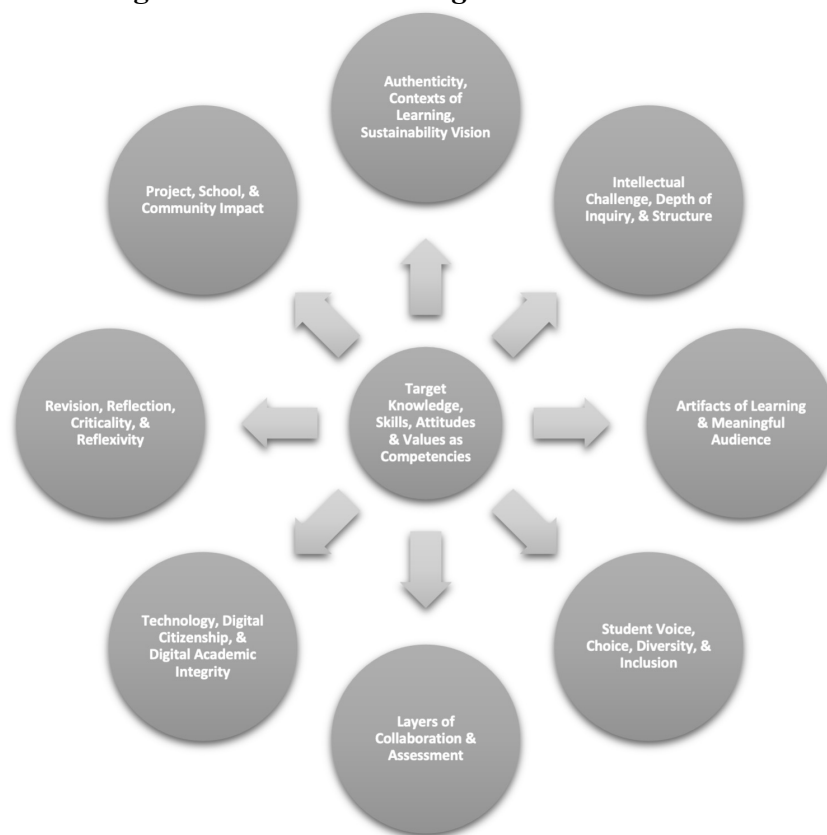
Project, School, and Community Impact

Designing to optimize project impact on the students is an important feature of ESD and is articulated as through the descriptions of strategic competency, integrated problem-solving competency, and anticipatory competency (UNESCO, 2017). Development of all these competencies requires the use of action-oriented, learner-centered pedagogies (Leicht et al.,

2018) such as PBL. However, Almeida and Steinberg (2001) note that a distinct element is planning for and assessing the impact on the school, as quality PBL can create transformation for schools and school systems as all school stakeholders transform through ongoing cycles of planning, execution, and evaluation. This can include analysis of impact on school staff and organizational function. Rieckmann, (2018) notes that this can result in a transformation of schools into role-models known as a whole-institution approach in ESD.

Community impact, whether in a local, regional, global or digital context is a particularly noteworthy design consideration for Education for Sustainable Development (UNESCO MGIEP, 2017). Miller and Krajcik (2019), raise the issue of planning for community impact in the design considerations, particularly regarding the public product and audience. Laur's (2013) design framework goes further and includes an analysis and justification of any proposed or enacted solutions that students must develop during the PBL experience (in this case focused on K-12 students). This justification needs to be critical, occur throughout the project both as proposals and milestone completions, and involve an audience outside the classroom.

Figure 1: Global PBL Design Cluster Framework



Discussion

Overall, this research found congruence between frameworks different for PBL design, with major differences being in emphasis. For example, some frameworks are more concerned with fostering real-world competencies and connections (Almeida & Steinberg, 2001) while others emphasize disciplinary learning goal attainment (McDowell, 2017). Learning goals as the start point for design, authenticity, public products, inquiry questions, student voice,

collaboration, revision, and reflection are design considerations that appear across the frameworks and are integral to PBL.

Technological considerations in design were not well represented in the literature reviewed and the design cluster of technology, digital citizenship, and digital academic integrity is an important addition. Technological considerations need to move beyond teaching students to use technology or using technology for its pedagogical affordances, although these remain one feature of the cluster. Digital citizenship is an increasingly important and contested area of our social commons with unique opportunities and dangers which deserve explicit consideration in design (Isin & Ruppert, 2016). Digital competency frameworks are useful reference points for designers. Similarly, new ways of thinking about composition, human-machine collaboration, plagiarism, and academic integrity are rapidly emerging (Kumar et al., 2023). These should be key considerations rather than an afterthought.

ESD design considerations were also poorly represented in the literature, though overlap in the areas of critical thinking and real-world action were noted. In providing additional depth for ESD, this research has only attempted to scratch the surface. Given the combination of pressing need and education policy directives, much more work needs to be done in capacity embedding ESD into all curricula (UNESCO, 2020). An excellent starting point for interested designers and teachers would be an examination of ESD learning objectives (UNESCO, 2017) and the implementation roadmap (UNESCO, 2020).

Impact planning and assessment emerged as a final cluster that was under-represented in the literature (excepting Almeida & Steinberg, 2001), but extremely important in the ESD literature as part of the anticipatory and strategic competencies (UNESCO, 2017). Including students in this process can help to clarify the difference between problem solving (generating potential solutions to a problem) and assessing how different solutions may impact different stakeholders. Linking this with critical pedagogy may further assist as a given “project solution” may impact more and less vulnerable stakeholders differently. Considering project impact on students and other stakeholders supports both a nuanced perspective and may result in enriching community discussions with stakeholders, empathy, and the avoidance of overly simplistic solutions that negatively impact vulnerable stakeholders, whether in the community or in a school.

Conclusion

Previous works note that there needs to be a reorientation of the learning goals and pedagogies to those that support peace, sustainability, civics, and problem solving for our shared challenges as a species (Reimers et al., 2016). There are numerous converging forces creating pressure for educational reform. These include the need to engage diverse students in inclusive education systems that create real world competencies (Almeida and Steinberg, 2001; Larmer et al., 2015). It includes rapid technological transformation and its affordances for learning, but also its impact on the need to develop digital citizenship and supporting people through the transition into human-AI hybrid work (Stone et al., 2016) while fostering academic integrity in schools and workplaces in a post-plagiarism era (Kumar et al., 2023). It also includes the need to foster the knowledge, skills, and values associated with sustainability competencies to support the mitigation of problems such as climate change (UNESCO, 2017). These imperatives need to be decompartmentalized, and PBL offers affordances that make it an option that has already been identified as a model to transform

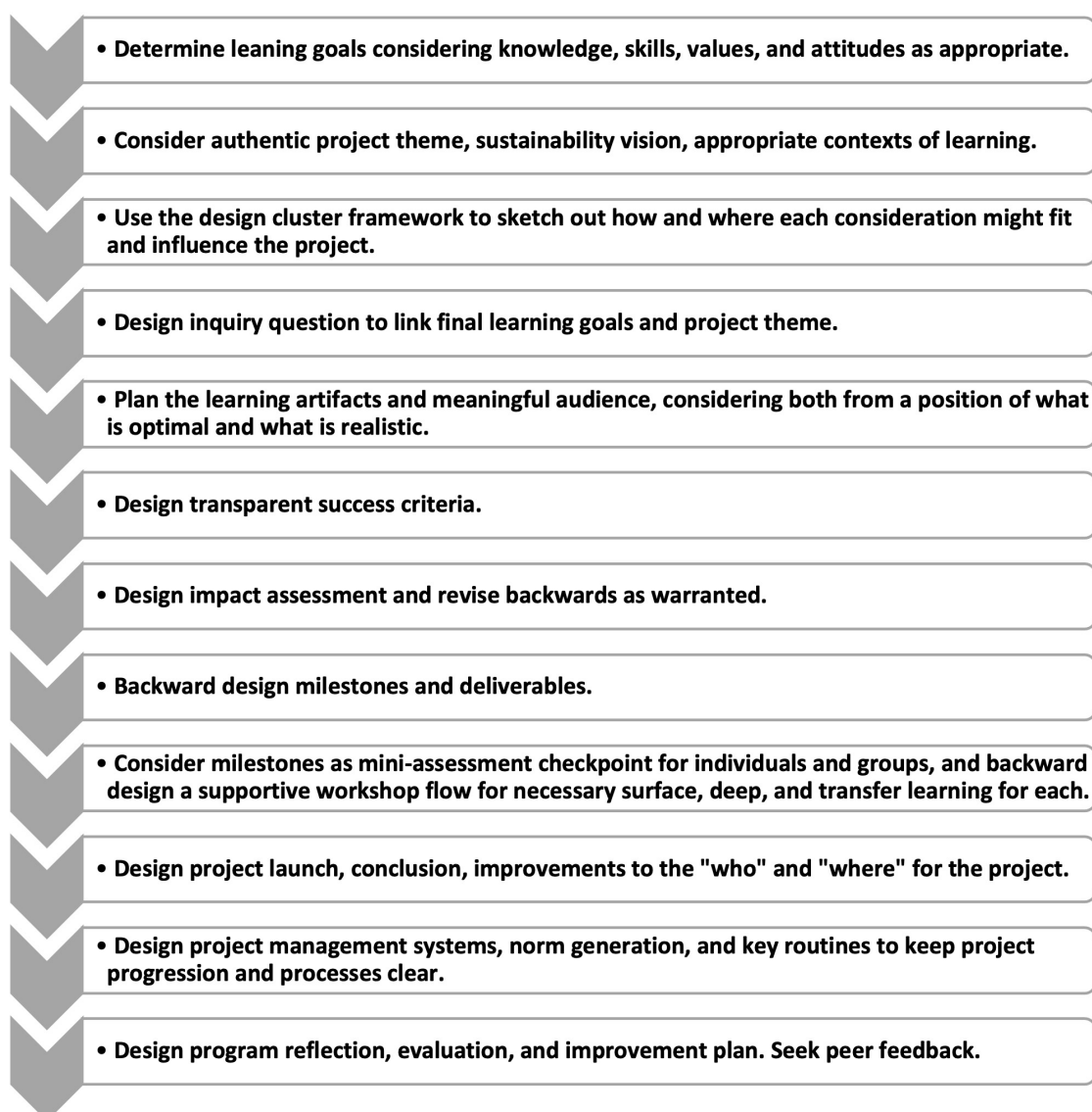
education to a more relevant system and support progress toward the Sustainable Development Goals (UNESCO, 2020).

Embedding ESD across curricula and transforming programming to stay relevant in a rapidly changing technological environment requires ongoing adaptation of PBL design frameworks. This paper is intended to contribute to that effort and thereby support research and field practice. There is a need to contextualize PBL design for different contexts and purposes (Du, 2011). As Stolk and Martello (2018) point out, there is no single way to design PBL that is best in all situations as design is always a matter of trade-offs. Similarly, UNESCO (2017) notes there is no single best way of incorporating ESD principles in all contexts. Given these factors, this paper has attempted to draw together some of the important considerations and resources for effective PBL design rather than to advocate for a single way of developing effective PBL.

Appendix A: Sample Design Workflow

Given the need for contextualization in the design process, the following sample design workflow is intended to provide an example of design process using the Global PBL Design Framework. The process can be ordered in different ways and is often iterative in nature.

Figure 2
Sample Design Workflow



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Participation in Early Childhood Education Toward Global Targets of Sustainable Development

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Abstract

The United Nations Sustainable Development Goals ensure that all girls and boys have access to early childhood development, care, and quality pre-primary education by 2030, enabling them to be prepared for primary education. The Indonesian government has implemented policies to attain these targets in line with these objectives. However, the national Gross and Net Enrolment Rate in Early Childhood Education, and School Readiness Rate have not met the expectations. The COVID-19 pandemic has further exacerbated early childhood student enrolment decline, posing additional challenges to pre-primary early childhood education participation. This study endeavors to analyse the factors influencing early childhood education participation and examine the efforts made to increase it. Adopting a mixed-method approach, the research was conducted in five districts/cities on the island of Java, which have regional policies on one-year pre-elementary early childhood education. The study involved early childhood education institutions, teachers, and parents as respondents. The findings revealed several factors affecting the level of participation, including inadequate socialization of local regulations regarding one-year pre-primary early childhood education, children attending supplementary courses, more than fifty per cent of parents with low income, suboptimal implementation of early childhood minimum educational standard assistance policy, and limited access to early childhood education in certain villages due to isolation and a lack of qualified teachers. Although early childhood education institutions have made serious efforts to encourage public enrolment, significant obstacles, and challenges remain that need to be addressed and resolved.

Keywords: Participation, Early Childhood Education, Sustainable Development Goals

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Introduction

The 1945 Constitution of Indonesia, in Chapter XA on Human Rights, Article 28B (2) states, "Every child has the right to survival, growth, and development, as well as the right to protection from violence and discrimination." Article 28C further mentions, "Every person has the right to develop themselves through the fulfilment of their basic needs, has the right to education, and to benefit from science and technology, arts and culture, for the purpose of improving the quality of their life and the well-being of humanity." Article 31 (2) states, "Every citizen has the right to education" (The 1945 Constitution of Indonesia, 1945). The constitution reflects that since Indonesia's independence, the rights of children to optimal growth and development, as well as access to education, are guaranteed by the law. Indonesia has long upheld equality and justice while preventing any form of discrimination. The opportunity for children to receive an education is made widely available.

The government also enacted a 'nine-year compulsory education' policy from primary school (age 7) to junior high school (age 15) under Government Regulation No. 47 (2008), as an implementation of the Education System Law No. 20 (2003). It means that the government has an obligation to finance basic education without charging fees (OECD/Asian Development Bank, 2015). However, there is no compulsory education regulation targeting preschool children.

Data shows that the Gross Enrolment Rate (GER) in Early Childhood Education (ECE) was 37.52% in 2020 decreased to 35.59% in 2021, and further decreased to 35.28% in 2022 (BPS, 2023b) and the Net Enrolment Rate in early childhood education remain very low from year to year. The data shows a decrease in the Net Enrolment Rate (NER) of ECE in 2021, followed by another decline in 2022. However, from 2019 to 2022, there has been a narrowing disparity in NER between rural and urban areas, with the NER in urban areas eventually approaching that of rural areas (Fig 1). The School Readiness Rate (SRR) also exhibits a similar pattern, with a decline in the figures in 2021 followed by a further decrease in 2022. Additionally, the SRR has remained around 74% from 2016 to 2022, making it appear challenging to surpass this figure. These conditions are very interesting and need to be analyzed. The arrival of the COVID-19 pandemic has exacerbated this situation, with a decrease in students enrolling in early childhood education and students dropping out. This is based on data from the Ministry of Education and Culture (Hakim et al., 2020, and Mediana 2021).

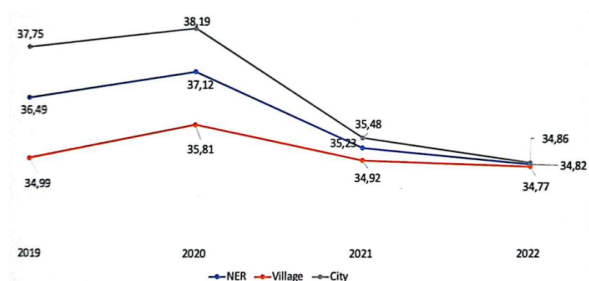


Figure 1: NER from 2019 to 2022
Source: BPS (Agustina et al., 2022)

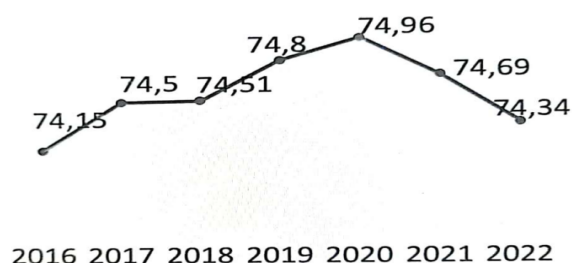


Figure 2: SRR from 2016 to 2022
Source: BPS (Agustina et al., 2022)

Several studies have approached children's participation in early childhood education (ECE) from various angles. Delijeve & Ozola (2023) explored the perspectives of teachers concerning children's participation in ECE practices. Leinonen & Venninen (2012) delved

into children's opportunities to take part in shaping the learning processes within Finnish day-care groups, while Wong et al. (2023) investigated the challenges linked to children's participation in ECE in regional and remote areas of Australia that their findings highlighted the complexity of the issue, underscoring the need for a nuanced and comprehensive policy approach operating at multiple levels, including the family, service, community, and socio-political spheres. Whereas Stevens et al. (2023) discussed the characteristics of ECE provision in low-and middle-income countries that are crucial to support refugee children with limited resources. In contrast to these studies, this research is based on the low Gross Enrolment Rate (GER), Net Enrolment Rate (NER), and School Readiness Rate (SRR) data. Our objective is to analyze the factors that influence participation in early childhood education and assess the initiatives aimed at enhancing it.

Research Methods

This research adopts a mixed-method approach. It is conducted in five districts/cities on the island of Java, which have regional policies on one-year pre-elementary early childhood education (Serang City, Pekalongan City, Banyumas Regency, Batu City, and Purworejo Regency) in 2021. The research involved ECE principals, teachers, and parents as respondents. Data was collected using Focus Group Discussion (FGD) with principals and teachers in the 5 locations, an online questionnaire through 2 types of Google Forms for ECE institutions and parents of ECE students, and a document study. Quantitative data was analyzed using descriptive statistics. Qualitative data cannot be precisely quantified and need to be understood and categorized by themes or groups (Soiferman, 2010). Qualitative data can be analysed using the inductive reasoning approach to describe the problems based on the facts. This approach analyses specific information to broader generalizations and theories. Inductive research is essential for progressing our understanding and formulating new theories (Woiceshyn & Daellenbach, 2018).

Results and Discussion

1. Characteristics of Parents as Participants

There are 1251 ECE institutions and 7419 parents as Google Forms participants in this research. They came from almost every province but mostly from Central Java Province. The characteristics of parents as participants can be seen in the following table.

Demographic	Frequency	Percentage
Highest educational attainment		
Primary school	964	13%
Junior high school	1822	24.6%
Senior high school	3075	41.4%
Higher education	1490	20.08%
Profession		
Non-working housewives	3036	40.9%
Merchant	80	1.08%
Government and Private employee	1166	15.72%
Farmer	262	3.5%
Teacher	112	1.51%
Village official	17	0.2%
State-owned enterprise employee	20	0.27%
Odds jobs or miscellaneous	1551	20.91%
Entrepreneur	961	12.95%

Table 1: Characteristics of parents as participants

2. Factors Influencing Participation in Early Childhood Education and Solutions

The decrease in participation in early childhood education during the pandemic primarily due to parents postponing their child's enrolment during the COVID-19 pandemic (72.10%) is seen as a common occurrence. However, sending children to courses during the pandemic (16%) with the risk of them getting infected and forcing them to continue their literacy development has become a long-standing issue. We highlight this as one of the crucial factors that reduce children's participation in early childhood education regarding the understanding of the community and educational institutions educators on early childhood development and their learning needs (Fig. 3).

a. Synergy in Learning

Parents prefer their children to engage in in-person learning because they may lack the time or expertise to assist their children in remote learning. Their decision is influenced by their eagerness for their child to acquire reading skills promptly, driven by the prerequisites of certain elementary schools that expect students to possess reading abilities before admission. This fosters a belief among parents that children should master reading as part of their early childhood education. While in ECE children are introduced to early literacy, introducing them with numbers and letters and learning early literacy through play. Providing them with a foundation for mastering reading skills, and the mastering reading continues in elementary school. This is related to the readiness of children to learn in elementary school.

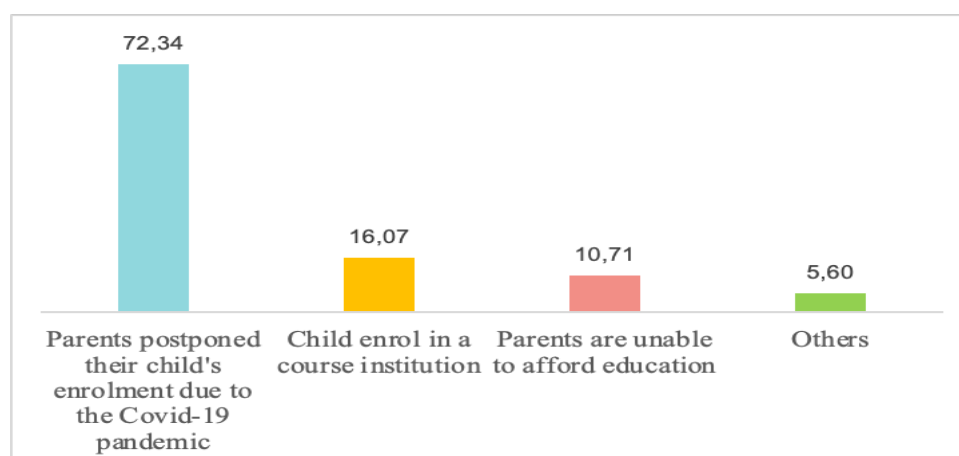


Figure 3: Factors influencing participation in ECE

The notion of school readiness has a broader scope. Pangestuti et al. (2019) referred to some previous researchers who concluded that school readiness can be achieved through transition programs involving children, families, and schools, it is crucial for ensuring that children feel comfortable when they start school. The 2002 mission statement of the United Nations World Fit for Children (WFFC) provides a compelling illustration of contemporary notions of school readiness. It underscores the significance of ensuring that children have a strong foundation in life, supported by a nurturing and secure environment that allows them to not only survive but also thrive, both physically and mentally. This entails ensuring their physical well-being, mental alertness, emotional security, social competence, and capacity for learning (Britto, 2012). The goals set by the WFFC emphasize the essential role of a caring, safe, and stimulating atmosphere in fostering the comprehensive development of young children not only for the capacity of academic competency such as reading. Developing an atmosphere that is comfortable for children to learn is a must and needs collaboration between family, school, and community.

There are regulations in place that prohibit conducting tests prior to the admission of new students (Government Regulation No. 17 Year 2010 on the Management and Implementation of Education, 2010 and Minister of Education and Culture Regulation No.1 on Admission of New Students in Kindergarten, Elementary School, Junior High School, Senior High School, and Vocational High School, 2021). Article 25 of the second regulation stipulates that in the selection process for New Student Admissions, written exams or academic ability tests should not be used. Although this regulation has been in place for a long time, it has not been consistently followed. Because of the problem, in 2021 the government launched a coordination program between Early Childhood Education (ECE) and elementary schools to create synergy in learning, with the hope that elementary schools would not administer reading tests to children entering primary school.

b. Financial Constraints

In Figure 3 we can also see that more than 10% of parents have financial constraints to educate their children, as Early Childhood Education (ECE) is not compulsory, and as a result, parents must fund their children's education. Only a limited number of ECE institutions are government-owned, with the majority being privately or community-owned and self-financed. We distributed a Google Form survey randomly to various Early Childhood Education (ECE) institutions for parents or guardians of students to fill out. Of the total participants of parents in the survey, more than 50% indicated that their income was less

than one million, which means they are well below the minimum income threshold for their region. The regional minimum wage in the province where most respondents (94,11%) live ranges from 1,805,000 rupiahs to 2,810,025 rupiahs (BPS, 2023a) in 2021. It refers to the legally mandated minimum wage that is set at a regional or local level, considering the cost of living and economic conditions specific to that region.

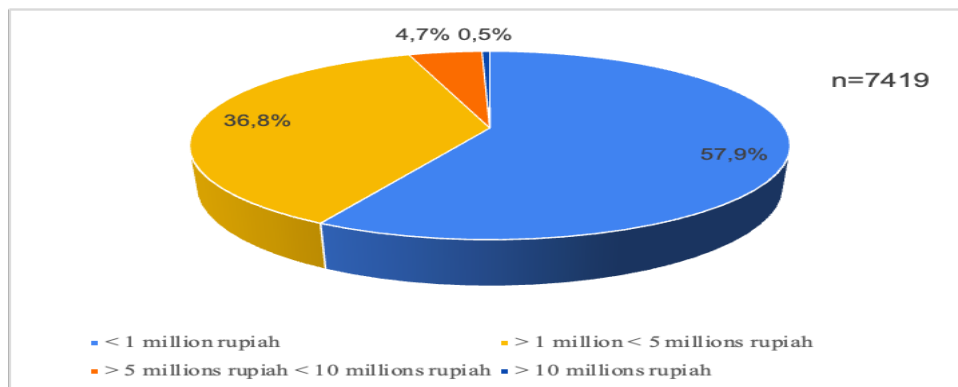


Figure 4: Parents' income

The government launched the policy for providing minimum education standards for helping children from financially disadvantaged families. The minimum educational standard (SPM) is the basic service quality. It is a measure of the quantity and quality of essential goods and services, as well as their minimal provision within the realm of basic education services. In this context, the measurement is conducted regarding the assistance provided to meet minimal service standards. Each student is provided with 6 brand-new drawing books and a new set of coloring materials containing at least 12 colors per semester (stated in Education and Culture Minister Regulation No 32 of 2018, Article 9 verse 2).

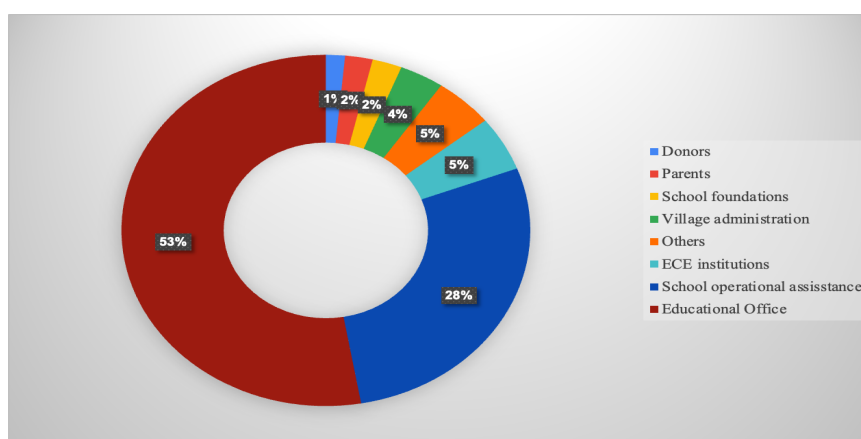


Figure 5: Percentage of aid provided by SPM in the form of coloring tools and drawing books

The local government provides minimal education assistance to students whose parents are financially disadvantaged, and 57.4% of ECE institutions where the children enrolled do not receive it. On the right side (Figure 5), we can see that various parties have contributed to meeting children's needs for these minimal educational standards. This means various parties are committed to ensuring the continuity of early childhood education. The meeting percentage of SPM underscores the local government's commitment to early childhood education, which is primarily their responsibility.

In 2022 the Minister of Education and Culture Regulation No. 32 of 2018 concerning Minimum Service Technical Standards for Education is deemed no longer in line with the legal requirements of the community regarding minimum service technical standards, and it is replaced with a more comprehensive regulation (Minister of Education, Culture, Research, and Technology Regulation Number 32 of 2022 on Minimum Technical Standards for Education Services, 2022). Besides the fulfilment of student participation and equality by collecting data on children aged 5-6 years old children who are not yet enrolled in school and raising awareness about the importance of one-year preschool education, paragraph 3 of article 18 outlines various activities aimed at ensuring student participation and equal distribution. These activities include providing financial aid to economically disadvantaged students.

c. Limited Access to ECE Institutions in Rural Areas

Another issue that contributed to the low participation in ECE was in Purworejo, one of the regencies that has been studied, there are 5.54% villages from a total of 469 villages that haven't established ECE institutions. These villages, located in remote areas, don't have qualified ECE teachers with bachelor's degrees (as the qualification of ECE teachers). This situation has also affected the progress of the 1-year pre-primary education program. Regarding this, the Minister of Education, Culture, Research and Technology Regulation No. 32 (2022) in Paragraph 3 Article 18 stated to expand Early Childhood Education services in villages, offering educational services in areas with capacity shortages, and extending education to regions classified as remote, outermost, and underdeveloped. However, this regulation has just been issued and requires a considerable amount of time and appropriate resources to implement it.

Another reason mentioned by the chairman of HIMPAUDI (Association of Early Childhood Educators and Professionals in Indonesia) is the rapid turnover of officials in their province. This turnover has led to situations where ECE initiatives initiated by local Early Childhood Education and Care providers have not had the opportunity to fully develop, as new officials frequently replace them.

3. Initiatives Enhancing Participation in ECE

Local government leaders have taken significant steps to increase participation in ECE, especially one year before elementary school. They have issued official decrees emphasizing the importance of ECE one year before primary education based on central government policy (Government Regulation No. 2 of 2018 on Minimum Service Standards, 2019; Iswahyuningsih et al., 2018). The Department of Education in the city and regency has established a dedicated team for the dissemination of these decrees, outlining specific targets for the dissemination process and collaborating with various partners. Additionally, local governments have allocated funds to support ECE initiatives including promoting the importance of ECE, enhancing the skills of educators, and providing resources to ECE institutions. However, the onset of the COVID-19 pandemic disrupted the socialization efforts, and budget reallocation to address pandemic-related challenges. This resulted in inadequate socialization for the decrees.

There were 93.37% of ECE institutions have socialization programs or activities aimed at encouraging the community to enroll their children in ECE one year before elementary school as well. The ECE institutions conduct socialization in various ways (Figure 6) with

each ECE typically employs more than one method. A teacher in the city of Serang stated that they collect data on households with children aged 5-6 who are not yet attending school, and then carry out socialization about the importance of early childhood education and care for their children who are in their golden ages (0-6 years old) by visiting homes. Parents cannot guide their children due to their limited competencies and time. Some parents with low economic conditions have expressed their inability to enroll their children in ECE due to financial constraints. They opt to directly enroll their children in elementary school because it does not impose monthly fees.

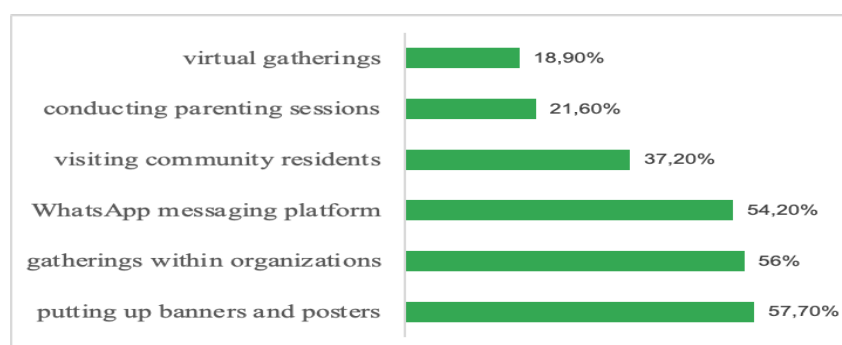


Figure 6: Various ways of socialization by ECE institutions on the importance of ECE

Meanwhile, the completion of one year of compulsory preschool education has been advocated by the UN through the Sustainable Development Goals, which aim to ensure that by 2030, all children, both boys and girls, have access to quality early childhood development and care, as well as quality pre-primary education, so that they are ready for further education. The indicator for this is the level of participation in organized learning measures by the Adjusted Net Attendance Rate or ANAR (Kementerian PPN/Bappenas et al., 2020). The ANAR which is measured by the number of 6-year-old children enrolled in early childhood education during a specific period added by the number of 6-year-old children enrolled in elementary school during a specific period divided by the total population of 6-year-old children during the same period, shows a different pattern compared to other measurement methods (GER, NER, and SRR). During the pandemic year 2020, participation declined, as it did in 2021. However, in 2022, following the pandemic, participation increased significantly. With this very positive trend, Indonesia is optimistic about achieving the SDG target by 2030 both for boys and girls aged 6 (Figure 7).

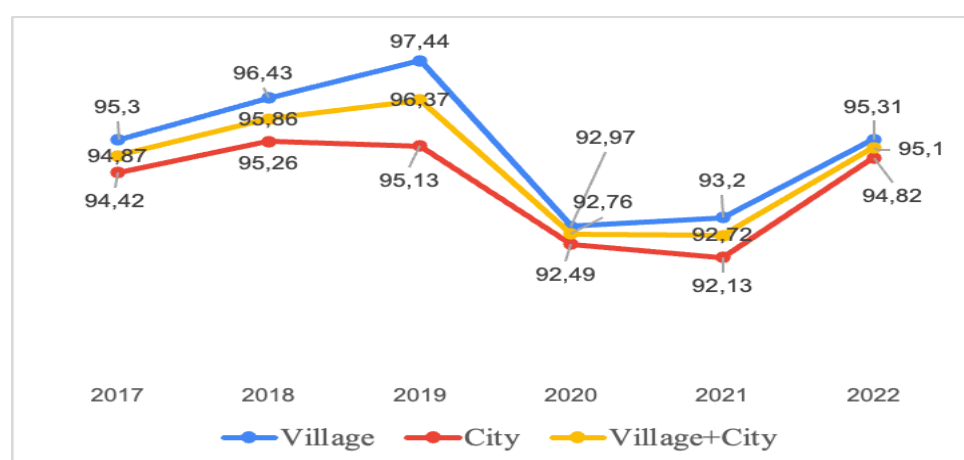


Figure 7: Children's participation in organized learning
Source: BPS (2020)

With a high ANAR achievement, the government cannot be complacent because the calculation of ANAR is significantly different from the calculation of GER or NER, making the task for the government to increase community participation in ECE quite challenging and complex. Especially when it is associated with poverty, which can increase the prevalence of stunting in Indonesia.

Conclusions

The main factors affecting participation rates in one-year pre-primary education due to parents delaying enrolment in pre-primary education because of the pandemic; opting to send their children to tutoring centers that relate to educators, especially in primary school, and community understanding of school readiness and early childhood development and learning needs; facing financial constraints that make it challenging to support their children's education; the policy for providing minimum education standards to young children is not being implemented effectively; limited access to early childhood education in certain villages due to isolation and a lack of qualified teachers, and inadequate socialization because of the Covid-19 pandemic.

In response to the challenges related to ECE participation, the government has initiated a series of strategic actions. These measures encompass provincial policies mandating the prioritization of early childhood education one year before primary education, the transition of ECE to primary school programs, the expansion of ECE services in rural areas, the provision of educational services in regions facing resource limitations, and the extension of education to remote, underserved, and underdeveloped areas. Additionally, they include the introduction of support programs for economically disadvantaged families. Nevertheless, it is essential to closely oversee and assess the implementation of these regulations.

The Participation Rate in Organized Learning saw a substantial increase in 2022. This development instils optimism and assures the government of Indonesia that the SDG's 2030 target, ensuring access to quality early childhood development and pre-primary education for all girls and boys to prepare them for primary education, will be met. It's essential to emphasize that this progress should not overshadow the need for significant improvements in GER, NER, and SRR, not only in terms of quantity but also quality.

Some implications from this research include: (1) Assess the achievements and challenges associated with the transition movement from ECE to elementary school, specifically the elimination of readiness test on reading, to gauge the effectiveness of the implementation of the policy, (2) Develop strategies for monitoring the overall effectiveness of the program aimed at ensuring a successful transition from ECE to elementary school, focusing on identifying key performance indicators and data collection methods, (3) Investigate the challenges faced by local governments in meeting the minimum service standard of ECE for economically disadvantage communities, as per the minister of education, culture, research and technology No. 32 of 2022, and propose potential solutions for establishing high-quality ECE services, (4) Explore methods to ensure an equitable distribution of teachers, especially in remote areas with limited resources, and outline the measures that village administrations and the government can take to facilitate this distribution, and (5) Examine educational and resource-based initiatives that empower communities to harness their region's potential and become self-sufficient in addressing poverty, and outline strategies for effective implementation of these initiatives.

While most respondents originate from a single province, this situation presents both strengths and limitations. On the positive side, it enables us to conduct a comprehensive analysis of cases within that specific provincial context. However, a drawback is that this focus constrains our ability to delve into cases in other locations in greater depth, primarily due to the limited availability of respondent data in those areas.

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Silk Roots - A Design Template for Interdisciplinary Learning Projects

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Abstract

This paper introduces a design template for interdisciplinary project-based learning (PBL), utilising a design thinking approach, with the "Silk Roots" project as a case study. Traditional education often compartmentalises knowledge, limiting students' understanding of real-world complexities. In response to these limitations, the paper presents a comprehensive four-stage framework for the implementation of interdisciplinary PBL rooted in design thinking principles.

Empathise: The design process begins with identifying users and stakeholders, recognising teachers as designers. The primary user is the student, but the community and curriculum are also significant stakeholders.

Define: Students seek real-world relevance and complex systems understanding. The process of crafting projects must address these needs while promoting collaboration, diverse perspectives, and student agency.

Ideate: The context of the educational system, the desired learning outcomes and the practical realities inform the possibilities that can be envisaged.

Prototype: The implementation stage involves a student cohort studying the silk industry near Bengaluru, India, with teachers facilitating their exploration. A unique outcome is the facilitators' transformation into co-learners, enriching the educational journey.

Implement: The success of the "Silk Roots" project led to the creation of a generalised design template. The template supports a project designer through logistical and philosophical considerations. It begins with conceptualisation and definition of the project study area, logistics and planning, the process of student research and the final outcomes of the project.

While such interdisciplinary PBL experiences might have cultural and practical limitations, the larger learning outcomes justify their consideration.

Keywords: Design Thinking, Interdisciplinary Project-Based Learning, Student-Centered Education, Co-learning, Project Design, Curriculum Innovation, Problem-Solving, Student Engagement, Holistic Education, Educational Reform

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1. Introduction

Traditional academic courses typically guide students through a linear trajectory, advancing from knowledge assimilation to conceptual comprehension to the demonstration of specific skills, often focusing on isolated topics (Peng et al., 2021). However, this compartmentalisation of knowledge into distinct categories can limit the appreciation and understanding of intricate, real-world systems (Henriksen et al., 2017). The historic focus in India has also been on examination proficiency and not necessarily real-world applicability of knowledge or skills. Mallya Aditi International School, established in 1984, aspires to educate its students beyond the examination as outlined in its philosophy and vision (as stated on the school website):

“...urge the students to question the conventional, challenge theories, validate hypotheses and employ analytical reasoning. At Aditi, students have exposure beyond books and academia.”

“Aditi creates opportunities for students to become confident, thinking, independent individuals who are sensitive to diversity, aware of their heritage and able to face the challenges of their time. ”

“...provides an education that is broad-based, encompassing a range of inter-connected disciplines.”

The students of Mallya Aditi International School, hailing predominantly from upper-class families, are well-acquainted with the modern face of Bengaluru as a technology hub. However, they often remain largely oblivious to the deep-rooted silk industry, which is an integral part of Bengaluru's rich culture and tradition. This 300-year-old heritage thrives in the northern outskirts of Bengaluru, India, not far from the campus of Mallya Aditi International School, Bengaluru. This small-scale industry encompasses every step of silk production, from cultivating mulberry leaves to producing silkworms and cocoons, extracting silk fibres, to weaving fabrics.

In keeping with the vision and objectives of the school, the Silk Roots project was launched to achieve the following objectives:

1. Provide students an opportunity to collaboratively study a multidimensional entity through first-hand research
2. Facilitate interdisciplinary study and the appreciation of real-world complexity
3. Encourage appreciation for the history and heritage of Bengaluru and provide visibility to a heritage industry
4. Develop faculty capacity in guiding students in student research projects

1.1. The Design Thinking Approach

We opted for a holistic, design thinking approach (Panke, 2019; Razzouk & Shute, 2012) to craft an interdisciplinary project, enabling students to grapple with the intricacies of complex systems (Bender-Salazar, 2023). In this approach, students actively participated in defining the problems, generating potential solutions, and establishing methods for evaluating their work (Lor, 2017). Teachers assumed the role of facilitators, guiding the process, and learning alongside the students (Daws, 2005).

Our important primary aim was to meet the unique needs of our learners. We wanted to prioritise collaborative learning, break down silos in the mind and embrace an interdisciplinary approach. This also involved building in feedback cycles as and when needed during the process to foster an iterative course design. Furthermore, design thinking would allow us to craft a curricular template attuned to the specific context in which we planned to implement it (Design Thinking for Educators. 2018).

From a pedagogical standpoint, our application of the design thinking process allowed for fostering collaborative and creative problem-solving skills amongst the learners. This philosophy aligns with social constructivist, sociocultural, and relational theories of learning (Bandura, 1986; Vygotsky, 1978). Consequently, design thinking lends itself to pedagogical strategies that actively engage students with reflective, experiential and authentic learning experiences. Most importantly, design thinking plays a pivotal role in cultivating a design thinking mind-set among students. It encourages a shift away from the conventional, teacher-led approach to a more flexible and creative one that emphasises experimentation.

Our journey did not merely follow design thinking principles for knowledge discovery and understanding but also embedded capacity-building throughout the entire process. Learning experiences, collaborative activities, and creative problem-solving were interwoven into the fabric of the project. These activities nurtured competencies such as critical thinking, reflective learning, adaptability, effective collaboration, and systems thinking, ensuring a well-rounded educational experience that extends beyond the boundaries of traditional learning (Koh et al., 2015).

2. The Design Thinking Process

The five stages conventionally associated with design thinking helped provide a framework that allowed us to clarify, contextualise and communicate our intentions. The section below is a discussion on how the different stages of design thinking informed our design of the interdisciplinary learning project and culminated in the design template.

2.1. Empathise

The first step was to identify the ‘users’ or the stakeholders. The parallel identification of the teacher as the ‘designer’ makes the project immediately practitioner-based, with awareness of the scope and limitations of the curriculum and practical realities.

The primary ‘user’ of the learning project is the student. The pedagogical requirements and outcomes of the project can vary depending on the grade level of the intended students, the affiliated syllabus and cohort ability.

The second stakeholder we identified was the community. We believe that learning should be people-centric and help our students acquire a deeper understanding of the people they share space with. Project Based Learning (PBL) can help improve awareness and provide visibility to crafts, industries and cultural artefacts that often get relegated to the margins of public awareness.

As teachers, the third stakeholder we cannot ignore is the curriculum. Curriculum includes components that may be externally mandated (by government or by an academic board), institutionally designed, course specific or even teacher generated.

Thus the design of projects must factor in all of the aforementioned; it must balance the tension between the practicality and convenience of the compartmentalisation of subjects and the larger, more complex goal of interdisciplinarity.

2.2. Define

As teachers, it is incumbent on us to create and present opportunities to students where learning can take place. The process of designing a project must be primarily student-centred. In our experience, students seek opportunities to apply their learning to the real world, to study the complex real-world systems they encounter in their lived realities and not the simplified contexts presented in textbooks and syllabi. We, as teachers, similarly recognise that students need exposure to complex, information-rich inputs to learn how to process and solve multidimensional problems, build self-confidence and prepare them for real-world problem solving.

Students also need opportunities to develop and refine their ability to meaningfully and productively collaborate. Our conception of PBL necessitates collective sense-making. Students have room to work synergistically and combine their learning into a larger holistic picture, support each other's learning and appreciate diversity of experiences, learning and ability. The intended target of our PBL activities also aims to help students appreciate the value of the historic and the modern.

2.3. Ideate

The design of the project therefore began to take form organically starting from the principles outlined above. Some of the key points that were explicitly stated were:

- The process of discovery is more important than the final product
- All students cannot undergo the same process and therefore need differentiated support
- Directed learning must be avoided and teachers involved in the project will act as guides and facilitators
- Multiple perspectives must be considered at all levels of study
- Students must collect data and collectively arrive at conclusions
- Students must be able to communicate their learning

These tenets were arrived at collectively by the core team designing the project and were shared with all participating faculty. These become not just design principles for the project, but also operational principles during the course of the project.

2.4. Prototype

A student cohort of 50 students guided by 9 facilitators engaged in a study of the silk industry situated in the outskirts of Bengaluru, India. The study was designed around the silk industry for two reasons:

1. The historic silk industry in Bengaluru has become effectively hidden from public knowledge by modern priorities like IT, biotechnology and the service sector. This is due to a number of factors including cultural visibility of the industry, its location, and the information the general populace and specifically, our students are exposed to.

2. The components of the industry are situated approximately an hour away from the school making the logistics of the project much easier. School buses can easily transport student teams to various study sites.

After the planning of the project (which will be detailed in the subsequent section) the participating teachers visited the various locations and processes involved in the silk industry with the help of local experts from the Indian National Trust for Art and Cultural Heritage (INTACH). Based on this visit, teachers identified different study areas, formed facilitator teams and created support structures for students to carry out their study. The study areas that were decided upon were the spaces and environments – biotic and abiotic components – associated with the industry, the mapping of human interventions in biological processes for economic gain, the communities that participate in this industry, and the process and its economics. Teachers facilitated student teams using their expertise in their respective disciplines as well as in disciplines unfamiliar to them. This study had dedicated time in the academic schedule for visiting the study site and collecting data, and analysing and discussing findings. Research groups documented their process, observations, measurements, findings and conclusions. They made presentations within the group and to other groups to share knowledge and help construct a cohesive and holistic picture of the industry.

2.5. Implement

The success of the project “Silk Roots” led to the creation of a generalised design template that considers the logistical sequence of events and pedagogical underpinnings in the planning and execution of interdisciplinary project-based learning. The formalisation of this process, in no way rigid or immutable in structure, was carried out in the hope that it will empower more teachers to design their own interdisciplinary project-based learning explorations at different academic levels and scales. The design template is structured as four stages which will be described below.

2.5.1. Stage 1

The project begins with the constitution of a core team that shares passion for the topic or theme of the project. In our experience, we find that members with very diverse skill sets and a willingness to take risks strongly support interdisciplinarity by design and promote a problem-solving approach to the planning and execution of the project. The vision of the core team and the definition of the learning outcomes is the starting point for interdisciplinarity. The selection of the intended student cohort is an important choice that factors in student workload, and background knowledge and skills. This leads to the definition of the intended learning outcomes that are strongly associated with the student cohort, the area of study, and the desired curricular and co-curricular learnings. The core team also envisaged the entire project as a co-learning process where teachers (who might be inexperienced in investigative projects or working in unfamiliar disciplines) and students engage in discovery-based learning.

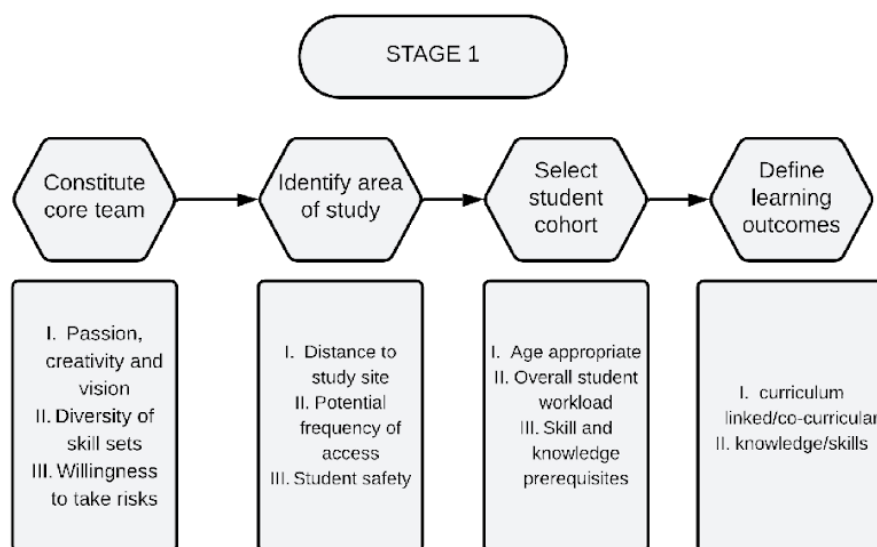


Fig 1. Stage 1 of project design: conceptualisation and definition

2.5.2. Stage 2

The second stage involves the administrative and pedagogic processes prior to student involvement. A successful project is built on support from the larger administrative framework at a school. This includes the scheduling and timetabling of project work hours for students and faculty, allocating budget to execute the project and devising a student safety plan. Once administrative permissions are received, there are several parallel actions that were taken.

The project timeline creates practical constraints that limit and guide the scale of work that can be carried out. This includes the number of visits to the study site and their frequency, and the frequency of meetings between students and facilitators and between facilitators. It also defines checkpoints for tangible submissions and sets deadlines for work by students.

Project based learning in external environments does often require the input of local experts and resource people. They will also help facilitate communication with the community directly involved in the area of work. The consent and collaboration of the local community is vital to obtain and school personnel may not be best suited to initiate these conversations.

Internally, the core team may also need to recruit additional facilitators. Maintaining the focus on interdisciplinarity requires team members from diverse disciplines with a willingness to work outside their area of expertise, a willingness to themselves learn alongside students and the ability to problem solve in unfamiliar contexts. This is important as real-world systems under study do not fit into neat boxes that can be compartmentalised as subjects. In our experience, all our colleagues who worked on the project did not necessarily understand what was meant by interdisciplinary study, however their work with students in this project enabled their learning as well.

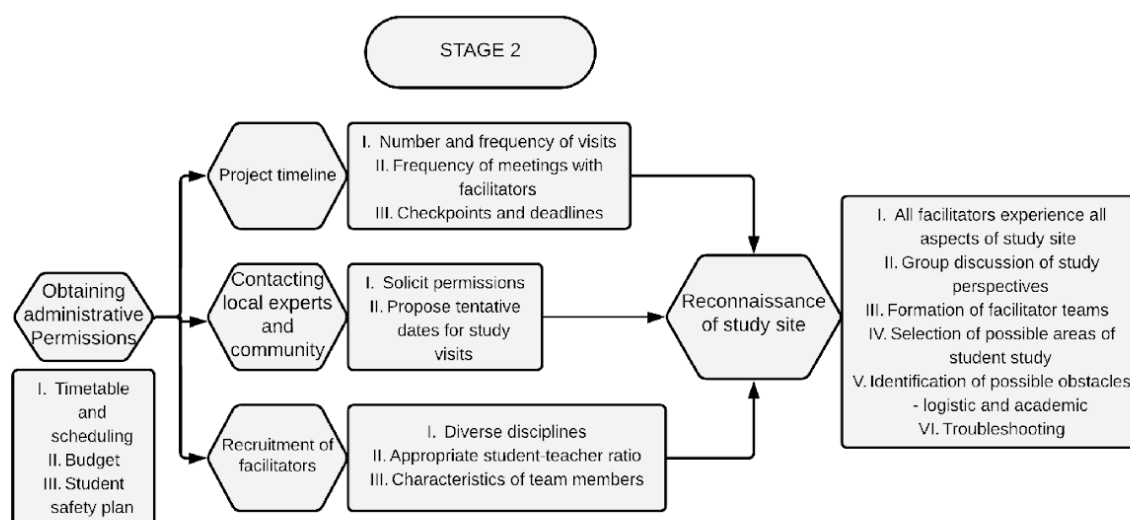


Fig 2. Stage 2 of project design: Logistics and planning; faculty onboarding

2.5.3. Stage 3

The third stage of the project is implementation with the selected student cohort. Since this template has been designed for high school students, typically minors, parent communication is a necessity. Parent buy-in and support also aids students in maintaining engagement with work over longer time frames. Therefore parents need to be given sufficient information – a concept note, the learning outcomes and the logistics – to give informed permission for the participation of their ward.

The involvement of students should begin with a brief introductory session, but care must be taken to communicate their ownership of the study and to not avoid creating preconceptions based on facilitator biases. In mixed group cohorts or contexts where PBL is not a frequent part of curriculum, it may be necessary to carry out some preparatory activities and exercises in observation and measurement, data collection and data analysis; this can be done on campus, even as a workshop, to pre-skill students. This will also help raise the average level of student efficacy in the project.

The student groups can be formed in several ways – random allocation, facilitator allocation, or student choice. Each group works with one or more facilitators. Facilitators can offer specific study areas based on their technical expertise or can have the student group propose the scope of their study. In both cases, all the students must first visit and observe the study site in its entirety. They can subsequently narrow their focus of study in discussion with their facilitator(s). They also identify the details of their study – sample sizes and the data/samples they will collect. This will be carried out on subsequent visits. The collected data or measurements involving the samples provides information that students must first analyse on their own, following which facilitators can help evaluate the findings. This discussion with the facilitators is important to help students understand the bigger picture, but should not be done prematurely to provide opportunity to foster student agency and hone their skills.

After the student group discussion with their facilitator, there should be a facilitator coordination meeting. This is required for the sharing of expertise among the facilitators, enables problem-solving and helps the project facilitator team construct the overarching narrative of the project. This also scaffolds the entire project for the facilitators and students,

helps with resource allocation and planning the way forward. This process of data collection, analysis, discussion, evaluation and coordination is done in a cyclic manner, as many times as required and is feasible. This culminates in each group having developed coherent, evidence-based narratives or conclusions.

An interesting outcome of the process was the evolution of the facilitators as co-learners. Teachers navigated uncharted territory alongside the students. Nearly half the facilitators involved in the project were working in areas outside their domain. They were guiding student teams while also generating their own knowledge of the specific study area, the academic domain of their study and the pedagogy of facilitating PBL. Much of this learning came from the knowledge produced through research by the student team or arose organically through their interaction with the team. Consequently, the educational journey transforms into a two-way co-learning process, where both students and teachers engage in a reciprocal learning process.

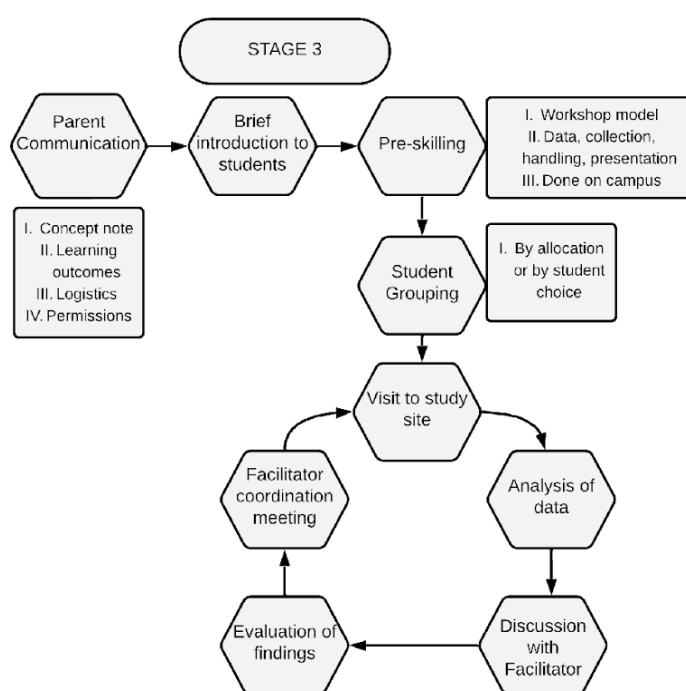


Fig 3. Stage 3 of project design: Student research

2.5.4. Stage 4

The fourth and final stage is the communication of individual group outcomes, the collective project outcome and evaluation of the project as a whole. Student groups have previously studied individual elements of the research area and now have to communicate and integrate their learning. This can be done through presentations and discussions complemented by peer evaluation. The planning for the final presentation must first identify the target audience – internal audience, larger school community, general public - and mode of presentation. This must also factor in the timeline to prepare students and materials, the logistics involved and ample time to set up and/or rehearse.

The final presentation should ideally communicate the process, outcomes and student reflections. Different modes of presentation will prioritise these differently and via different

media, visuals and experiences. The last step is a necessary debrief. Student feedback is vital to improving the experience and refining the process for subsequent cohorts. This is combined with project evaluation by the facilitators and the core team in the final report. This is important and necessary institutional documentation for the institutional portfolio and for future ventures.

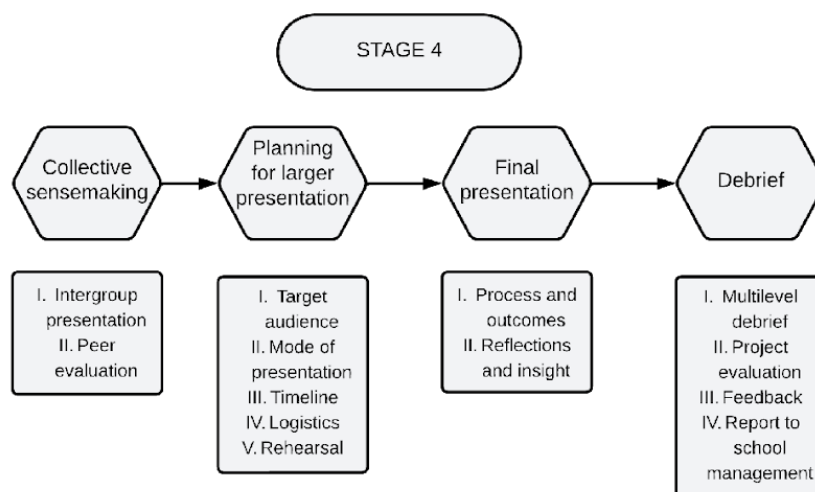


Fig 4. Stage 4 of project design: Collective sensemaking, presentation and final documentation

3. Conclusion

We advocate for the integration of culturally relevant and interdisciplinary teaching practices as a driving force within an institutional curriculum. The design template we have produced has broad applicability - transcending age groups, and geographical and cultural boundaries. It offers a versatile framework that can be implemented across diverse educational settings worldwide. It is not envisaged to be immutable, but offers a starting point and general framework that should be adapted to the specific needs, outcomes and realities of a given project.

This template however presupposes high intrinsic motivation among the organisers and facilitators. Interdisciplinary projects require multiple facilitator inputs, additional time and resources and enhanced engagement with students. This design template also seeks to facilitate the co-learning of teachers and create an environment for the development of pedagogical skills and knowledge. These add to the pre-existing demands on teachers that may not be healthy or viable. The considerable infrastructural requirements necessitates substantial institutional support and an understanding of the value of such learning experiences, which may not always be present. Sustaining student motivation through the duration of the project, especially when allocated time is limited to once or twice a week, is a challenge. In examination-oriented systems, students may view the time spent on the project as detrimental to their short-term academic success.

Despite these limitations, the benefits of interdisciplinary PBL, stated at the outset, can motivate educators to design such learning experiences. These equip the institution, teachers and students with the skills necessary to address novel challenges. By approaching these issues from a human-centric perspective, they can reframe problems, shedding light on what truly matters to their specific user groups. This approach transcends cultural and regional

differences, ensuring that the core principles of effective and meaningful education remain universally applicable.

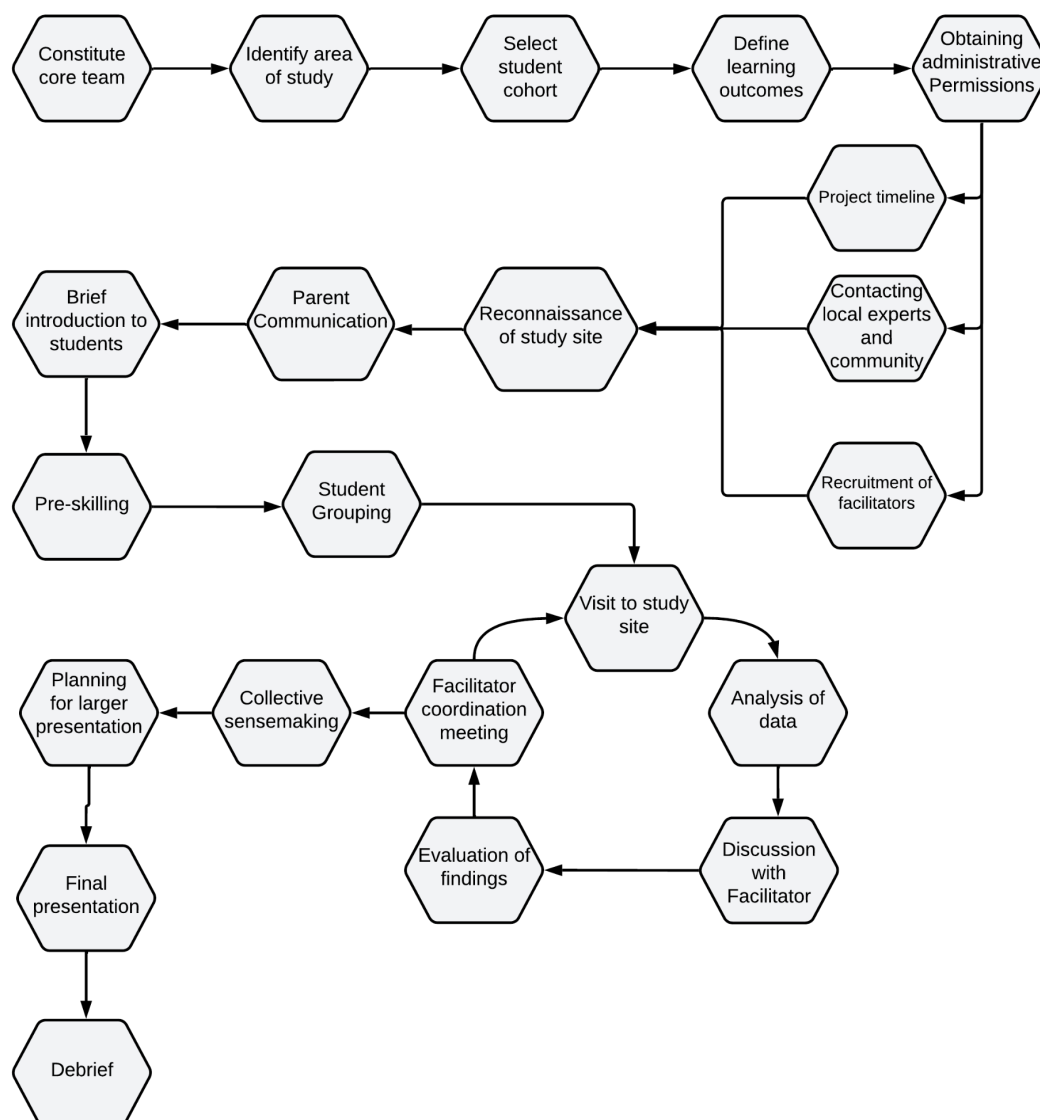


Fig 5. The project design template

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Challenges and Success Among International Students: What Makes International Students Resilient?

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Abstract

International students face an array of challenges while attending higher education institutions. Among these challenges are the resettlement process of making a home in a new country, developing new relationships (e.g., friends, close relationships), and attending college courses in a country and culture different from their own. Using the grounded theory method, we interviewed international students about these challenges in addition to how they were impacted by the onset and persisting COVID-19 pandemic. We also interviewed a few faculty and staff members about their experience working with international students. Our findings suggested that international students faced a number of challenges in general, including language barriers, discriminations, difficulties making friends, etc. However, they also shared some good aspects in studying and living in the U.S. For example, many international students appreciated that professors in the U.S. were approachable, and many of them liked the university systems in the U.S. In addition, international students were affected negatively by the COVID-19 pandemic in different aspects, including impacts on their personal and academic lives, emotional impact, financial impact, etc. However, they also received support from the university during the pandemic. Further resilience among these international students is because of a substantial amount of support from their home network (i.e., friends and family from their home country), their new friends, and especially their higher education institution. Recommendations to higher educational institutions are provided.

Keywords: International Students, American Universities, COVID-19, Grounded Theory Approach

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Introduction

The United States has high-quality higher education, which attracts numerous international students to come to study each year. In the academic year of 2019-2020, there were around 1.1 million international students enrolled in U.S. institutions (U.S. News, 2020). The number dropped below 1 million in 2020-2021 (NAFSA, 2022). In the 2021-2022 academic year, there were 948,519 international students (Statista, 2023). International students come from different countries, with China, India, and South Korea being the three leading countries that sent students to study in the U.S. In the school year of 2019-2020, 34.6% of international students in the U.S. were from China, 18% were from India, and 4.6% were from South Korea (U.S. News, 2020).

The Benefit of Having International Students

International students bring valuable resources to the universities and communities in which they study. Having international students come to study in the U.S. contribute to the diversity of the campus and the community. They bring their own cultural background to the U.S. and learn about American culture while American students and faculty can also learn about different cultures outside the U.S. from international students.

International students also benefit the economy of the communities in which they study. International students were often been viewed as “cash cows” in U.S. higher education institutions. Higher education institutions often seek opportunities to recruit more international students, as they provide a source of cash flow (Choudaha, 2017). During the 2021-2022 academic year, international students contributed \$33.8 billion to the U.S. economy, which was more than \$5.5 billion from the year before. International students also supported 335,423 jobs in the U.S. economy during 2021-2022 (NAFSA, 2022). The students themselves help prop up the financial stability of higher education institutions. For all that American universities and higher education can claim about the benefits to international students – exposure to the American way of life, and high-quality universities – these students contribute much to the universities and communities in which they study.

Challenges That International Students Face

For many international students, coming to study in the U.S. can be a challenging life experience. For example, language barriers are one issue that many international students have experienced. Over 53% of international students experienced language barriers when studying in the U.S. (Chen & Yang, 2014). Although some international students have studied English for many years in their home countries, because the language environment is different in the U.S. compared to their home countries, international students face language challenges such as accents, pronunciation, and the use of academic English (Wu et al., 2015). Language barriers affect international students’ academic life. In Leong’s (2015) study, a student commented that they needed to put extra time into homework assignments because they needed to use a translation dictionary. Language barriers also affect international students’ personal lives. In Wu et al., (2015), a student reported that they had difficulties making phone calls to the cable company to set up the internet. In sum, language barriers have affected international students negatively in their academic and personal lives.

International students also have experienced academic difficulties due to learning styles. Many international students experienced difficulties with student-centered learning and group

work (Chen & Yang, 2014). International students also experienced difficulties interacting with professors. For example, American education values independent learning and self-directedness, but international students who came from China may not be used to independent learning and may over-rely on their professors or advisors relative to American students (Yan & Berliner, 2009).

International students also experienced isolation and loneliness when studying in the U.S., and it is more of a problem for international students who do not have relatives or someone they knew in the local area. Some international students have difficulties making friends with American students (Wu et al., 2015). Because many international students' first language is not English, they may have a harder time making friends with Americans due to language barriers. In addition, experiencing culture shock may also make it hard for international students to be connected with others who have different cultural backgrounds (Ng et al., 2018). Further, a study related to the utilization of university counseling services found that international students did not always have someone to rely on when experiencing difficulties and were not shown empathy by others (Yi et al., 2003).

International students are also often subject to experiencing prejudice and discrimination in the U.S. Some American students perceived international students as symbolic threats (e.g., the values and beliefs of international students regarding moral and religious issues are not compatible with the beliefs and values of American students) or realistic threats (e.g., international students are competing with American students for good grades) to them (Charles-Toussaint & Crowson, 2010). Poyrazli & Lopez (2007) also found that international students experienced more discrimination than American students, and the discrimination also led to homesickness. Taken together, international students may be perceived as threats to American students and experienced more prejudice and discrimination than local students.

International Students' Positive Experiences

Although international students are facing numerous challenges studying and living in the United States, they also have gained positive experiences. The study abroad experience helps international students with their personal growth and self-discovery. Because international students have access to helpful educational resources from universities, it also helps enhance their intellectual development. Being far away from their families also helps international students to grow up and be independent (Chen & Yang, 2014). By studying in the United States, international students may also benefit from being in a multicultural, diverse environment. It helps international students to be open-minded and learn from different perspectives (Younes & Asay, 2003). Taken together, studying abroad provide international students with opportunities to grow and gain positive experiences.

International Students' Experience During COVID-19

International students have faced some unique challenges during the COVID-19 pandemic along with some positive experiences during the pandemic. On the positive side, many international students adapted to remote learning well, and even better than domestic students. International students also appreciated the support from their universities during the pandemic (Chirikov & Soria, 2020). Although some international students adjusted well to remote learning, some students also reported lacking motivation for remote learning, feeling disconnected to other students during remote learning, and experiencing difficulties to learn effectively online (Chirikov & Soria, 2020). Because some international students relocated

(e.g., moved back to their home country) during the pandemic, it became difficult for them to attend classes or meetings at their scheduled time due to time differences (Chirikov & Soria, 2020).

Other than difficulties in remote learning, international students were also concerned about their personal life related to healthcare, immigration, visa issues, and discrimination. (Chirikov & Soria, 2020). In addition, Gallagher and colleagues (2020) reported that international students in Queensland, Australia experienced financial hardship during the pandemic, which made them not able to afford basic needs, such as food and housing. Another study also found that international students in Canada experienced financial and emotional distress (Firang, 2020). Another study found that Chinese international students experienced a high level of anxiety, which was associated with discrimination and fear of COVID-19 (Ma & Miller, 2021).

In sum, international students experienced different kinds of difficulties during the COVID-19 pandemic, including difficulties related to remote learning, healthcare, immigration issues, financial situation, etc. However, on the positive side, many international students adjusted to remote learning well.

Current Study

The purpose of this study was to gain a greater understanding of undergraduate and graduate international students' experience in the U.S., highlighting their experience during the COVID-19 pandemic. In the current study, we not only interviewed undergraduate and graduate students but also interviewed faculty and staff who have international backgrounds to gain a greater understanding of international students' experience in the U.S. The current study uses a grounded theory approach for data collection and analyses because it allows us to build models based on qualitative data.

Method

Participants

Nineteen international students were recruited from a mid-size midwestern private university in the United States. Fifty-two percent identified as male, and 68% were undergraduates with an average age of 27.71 (Table 1).

Table 1. Participant demographics

Participant #	Country	Gender	Age	Undergraduate/Graduate Student	Time in the U.S.
1	Lebanon	Female	50	Graduate	6 years
2	China	Male	19	Undergraduate	2 years
3	Saudi Arabia	Male	30	Graduate	5 years
4	Germany	Male	27	Graduate	4 years
5	China	Female	22	Undergraduate	6 years
6	Israel	Male	23	Undergraduate	2 years
7	Ivory Coast	Female	19	Undergraduate	10 years
8	Israel	Female	32	Graduate	2 years
9	Peru	Male	33	Graduate	2 years
10	Germany	Female	30	Graduate	6 years

11	Spain	Male	23	Undergraduate	3 years
12	South Africa	Male	27	Graduate	8 years
13	Greece	Female	26	Graduate	2 years
14	Eritrea	Male	22	Undergraduate	7 months
15	India	Male	22	Graduate	5 months
16	Russia	Female	34	Graduate	5 years
17	China	Male	27	Graduate	3 years
18	Brazil	Female	25	Graduate	7 years
19	Ukraine	Female	26	Graduate	1.5 months

In addition, we interviewed an international postdoctoral research associate who graduated and currently working at the university, three international faculty members from China, Japan, and Italy, and one staff member from the Office of International Services at the university.

Interview Protocol

This study used semi-structured interviews. Interviewers asked four main categories of questions: (a) resettlement in the U.S. (e.g., “What has living in the U.S. been like?”); (b) relationship building (e.g., “How have people treated you here?”); (c) adjustment to American University System (e.g., “What do you like about studying in the U.S.?”); and (d) impact of COVID-19 on international students¹ (e.g., “How have you been affected by COVID-19?”).

Procedure

Participants were recruited via the psychology research SONA system and via emails using snowball sampling. The recruitment emails were sent to the Office of International Services and professors at the university. Data were collected from March 2020 to September 2020. Due to the COVID-19 pandemic, all the interviews were conducted online via Zoom. The nature of the study was written in a recruitment statement and explained verbally before interviews started. The interviews were conducted by the first two authors. Interviews were audio-recorded using Otter.ai, an auto-transcription software, and lasted between 22 minutes to 50 minutes.

The interviews were analyzed using the grounded theory approach (Chun Tie et al., 2019). The interviews were coded in three phases. The first phase was open-coding, which involved line-by-line coding that put participants’ words into more concise phrases or sentences. For example, one participant said, “I didn’t know how to make friends with Americans and even with other international students.” Using open-coding, we coded it as “difficulties making friends.” The second phase was axial-coding, which involved grouping segments into one category at a time for each section of the structured interview. For example, the line-by-line codes were put into a higher-level category called “making friends.” This category included participants reporting having difficulties making friends in the U.S. It also included participants discussing making friends easily in the U.S. The third phase of selective-coding involved integrating axial-coding categories to show how the codes related to each other. For

¹ Interview questions regarding the impacts of COVID-19 were added to the structured interview because data collection started shortly after many cities in the United States and countries around the world enacted a form of lockdown.

example, the themes “language,” “cultural differences,” “discrimination,” “public transportation,” and “safety issues” can all belong to a core theme “integration/adaptation.”

Results

International Students’ Experience Model

Based on the themes that emerged during the interviews, we generated the International Students’ Experience Model (Figure 1). This model indicates that the experiences of international students from a Midwestern university in the United States can be categorized into integration/adaptation, relationships, and academic life.

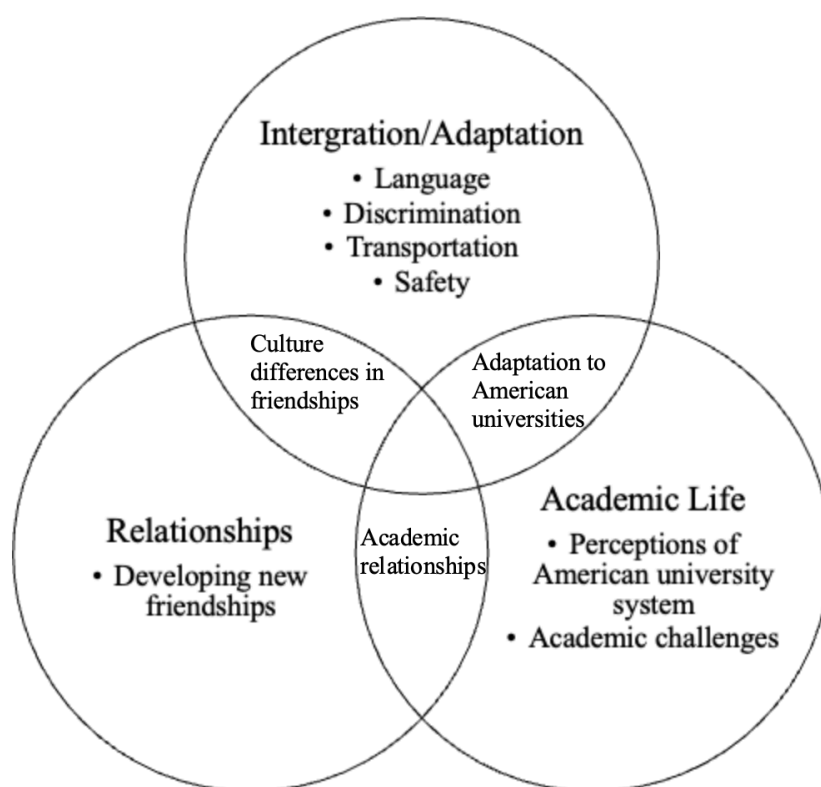


Figure 1. International students’ experience model.

For integration/adaptation, international students have experienced cultural differences between their home countries and the United States. They have also experienced language barriers when communicating with other people in the United States. Because all students in this study were living in a mid-sized Midwestern city in the United States, they also experienced difficulties with limited public transportation, and some students also experienced safety concerns. In addition, some students reported experiencing discrimination on or off campus.

For relationships, it was easy for some international students to make friends, but other international students experienced difficulties making friends in the United States due to cultural differences or having different understandings of the definition of friendships. Most students reported having positive relationships with their professors, and some also

mentioned that their professors were approachable, and the relationships with professors were less formal in the United States than in their home countries.

In terms of academic life, other than having positive relationships with their professors, international students discussed the cultural differences in university systems. Some students mentioned that the universities were more challenging, compared to their home countries' universities. For example, one student from China discussed that it was hard to graduate from an American university compared to graduating from a Chinese university. However, not everyone perceived universities in the U.S. to be hard. For example, one student from Israel discussed that high schools in Israel were harder than universities in the U.S. in some ways.

Other than experiencing language barriers which could be an academic challenge for international students, international students also experienced other academic challenges. One academic challenge is that some international students were not familiar with lab courses, as mentioned by a student from China. In addition, classes were also taught in American contexts, which may not be familiar to some international students. This could be more of a challenge for international students who were taking classes in humanity or social science.

International Students' COVID-19 Experience Model

International students' experience during COVID-19 could be different from their experience in the U.S. in general, also COVID-19 may have impacted international students in unique ways, compared to the impact on local students. Therefore, we generated the second model using the Grounded Theory approach, which is the International Students' COVID-19 Experience Model (Figure 2). International students have experienced negative impacts due to the COVID-19 pandemic. The negative impact includes emotional impact (e.g., feeling anxious), impact on personal life (e.g., flight tickets got canceled), impact on academic life (e.g., lack of access to the library on campus), impact on policies (e.g., student visa issues), financial impact (e.g., experiencing financial difficulties), and discrimination against Asian students. At the same time, students also have received extra support from the university. As students mentioned, the faculty and staff were being helpful, and the university also supported students by providing funding opportunities and sending out consistent email updates about the pandemic.

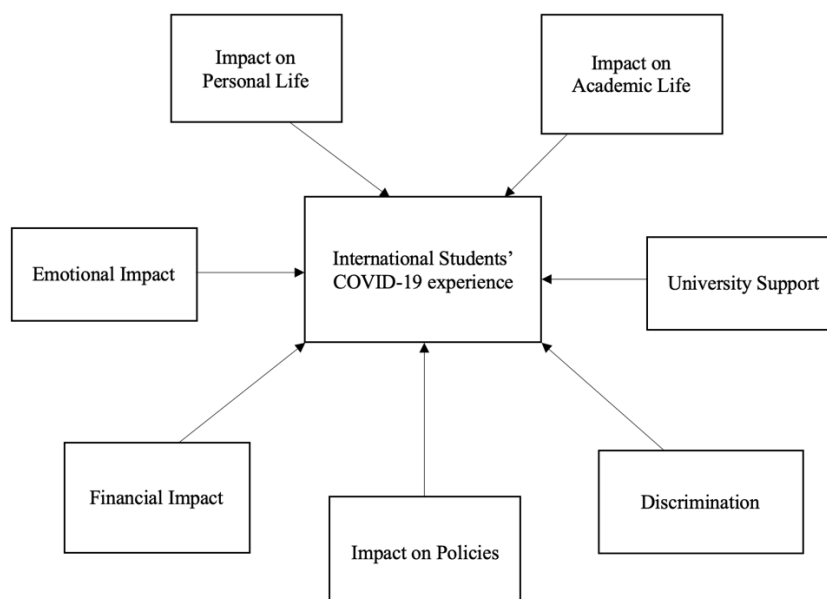


Figure 2. International students' COVID-19 experience model.

Discussion and Conclusions

Limitations

The study cannot be done without limitations. One limitation is that our university is a private Jesuit university located in the Midwest of the U.S. We assumed that many international students came from middle- or upper-middle class or their respective home government sponsored them, so their experience could be different from international students at large public university. In addition, participants' experience may also be different from international students who live on the East-coast and West-coast. Another limitation is that we used convenience sample and snowball sampling in the study, and participants self-selected to participate in the interviews. The self-selection could lead to some bias in this study.

Implications

The current study has several practical implications. First, many students experienced language barriers when they first came to study in the U.S. It would be helpful if faculty and staff understand that international students may need extra help with their English – both written and spoken – and provide help as necessary. Second, many international students reported having difficulties making friends in the U.S. Universities could provide more networking opportunities for international students to make friends with other students who share similar cultural backgrounds and American students. Third, international students experienced lots of challenges during their time in the U.S. and especially during the COVID-19 pandemic. The university counseling centers could provide more help specifically targeting international students. It would be beneficial to have a counselor who has international experience, because they may be able to understand international students' experiences better.

In conclusion, using the Grounded Theory Approach, we interviewed international students, faculty, and staff who worked with international students to learn about their experience studying in the U.S. We developed two models based on the interview data, which were the *International Students' Experience Model* and the *International Students' COVID-19 Experience Model*. The current study helped us to gain a better understanding of international students' experience, which could help faculty and staff to understand and accommodate those students when working with them.

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Educational Recommender Systems: A Systematic Literature Review

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Abstract

Recommendation systems were implemented as a solution to reducing the time and effort required by a user to search for information. In the development of the recommendation systems that offer the best performance, artificial intelligence algorithms are used, in combination with various recommendation approaches. However, in the educational context these systems have a different connotation since their objective It focuses on improving educational quality and not only on offering the user the option that best suits them. Educational recommendation systems (ERS) are those information systems that have been developed with the purpose of being used in an educational institution or organization with the purpose of recommending the different actors of the educational system: students, teachers, researchers or others, educational articles such as: programs, subjects or subjects, exercises, educational resources, etc. that contribute to raising educational quality. This scientific work seeks to determine what type of educational recommendation systems contribute to the educational quality of different education centers worldwide. To answer this question, the Cochrane methodology for the systematic review of ERS has been used. As a result, the recommendation systems implemented within the educational context raise the results of several educational quality indicators, including the student graduation rate and the academic performance of the students.

Keywords: Educational Quality, Teachers, Students, Educational Recommender Systems

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Introduction

Recommender systems (RS) are software tools that assist users in the decision-making process by applying information filtering, data mining, and prediction algorithms (Urdaneta-Ponte et al., 2021). These systems provide personalized suggestions about products, services, information, or content. There is a wide variety of RS in e-commerce services, video and music (Vara et al., 2022), streaming, search engines, social networks, among others. The first RS were developed for companies such as Amazon and Netflix, however, the transversality of the technology has achieved its use in the fields of health, transportation, agriculture, media, smart cities, education, and others.

The international body that defines criteria and indicators of educational quality is UNESCO, under this body every nation in the world within its governance has one or more bodies that maintain an accreditation system that ensures educational quality. In Spain the higher education accreditation body is the National Agency for Quality Assessment and Accreditation (ANECA), in Chile there is the National Accreditation Commission (CNA) (Aucancela, 2019) and in Ecuador the Council for Quality Assurance in Higher Education (CACES). For (UNESCO, 2023), the dimensions of educational quality are: learner characteristics, material and human inputs, teaching and learning, outcomes, and context. Some indicators of educational quality are retention rate and graduation rate (Modelo de Evaluación Externa de Universidades y Escuelas Politécnicas 2019, 2019). Retention rate refers to the number of students who remain in the same institution from the beginning to the end of a programme (Laura Horn, 2000). The graduation rate refers to the percentage of students who complete their education on time or in one more academic year in relation to their entry cohort (University of Castilla-La Mancha, 2021).

On the above-mentioned aspects, through this work, the following question will be answered: what type of educational recommendation systems (ERS) contribute to the educational quality of different education centers worldwide? Now answering this question means address research domains related to SR, machine learning and education.

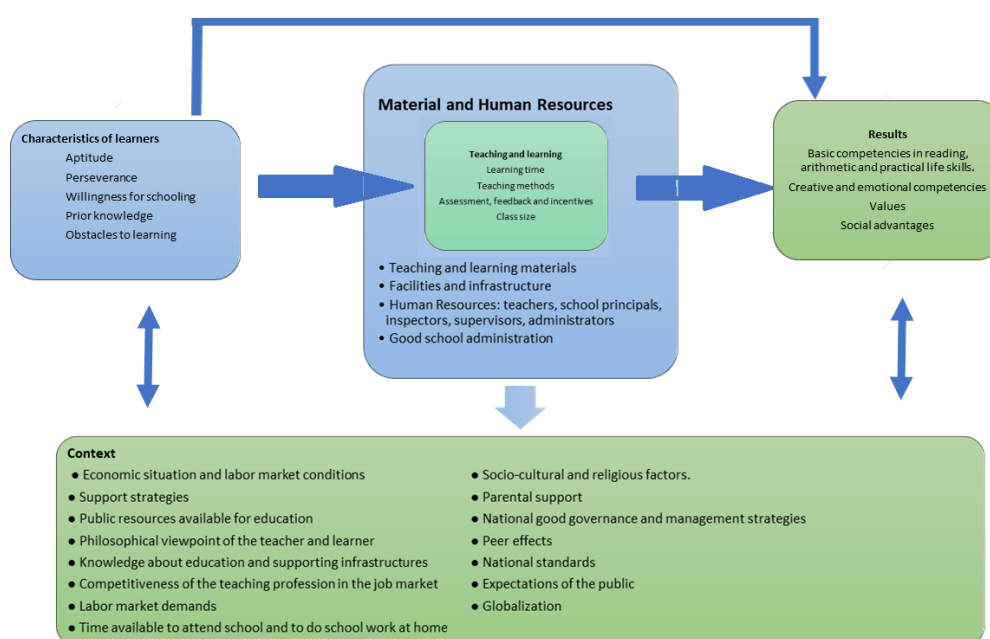


Figure 1: Education quality scheme (UNESCO, 2005)

The rest of the article is structured so that in section 2 the works related to this research are presented, in section 3 the methodology used for the development of this scientific work is presented, in section 4 the results are presented and in the Section 5 presents the conclusions.

Related Works

The integration of technology into teaching and learning processes has generated multiple benefits such as: improvements in the learning experience, personalization of teaching and promotes collaborative learning (Dao et al., 2022). The technology that was integrated into teaching and learning processes are educational recommender systems (ERS), which are tools that use algorithms to provide course recommendations, curricula and personalized learning resources to students: such as textbooks, activities and educational games (da Silva et al., 2022). In the work of (Urdaneta-Ponte et al., 2021) a systematic review on ERS is performed, however, it is necessary to determine which educational processes use ERS to improve educational quality, in the work of (Kulkarni et al., 2020) a study of e-learning challenges and methodologies is presented, however, it is necessary to know the elements involved in the development of an ERS and to determine what is the role that recommendation approaches and artificial intelligence algorithms have in the development of an ERS. In the work of (Roy & Dutta, 2022) a systematic review of the literature on ERSs is performed, however, it is necessary to identify the educational contexts and the objectives of ERS development.

Methodology

To develop this research work, the Cochrane methodology for the development of systematic reviews was used as a reference; this methodology proposes following the steps shown in Figure 2 (Pardal-Refoyo et al., 2020):

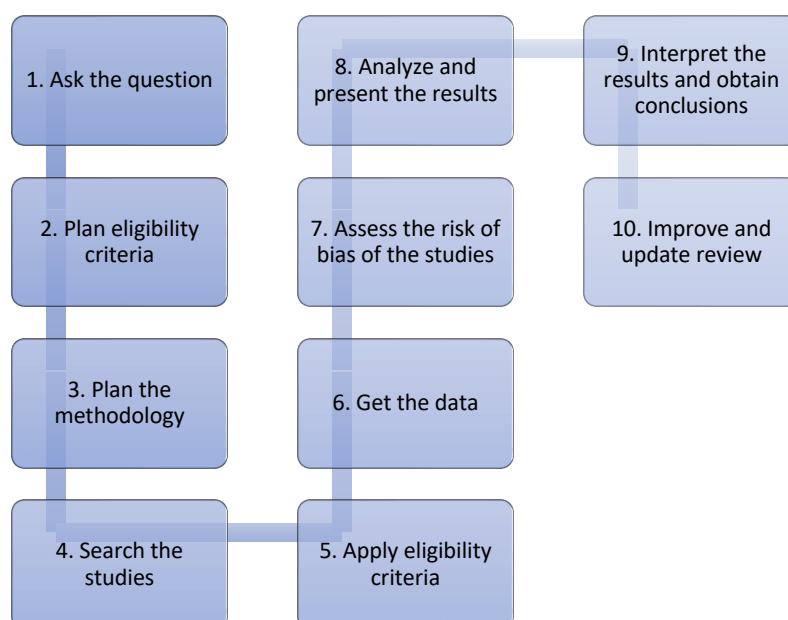


Figure 2: Main steps of the Cochrane methodology (Pardal-Refoyo et al., 2020)

First, a general review of ERS was conducted to understand the research problem and its context, and then the following questions were posed:

- Q1. What are educational recommender systems (ERS)?
- Q2. What elements are involved in an ERS?
- Q3. What are recommender approaches?
- Q4. What artificial intelligence (AI) algorithms have been used in ERSs?
- Q5. What kind of recommender systems contribute to the educational quality of different educational institutions worldwide?

The planned eligibility criteria respond to the following details:

- a. Articles published from 2018 through 2023.
- b. Articles from Web of Science (WOS) and Scopus scientific databases.
- c. Articles published in the English language.
- d. Articles related to recommender systems, machine learning and education.

Once the eligibility criteria were defined, the methodology was planned, and the following activities were carried out:

- a. Obtaining scientific articles: a search string was formed with the following terms: "recommendation systems", "machine learning" and "education". Applying the eligibility criteria, 141 articles were obtained, 60 articles from the WOS database and 81 from the SCOPUS database.
- b. Elimination of articles: using Excel pivot tables, a cross-checking of the obtained articles was performed, 12 duplicate articles were found, then 47 articles that did not respond to the research topic were eliminated.
- c. Review of scientific articles using the Askyourpdf platform to speed up the exploration.

Results

The review of more than 80 scientific articles detected a relevant gap due to the fact that the majority of them present general topics on ERS or the development of a specific ERS, which motivated to: determine the educational processes that are automated by ERS, identify the elements involved in ERS, determine the importance of recommendation approaches, perform a rough categorization of AI algorithms as a way to organize the knowledge on this topic and define the objectives of ERS development.

Q1. What are ERS?

By using AI in education two disciplines were developed: educational data mining (EDM) and learning analytics (LA), EDM focuses on the analysis of educational data to improve teaching and learning, while LA focuses on the analysis of student data to improve educational decision making, both contribute to improve educational quality through data analysis and the application of machine learning techniques (Charitopoulos et al., 2020).

ERS appear as an emerging discipline resulting from the use of AI in education, initially ERS were focused on improving learning (T. N. De Oliveira et al., 2021), however, comparing the (External Evaluation Model of Universities and Polytechnic Schools 2019, 2019) with the ERS found, it is evident that ERS are used in multiple educational processes other than the teaching-learning process, which motivated to think of an integral approach. See Figure 3. An

integral vision of the educational context allows extending the development objectives of the ERS to improvements in educational quality.

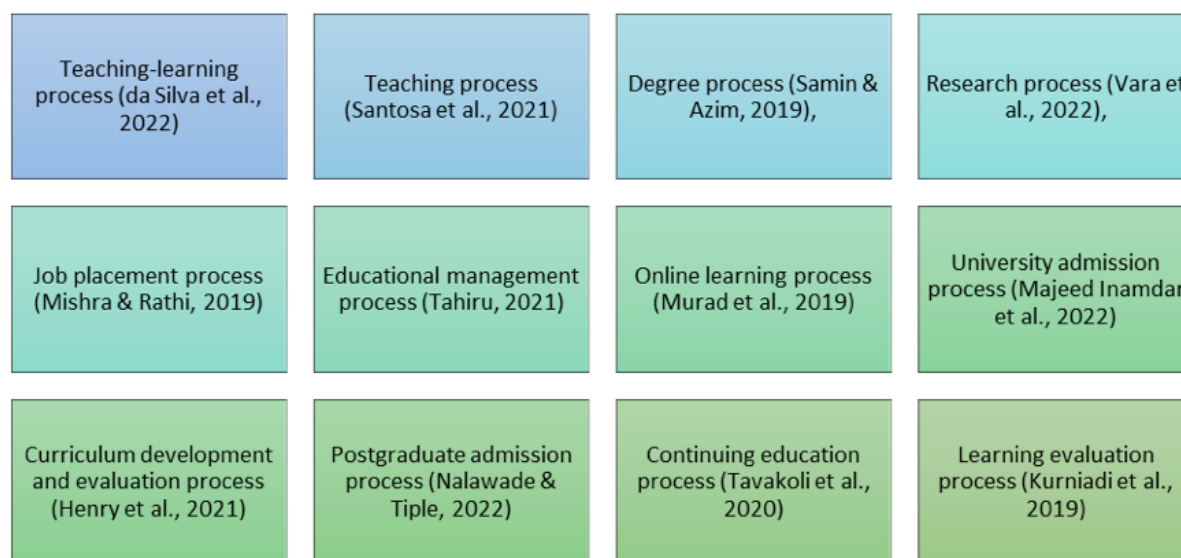


Figure 3: Educational processes automated by an SRS

The relationship between educational processes indicates that, if an educational process is automated, improved or strengthened by an ERS, it influences another process; an example of this is the positive influence of the teaching-learning process on the teaching process. An ERS of the teaching-learning process suggests courses, reading materials, videos, exercises and other learning resources according to the preferences and needs of each student (da Silva et al., 2022), improving the results evidenced in quality indicators such as academic performance (Jalota & Agrawal, 2019) and the graduation rate of students (Fernández-García et al., 2020). The teaching process affected by the teaching-learning process allows professors to make decisions on how to design and deliver courses and curricula, which improves the effectiveness and efficiency of teaching and learning (Charitopoulos et al., 2020).

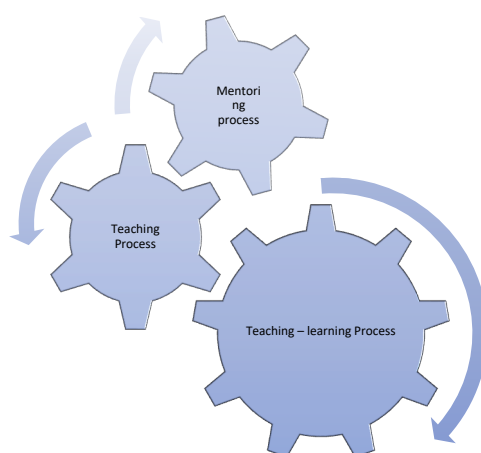


Figure 4: Relationship between educational processes

Thus, it is evident that the ERS are information systems developed in an educational institution or organization with the purpose of recommending to the different actors of the educational environment: students, teachers, researchers or others, educational items:

subjects, careers or departments, exercises, activities, etc. that contribute to improve the quality of education.

Q2. What elements are involved in an ERS?

To understand the architecture of an ERS, it was proposed to know its elements. See figure 5.

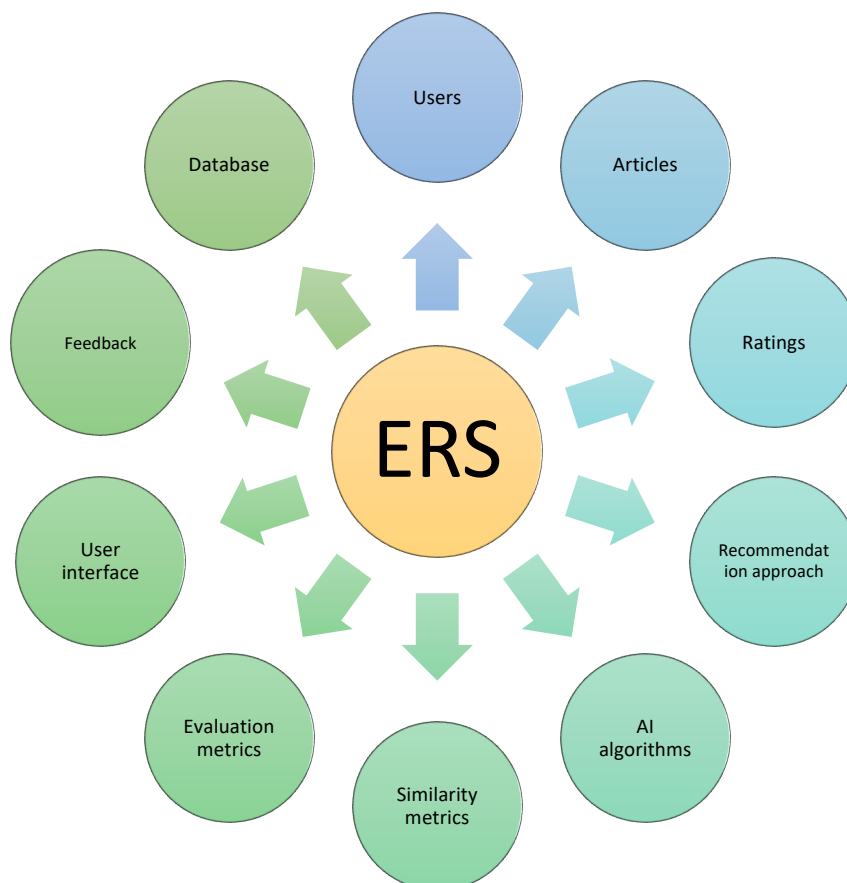


Figure 5: Elements of an ERS

Below is a brief explanation of each element:

- Users: people who use the system and receive recommendations based on their preferences, behavior, and feedback (Li & Zhang, 2021).
- Items: products, services or content that are recommended to users based on their interests and needs (Uddin et al., 2021).
- Ratings: explicit comments (ratings, reviews, preferences) or implicit comments (clicks, views) (Ren, 2023) provided by users on items they have used or consumed, which is used to calculate the similarity between users and items.
- Recommendation approach: is the method or technique used to generate recommendations (Murad et al., 2019).
- AI algorithms: used to analyze data and generate recommendations (Zhou et al., 2018).
- Mathematical formulas: measures used to determine the similarity between users or items based on their ratings (Abed et al., 2020).
- Evaluation metrics: criteria used to measure the effectiveness of ERS, such as accuracy, coverage, diversity, and novelty (Saito & Watanobe, 2018).

- User interface: through which recommendations are presented to the user. It can be a website, mobile application, email or other forms of communication (Liu et al., 2021).
- Feedback: ERS continuously learns and improves by incorporating user comments. This can include explicit comments (ratings, reviews) or implicit comments (clicks, time spent) to refine recommendations over time (Santosa et al., 2021).
- Database: It is where information about users, items and interactions between them is stored (Lazarevic et al., 2022).

Q3. What are recommendation approaches?

The development of RS has a history, they emerged in the early 1990s and used algorithms that identified other users with similar tastes and combined their ratings into a personalized weighted average (Jannach et al., 2011). From there, the first recommendation approach called collaborative filtering appeared. This was followed by the construction of online SRs and in 2006 led to the development of in-context SRs. By 2007, six recommendation approaches were identified: collaborative filtering (CF), content-based filtering (CBF), context- or utility-based filtering, knowledge-based filtering, demographic filtering and hybrid filtering (Burke, 2007). The innovation that has this technology has achieved the emergence of emerging popularity-based and artificial intelligence (AI)-based approaches.

The importance of knowing recommendation approaches lies in the way recommendations are conceived, for example, a collaborative filtering ERS focuses on students' preference similarities or similarity of preferences of educational resources, while a content-based ERS is going to focus on a student's historical preferences, i.e. on the educational resources he/she has already chosen before.

ERS are categorized according to the form and according to the algorithmic approach (Quijano-Sánchez et al., 2020), according to the algorithmic approach based on unknown valuation estimation methods (Palomares & Porcel, 2020) ERS are categorized into: ERS based on heuristics and ERS based on models. Heuristic-based ERS estimate the relevance of items through mathematical formulas such as cosine similarity calculation or item or user correlation, whereas model-based ERS predict the relevance of items through machine learning techniques (Quijano-Sánchez et al., 2020), this indicates that the algorithmic approach will depend on whether AI algorithms are used, or mathematical formulas are used to generate the recommendations. Similarly the metrics to evaluate the accuracy of the recommendations will depend on this algorithmic approach, for example, a metric to evaluate the AI algorithm: classification tree, used in the ERS is the cross-validation (Pesovski et al., 2022), a metric to evaluate the accuracy in the calculation of the cosine similarity in the ERS is the mean average precision (mAP)(W. J. B. de Oliveira & Brandão, 2021).

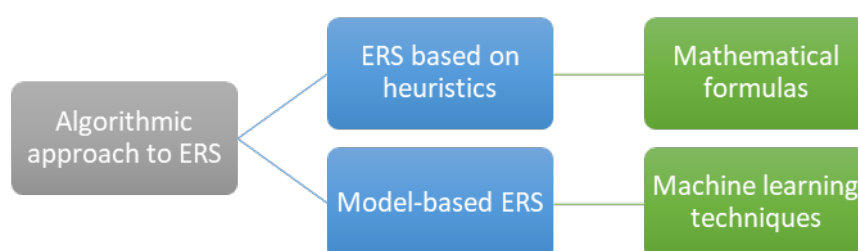


Figure 6: Algorithmic approach to ERS

For (Sunil Kumar Aithal et al., 2023), the most used approaches in ERS are: collaborative filtering, content-based filtering and the hybrid approach. Each of these and the emerging approaches identified in this study are detailed below.

Collaborative Filtering (CF)

For (Cai et al., 2022) collaborative filtering is a recommendation methodology that uses the known preferences of a group of users to recommend or predict the preferences of other users. These are categorized into memory-based collaborative filtering systems and model-based filtering systems (Zhang, 2021). Memory-based collaborative filtering recommendation systems are categorized into user-based filtering and item-based filtering (Rana et al., 2020; Roy & Dutta, 2022).

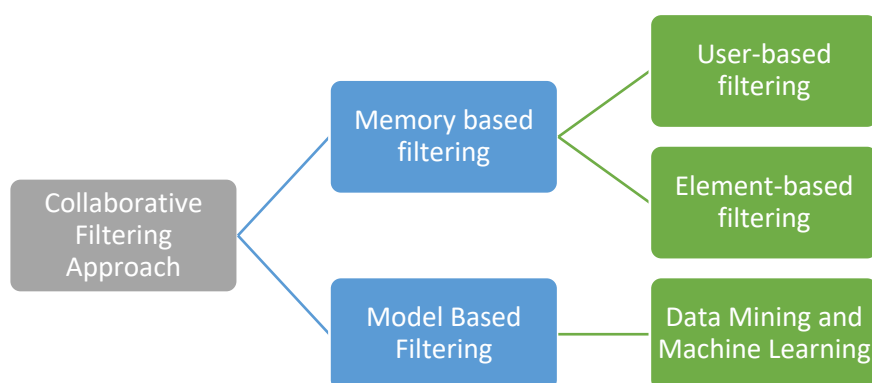


Figure 7: Categorization of the collaborative filtering approach

Memory-based collaborative filtering systems recommend new items by taking into account the preferences of their neighborhood (Xu & Yin, 2022).

In user-based filtering, the similarity between users is rated in relation to a given item. If a new item receives positive ratings from the user's neighborhood, the new item is recommended to the user.

In the item-based approach, the similarity between items is rated, an item neighborhood is constructed consisting of all similar items that the user has previously rated. Then for a new item, the rating is predicted by calculating the weighted average of all the ratings present in a neighborhood of similar items (Palomares & Porcel, 2020).

Model-based collaborative filtering systems use machine learning and data mining to predict user ratings to unrated items (Rana et al., 2020; Roy & Dutta, 2022).

Content-Based Filtering (CBF)

These systems use the student's personal information and the characteristics and attributes of the items to generate recommendations like the items the student liked in the past (Mohamed et al., 2019).

Hybrid Filtering

A hybrid recommender system combines two or more recommendation techniques to obtain higher accuracy and improvements in recommendations (Choe et al., 2021).

Popularity-Based Filtering

This approach recommends popular or trending items based on the popularity and demand of the items among users (Mohamed et al., 2019).

AI-Based Filtering

This approach uses AI algorithms for the design of ERSs. To achieve this, supervised and unsupervised learning techniques, such as regression, classification, and clustering, are used to develop recommendation models (Assavakamhaenghan et al., 2021). When having large amounts of data, ERSs use deep neural networks to analyze and extract complex features from student data for more subtle patterns and make more accurate and detailed recommendations (Tahiru, 2021).

Q4. What AI algorithms have been used in ERS?

For (Coca & Llivina, 2021) AI has four basic knowledge cores: knowledge representation, reasoning, uncertainty treatment and learning, furthermore the author indicates that AI is the computer science in charge of applying methods of knowledge representation, processing and extraction, by means of multi-paradigm programming, in the development of computer systems with rational behavior. Table 1 shows the relationship of AI problems related to the four basic knowledge cores.

Table 1: Relationship between AI problems and the basic knowledge cores
(Coca & Llivina, 2021)

AI Categories	Problem
Knowledge representation	Tacit knowledge representation
	Natural language representation
Uncertainty handling	Models for computational decision making
Reasoning	State space search
	Inference in knowledge-based systems
Machine learning	Data mining
	Agent autonomy

According to the (European Parliament, 2021) there are two types of AI, that AI developed through software that generates applications such as: virtual assistants, image analysis software, search engines, voice and face recognition systems, recommendation systems and that integrated AI used in robots, drones, autonomous vehicles or in general, in the Internet of Things.

Analyzing the concept of (Coca & Llivina, 2021 and the categorization of (European Parliament, 2021) evidences that behind all software applications developed by AI, there are AI algorithms that belong to different programming paradigms, this determines a change of perspective in software programming and research, due to the fact that some authors indicate that machine learning, deep learning and reinforcement learning are branches of AI (Bagnato, 2023), when in fact, machine learning more than being a basic core of AI knowledge (Coca & Llivina, 2021) becomes one of the main programming paradigms to develop AI software applications, this paradigm contains learning strategies which have a set of techniques and each technique has algorithms that analyze data.

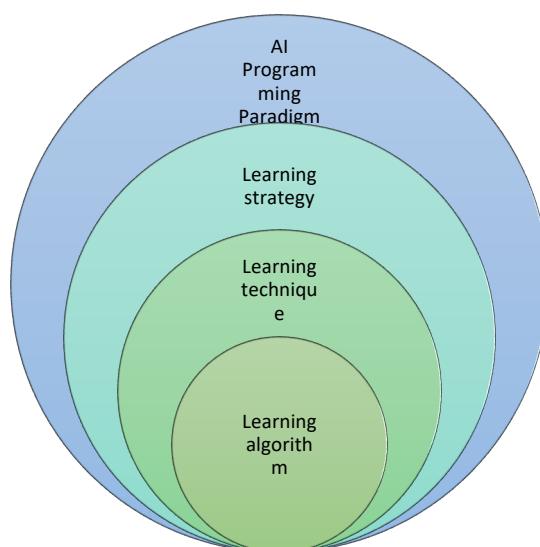


Figure 8: Paradigm, strategy, technique, and algorithm relationship

Machine Learning

This paradigm contains algorithms and statistical models that allow computer systems to learn and make predictions or decisions based on data, without being explicitly programmed (Yongxian et al., 2020).

The main machine learning strategies are supervised learning, unsupervised learning, reinforcement learning and deep learning. Figure 9 shows the main machine learning algorithms.

In supervised learning, the algorithm is trained on labeled examples, where the correct output for each input is known. In unsupervised learning, the algorithm is trained on unlabeled data and must find patterns or structures in the data. In reinforcement learning, the algorithm learns by interacting with an environment and receiving feedback in the form of rewards or punishments. Deep learning involves training generative neural networks to learn from large amounts of data.

The main application areas of deep learning are computer vision, speech recognition, natural language processing (NLP) and recommender systems (Batmaz et al., 2019).

Technological advances in NLP have given rise to what is now called generative artificial intelligence (GIA) which is characterized by using generative neural networks, the work of (Vaswani et al., 2016) presents dominant sequence transduction models which are based on convolutional neural networks or complex recurrent neural networks to develop machine translation and language management tasks.

The multi-paradigm programming of AI allows the combination of algorithms from one paradigm and another in applications, giving rise to artificial general intelligence (AGI). One of the main AGI developments is ChatGPT, which is a natural language processing (NLP) chatbot (Frackiewicz, 2023) based on the GPT (Generative Pre-trained Transformer) model, which uses generative neural networks and evolutionary algorithms. By using ChatGPT in education, it is concluded that this application is also an ERS.

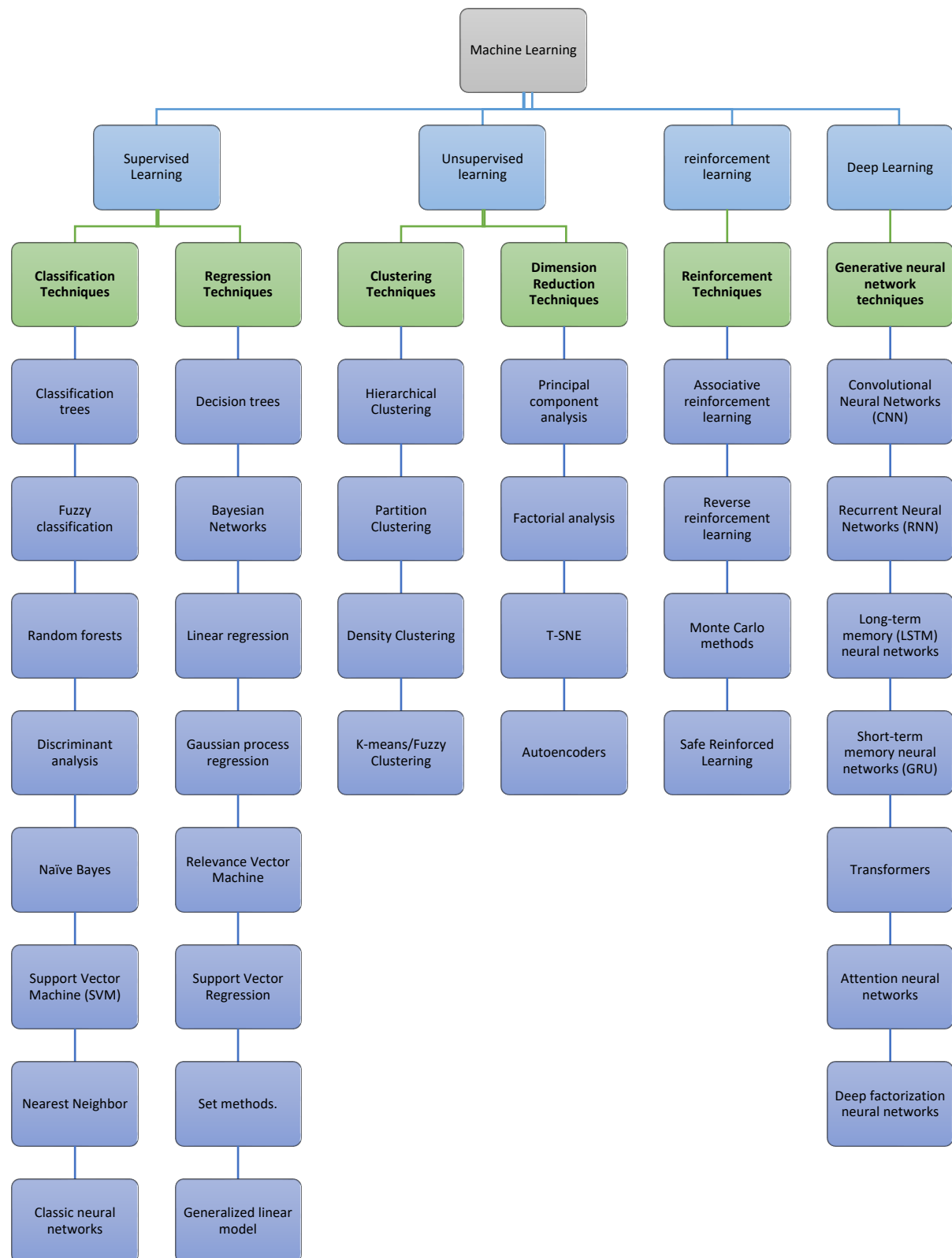


Figure 9: Main machine learning algorithms

Q5. What type of recommendation systems contribute to the educational quality of the different educational centers worldwide?

Knowing the educational context allows directing efforts towards educational quality objectives. The commonly identified educational levels are primary, secondary, higher (da Silva et al., 2022) and postgraduate (Nalawade & Tiple, 2022), however, the U.S. educational system includes K-12 schools, the "K" refers to "Kindergarten", which is the first year of formal education, and the "12" refers to the 12 years of education that includes primary and secondary (Zayet et al., 2022).

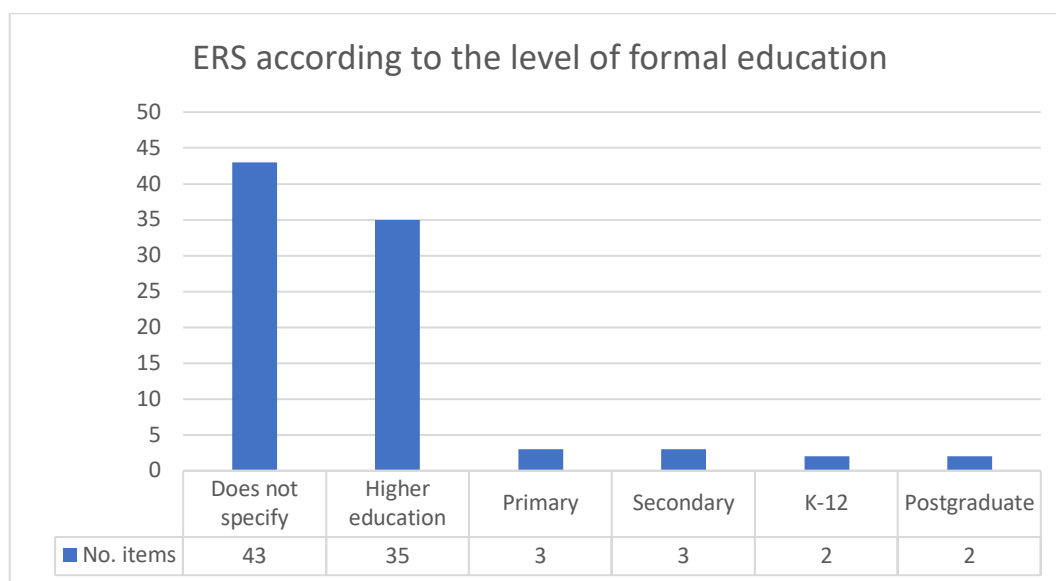


Figure 10: SRs identified according to the level of formal education

For (Charitopoulos et al., 2020) the educational modalities of the ERS are grouped into 8 families, see figure 11.

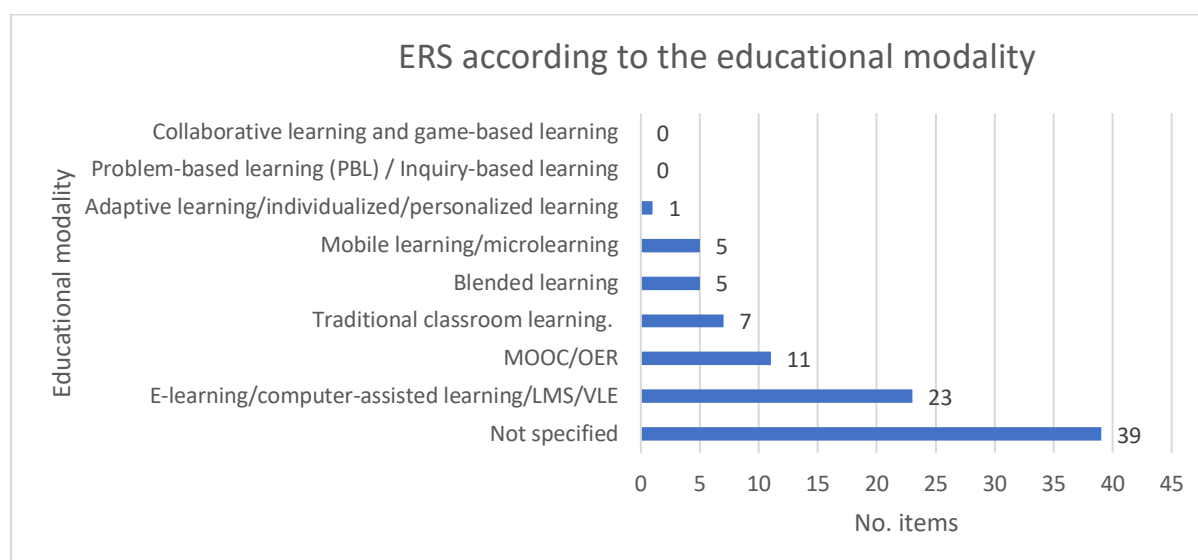


Figure 11: ERS identified according to the educational modality

It should be noted that some ERS were implemented for 2 or more levels and the same happens with educational modalities; some articles indicated that ERS were used in 2 or more modalities.

From the analysis of the 82 scientific works, around 55 ERS were identified focused on development objectives related to educational quality such as:

Table 2: Main contributions of the ERS to educational quality

Dimension	ERS Development Objectives	No. ERS
Learner Characteristics	Motivate student engagement	2
Teaching and Learning	Support student assessment	2
Context	Provide career guidance to suggest relevant career paths, job opportunities, or internships based on students' interests, skills, and educational background(Mansouri et al., 2023)	8
Material and human inputs	Support teachers by providing information about students' preferences, learning patterns and progress(Rahman et al., 2021)	3
	Support faculty in the development of research and outreach activities.	3
	Select and plan appropriate courses, majors, or programs that align with their aspirations and help them make informed decisions based on their interests, career goals, and skill development needs(Lazarevic et al., 2022; Liu et al., 2021).	17
	Provide personalized learning to tailor educational resources and learning activities to each student's individual needs, learning styles(D. Li et al., 2023), and preferences.	16
Results	Support remediation through identification of knowledge gaps and recommendation of remedial resources, tutorials, or personalized interventions(Campos et al., 2022).	4
Total number of articles with specific development objectives		55
Total number of articles without specific development objectives		27
Total number of articles reviewed		82

As can be seen, most ERS have course selection, personalized learning and career guidance as development objectives.

Conclusions

It was determined that ERS improve educational processes and therefore the quality of educational centers. Future research can focus on the multiparadigm programming of AI, the methodology and evaluation methods that ERS have.

The elements involved in ERS were identified: users, items, ratings, recommendation approach, AI algorithms, mathematical formulas, evaluation metrics, user interface, feedback and database. In this work, we only delved into recommendation approaches and AI algorithms, however, future research can study the elements that have not been observed.

Recommendation approaches were identified, the decision to use AI algorithms depends on the recommendation approach selected for an ERS, in addition to the educational objectives and quality criteria required by an educational institution.

So far it was established that the most used algorithms in ERSs belong to the machine learning paradigm, however, they are not the only algorithms used, future research can study algorithms from other AI paradigms such as evolutionary computation, logic programming and functional programming.

It was identified that most of the ERS use the hybrid recommendation approach, the educational contexts respond to the levels of education "Kindergarten" or first year of formal education, primary, secondary, higher and postgraduate. The educational modalities are grouped into 8 families and the types of ERS so far implemented are mainly focused on the objectives of: personalized learning, course selection and career guidance, with the student being the main user of the ERS.

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The Influence of Behavioral Intention to Use e-Learning System on Academic Performance in Developing Countries: Tanzania Context

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Abstract

The objective of this study was to evaluate the direct and indirect impact of behavioral intention on academic performance by examining the usage behavior of e-learning systems among students at higher education institutions in Tanzania. The research employed an explanatory cross-sectional survey design and utilized a stratified sampling method to choose a sample of 312 participants. Data collection was conducted using documentary review and a questionnaire consisting of closed-ended questions. The inferential analysis of the collected data was performed using Partial Least Squares Structural Equation Modeling, facilitated by the utilization of SmartPLS 4 software and descriptive analysis was performed with the help of IBM SPSS statistics version 26. The results of the study indicate that there is a significant positive relationship between behavioral intention and academic performance (p value < 0.05). This relationship is mediated by the use behavior of the e-learning system. The findings of the study suggest that there is an indirect relationship between students' behavioral intention to utilize e-learning systems and their academic achievement in higher education institutions. Additionally, the effectiveness of the e-learning system is contingent upon the user's behavior. Hence, it is advisable that in the context of developing nations, with specific reference to Tanzania, due attention should be given to the behavioral intention and use patterns of students both during and subsequent to the deployment of the novel e-learning system.

Keywords: Behavioral Intention, e-Learning System, Academic Performance, Use Behavior

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1. Introduction

The COVID-19 pandemic has had a significant influence on the education sector worldwide, leading to the closure of universities and schools, notably in underdeveloped countries such as Tanzania (Chahal & Rani, 2022; Mailizar et al., 2021; Tawafak et al., 2021). In light of the COVID-19 pandemic, there has been a notable increase in the adoption of online learning by numerous universities worldwide (Mailizar et al., 2021). According to existing scholarly literature, the impact of e-learning on students' learning outcomes, academic achievements, and satisfaction levels has been widely acknowledged (Abramson et al., 2015; Kuliya & Usman, 2021). Moreover, it has been observed that the intention to use e-learning systems plays a crucial role in the adoption and implementation of online educational programs in various countries (Bhalalusesa et al., 2023; Abramson et al., 2015; Abhirami & Devi, 2022; Kuliya & Usman, 2021; Ramadiani et al., 2017; Revyathi & Tselios, 2019). However, previous research has engaged in a discourse concerning the direct and indirect impacts of e-learning platforms on academic achievement (Kuliya & Usman, 2021; Chahal & Rani, 2022; Mailizar et al., 2021; Tawafak et al., 2021; Al-Adwan & Al-Debei, 2023). The objective of this study is to evaluate the impact of behavioral intention to utilize e-learning systems on academic achievement. The original Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. (2003) is employed to analyze both the direct and indirect effects. Similarly, this study examines the mediating role of students' usage behavior on their academic performance at higher education institutions located in underdeveloped nations, with a specific focus on Tanzania.

1.1 Constructs Development and Hypotheses Formulation

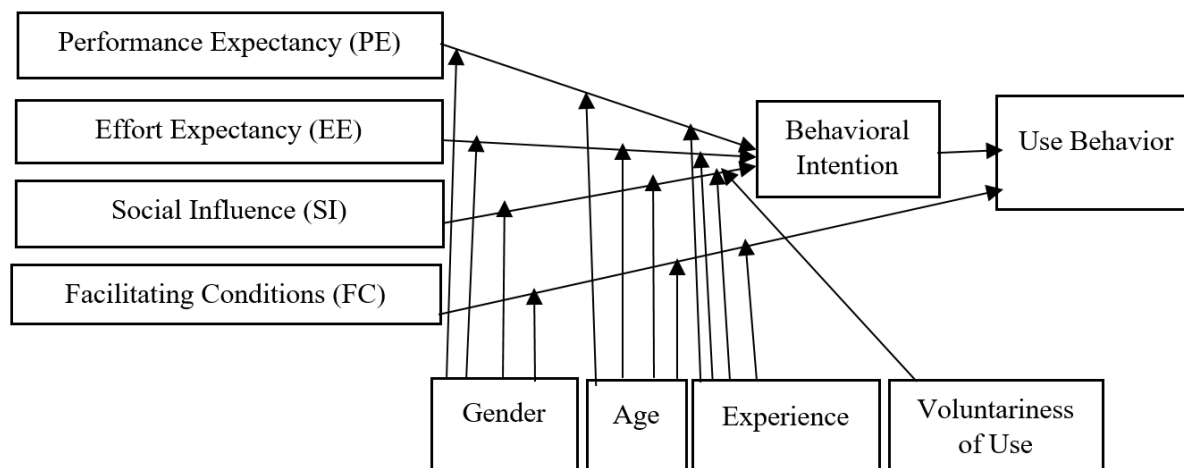
The present study integrated two constructs, namely behavioral intention and use behavior, from the original Unified Theory of Acceptance and Use of Technology (UTAUT) proposed by Venkatesh et al. (2003). Additionally, one construct, specifically academic performance, was incorporated from the empirical literature review. These constructs were utilized to develop the research model and establish the hypotheses, drawing upon previous studies by Dwivedi et al. (2017) and Venkatesh et al. (2016, 2012).

1.1.1 Constructs Development

The present study utilized the Unified Theory of Acceptance and Use of Technology (UTAUT), originally created by Venkatesh et al. (2003), following a comprehensive assessment of around eight theories and models (Chen et al., 2011). Chen et al. (2011) have identified a range of theories and models explored by Venkatesh et al. (2003) in their research. These include the Diffusion of Innovation Theory (DIT), Combined Theory of Planned Behavior/Technology Acceptance Model (TPB/TAM), Model of PC Utilization (MPCU), Social Cognitive Theory (SCT), Motivational model (MM), Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA), and Theory of Planned Behavior (TPB). According to the findings of Venkatesh et al. (2003), the explanatory power of the eight theories/models examined in their study was limited, accounting for just 17% to 53% of the variability in users' intention to adopt Information Technologies (IT). Nevertheless, the UTAUT framework, initially proposed by Venkatesh et al. (2003), demonstrated superior performance compared to the other eight theories/models when applied to the same dataset. This theory successfully accounted for almost 70% of the variability in individuals' behavioral intention to adopt and utilize Information Technologies (IT), as reported by Dwivedi et al. (2017). The original UTAUT was used for this study due

to its superior ability to elucidate the variability in users' intention to utilize Information Technologies (IT). Figure 1 illustrates the primary components and moderating factors of the initial Unified Theory of Acceptance and Use of Technology (UTAUT).

Figure 1: *Unified Theory of Acceptance and Use of Technology (UTAUT)*



Source: Venkatesh et al. (2003).

1.1.2 Criticisms of the Original UTAUT

Despite the fact that the original Unified Theory of Acceptance and Use of Technology (UTAUT) has demonstrated the ability to account for around 70% of the variability in individuals' behavioral intention to adopt Information Technologies (IT), it has faced significant criticism from various scholars in recent times. The study conducted by Dwivedi et al. (2017) proposes a revised version of the Unified Theory of Acceptance and Use of Technology (UTAUT). This revised model suggests that factors such as gender, age, experience, and voluntariness do not influence the relationships between constructs such as performance expectancy, effort expectancy, social influence, behavioral intention, and use behavior. The proposition presented in this study is substantiated by a substantial body of prior empirical research. Specifically, it deviates from the original Unified Theory of Acceptance and Use of Technology (UTAUT) proposed by Venkatesh et al. (2003) by excluding four moderators and incorporating additional dimensions, such as attitude, as recommended by Dwivedi et al. (2017), Venkatesh et al. (2016), and Venkatesh et al. (2012). Drawing off the critiques put out by Venkatesh et al. (2012), Venkatesh et al. (2016), and Dwivedi et al. (2017), the present study posits that there exists a positive and significant relationship between behavioral intention and academic performance, both directly and indirectly. The authors of previous studies (Chen et al., 2011; Dwivedi et al., 2017; Venkatesh et al., 2003; Venkatesh et al., 2012; Venkatesh et al., 2016) have not fully understood the relationship between behavioral intention and academic performance. Therefore, this study aims to contribute to the existing theories and models by predicting the direct and indirect linkages between these two variables. Similarly, the existing empirical research is insufficiently elucidating these types of relationships (Kuliya & Usman, 2021; Chahal & Rani, 2022; Mailizar et al., 2021; Tawafak et al., 2021).

1.1.3 Hypotheses Formulation

Previous empirical studies have produced predictions about how behavioral intention affects the actual use of different technology environments (Abramson et al., 2015; Kuliya &

Usman, 2021; Ramadiani et al., 2017; Revyathi & Tselios, 2019). Previous research has shown the presence of positive path coefficients, which signify a statistically significant association between behavioral intention and actual use (Dwivedi et al., 2017; Venkatesh et al., 2012; Venkatesh et al., 2016; Chahal & Rani, 2022; Mailizar et al., 2021; Tawafak et al., 2021). The objective of this study was to assess the possible influence of behavioral intention to employ e-learning systems on academic accomplishment, a topic that has received little attention in prior scholarly researches. Therefore, the main aim of this work was to illustrate the impact of using behavior as a crucial determinant affecting both theoretical and empirical knowledge addition via the mediation process.

H₁: Behavioral intention (BI) would direct influence academic performance (AP)

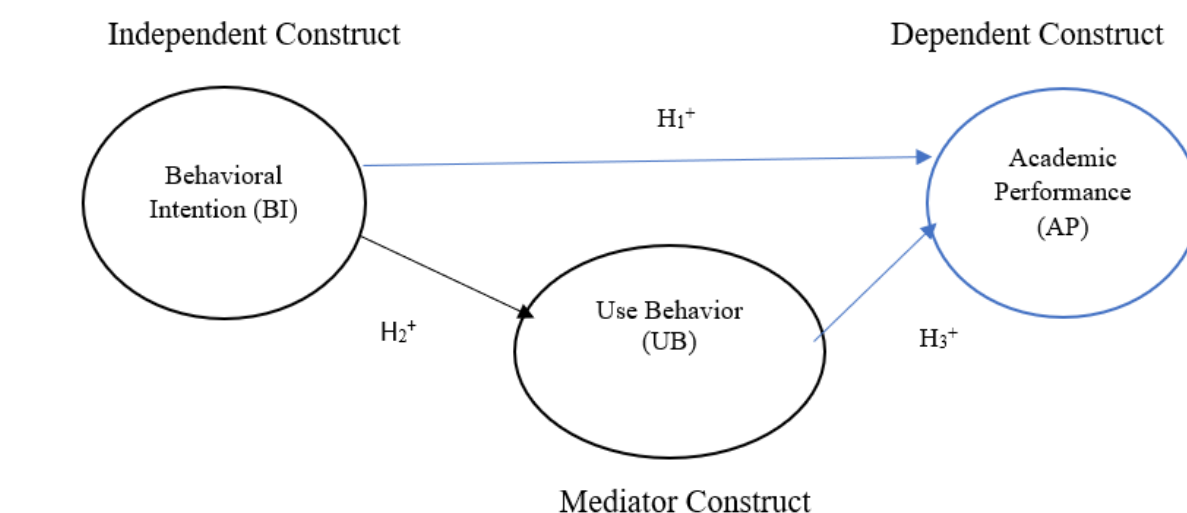
H₂: Behavioral intention (BI) would direct influence use behavior (UB)

H₃: Use behavior (UB) would direct influence academic performance (AP)

H₂*H₃: Behavioral intention (BI) would indirect influence academic performance (AP) through use behavior (UB)

The conceptual model of the study is presented in Figure 2.

Figure 2: Conceptual Model of the Study



Key

- Theoretical Gap
- Relationship which exists in Literature

Source: Researcher' Conceptual Model (2023)

1.1.4 The Mathematical Model for Latent Variable and Its Observed Indicators

The present work used the mathematical model $x = lY + e$ to illustrate the relationship between a latent variable and its observable indicators, as seen in Figure 2. In the study conducted by Sarstedt et al. (2022), the observable indicator variable is denoted by x , while the latent variable is represented by Y . The loading, denoted by l , serves as a regression coefficient that quantifies the strength of the link between x and Y . Additionally, e is used to indicate the random measurement error.

2. Methodology

2.1 Research Design, Methods and Tools for Data Collection and Analysis

The research strategy used in this study was an explanatory cross-sectional survey, since it included the collection of data from a specific group by investigating a representative sample of that community (Creswell & Plano, 2018). Furthermore, this research used a survey methodology to collect data from two institutions of higher education. This approach was chosen because to its ability to acquire quantitative data, which could then be evaluated using descriptive and inferential statistical techniques. To fulfil the requirements of this study, the researcher used the tenth rule guideline offered by Hair et al. (2019) for using PLS-SEM and SmartPLS software in data analysis. This guideline was employed to establish the minimum number of participants necessary to evaluate the proposed research model. According to Hair et al. (2019), the tenth guideline proposes that the minimum sample size needed to test the hypotheses of the research model is determined by multiplying the number of indicators of the exogenous construct (specifically, four indicators of behavioral intention in this study) by ten. According to the tenth rule of thumb, the sample size of 312 respondents in this research was deemed enough for testing the hypotheses, since it exceeded the minimal requirement of 40 respondents. Furthermore, closed-ended surveys were given numerical values to enhance the accuracy and streamline the process of quantitative data analysis. The quantitative data acquired for the respondents' profiles were evaluated using descriptive statistics, using IBM SPSS Statistics Software Version 26. The inferential statistical analysis for evaluating the hypotheses was conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM) with the assistance of SmartPLS 4 software. The Extra Answer approach was used to address the issue of missing data via the utilization of SmartPLS 4 software. This research used the value of 99 as a supplementary response to substitute for seventeen (17) missing values that were identified in the questionnaires. However, this approach facilitated the establishment of a systematic distinction between data that has been seen and data that has not been observed (Hair et al., 2019). The identification of outliers was conducted using IBM SPSS Statistics version 26. This included examining the frequencies of all variables in relation to their degree of agreement. No outliers were detected in the present study.

2.2 Evaluation of Models

The evaluation of the measurement model and structural model of the suggested research model in this study was conducted using the criteria specified by Hair et al. (2019). There were four processes involved in examining the reflective measurement models, which are outlined as follows: The examination of the reliability value of indicators should exceed 0.708. When assessing the internal consistent reliability value of the composite reliability of constructs, it should also exceed 0.708. In order to assess the convergent validity of the constructs, the Average Variance Extracted (AVE) value should be greater than 0.5. On the other hand, for discriminant validity, the Heterotrait-Monotrait Ratio of Correlations (HTMT) criterion value should be less than 0.9. Similarly, the examination of collinearity was conducted for the constructs of the structural model. Based on the findings of Hair et al. (2019), VIF values over 5 suggest the presence of potential collinearity among the predictor constructs. However, it is important to note that collinearity concerns may also arise with VIF values ranging from 3 to 5. Ideally, it is desirable for the Variance Inflation Factor (VIF) values to be about 3 or below.

After doing a collinearity check, the primary factors for evaluating the structural model in Partial Least Squares Structural Equation Modeling (PLS-SEM) were as follows: the significance of the path coefficients, with a t-statistic above 1.96 at a significance threshold of 0.05 considered acceptable, and p-values equal to or less than 0.05 deemed significant. According to Hair et al. (2019), R^2 values of 0.75, 0.50, and 0.25 may be categorized as significant, moderate, and weak, respectively. Similarly, the f^2 effect sizes, with values greater than 0.02, 0.15, and 0.35, indicate small, medium, and big impact sizes, respectively (Hair et al., 2019). The predictive relevance, as measured by the Q^2 effect size, is expected to have a greater than zero value (Hair et al., 2019; Becker et al., 2018). In general, the outcomes pertaining to the assessment of both the measurement and structural models were deemed satisfactory and aligned with the criteria set out by Hair et al. (2019).

2.3 Variables, Indicators and Measurement of Scale

This study used the variables, indicators and the measurement of scale presented in Table 1.

Table 1: *Variables, Indicators, Measurement, Data Analysis Method and Tool*

Dependent Variable	Indicators	Level of Measurement	Analysis Method	Analysis Tool
Academic Performance	Consistency of high grades scores, satisfied with academic performance, apply knowledge to the real-world situation	Ordinal	PLS-SEM	SmartPLS 4
Mediator Variable	Indicators	Measurement Level	Analysis Method	Analysis Tool
Use Behavior of e-Learning System	Continue interesting the system, continue learning the system, continue using the system, continue enjoying the benefits of the system	Ordinal	PLS-SEM	SmartPLS 4
Independent Variable	Indicators	Measurement Level	Analysis Method	Analysis Tool
Behavioral Intention to Use e-Learning System	Personal opinion on the system, intention to learn the system, intention to use the system, intention to continue taking advantages of the system	Ordinal	PLS-SEM	SmartPLS 4

Source: Researcher' Own Design (2023)

3. Results

3.1 Respondent's Profile

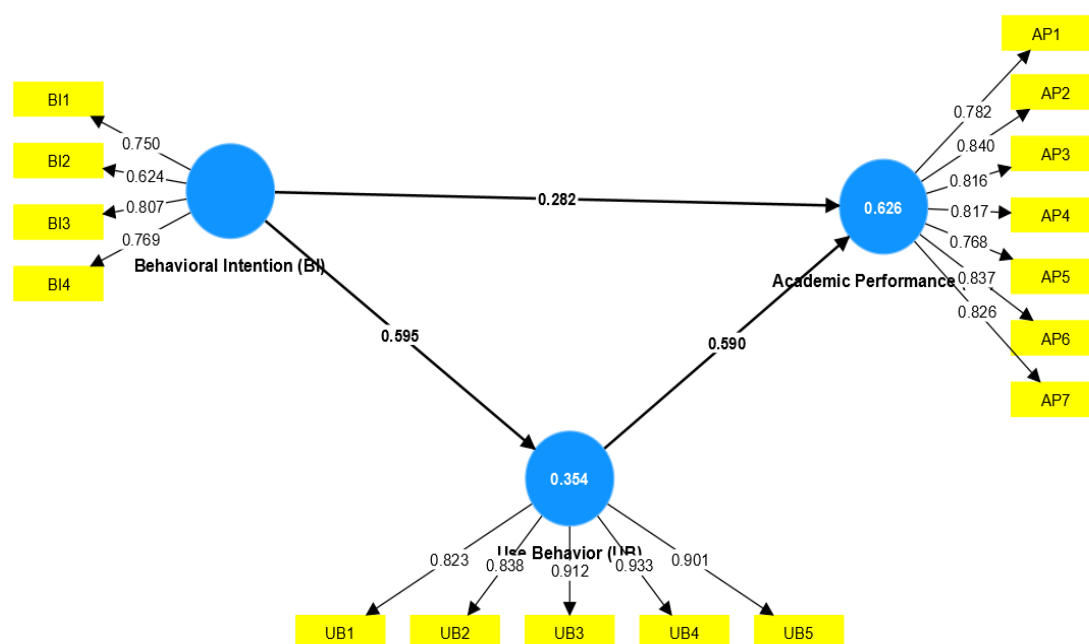
Approximately 73% of the participants identified as female students, while approximately 27% identified as male. These results are contrary to the study findings by Bhalalusesa et al. (2023) which revealed that 71.4% were males while 28.6% were females. Furthermore, it is worth noting that around 46 percent and 34 percent of the participants were pursuing undergraduate and graduate degrees, respectively. The findings of this study indicate that the information supplied by the participants may be considered authentic. Table 2 presents the profile of the respondents in this research.

Table 2: *Type of Respondent *Education Level Crosstabulation*

	Education level				Total
	Certificate Level	Diploma Level	Bachelor's Degree	Master's Degree	
Female Students	15	30	104	80	229
Male Students	10	8	40	25	83
Total	25	38	144	105	312

3.2 R² Values, Relevance of the Path Coefficients and Indicators' Loadings Values

Hair et al. (2019) propose that R² values of 0.75, 0.50, and 0.25 might be categorized as considerable, moderate, and weak, respectively. The findings of this research showed that the R² values for the endogenous constructs were 0.354 and 0.626, suggesting a modest level of predictive power for the result. According to the established criteria outlined by Hair et al. (2019), the values of 0.354 and 0.626 exceeded the minimal level recommended. These findings suggest that the combined influence of behavioral intention to use an e-learning system and actual use behavior accounts for 62.6% of the variability in academic performance. Additionally, behavioral intention alone explains 35.4% of the variability in the use behavior of the e-learning system. Furthermore, it is noteworthy that all route coefficients had a positive relationship, indicating that a one standard deviation rise in behavioral intention and use behavior corresponded to an improvement in academic achievement. Furthermore, the loadings values of the indicators were all greater than 0.708, except for BI2, which was less than 0.708. Based on the findings of Hair et al. (2019), indicators with a reliability value below 0.708 may be considered for removal, but only if their exclusion would result in an improvement in both composite reliability (CR) and Average Variance Extracted (AVE). Based on this evidence, it can be concluded that the deletion of BI2 did not have a significant influence on the internal consistent reliability values of the composite reliability of all constructs, which were found to be more than 0.708. Additionally, the deletion of BI2 did not affect the convergent validity of all constructs, as shown by the Average Variance Extracted (AVE) values, which were greater than 0.5. The findings of this study indicate that there were favourable response patterns observed, and each construct demonstrated convergence in explaining the variability of its respective item (Hair et al., 2019). Figure 3 displays the values of R², the outcomes of path coefficients, and the values of indicators' loadings.

Figure 3: R^2 Values, Relevance of the Path Coefficients and Indicators' Loadings Values

3.3 Reliability and Convergent Validity

According to Hair et al. (2019), a construct's reliability may be assessed using the composite reliability (CR) value. A CR value better than 0.708 is deemed acceptable. Additionally, the construct's convergent validity can be evaluated using the Average Variance Extracted (AVE) value. It is suggested that the AVE value be greater than 0.5. In this research, the composite reliability (CR) values for all components were found to be better than 0.708, indicating satisfactory reliability. Additionally, the convergent validity of all constructs was assessed using the Average Variance Extracted (AVE) measure, with all constructs demonstrating AVE values over 0.5, indicating acceptable convergent validity. The implications of these results suggest that the research saw favorable response patterns, with each construct converging to account for the variability of its respective item (Hair et al., 2019). Table 3 displays the findings pertaining to the reliability and validity of the constructs.

Table 3: *Reliability and Convergent Validity*

Construct	Composite Reliability (CR)	Average Variance Extracted (AVE)
Academic Performance (AP)	0.932	0.661
Behavioral Intention (BI)	0.828	0.549
Use Behavior (UB)	0.946	0.779

3.4 Discriminant Validity

The HTMT values for all relationships postulated in the research model were found to be less than 0.90, indicating that each construct within the proposed research model was empirically distinguishable from other constructs within the structural model (Hair et al., 2019). The findings of the discriminant validity study utilizing the HTMT measure are shown in Table 4.

Table 4: Discriminant Validity

	Academic Performance (AP)	Behavioral Intention (BI)
Behavioral Intention (BI)	0.761	
Use Behavior (UB)	0.819	0.714

3.5 R-square

Based on the findings of Hair et al. (2019), it can be inferred that R^2 values of 0.75, 0.50, and 0.25 may be categorized as considerable, moderate, and weak, respectively. The study yielded R^2 values of 0.354 and 0.626, indicating an existence of predictive power among the constructs which seemed to influence other constructs in the proposed research model. According to the established criteria outlined by Hair et al. (2019), the R^2 values of 0.354 and 0.626 observed in this study above the minimal threshold values recommended. The findings suggest that a combination of behavioral intention and use behavior accounts for 62.6% of the variability seen in the academic performance. Furthermore, behavioral intention alone explains 35.4 % of the variability in the use behavior. The findings of the R^2 values are shown in Table 5.

Table 5: R-square

	R-square	R-square adjusted
Academic Performance (AP)	0.626	0.624
Use Behavior (UB)	0.354	0.352

3.6 Collinearity Statistics (VIF)

In the present study, collinearity statistics were assessed using the variance inflation factor (VIF). The obtained VIF values for all items were below 3, indicating the absence of collinearity issues among the predictor constructs in the proposed research model. Table 6 displays the collinearity statistical findings for the inner model of the proposed research model, measured using the VIF metric.

Table 6: Collinearity Statistics (VIF)

	Academic Performance (AP)	Use Behavior (UB)
Behavioral Intention (BI)	1.549	1.000
Use Behavior (UB)	1.549	

3.7 F Square

Hair et al. (2019) established that effect sizes of 0.02, 0.15, and 0.35 are indicative of modest, medium, and large f^2 values, respectively. The present study observed f^2 effect sizes of 0.138, 0.549 and 0.602, indicating the occurrence of modest, and high f^2 impact sizes across all hypotheses of the research model. The findings of the study are shown in Table 7, which displays the f^2 values.

Table 7: F Square

	Academic Performance (AP)	Use Behavior (UB)
Behavioral Intention (BI)	0.138	0.549
Use Behavior (UB)	0.602	

3.8 Q² Predict Results

In the present study, it was observed that the values of Q² for all endogenous constructs, namely use behavior (UB) and academic performance (AP), were found to be greater than zero. This suggests that the exogenous construct behavioral intention (BI) possesses predictive power within the research model. The findings of Q² for the endogenous construct of the proposed research model are shown in Table 8.

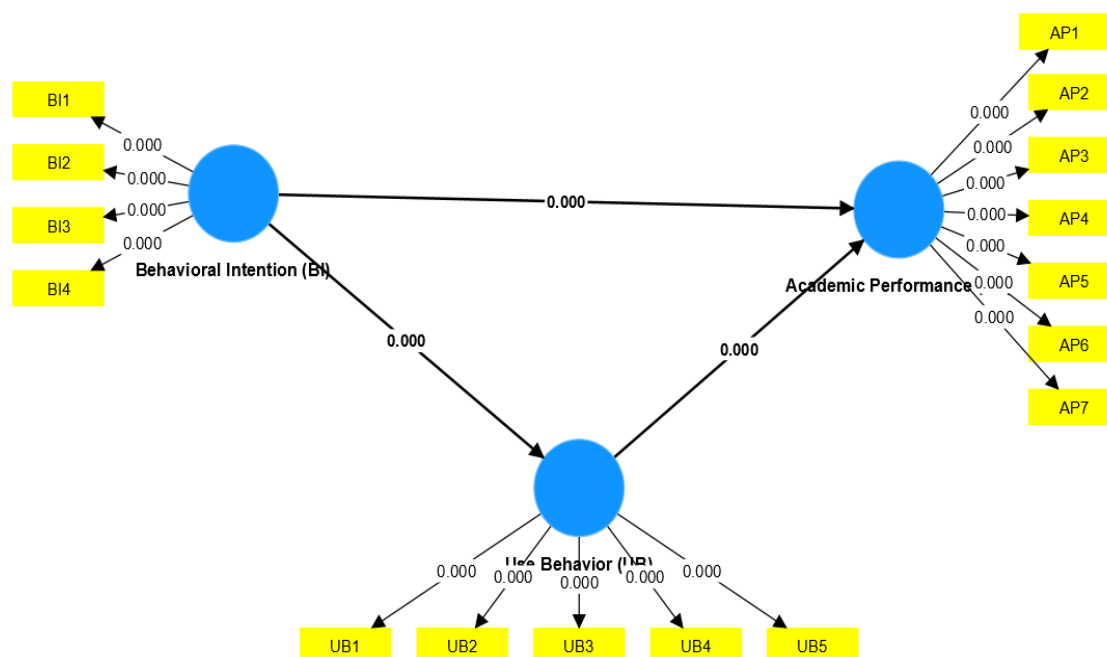
Table 8: Q Square

Construct	SSO	SSE	Q ² (=1-SSE/SSO)
Academic Performance (AP)	2184	1301.421	0.404
Use Behavior (UB)	1560	1138.791	0.270

3.9 Significance of the Path Coefficients

Upon doing bootstrapping analysis, the obtained findings revealed statistical significance for all anticipated hypotheses. Specifically, the p-values associated with all routes were determined to be less than 0.05. The findings of this study indicate that the hypothesized correlations are really present in real-world contexts. The significance of the path coefficients is seen in Figure 4.

Figure 4: Significance of the Path Coefficients



3.10 Total and Specific Indirect Effects of the Hypotheses

Based on the findings shown in Figure 4, this research has demonstrated the presence of substantial impacts of behavioral intention towards using an e-learning system (both direct and indirect effects) as well as the actual use behavior (direct effect) on academic achievement. Table 9 presents the comprehensive and particular indirect impacts of the hypotheses that were examined in the study.

Table 9: Total and Specific Indirect Effects of the Hypotheses Tested Results

Hypothesis	Standard deviation (STDEV)	T statistics (O/STDEV)	P values	Remark
BI -> AP	0.037	17.079	0.000	Supported
BI -> UB	0.045	13.103	0.000	Supported
UB -> AP	0.054	10.966	0.000	Supported
BI->UB->AP	0.041	8.525	0.000	Supported

3.11 Total and Specific Indirect Effects of the Hypotheses Tested by Using MGA

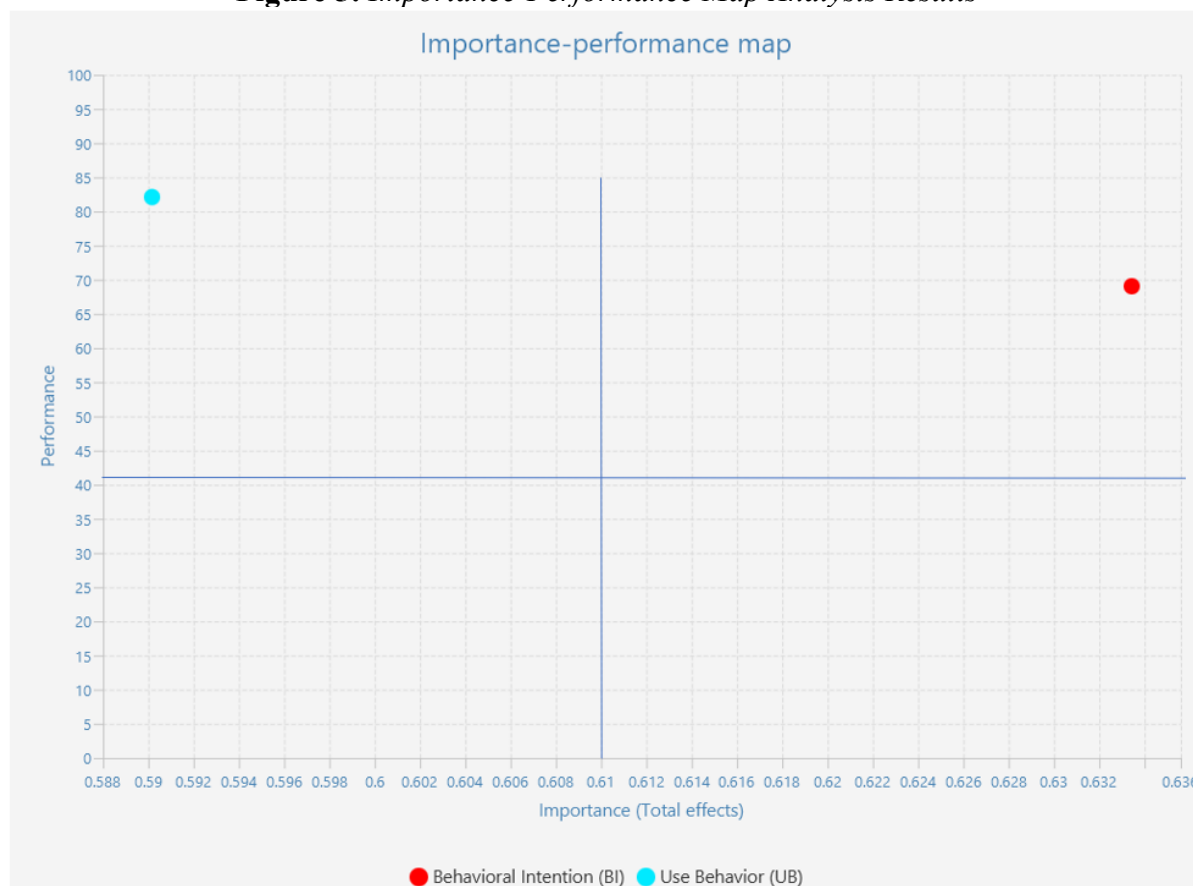
The statistical analyses conducted in this study, namely the BI -> AP and BI -> UB models, indicate a significant positive correlation. This suggests that female students exhibit more strength compared to male students, accounting for about 50% of the total hypotheses examined and the observed connections. The statistical analysis conducted using multiple group analysis (MGA) indicates that there is a significant negative relationship between the variables UB-> AP, as well as between BI ->UB, respectively. These findings suggest that male students exhibit more strength compared to female students in about 50% of the total hypotheses examined. Table 10 displays the comprehensive and distinct indirect impacts of the hypotheses examined via the use of MGA. It also includes the disparities in path coefficients and corresponding p-values. Based on the obtained p values in this research, which were all found to be larger than 0.05, it can be concluded that the perceptions of the two groups, namely female and male students, regarding the predicted correlations exhibit similarities. The findings suggest that there were no significant differences in the responses of female and male students to the presented propositions.

Table 10: Total and Specific Indirect Effects of the Hypotheses Tested by Using MGA

Hypothesis	Difference (Female - Male)	2-tailed (Female vs Male) p value	Remark
BI -> AP	0.027	0.721	Rejected
BI -> UB	0.035	0.629	Rejected
UB -> AP	-0.103	0.385	Rejected
BI->UB->AP	-0.040	0.556	Rejected

3.12 Importance-Performance Map Analysis Results

The construct of behavioral intention to use the e-learning system, as depicted in Figure 5, is situated above the average of the importance and performance of the target construct, namely academic performance. This positioning is logical as it suggests the need to prioritize, invest more in, and enhance the construct of academic performance during and after the implementation of the e-learning system, with the aim of improving overall academic performance. On the contrary, the construct of use behavior is seen to have a lower level of relevance compared to the goal construct, which is academic performance. This implies that the construct being examined has a somewhat restricted impact on the target construct. However, it is seen that the use behavior construct exhibits performance levels that are higher than the average, indicating that it should be considered of lesser relevance before and after the implementation of an e-learning system in order to improve academic achievement.

Figure 5: Importance-Performance Map Analysis Results

4. Discussion

4.1 The Hypotheses Tested for the Theorized Research Model

The present research hypothesized that there would be a direct relationship between behavioral intention and the use behavior of an e-learning system. The findings indicated a positive path coefficient, suggesting that a one standard deviation rise in behavioral intention would result in an increase in the rate of use behavior of e-learning system. The results of this study align with prior research conducted by Dwivedi et al. (2017), Venkatesh et al. (2012), and Venkatesh et al. (2003). These studies also found that behavioral intention significantly influences the utilization of technology, as shown by a p-value of less than 0.05.

Additionally, this research posited the hypothesis that the behavior of using an e-learning system would have a direct impact on students' academic performance. Furthermore, it suggested that the behavioral intention to use the e-learning system would indirectly affect students' academic performance via their use behavior. The findings indicate that there are positive path coefficients, suggesting that an increase of one standard deviation in behavioral intention and use behavior is associated with an improvement in academic achievement. The findings presented in this study are not consistent with the results of earlier research, and thus represent a novel addition to the existing body of knowledge.

5. Conclusion

5.1 Theoretical Implications

The present study has successfully addressed a gap in the current theoretical and empirical literature by comprehensively examining the role of use behavior as a mediator and behavioral intention as a predictor, as originally proposed in the Unified Theory of Acceptance and Use of Technology (UTAUT).

5.2 Practical Implications

The statistical significance of behavioral intention in both direct and indirect interactions implies that students primarily depend on their behavioral intention when making the choice to use e-learning systems.

5.3 Limitation and Recommendation for Future Research

This research only used two components, namely "behavioral intention" and "use behavior," derived from the original Unified Theory of Acceptance and Use of Technology (UTAUT) proposed by Venkatesh et al. (2003). The model provided an explanation for just 62.6% of the observed variance in academic achievement. The study therefore suggests that future research should include more components from the Unified Theory of Acceptance and Use of Technology (UTAUT) proposed by Venkatesh et al. (2003) in order to enhance the diversity of factors influencing academic success. Similarly, the present research used participants who were students hailing from a single nation, namely Tanzania. In light of this observation, it is recommended that future research endeavors use a diverse sample of students from other nations in order to enhance the generalizability of the proposed model for e-learning systems.

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Education 4.0: Collaboration to Engage, Include and Enhance – Edu4Col@b

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Official Conference Proceedings

Abstract

The Continuous Training Division of the Regional Directorate for Education, fulfilling its mission of developing teaching professionalism, through continuous training, located in a metamorphic perspective with a view to improving the learning of all students and promoting the process of gradual transformation of the organizational and pedagogical Dialectics of teachers' work, Develops the project Education 4.0: Collaboration to Engage, Include and Enhance, acronym Edu4Col@b, within the framework of the Erasmus+ Programme of the European Commission. This project obtained a rating of 93 % and integrates 4 of the 5 schools in the Autonomous Region of Madeira, which operates in “vertical grouping” (from childhood to secondary education), which opted to join the KA1 Consortium, constituted in application under Key Action 1 of the Erasmus+ programme. Edu4Col@b falls under three key areas: Strengthening equity and inclusion in education; modernisation and innovation of pedagogical practices and tools; internationalisation of organisations. As part of the project, 92 mobilities of different types taken place, including structured courses and training events, job shadowing activities and teaching missions. Edu4Col@b aims to contribute to schools being places for training and building knowledge in context, where collaboratively and cooperatively work in flexible and multifunctional spaces and time, so that the curriculum is accessible to all and to each one. It is also Believed that the dissemination of learning represents an “oil stain” effect for other schools in the Region, representing a “cluster” for innovation.

Keywords: Erasmus+, Continuous Training, Teaching Professionality

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Introduction

Erasmus+, the European Commission's Education, Training, Youth and Sport programme, under the motto 'Enriching lives, broadening horizons', provides a range of opportunities for its audiences in the field of individual mobility, cooperation between organisations and institutions, support for policy development and cooperation between 2021 and 2027. The Regional Secretariat for Education, Science and Technology (SRE), through the Regional Directorate for Education, the regional public administration body that coordinates and monitors the curriculum development in schools of the Autonomous Region of Madeira (RAM), created the Education Project 4.0 - Colabor@r to Involve, Include and Power, acronym, in Consortium. This project, approved by the Erasmus+ National Agency Education and Training with the number 2020-1-PT01-KA01-078173 in Call KA1 of 2019, with a rating of 93 %, was expected to be implemented between November 2020 and October 2022. However, it ended until 31 October 2023 due to the impossibility of carrying out mobility during the COVID-19 pandemic lockdown period.

Underlying the conviction that "The task is not to make the impossible possible, but to make the possible attainable" (OECD, p. 56), Regional Directorate for Education launched the challenge to five schools, which vertically brought together various levels of education and education. Of these five schools, four accepted the challenge, with three of them bringing together all the levels of education and teaching in the localities where they are inserted. It was in this scenario that the European Development Plan (EDP) was built, which describes the objectives of the Consortium and its members and explains its relationship with the needs of the organisations involved and the contexts in which they operate. The European Development Plan is therefore a guiding document and was a fundamental contribution to the mapping of the path taken, in order to improve and deepen the professional knowledge and skills of the entire community involved, based on the decisive role that top and intermediate management play in the whole process. Therefore, seeking to define this path, Edu4Col@b was based on three key areas: strengthening equity and inclusion in education; modernisation and innovation of pedagogical practices and tools; internationalisation of organisations. In this sense, the activities carried out in the scope of the project, namely the structured courses, job shadowing activities or teaching missions were framed in these dimensions, thus seeking to respond to the identified needs, resulting in an understanding of the contexts where best practices occur, in the certainty that this understanding contributes, not only to reinforce leadership and facilitate the construction of an identity matrix of each school, but to support more effective and appropriate educational options for students.

Betting, above all, on collaboration, at all levels, on the decision-making power and influence of each participant in managing change, Edu4Col@b' European Development Plan aimed to assume that schools are places for training and building knowledge in context, in which teachers and students are people, where we work collaboratively and cooperatively in flexible and multifunctional spaces and time, so that the curriculum is accessible to everyone, in their diversity, and success is not a variable, but a fixed value, because it is believed that everyone can learn. However, the Regional Directorate of Education, as responsible for the pedagogical coordination of schools in the Autonomous Region of Madeira, has been on a path that has often been in the national scene, of anticipation of some educational policies. It is understood, therefore, that alongside other projects developed, such as the implementation of the Full Time School, the integration of all children into the education system, from the age of zero, the generalisation of the foreign language in the 1st cycle of basic education and in pre-school education and, more recently, the generalisation of Digital Manuals to all

students, starting from the 5th year of schooling, in public schools, the project Edu4Col@b represents a significant investment in innovative projects and promotes the educational success of students, along with the conclusion of partnerships with regional, national and international entities, thus contributing to the alignment of the Regional Directorate of Education with the most current international and national educational policies. In addition, it gives consistency to the next step in this evolutionary path towards the improvement that will necessarily be internationalisation, as a way of imbuing both public administration and schools, with what is most innovative in a European context. On the other hand, in pedagogical and didactic terms, it became clear the gain of associating schools with the KA1 project in a consortium, since it is understood that the overall involvement of these schools will function as a “cluster” for innovation and that it will translate into a transfer of learning, as if it were a laboratory or “oil stain” to other schools in the Region.

Consortium

Of the 96 public schools in the Autonomous Region of Madeira, only 5 operate in a “vertical grouping” (from childhood education to secondary education) and, of these, the following have actually chosen to join the KA1 Consortium, constituted by application under Key Action 1 of the Erasmus+ programme:

- Basic School of the 1st, 2nd and 3 rd Cycles with Pre-School of Porto da Cruz;
- Basic School with Pre-School of Santo António and Curral das Freiras;
- Elementary school of the 1st, 2nd and 3 rd Cycles with Pre-School Bartolomeu Perestrelo;
- Basic and Secondary School with Pre-School and Childcare of Porto Moniz.

Each of the schools of the Consortium brings together all the levels of education and teaching of the localities where they are inserted, with the exception of one, acting as an essay of new processes and practices, framed in the key areas of the project and capable of network transfer to a broader context, regional, national or even international. We believe that the fact that the Consortium schools have various levels of education and teaching can enhance, for example, transitions, and bring new opportunities for collaborative work to all professionals, in order to generate a new look at the student, in his individuality and in his path. It was also our ambition that the effects of the Consortium, through the adoption of new processes and practices framed in the key areas of the project, are transferable, in a network, to a broader context and that they are prolonged in space and time, affirming their sustainability by the impact of the learnings carried out and the models experienced, among the other schools of the Region. After the constitution of the Consortium, needs were surveyed.

Needs Assessment

Thus, in the Regional Directorate of Education, an internal survey was used by each of the Organic Units, through working meetings with coordination and using various means, including a platform for networking in the information systematisation phase. Reference should also be made to the use of the management tools of this regional directorate, namely (i) Annual Activity Plan; (II) Annual Activity Report; (III) Evaluation and Accountability Framework; (iv) SWOT Analysis.

To understand the needs of each of the schools, depending on the Consortium as a whole, a meeting guided by the Regional Director of Education was held with the Chairmen of the Executive Boards, the project coordinator and an external consultant, with experience of

coordinating KA1 in a consortium. It was also considered the information resulting from a recent survey of teachers, students and guardians and was also taken into account, on time, the consultation of strategic documents of schools, namely (i) School Educational Project; (ii) business plan; (iii) Rules of Procedure; (iv) Institutional evaluation. The fact that schools have a common organisational context facilitated the whole needs mapping process and thus the following needs of this Consortium could be identified as part of the European Development Plan, highlighted below:

- innovate pedagogical practices;
- reduce the failure and drop-out rate;
- foster inter-institutional communication and the culture of teamwork and network up to an international level;
- promoting the European dimension and the internationalisation of organisations.

According to the needs survey explained in the European Development Plan, Edu4Col@b aimed to contribute on the one hand to the strengthening of equity and inclusion in education, through the implementation of an education that promotes respect for diversity, freedom, responsibility and valorisation of the work of each and every one. On the other hand, it will contribute to the modernisation and innovation of pedagogical practices and tools, with the aim of using active learning methodologies; implement pedagogical differentiation and innovative learning environments; operationalise collaborative and integrated learning of knowledge, that is, a meaningful learning in which understanding, knowledge, creativity and critical sense allow to respond to the needs of an ever-changing society. Edu4Col@b has also promoted the internationalisation of organisations in order to generate new European partnerships, increase foreign language skills, develop the European dimension in education and, by enabling, through mobility, the understanding of the contexts in which best practices occur, strengthen leadership and facilitate the construction of an identity matrix of each school that provides effective educational options by providing the most appropriate educational opportunities for its students. Integrating this project was in itself an opportunity and a way for these schools and their leaders to benefit from unique conditions for the modernisation and innovation of personal, professional, institutional and interinstitutional practices, from a collaborative network powered by Edu4Col@b.

Key Areas and Priorities

The fact that this Consortium is based in an outermost region, with a number of specific constraints (geographical remoteness, insularity, small size, topography, among others), makes it even more relevant to participate in projects with activities such as those of this Erasmus+ project, with a context reinforced by the political-administrative autonomy of the Autonomous Region of Madeira, in the area of education and which underpins the project Edu4Col@b, from its planning to its implementation. We also understand that the recent publication of important guiding and normative documents of national scope, namely the Profile of Students to Exit Obligatory Schools, the Inclusive School and the Autonomy and Curriculum Flexibility, internationally recognised and combined with regional policies, can represent a unique opportunity for the modernisation and innovation of practices, professionals, institutional and interinstitutional. However, the regulations alone do not guarantee effective change. Thus, Collaborative Work between institutions, between policy and decision makers, between top and middle management in schools, between teachers and between students, both horizontally and vertically, is essential for what is now called Education 4.0. Therefore, the implementation of Collaborative Work (Col@b) is considered a key cross-cutting area, along with training for leadership, contemplated the three Key Areas

of the: AK1- Strengthening Equity and Inclusion; AK2 – Modernisation/Innovation of Pedagogical Practices and Instruments and AK3 – Internationalisation of Organisations.

To achieve its objectives and add quality to the profile of leaders and actors in the education system, this project used mobilities in a perspective of international benchmarking, seeking and studying best practices in comparison to what is best done in the organisation itself and evaluating in its context what best applies, against the objectives defined in the framework of the European Development Plan. The structured courses, training events and job shadowing carried out thus allowed to identify good practices and the theoretical foundations that support them, especially in countries that already have a long experience in these areas.

Reflecting the intentions set out in the European Development Plan, the following priorities were defined in the construction, development and operationalisation of the project Edu4Col@b, namely (i) improving the levels of motivation, involvement and satisfaction of the educational community by providing quality training in a European context; (ii) contact and know experiences of inclusive and equitable school management at the different levels of intervention; (iii) to share knowledge and experience of policies and practices of inclusion and equanimity in education, whether in the regional, local, organisational and people's dimension, including in their individual and leadership action, in their relationship with the self and with others; (iv) know innovative foundations and practices at international level; (v) reflect, discuss, decide and act in the different fields of action, in relation to the foundations and innovative practices that aim for the success of all in the face of the uncertainties and rapid changes of our time; (vi) to enhance collaborative and networking work in the adoption and dissemination of new practices flexible and proven effective pedagogical and curricular management, building bridges, motivating and involving people at all possible levels of intervention; (vii) create, leverage, develop networks of contacts and communication channels of European scope, developing a spirit of European citizenship and identity, establishing partnership agreements between international institutions within the Consortium organisations.

In addition to the knowledge of the contexts underlying the various entities, the objectives set out in the European Development Plan and the definition of priorities for the action, it has become essential to reflect on the operationalisation of Edu4Col@b and on the activities that gave it both form, consistency and coherence, being elected those that are now: (i) strengthening equity and inclusion in education, through the implementation of an education promoting respect for diversity, freedom, responsibility, valorisation of the work of all and of each; (ii) modernisation and innovation of pedagogical practices and tools, through active learning methodologies, pedagogical differentiation and innovative learning environments, meaningful and agency-integrating collaborative and knowledge learning, where understanding, knowledge, creativity and critical sense can respond to the needs of an ever-changing society; (iii) internationalisation of organisations to develop the European dimension in education and generate new European partnerships.

The mobilities implemented were thus in line with these aims, thus forming part of a broader ideal that, over the lifetime of the project, has the strategic vision of fostering a Community of Practice among the Consortium entities and in which internationalisation, inclusion, collaborative work and renewal of pedagogical practices were an effective reality and an example to be disseminated. Placing these schools as a reference on the map of the schools of the Autonomous Region of Madeira and understanding, at the level of their processes (internal and external), how to extend this Community of Practice, is also one of the visions

of the European Development Plan in the implementation of this project, which finally has the students. The relevance of these mobilities has enshrined them as one of the critical factors in achieving the objectives of the project and this highlighted the need and usefulness of drawing the profile of the participants in this KA1, around pedagogical leaderships distributed by 4 typologies, two for decision-makers (one in the definition of educational policies and the other at the level of defining the identity profile of the school) and two for the field (one at the level of the operationalisation of policies, with the pedagogical teams of the Regional Directorate of Education and with teachers, in particular in the exercise of intermediate management), namely:

- Typology I (TpI) – Regional Secretary for Education, Science and Technology and Leaders of the Regional Directorate of Education (Regional Director, Service Directors, Heads of Division);
- Typology II (TpII) – Elements of the Regional Directorate of Education Teams (Trainers, Teachers with Technical-pedagogical Functions, Technical Assistants);
- Typology III (TpIII) – Top School Leaders (Chairman of the Executive Board and other members of the Executive Board, Chairman of the Pedagogical Council, Chairman of the Educational Community Council);
- Typology IV (TpIV) – Teachers with a teaching component and middle management positions in schools (settled on the Pedagogical Council and/or the Council of the Educational Community, Directors of Class, Coordinators/Project Managers).

The key areas and objectives of the project also guided the choices made regarding the type and number of activities selected, seeking a balanced distribution within the Consortium, between public administration participants and participants from the schools involved, also considering the typologies of the applicants and without neglecting the desired impact on training. Finally, different types of learning mobility were included in the modalities of Job Shadowing, Structured Courses and Training Events.

Activities

With regard to the three-day Job Shadowing (JS) activities, the recipients of which were Regional Directorate of Education Leaders, members of the Regional Directorate of Education Teams, senior school leaders and teachers with intermediate management positions in schools that are part of the Consortium, with a total of 21 people, it was possible to observe practices in partner organisations, in the context of the definition, communication and operationalisation of educational policies (TpI); observe, at the organizational level, focusing on the three key areas of the project, space and time management in the school, transition management, project implementation, scheduling of students in the curriculum appropriation (TpII); visit schools with an agenda for observing innovative and quality practices in the three key areas of Edu4Col@b, with particular focus, in addition to the areas mentioned for the pedagogical dimension of typology II, on collaborative and cooperative work, communication and shared leadership (Typologies III and IV). In this regard, Job Shadowing activities were held in the UK, under the theme Collaborative Learning supported by video; in Branston, with a visit to the Branston Junior Academy; to Finland, more precisely to the city of Ylitornio – Ylitornio school yhteiskoulun Lukio and, finally, to the Sant Josep School in Barcelona.

Regarding Structured Courses, they had an average duration of five days and were intended for members of the Regional Directorate of Education Teams and teachers with intermediate management positions in the schools that are part of the Consortium. The courses carried out

were part of the key areas of the European Development Plan in the following themes: Principles and practices of equity and inclusion, access to learning and curriculum, responding to each student; Active methodologies and innovative pedagogical evaluation practices; Intercultural competences, from a citizenship perspective and a European and international dimension; Foreign language skills; Educational technologies; computer science/robotics; Literacy; Critical thinking and creativity; Inquiry/Problem/Project Based Learning (IBL/PBL/PjBL), STEAM methodology; Student agency in the curriculum ownership; Interpersonal relationship; cooperative work, emotional intelligence, leadership.

The following are the structured courses held by about 60 participants: The Child First: Montessori, Reggio Emilia System and Contemporary Approaches to Pre-School – Florence; Learning Through Collaboration and Cooperation – Verona; ICT Tools for a Creative and Collaborative Classroom – Ghent Interactive Technologies for the Future Classroom – Brussels; Brain-Based Learning: Understand How Students Really Learn – Amsterdam We Are All Special: Inclusion and Support for Students With Special Needs In and Out of the Classroom – Barcelona Project-Based Learning (PBL): Make Student's Learning Real and Effective! — Madrid; Designing Inclusive Learning Environments (IEL) to Support all Students – Florence.

Finally, the Training Events, with an average duration of three days, were members of the Regional Directorate of Education Teams and teachers with a teaching component and middle management positions in the schools that are part of the Consortium. These mobilities aimed to participate in international training events, in the area of educational innovation or the internationalization of education. In one of the events, the participant made a communication, with the aim of sharing some of the innovative practices within the project Edu4Col@b, thus contributing to make the project known in an international dimension. The presence of 14 participants in Cologne at the Towards High Quality in KA1 event should therefore be highlighted; in Barcelona, at the Connect International Conference on Open Schooling and The 4th Barcelona Conference on Education and in Glasgow at the European Educational Research Conference (ECER).

After the realization of the mobilities, and in order to contribute to the transformative role of the teacher, the participants were invited to share and disseminate the learnings, previously agreed through the Plan for Dissemination of Learning. This document includes, in a general way, the objectives of the Dissemination Plan, which meet the objectives of the project Edu4Col@b. The objectives, to be selected by the participants, aim, for example, to implement measures of organizational and pedagogical scope: space and time management in school, transition management, project implementation, collaboration and student agency in the curriculum ownership; strengthen equity and inclusion in education through the implementation of an education that promotes respect for diversity, freedom, responsibility and valorisation of the work of each and every one; contribute to the modernisation and innovation of pedagogical practices and tools, using active learning methodologies; implement pedagogical differentiation; disseminate and promote innovative learning environments; operationalise collaborative and integrated learning of knowledge, i.e. meaningful learning in which understanding, knowledge, creativity and critical sense can respond to the needs of an ever-changing society; to promote the internationalisation of organisations to generate new European partnerships, to increase active learning approaches; deepen work in learning communities or collaborative practices that help develop research, systematisation and communication skills, encouraging teacher self-training as a response to priorities or intervention needs. It is also foreseen to elect the target audience, to whom the

initiatives are addressed, as well as the methods of dissemination, focusing on creativity and the diversity of methods for disseminating mobility activities as a factor of differentiation when applying for mobility.

We highlight, therefore, as the main methods of dissemination of learning implemented the following:

- Short-term training/workshop;
- Training with validation for career development;
- Multiplier event at school;
- Multiplier event in the Consortium's school or network of schools, or open to others Entities;
- Presentation of Communication in training activities or events organised by entities of the Consortium or others;
- Presentation of Communication at events external to the Project or Consortium;
- Mass dissemination, e.g. in the media (Press/Radio/TV);
- Publication of a journal article in the field of education;
- Workshop.

In this context, workshops, training events and validated training actions were held, whose main objective was to make known the project itself as well as the themes worked in the framework of the structured courses attended. The following picture illustrates some of these initiatives.



Figure 1: Examples of dissemination of learning

Conclusion

The Regional Directorate for Education, through the Continuous Training Division, in conjunction with the Support and Monitoring Team (Team formed in the Continuous Training Division, with the responsibility of monitoring the European Development Plan), has the responsibility to proceed with the direct validation of training activities carried out abroad, within the scope of Edu4Col@b mobilities, waiving the formality of the individual application of the interested party. Also in this context, and given the possibility of full certification/validation of participation in the project, as hours of continuous training for the purpose of teaching career development, it was previously suggested that participants

describe their path at Edu4Col@b, (Learning Diary), in digital or other support, in order to facilitate the monitoring and registration of their learning process, to act as a tool for reflection and meta-learning, to reveal the progress made and the results achieved.

It was also considered desirable that each participant in the project Edu4Col@b should take an attitude of creativity and critical thinking in the way he observed, collected his data and made his records, his reflections, the transfer, ultimately, to his/her work contexts. From their personal reflection and with the awareness of their transformative role, each participant in Edu4Col@b thus had the opportunity to (re)build their own narrative and have their story to tell.

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