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Enhancing Students' Sustainability Awareness Through International Collaboration: A Study of the Australia-Indonesia Sister School Initiative

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Abstract

In response to the urgent global need for sustainability education, this study investigates the effectiveness of international school partnerships in advancing students' sustainability awareness. This study examines the impact of international school collaboration on Indonesian students' sustainability awareness, with a focus on the Australia-Indonesia BRIDGE School Partnership Program between MAN Insan Cendekia Gowa and St. John's Grammar School. Situated within the framework of Education for Sustainable Development (ESD), the research investigates how cross-cultural educational initiatives can enhance sustainability consciousness among school students in Indonesia. Employing a mixed-methods approach, data were collected from 96 students at MAN Insan Cendekia Gowa through a structured sustainability awareness questionnaire and analyzed using descriptive statistics and paired sample t-tests in SPSS. Qualitative data from teacher interviews were examined through thematic analysis. The findings indicate a statistically significant increase in students' sustainability awareness following their participation in the partnership's projects ($p < 0.05$). These projects, which included eco-brick making, virtual environmental discussions, and intercultural exchanges, contributed to students' cognitive understanding, emotional engagement, and sustainable behavioral practices. Students reported a greater sense of environmental responsibility and demonstrated measurable changes in daily habits, such as reducing plastic use and promoting green practices. This study underscores the effectiveness of international school partnerships in contextualizing global sustainability challenges within local educational experiences. The findings offer valuable insights for educators and policymakers aiming to integrate global citizenship and sustainability education in Indonesian schools through collaborative and experiential learning models.

Keywords: sustainability awareness, international collaboration, education for sustainable development, BRIDGE program, SDGs

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Introduction

The 21st century is marked by intensifying global environmental issues, including rising temperatures, extreme weather events, biodiversity loss, and pollution. These challenges have been exacerbated by unsustainable patterns of human production and consumption, placing immense pressure on ecological systems and future generations (Intergovernmental Panel on Climate Change [IPCC], 2022). While these issues are global in scale, their impacts are profoundly local—affecting daily life, economic stability, and community resilience. This urgency has catalyzed an international movement to integrate sustainability into various sectors, particularly education.

Education for Sustainable Development (ESD) has been recognized by UNESCO as a transformative force to reorient education systems toward sustainability. ESD seeks to equip learners with the knowledge, skills, values, and attitudes needed to address complex environmental, social, and economic issues in a rapidly changing world (UNESCO, 2017). It promotes critical thinking, systems thinking, empathy, and active participation in societal transformation—shifting the purpose of education from knowledge transmission to cultivating responsible global citizenship.

Despite growing advocacy for ESD, its implementation remains uneven across educational contexts. In many countries, including Indonesia, schools face structural challenges such as inadequate teacher training, insufficient curriculum integration, limited access to pedagogical materials, and a lack of institutional support (Hopkins & Kohl, 2019; Van Poeck et al., 2019). These barriers hinder the effective internalization of sustainability principles in both teaching practices and student learning outcomes.

In Indonesia, where environmental degradation intersects with socio-economic disparities, ESD is critically important yet inconsistently embedded within the national curriculum. The integration of ESD in Indonesian schools is typically limited to certain subjects or extracurricular initiatives, without a holistic or cross-disciplinary approach (Aisy & Gunansyah, 2020; Listiawati, 2013). Teachers often struggle to implement ESD meaningfully due to constraints in professional development and institutional policy, making innovation and collaboration essential for progress.

In light of these challenges, international collaboration emerges as a promising strategy to support ESD implementation. Cross-border school partnerships offer a platform for sharing best practices, co-developing learning experiences, and contextualizing global issues within local realities. One notable model is the BRIDGE School Partnership Program, an initiative supported by the Australian Government's Department of Foreign Affairs and Trade (DFAT) and implemented by the Asia Education Foundation at the University of Melbourne. The program aims to foster intercultural understanding and global citizenship through long-term partnerships between schools in Australia and Indonesia (Asia Education Foundation, 2023).

This study investigates the impact of such a partnership between MAN Insan Cendekia Gowa, a public Islamic boarding school in South Sulawesi, Indonesia, and St. John's Grammar School in South Adelaide, Australia. Since 2021, the partnership has focused on achieving SDG 4 (Quality Education) and SDG 13 (Climate Action) through collaborative sustainability projects. While the broader aims of the BRIDGE program are intercultural, this study narrows its focus to examine how these international collaborations shape Indonesian students' awareness, attitudes, and behaviors toward sustainability.

By centering on the experiences of Indonesian students, this research contributes to a growing body of literature on localized impacts of global educational initiatives. The research questions are: What are the specific sustainability-focused projects implemented through the partnership? And to what extent do these activities influence students' sustainability awareness? Through a mixed-methods approach, this study seeks to generate empirical insights into how international partnerships can strengthen ESD delivery in Indonesian schools and promote meaningful student engagement with global sustainability goals.

Literature Review

Education for Sustainable Development (ESD)

Education for Sustainable Development (ESD) is a framework that integrates principles, values, and practices of sustainable development into all aspects of education and learning (UNESCO, 2017). It aims to empower learners to make informed decisions and take responsible actions that promote environmental integrity, economic viability, and a just society. ESD emphasizes competencies such as critical thinking, systems thinking, participatory decision-making, and future-oriented reasoning (Wals, 2015). These competencies are essential for preparing students to engage with global issues like climate change, biodiversity loss, and unsustainable consumption patterns.

Research by Pauw et al. underscores the importance of sustainability consciousness, which encompasses knowledge, attitudes, and behaviors related to environmental, social, and economic sustainability. They developed an innovative instrument for measuring these competencies, indicating the need for analytical tools in assessing ESD effectiveness (Pauw et al., 2015). Complementing this, Wiek et al. provide a systematic framework for developing key competencies in sustainability, emphasizing that a well-defined curriculum is crucial for imparting the necessary skills for problem-solving within the sustainability domain (Wiek et al., 2011). Such frameworks are instrumental in transforming educational practices and enhancing the capacity of graduates to contribute effectively to sustainable development.

Moreover, interdisciplinary approaches are vital for ESD, as they enrich the learning experience and reflect the complexity of sustainability challenges. Didham et al. advocate for interdisciplinary education as a means to engage various fields in addressing sustainability, thus preparing students to navigate multifaceted environmental issues (Didham et al., 2024). This aligns with the findings of Nyatuka, who notes that effective ESD must address broader societal issues while promoting cultural understanding and global citizenship (Nyatuka, 2020). As part of this interdisciplinary integration, architecture education has also been highlighted as pivotal; Xiang et al. discuss the application of sustainability concepts in architectural design courses, reinforcing the need for practical and critical engagement with sustainability (Xiang et al., 2021).

In school settings, ESD is commonly implemented through subject integration, extracurricular programs, and cross-disciplinary projects. However, the degree of implementation varies significantly across regions and school types. In Indonesia, although ESD is recognized in policy frameworks and curricula, its practical application is often fragmented due to limited teacher training, weak institutional support, and lack of context-specific learning materials (Aisy & Gunansyah, 2020; Listiawati, 2013). Studies have shown that teachers often lack confidence and pedagogical strategies to incorporate sustainability themes into their teaching (Hopkins & Kohl, 2019).

Measuring Sustainability Awareness in Students

Measuring sustainability awareness among students is critical in advancing education for sustainable development (ESD). Various studies have explored different methodologies to assess sustainability awareness, revealing insights into students' understanding and engagement with sustainability issues.

One effective approach detailed by Khoiri et al. involves the use of a validated questionnaire developed through ESD-oriented project-based learning. This study assessed students' sustainability awareness by employing a survey format, ensuring that the instrument comprehensively covered students' knowledge and attitudes towards sustainability Khoiri et al. (2023). The adoption of standardized questionnaires provides a reliable framework through which students' sustainability awareness can be quantitatively assessed, serving as a significant indicator of the educational impact of ESD initiatives.

Another significant perspective is offered by Kruger et al., who emphasize the role of higher education institutions in enhancing sustainability literacy among students. Their findings suggest that intentional educational designs—such as campus ecology models—can effectively cultivate students' understanding of both environmental and social justice dimensions of sustainability (Kruger et al., 2020). This holistic educational experience fosters a deeper connection to sustainability, promoting a culture where students not only learn about sustainability but also apply this knowledge in real-world contexts.

Moreover, Speer et al. (2020) focus on the necessity of awareness as it relates to environmental behavior. Their research indicates that understanding the broader environmental issues correlates with the belief in one's capacity to initiate change. They found that while students demonstrate awareness of climate change and its impacts, their practical knowledge on actionable sustainability practices often remains limited (Speer et al., 2020). Thus, effective assessments should not only gauge awareness but also evaluate the capacity for positive behavioral change.

The investigation by Ukenna et al. supports the notion that sustainability education can prompt behavioral shifts. They argue that increased awareness, fueled by educational efforts, leads to sustainable consumption practices (Ukenna et al., 2018). This connection highlights the importance of measuring students' awareness as a precursor to behavioral changes, providing a compelling argument for continuing to enhance sustainability curricula in educational settings.

Additionally, the work of Gródek-Szostak et al. supports the need for a well-rounded approach to assessing sustainability awareness. By focusing on energy conservation behaviors among students in Poland, the authors highlight the importance of context-specific studies in understanding how cultural and geographical factors influence sustainability awareness (Gródek-Szostak et al., 2021). Such localized assessments can enrich broader understanding by addressing unique sustainability challenges faced in different regions.

Sustainability awareness refers to a learner's cognitive understanding, emotional engagement, and behavioral intention related to sustainable living and environmental responsibility (Hassan et al., 2010). Several instruments have been developed to assess this construct, usually through Likert-scale questionnaires that evaluate students' knowledge, attitudes, and practices. These tools have been adapted in various educational contexts to gauge the

effectiveness of sustainability-focused interventions (Rini et al., 2022; Sammalisto et al., 2016). In Indonesia, research using such instruments has helped highlight how students' environmental awareness can be enhanced through project-based and experiential learning.

Sustainability awareness is not only shaped by formal instruction but also by experiential exposure, peer interactions, and contextual relevance. Projects that connect global challenges to local contexts, such as waste management or water conservation, are shown to be more impactful in shifting students' sustainability-related behaviors (Balducci & Mao, 2022; Manucom, 2023).

International Collaboration and the BRIDGE Program

International school partnerships offer unique opportunities to enhance ESD through intercultural exchange, collaborative problem-solving, and real-world engagement. The Australia-Indonesia BRIDGE School Partnership Program exemplifies such efforts, aiming to build global friendships and promote mutual understanding through digital literacy, cultural exchange, and joint action on global issues like the SDGs (Asia Education Foundation, 2023). Research suggests that international partnerships enrich students' worldview, deepen empathy, and provide new perspectives on environmental issues (Goren & Yemini, 2017).

Within the BRIDGE framework, participating schools co-design learning projects that align with their shared goals. These may include collaborative sustainability campaigns, virtual forums, and environmental action projects such as eco-brick making or community clean-ups. For Indonesian schools, such partnerships provide access to new pedagogical models, resources, and global best practices that may not be locally available.

Previous studies have shown that when international collaborations are well-structured and contextually relevant, they contribute to students' enhanced awareness and motivation to act sustainably (Leicht et al., 2018). However, empirical evidence on the direct impact of these partnerships on student learning outcomes, especially in the Indonesian context, remains limited.

While the literature affirms the value of ESD and highlights the promise of international school collaboration, few studies have examined how such partnerships influence Indonesian students' sustainability awareness. Most existing research either focuses on teacher development or institutional partnerships without assessing the behavioral and attitudinal shifts among students. This study addresses that gap by empirically evaluating the impact of the MAN IC Gowa–St. John's Grammar School collaboration, offering insights into how international partnerships can meaningfully advance ESD goals in Indonesian schools.

Methodology

Research Design

This study employed a convergent mixed-methods design to explore and evaluate the effectiveness of an international school partnership in enhancing Indonesian students' sustainability awareness. The quantitative component assessed changes in students' knowledge, attitudes, and behaviors toward sustainability, while the qualitative component captured in-depth insights into the educational processes and perceived impact of the partnership. This design was chosen to allow for triangulation of data and to enrich the

interpretation of findings through both measurable outcomes and narrative perspectives (Creswell & Plano Clark, 2018).

Participants

The research was conducted at MAN Insan Cendekia Gowa, a public Islamic boarding school in South Sulawesi, Indonesia. A total of 96 students from grades X to XII participated in the quantitative survey, selected through purposive sampling based on their involvement in the BRIDGE partnership projects. Additionally, one teacher representing the school's international collaboration unit participated in a semi-structured interview to provide qualitative insights.

Instruments and Data Collection

For the quantitative phase, data were collected using a sustainability awareness questionnaire adapted and modified from Rini et al. (2022). The instrument consisted of 20 statements measured on a 4-point Likert scale (1 = strongly disagree to 4 = strongly agree), covering three core dimensions: (1) cognitive awareness (knowledge of environmental issues), (2) emotional and attitudinal awareness (values and concern), and (3) behavioral practices (personal and collective actions for sustainability). The instrument was validated through expert judgment and piloted for reliability prior to full deployment.

The qualitative phase involved a semi-structured interview with the teacher, focusing on the nature of the collaborative projects, the integration of ESD elements, and perceived changes in student engagement and attitudes. The interview was conducted in Indonesian, recorded with consent, and transcribed verbatim for analysis.

Data Analysis

Quantitative data were analyzed using SPSS 26.0, with descriptive statistics (mean and percentage) used to categorize levels of sustainability awareness based on criteria adapted from Hassan et al. (2010). To determine the significance of change in student awareness, a paired sample t-test was conducted comparing pretest and post test scores. Awareness levels were classified into low, moderate, and high based on cut-off values as defined by Hassan et al. (2010) as follows.

Table 1
Students' Sustainability Awareness Level

Mean	Category
1.00-2.00	Low
2.01-3.00	Moderate
3.01-4.90	High

Then the results of the percentage of statements from respondents are classified based on the criteria in Table 2.

Table 2
Students' Sustainability Awareness Category

Sustainability Awareness Percentage (%)	Explanation
0.00-39.90	Practices that seldom or dislike to be done
40.00-69.90	Practices that are done/ happened moderate/ medium
70.00-100	Practices/ feelings that are most likely one/happened

Qualitative data from interviews were analyzed thematically following Miles and Huberman's (1994) framework: data reduction, data display, and verification. Emerging themes were identified in relation to students' learning experiences, project participation, and observed behavioral changes.

Results and Discussion

The Effectivity of the International School Partnership in Improving Students Sustainability Awareness

To evaluate the impact of the Australia-Indonesia BRIDGE school partnership on Indonesian students' sustainability awareness, data was gathered using validated questionnaires. The pretest and posttest data provided a basis for the assessment and highlighted specific areas of sustainability awareness among students, categorized as behavioral and attitude awareness, emotional awareness, and sustainability practice awareness.

Table 3
Result of Students Sustainability Awareness

No	Sustainability Awareness Category	Percentage (%)	Explanation
1	Behavioral and attitude awareness	78.2	Practies/feeling that are most likely one/happened
2	Emotional awareness	84.2	Practies/feeling that are most likely one/happened
3	Sustainability practice awareness	65.3	Practices that are done/happened moderate/medium

The findings, presented in Table 3, indicate that students showed significant percentages in different categories of sustainability awareness: 78.2% for behavioral and attitude awareness, 84.2% for emotional awareness, and 65.3% for sustainability practice awareness. These results are consistent with existing literature that emphasizes the positive outcomes of structured educational programs in enhancing sustainability awareness among students.

For instance, (Khoiri et al., 2023; demonstrated that the integration of Education for Sustainable Development (ESD) through project-based learning positively influenced students' comprehension of sustainability concepts and practices, paralleling the results observed in the current study (Khoiri et al., 2023; Ndomah & Oduntan, 2022) support the notion that exposing students to environmental issues through formal education significantly amplifies their awareness and attitudes towards sustainability (Ndomah & Oduntan, 2022). This reinforces the idea that structured educational interventions—like the BRIDGE partnership—can effectively enhance students' sustainability awareness, aligning with the data collected from the project.

Additionally, the concept of emotional awareness, which achieved a notable score of 84.2%, aligns with findings from Suna and Köse (2023) who highlighted that emotional engagement in sustainability education cultivates a deeper understanding and commitment to sustainable living among students (Suna & Köse, 2023). This emotional awareness is crucial in motivating behavioral changes, as students who feel emotionally connected tend to engage more actively in sustainability practices.

The results presented in Table 4 indicate a significant improvement in students' sustainability awareness as measured by the pretest and posttest assessments, highlighting the positive impact of the educational intervention. Specifically, students exhibited a transition from medium to high levels in both *behavioral and attitude awareness* and *emotional awareness*. This advancement suggests that the educational initiatives were effective in enhancing students' perceptions and motivations toward sustainability, aligning with findings from previous research that emphasizes the role of experiential learning in fostering positive attitudes and behaviors related to environmental issues.

Additionally, the increase in emotional awareness reflects a deeper connection and empathy towards sustainability challenges, an aspect supported by studies indicating that emotional engagement is crucial in motivating sustainable actions. On the other hand, the shift from low to medium in *sustainability practice awareness* illustrates progress, though it also indicates that there remains room for further development in translating awareness into actionable practices. This outcome resonates with existing literature that points to the challenges individuals often face in converting awareness into consistent sustainable behaviors. Therefore, while the results are promising, they underscore the need for continued education that emphasizes the practical application of sustainability principles to help reinforce and solidify these improvements in awareness among students.

The comparison of students sustainability awareness between pretest and post test is presented in Table 4 as follows.

Table 4
Result of Students Sustainability Awareness Comparison: Pre-test and Post-test

No	Sustainability Awareness Category	Pre-test	Post-test
1	Behavioral and attitude awareness	Medium	High
2	Emotional awareness	Medium	High
3	Sustainability practice awareness	Low	Medium

After engaging in BRIDGE-supported activities—such as environmental campaigns, intercultural virtual discussions, and eco-brick projects—a paired sample t-test was conducted to determine statistical significance in the shift of students' sustainability awareness. Results indicated a significant increase in overall scores, with a p-value of 0.00 (< 0.05), confirming that the international collaboration had a positive impact on students' awareness levels.

Further analysis revealed notable improvements across all three key dimensions of sustainability awareness. In terms of cognitive awareness, students demonstrated an enhanced understanding of critical environmental issues such as climate change, plastic pollution, and biodiversity loss. They were able to articulate more clearly the causes and consequences of these challenges, as well as their relevance to local and global contexts. Regarding emotional engagement, students expressed a heightened sense of empathy and concern for the environment. This emotional connection appeared to motivate a deeper commitment to sustainability principles, reflecting a shift from passive awareness to active care. Finally, in the area of behavioral practice, many students reported adopting more environmentally responsible habits, such as reducing single-use plastic consumption, carrying reusable containers, and advocating for green practices among their peers. These behavioral shifts indicate that the students internalized sustainability not only as a concept but also as a set of values guiding their daily actions. These outcomes align with existing literature suggesting that project-based and experiential learning strategies are effective in fostering sustainability competencies, particularly when learning is embedded in real-world contexts and collaborative activities (Balducci & Mao, 2022; Sammalisto et al., 2016).

The findings of this study align with previous works that highlight the effectiveness of experiential, project-based ESD approaches (Leicht et al., 2018; Rini et al., 2022). Moreover, the statistically significant outcomes support the argument that international collaboration can be a catalyst for behavioral and attitudinal change, especially when projects are grounded in real-world challenges and local relevance.

Unlike traditional didactic methods, the BRIDGE partnership allowed for participatory learning, intercultural dialogue, and applied action—elements that scholars argue are essential for advancing transformative sustainability education (Van Poeck et al., 2019; Wals, 2015). This study contributes empirical data from an Indonesian school context, helping to fill the existing gap in the literature on the local impact of global education initiatives.

Project Experiences and Perceived Impact

Insights from the semi-structured teacher interview offered further evidence of the program's transformative effects. The collaborative projects under the BRIDGE initiative provided students with opportunities to engage in authentic, cross-cultural sustainability education. Notably, students co-created learning materials, engaged in virtual exchanges with their Australian peers, and participated in environmentally focused campaigns such as eco-brick construction to combat plastic pollution.

The teacher observed that these experiences contributed to students' critical reflection, increased motivation to act, and a sense of global connectedness. For instance, cultural immersion activities not only fostered mutual respect and understanding but also enabled students to perceive environmental issues through both local and global lenses. This aligns

with Goren and Yemini's (2017) assertion that international partnerships can deepen students' intercultural empathy and enhance global citizenship values.

Students' personal reflections—shared during classroom discussions and project debriefings—further confirmed a positive shift in sustainability attitudes. One student noted, "Before the project, I knew about recycling, but now I understand how my choices affect people and ecosystems far beyond my hometown." Another student expressed, "I've started carrying my own tumbler and stopped using plastic bags. These small things feel meaningful now."

These testimonials suggest that the partnership did more than transfer knowledge; it cultivated sustainability as a lived value and not merely an academic concept.

Implications and Directions for Future Research

The findings of this study offer several important implications for educators, policymakers, and curriculum developers aiming to strengthen Education for Sustainable Development (ESD) in Indonesia and similar contexts. First, the study demonstrates that international school partnerships, such as the BRIDGE program, can serve as effective platforms for embedding sustainability education in meaningful, participatory, and contextually relevant ways. When students engage in collaborative projects that connect local environmental challenges to global sustainability goals, they are more likely to internalize sustainability values and translate them into concrete actions. Therefore, schools should be encouraged to establish and institutionalize international collaborations that support experiential learning, intercultural dialogue, and student-led environmental initiatives.

Second, the study highlights the need for systemic support in the form of teacher professional development, flexible curriculum frameworks, and access to sustainability-focused teaching resources. While the partnership facilitated valuable learning experiences, its success was partly dependent on the teachers' capacity to integrate these experiences into the broader curriculum. Capacity-building programs that equip teachers with both pedagogical and intercultural competencies are essential to ensure the sustainability and scalability of such initiatives.

In terms of policy, education stakeholders at the national and regional levels should consider incentivizing and mainstreaming international partnerships as part of ESD implementation strategies, particularly under Indonesia's commitment to achieving the Sustainable Development Goals (SDGs).

Future research should explore several areas to build on the current findings. First, longitudinal studies could examine the long-term behavioral impacts of international collaborations on students' environmental attitudes and actions. Second, comparative studies involving both partner schools—Indonesian and Australian—would provide insights into the mutual learning outcomes and intercultural exchange processes. Finally, additional research could investigate how different types of projects (e.g., digital vs. in-person, short-term vs. long-term) influence the depth and sustainability of student engagement with environmental issues. Expanding the scope of inquiry to include more schools from diverse geographical and socio-economic backgrounds would also strengthen the generalizability of findings and inform policy recommendations on a broader scale.

Conclusion

This study has demonstrated that international school partnerships can significantly enhance students' sustainability awareness, particularly when implemented through project-based and intercultural learning models. Through the collaboration between MAN Insan Cendekia Gowa in Indonesia and St. John's Grammar School in Australia, students engaged in meaningful environmental activities, virtual cultural exchanges, and hands-on sustainability projects that strengthened their cognitive understanding, emotional engagement, and sustainable behavioral practices.

Quantitative analysis revealed a statistically significant increase in students' sustainability awareness following participation in the BRIDGE program initiatives. Qualitative insights further supported these findings, with students expressing a deeper appreciation for environmental issues and a stronger commitment to adopting sustainable lifestyles. These outcomes reflect the transformative potential of integrating Education for Sustainable Development (ESD) within real-world, collaborative learning experiences.

The results affirm the role of international partnerships as a valuable strategy for advancing ESD goals in Indonesian secondary education. By providing students with opportunities to interact across cultures and co-create solutions to shared global challenges, such collaborations foster not only environmental literacy but also intercultural competence and global citizenship.

To maximize the impact of similar programs, continued investment in teacher training, institutional support, and inclusive policy frameworks is essential. This research contributes to the growing evidence base supporting the localization of ESD through global engagement, offering a replicable model for sustainable education reform in diverse educational settings.

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Teacher Reflection in Enhancing Student's Mathematical Problem-Solving Ability Through the Mathematical Task-Oriented PBL Model

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Abstract

One of the problems of learning mathematics in Indonesia is the low level of mathematical problem-solving skills at the elementary school level. Elementary school students still feel confused about how to solve problems related to mathematics. In overcoming the problem of low mathematical problem-solving ability, teacher professionalism is needed in implementing learning models. PBL reflection oriented mathematical task is one form of teacher professionalism efforts in improving students' mathematical problem-solving skills. Didactical Design Research (DDR) is one of the methodological frameworks to produce learning designs and frameworks for implementing reflection practices. The purpose of this research is to produce didactical design for elementary school mathematics teachers' reflection practice in improving students' mathematical problem-solving ability. The method used in this research is DDR with data collection techniques through tests, interviews, observations, documentation, document studies, learning records, and triangulation. The participants in this study consisted of 120 students and 5 participants of elementary school mathematics teachers in Yogyakarta. The data analysis used four stages of qualitative data analysis developed by Miles and Huberman. The result of this study is the formulation of empirical didactical design of mathematical task-oriented PBL model obtained through four stages of DDR, namely preparation for reflection practice, design/reflection planning for action/prospective analysis, design/reflection implementation in action/metapedadidactic analysis, and reflection and evaluation of design/reflection after action/retrospective analysis. In addition, this study also analyzed the implementation of elementary school mathematics teachers' reflection practices in improving elementary school students' mathematical problem-solving skills using metapedidactic analysis and didactic transposition.

Keywords: teacher reflection, mathematical problem-solving ability, mathematical task, PBL models

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Introduction

Education means interactions between teachers and students to improve the quality of human resources (HR) during learning activities. The main goal of the learning process is to be able to achieve changes in student behavior and become a better person permanently. Factors that can affect the success of the learning process include teachers, students, subjects, the environment, learning models, and supporting learning resources (Pangabean et al., 2021).

Learning in the field of quality mathematics will have an impact on maximizing the cognitive potential of students (Sa'dijah et al., 2020). Quality mathematics learning should place more emphasis on the relationship between concepts and students' experiences in real life. But in reality, learning mathematics in elementary schools is only dominated by lecture activities and assignments given by the teacher. Meanwhile, the demands of the 2013 curriculum require teachers to be more creative in order to be able to guide students in discovering, understanding, and applying mathematical concepts in everyday life (Shoriah & Efendi, 2022). This is in line with the low-quality mathematics learning process that will have an impact on the results of obtaining a PISA score.

The results of the Program for International Student Assessment (PISA) study in 2018 showed that the country of Indonesia had decreased compared to 2015. In the mathematics category, Indonesia obtained a score of 379. This is an indication that students have not been able to link the concepts they have learned with their life experiences. daily. The obstacles faced by students in the middle of learning can be referred to as learning challenges. Some of the reasons that were found to be the cause of this condition were the mathematics learning practices applied by the teacher still using the old model (drill), the fact that students were not accustomed to working on problem-solving questions, and the low motivation of students in learning mathematics.

Based on observations and interviews in the field with teachers and fifth grade students at SDN Vidya Qasana, it was shown that the teacher only gave procedural routine questions; the teacher did not have time to give problem-solving questions for the reason that it was too difficult for students and there was limited time. Likewise, the mathematics learning process carried out by the teacher has not changed, even though the RPP contains a certain model. This shows that the implementation of learning is still not in accordance with the demands of the curriculum. It also identified that further serious efforts were needed to resolve the issue. One effort that can be made is to apply mathematical tasks in collaboration with the PBL model.

Mathematical Task

Moulds (2002) states that a mathematical task is a learning activity in the form of contextual problem-solving activities that is able to engage students in the learning process, help students understand material meaningfully, strengthen connections between ideas and disciplines, be easily adaptable to students' ability levels (Stein et al., 2006) and create opportunities for students to explore and articulate mathematical ideas independently (Piggot, 2012). Related to the advantages of this mathematical task, teachers are required to use this concept in everyday mathematics learning, but the implementation of this mathematical task is not easy (Suardja et al., 2015).

Mathematical tasks are performances, demonstrations, or products that culminate in the form of goals and life role models. Mathematical tasks present substantive, real problems to solve and engage students in pragmatic social actions that have real value in the world. These problems require identification, analysis, and resolution and require students to analyze, theorize, and engage intellectually with the world. Apart from having links with the world outside the classroom, this mathematical task is also rich in its application; the tasks represent educational outcomes of real and substantial intellectual and educational value. What's more, to become truly rich, mathematical tasks must be trans-disciplined. Interdisciplinary learning leverages cross-disciplinary practices and skills while maintaining the integrity of each discipline.

Another opinion that is also interpreted in depth is explained by Piggott (2012): rich mathematical tasks can involve students' interests from the start, allow further challenges and can be extended, invite students to make decisions, and involve students in speculating, creating, and testing. hypothesize, prove and explain, reflect and interpret, promote discussion and communication, and encourage originality and discovery. Several definitions from these experts have identified the basic characteristics of mathematical tasks, such as questions in the form of open-ended problems, requiring students to carry out in-depth investigations to solve problems, demanding creativity, the potential to discover patterns or generalize or unexpected results, demanding discussion and collaboration, and requiring students to develop a sense of self-confidence and independence and become critical thinkers (MacDonald & Watson, 2013; Moulds, 2004; Piggott, 2012). Mathematical tasks are also seen as an authentic assessment approach that can be used to measure higher-order thinking skills such as reflective thinking and problem solving (Suardja et al., 2015). Therefore, the application of mathematical tasks must coincide with the use of learning models.

Mathematical Task-Based PBL

The problem-based learning model (PBL) is a teaching and learning model designed so that students gain important knowledge, which makes them proficient in solving problems, have their own way of learning, and have the skills to participate in teams. This learning process also uses a systemic approach to solving problems. This PBL model also presents many authentic and meaningful problems, to solve which students are required to work in groups and find solutions to real problems. This characteristic of PBL is very relevant to mathematical tasks, so it is very suitable to be used simultaneously in the process of learning mathematics to hone students' problem-solving skills.

PBL implementation based on mathematical tasks involves at least three components: students as learning objects, teachers as teachers, and mathematical tasks as problems. Problem-solving skills need to be trained and familiarized with the use of these models in the everyday process of learning mathematics. This is in line with the research of Retnowati et al. (2018), which states that the application of problem-solving methods can significantly improve mathematical problem-solving abilities, especially in understanding problems and planning solutions. Based on the description put forward, this study aims to apply the mathematical task-based PBL model to the everyday mathematics learning process in an effort to foster students' problem-solving abilities.

Methods

Based on the research objectives that have been formulated, this research method uses a type of research design method. The stages in this study used the stages of Gravemeijer and Cobb (2006), namely: providing mathematical task-based HLT PBL interventions (preliminary design), b) mathematical task activities (experiment), and c) documentation (retrospective analysis). The focus of this research is the ability of elementary school students to solve mathematical problems when presenting data. The sample in this study was 28 grade V elementary school students at SDN Vidya Qasana Yogyakarta. The sample consisted of 16 female students and 12 male students, whose ages ranged from 9–10 years.

The flow of learning by providing HLT from PBL based on mathematical tasks to teachers who teach mathematics in that class. By using the PBL concept, namely problem- oriented learning, sharpened by the presence of mathematical tasks in the learning process, it is hoped that students will be able to develop mathematical problem-solving abilities, especially in data presentation material.

The implementation of HLT with PBL based on mathematical tasks is carried out in the classroom with three times of offline learning. Students who follow this study include as many as 28 students. Before the HLT was given, the learning process with PBL designed by the teacher only started by giving contextual problems to students as an initial problem orientation. Students were asked their weight without going through the measurement process. So that students can only guess the size of their weight, so that the context of the student's answer is not right. The following is an example of students' initial orientation activities on data presentation problems.

Specifically, the following is presented in Table 1. Learning steps with mathematical task-based PBL models.

Table 1
Syntax of Mathematical Task-Based PBL Learning

Teacher Activity	Student Activity
Phase 1: Orientation of student to problems	
a. The teacher starts learning with apperception activities and provides motivation, conveying learning objectives and problem-solving skills that will be developed. b. The teacher makes a formulation of the question (the first step of the mathematical task).	a. Students remember previous related material, listen to the teacher's motivation, and understand the learning objectives conveyed by the teacher and the problem-solving skills needed. b. Students explain the existing problem. c. Students formulate one or more questions that can be answered with data.
Phase 2: Organizing students for learning	
a. The teacher divides students into groups with various abilities (4-5 students). b. The teacher distributes worksheets consisting of mathematical tasks to be worked on by students in groups in collaboration. c. In the group, there is a data collection process (the teacher instructs students to design a plan and use the plan).	a. Students gather in groups as distributed by the teacher. b. Students work in groups to complete the mathematical tasks that have been distributed. c. Students design a plan to collect appropriate data. Students use plans to collect data.
Phase 3: Guiding individual as well as group investigations	
a. The teacher guides students in completing the mathematical task process and the process of analyzing data. b. The teacher guides students in groups to analyze the data.	a. Students understand the problem by identifying what is known and unknown from the given mathematical task. b. Students choose the appropriate mathematical formulas or concepts (appropriate graphical or numerical methods). c. Students in groups apply the concept to complete the given mathematical task.
Phase 4: Develop and present the work	
a. The teacher guides students in groups to interpret the results (the interpretation of the analysis of the answers and the relationship between the interpretation and the initial question). b. The teacher guides students to present their answers to other groups in front of the class.	a. Students in groups interpret the results of their analysis. b. Students in groups connect and interpret the initial question. c. Students prepare answers on the sheets that have been provided and present them in front of the class, and they provide colleagues to ask questions or provide input.
Phase 5: Analyze and evaluate the process	
a. The teacher guides students to evaluate the process and achievement of their problem-solving abilities. b. The teacher gives individual assignments that are done by each student.	a. Students evaluate the processes and achievements of their problem-solving abilities. b. Students work on mathematical tasks individually outside of school hours.

Results and Discussion

Results

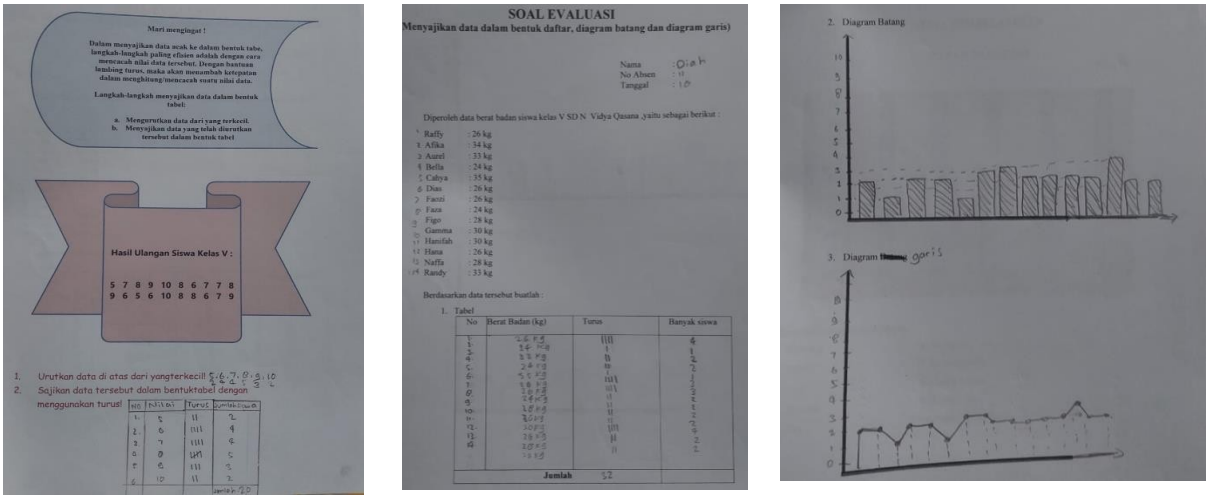
The results of research using the PBL model based on mathematical tasks found or identified that students' thinking processes about problem-solving abilities were still not optimal. This is because students are not familiar with problem-based questions (open- ended), and at the beginning of learning (the first meeting), the teacher has not carried out learning according to the lesson plan.

The research continued to the second and third meetings by conducting instructional interventions with the teacher in the HLT that had been made before. The teacher starts with apperception first by linking the previous material, and in this case, it can be seen that students are trying to remember the previous material by answering trigger questions from the teacher.

Furthermore, students work in groups that have been randomly divided by the teacher. Students and their groups begin to understand the problem by identifying what is known and unknown from the mathematical task given and choosing the appropriate mathematical formula or concept (appropriate graphical or numerical method).

From the activities of students in groups while working on worksheets, the results of student work were varied and in accordance with their problem-solving abilities. Of the four indicators of problem-solving ability, most are only able to understand the problem and plan a solution. For the third and fourth indicators, namely carrying out settlements and evaluating results, only two groups were able to complete them well. The following is a comparison of student group answers.

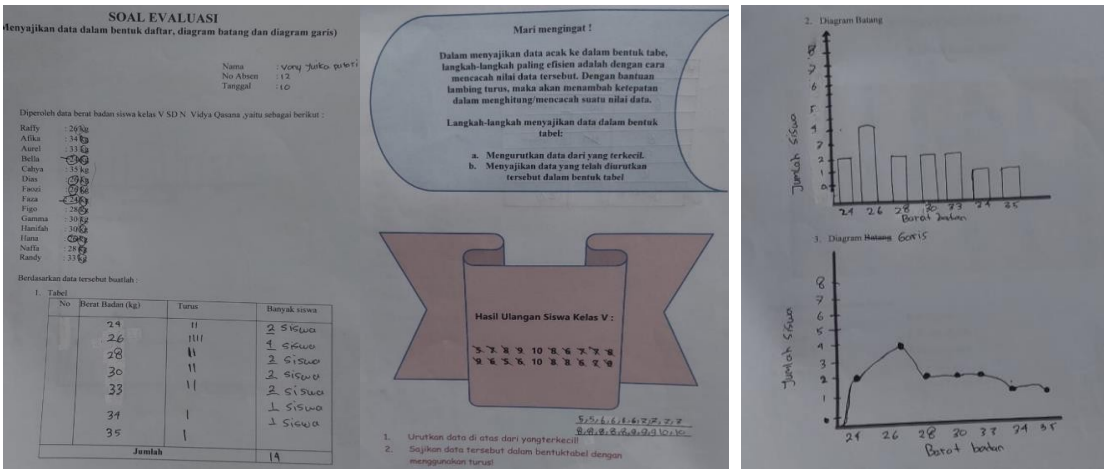
Figure 1
Group 1 Student Answers



From Figure 1, it can be seen that students in this group understand the questions but have not been able to complete the answers correctly (the process of applying and evaluating answers is not carried out properly). Subsequent analysis of student answers in groups indicated that students did not understand the intent of the questions given but were able to plan the presentation of the data in a proper manner. The next result is that students in groups

are able to use the concepts of bar and line charts but are not precise in applying them. However, different results were shown in other groups that did very well in the LKS. The following is a presentation of the results of the student answers in Figure 2.

Figure 2
Results of Group 2 Student Answers



From Figure 2, it can be seen that students in this group understand the questions well and are able to plan to implement a settlement plan. Subsequent analysis of student answers in groups indicated that students understood the intent of the questions and were well able to plan the completion of presenting the data in a proper manner. The next result is that students in groups are able to use the concepts of bar and line charts and correctly apply them.

In general, there are not many groups that are able to solve problems according to the problem-solving ability indicators (Park & Seo, 2013). However, this is a new experience for them in solving unusual problems. The learning process is interpreted differently by students. In groups, they really carried out the stages of the learning activities well.

Discussion

Indicators of problem-solving abilities use the criteria from Polya (1981), including: a) understanding the problem; b) plan completion; c) carrying out the settlement; and d) evaluating the results. The problem-solving ability indicators developed for students have the same characteristics as the process of doing statistics, namely there are four criteria, namely:

a) Formulating a problem consisting of clarifying the existing problem and formulating one (or more) questions that can be answered with data; b) collecting data whose activities are in the form of designing a plan to collect appropriate data and using the plan to collect data; c) analyzing the data by choosing graphical and numerical methods that are appropriate to the problem and using these methods to analyze the data; d) interpreting the results in the form of analytical interpretation and connecting the interpretation with the initial question (Walle et al., 2009).
b) During the learning process, students face a challenge in working on worksheets as well as some experiences that help them deepen their understanding of the process of completing data presentation (statistics), statistical concepts needed to carry out investigations, or the context of their investigation in line with indicators of solving ability. Linking questions with the interpretation of the expected results, of course, will raise several investigative questions, and this is considered a challenge for students.

Conclusion

Based on the findings of the study, it can be concluded that the flow of students' thinking in the problem-solving process is related to students' problem-solving abilities. only able to reach stage 2 indicators of students' problem-solving abilities.

The group that was only in stage 2 of the initial indicators of problem-solving ability understood the questions but had not been able to complete the answers correctly (the process of applying and evaluating answers was not carried out properly). Subsequent analysis of student answers in groups indicated that students did not understand the intent of the questions given but were able to plan the presentation of the data in a proper manner. The next result is that students in groups are able to use the concepts of bar and line charts but are not precise in applying them.

Unlike the group with the highest fulfillment of problem-solving ability indicators, this group understands the questions well and is able to plan to implement a settlement plan. Subsequent analysis of student answers in groups indicated that students understood the intent of the questions and were well able to plan the completion of presenting the data in a proper manner. The next result is that students in groups are able to use the concepts of bar and line charts and correctly apply them.

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A Bibliometric Analysis of Equating Research: Unveiling Trends, Collaborations, and Influential Works

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Abstract

Equating in standardized testing is crucial for ensuring equitable outcomes for test-takers across different test versions, enabling accurate decision-making based on test scores. This study evaluates scientific publications on equating using bibliometric methods. This analysis will examine the research ecosystem, international and institutional collaborations, trending topics and their temporal evolution, characteristics of impactful research, and the latest emerging theme in the equating literature. Data was selected using the Scopus database, and 327 relevant papers were identified using a methodical screening process. The comprehensive bibliometric analyses employed the Biblioshiny and VOSviewer tools. The results indicated a strong research environment, with the United States and Turkey as the main contributors. The research identified collaboration networks and key institutions, highlighting the importance of international cooperation. The study identified common topics such as item response theory, simulation studies, and population invariance. The analysis identified thematic clusters related to methodological intricacies, accuracy evaluation, and equating method development. The distinguishing features of highly cited papers were their meticulous evaluation of equating methods, incorporation of item response theory, and creation of proper equating instruments. Future research must focus on fostering international collaborations, promoting interdisciplinary perspectives, and employing advanced statistical tools and computational resources to improve current equating techniques, develop innovative approaches, and address new challenges in the field of equating.

Keywords: bibliometric analysis, biblioshiny, equating, testing, VOSviewer

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Introduction

The advancement of measurement and assessment necessitates a heightened focus on ensuring score equivalence across various tests. In educational contexts, instances often occur where students undertake different assessments, varying in both content and timing of administration. Equating in standardized testing is essential for ensuring equitable outcomes for all examinees, irrespective of the test version (Andersson et al., 2013). Fairness and equity in assessment enable informed decision-making based on test scores (Jurich et al., 2012). Test scores frequently serve as the foundation for significant decisions, including college admissions, scholarship allocations, and educational placements. Accurate and equitable score distributions are essential to ensure fair and unbiased decision-making. Establishing equivalence among measurement instruments is essential for making informed decisions regarding equating the resulting scores (Dowling et al., 2020). In the absence of equivalence among the measured constructs, score equating becomes invalid, potentially resulting in erroneous inferences and decisions.

Equating comprises a set of statistical methodologies employed to render test scores similar across various test versions, ensuring the interchangeability of scores among these forms. This technique tackles the intrinsic discrepancies in test forms resulting from variances in administration conditions and the infeasibility of producing similar forms (de Ayala, 2022). Despite optimal efforts, test forms will inherently differ in difficulty owing to factors such as diverse item qualities, test delivery protocol variances, and overall test design discrepancies. Equating enables the comparison of people's performances across diverse test forms by standardizing person location estimations on distinct measures to a standard metric. Classical equating methods, like equipercentile and linear equating, entail aligning percentile ranks or results across assessments. These strategies seek to provide a concordance table or a linear transformation that facilitates the conversion of scores across different test forms.

The equating process generally entails administering tests to randomly equivalent groups to account for variations in difficulty across different forms, thus facilitating equitable comparisons and informed decision-making based on the resulting scores (González & Wiberg, 2017; Hambleton et al., 1991; Kolen & Brennan, 2004). Utilizing homogenate groups allows for the attribution of observed performance differences to variations in test difficulty rather than to disparities in the ability levels of test-takers. The random equivalent group design is essential in equating studies, as it ensures the validity and fairness of the equating process.

A variety of studies have concentrated on equating, addressing both the development of equating theory and its application in specific fields (Cardwell et al., 2024; Halpin, 2024; Harris, 2024; Kara et al., 2024; Purnama et al., 2024; Sun & Kim, 2024). This body of research has examined multiple facets of equating, including novel equating methodologies, their applications across diverse assessment contexts (e.g., educational, psychological, medical), and analyses of the consequences of violating equating assumptions. Despite extensive research, a comprehensive review assessing the extent and depth of the scientific community's exploration of equating as a topic is absent. A bibliometric analysis may yield insights into the current status of equating research, highlight gaps and areas requiring further investigation, and inform future research directions.

A bibliometric study employs statistical and mathematical methods to assess research trends by evaluating scientific publications within a designated database (Oluwadele et al., 2023). Bibliometric analysis effectively visualizes research trends, analyzes keywords, examines

collaborations, and provides recommendations for future research (Büyükkidik, 2022). Quantitative analysis of publication data in bibliometric studies uncovers patterns and trends often not evident in conventional literature reviews. Bibliometric analysis yields significant insights for this field's scientific community and researchers. The findings assess existing research and offer insights and recommendations for future research directions, potentially directing researchers toward understudied areas or emerging topics of interest.

This research aims to evaluate scientific publications on the topic of equating through bibliometric methods, addressing the existing gap in the literature. This study will examine the stability of the research ecosystem and researchers in this area, the collaborations between countries and institutions, the evolution of topic trends over time, and a detailed analysis of the most prominent topics. This study examines the research ecosystem and collaborations to elucidate the dynamics of equating research and identify opportunities for enhancing collaboration and knowledge sharing. Examining prevalent subjects and trends in topics aids in recognizing areas of considerable focus alongside emerging or less-explored domains that may require additional research. Analyzing trending topics provides a nuanced understanding of the current research landscape, identifies potential gaps or limitations, and outlines future research directions.

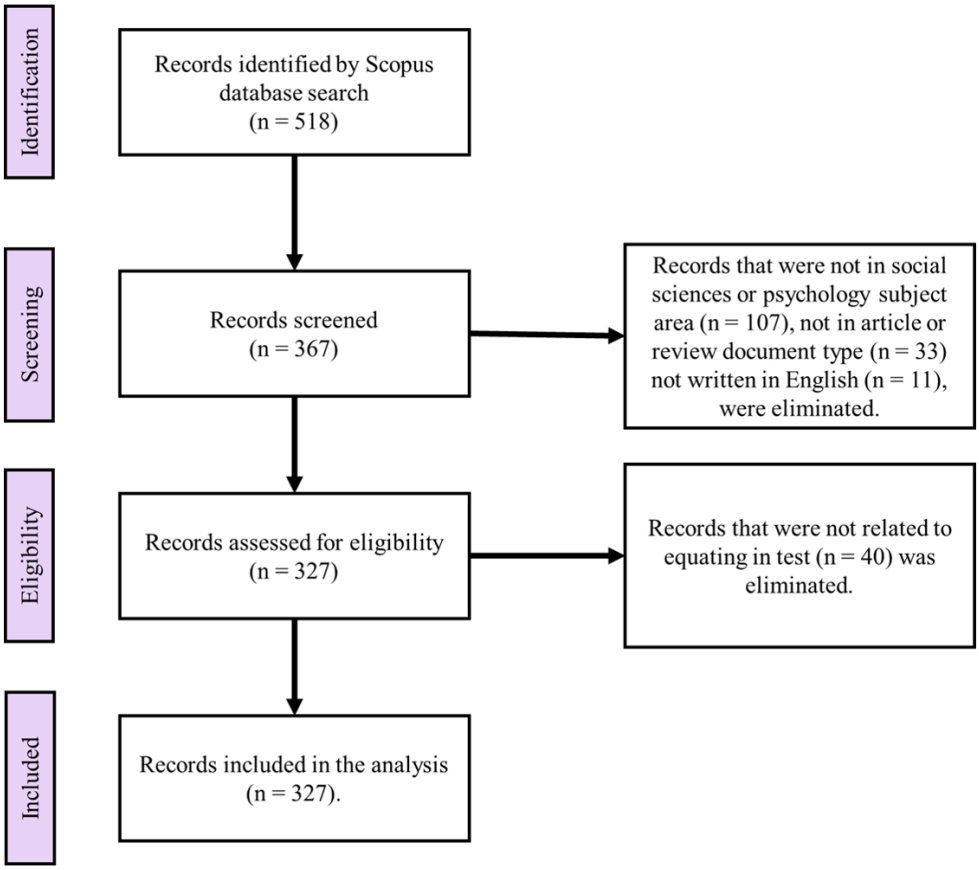
The results of this bibliometric study are anticipated to assist those exploring equating by emphasizing areas that require enhancement or further development based on current scientific literature. This study offers a detailed overview of the equating research landscape, enabling individuals to pinpoint promising avenues for further exploration and potential pitfalls or areas that may have been overlooked or underexplored. The bibliometric analysis is a significant asset for the equating research community, enhancing knowledge, and formulating more effective and fair assessment practice.

Methodology

Data Selection

The Scopus database was selected due to its extensive coverage of diverse academic disciplines, facilitating a thorough search for pertinent publications on equating. The inclusion of high-quality peer-reviewed articles in Scopus enhances the reliability and validity of the publications presented. The impact analysis tools, including citations and h-index, offer essential metrics for evaluating the influence and significance of publications in the field. The interface of Scopus enabled efficient searching, allowing researchers to refine their queries through logical operators and keywords to identify relevant studies. Following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework (Page et al., 2021) promotes transparency and reproducibility in the literature search and selection process. The framework offers guidelines for systematic reviews and meta-analyses, outlining a structured method for identifying, screening, and selecting pertinent studies. Adhering to the PRISMA framework, the researchers implemented a systematic methodology, enhancing the study's credibility and replicability.

Figure 1
Selection of the Publications Included in the Research by PRISMA Method



The search strategy was meticulously crafted to obtain the most pertinent publications on equating. Including "Equating" in the search criteria effectively narrowed the initial search results to the relevant topic. The researchers acknowledged the necessity for additional screening and refinement to confirm that the selected publications were directly pertinent to equating in the testing context. The screening process comprised several stages aimed at the elimination of irrelevant records. Initially, records outside the social sciences or psychology domains were excluded, as equating is predominantly examined and utilized within these disciplines. Subsequently, records that were neither articles nor reviews were excluded, as these document types are generally peer-reviewed and offer the most thorough and dependable information. Records not written in English were excluded because English is the predominant language for academic publications in this field. The eligibility evaluation confirmed the relevance of the included publications. Studies that did not directly pertain to equating in testing were excluded, as the research concentrated on applying equating within the context of testing and assessment. The screening process included 327 relevant publications, establishing a solid foundation for the bibliometric analysis.

Analysis of Data

Data analysis was conducted using two robust software tools: Biblioshiny and VOSviewer. Biblioshiny, a web-based application in the bibliometric package in R, allows researchers to perform extensive bibliometric analyses and produce informative outputs, including keyword analyses, authorship analyses, and document analyses (Aria & Cuccurullo, 2017). The outputs yielded significant insights into the bibliometric characteristics of the selected publications,

facilitating a comprehensive analysis of co-citation networks, collaboration patterns, and co-word analyses. VOSviewer demonstrated superior capability in the construction of bibliometric maps. The visualizations enabled the analysis of topics associated with specific keywords and the mapping of keyword co-occurrences, yielding insightful representations of relationships and patterns within the data (van Eck & Waltman, 2010). Integrating Biblioshiny and VOSviewer allowed researchers to perform thorough citation, distribution, and text analyses on the chosen publications, closely aligned with the study's research questions.

Results

General Overview

Figure 2 presents the primary data extracted from the database and subsequently entered into the bibliometric software.

Figure 2
Main Information

Figure 3 depicts the temporal trend of scientific output from 1934 to 2024. The highest output occurred in 2008, with approximately 32 publications, marking a significant peak within the analyzed timeframe. The 2024 data indicates a decline, likely due to the mid-year timing of data collection, as publications typically accumulate toward the year's end. Thus, an increase is anticipated in the second half of 2024.

Figure 3
Annual Scientific Production

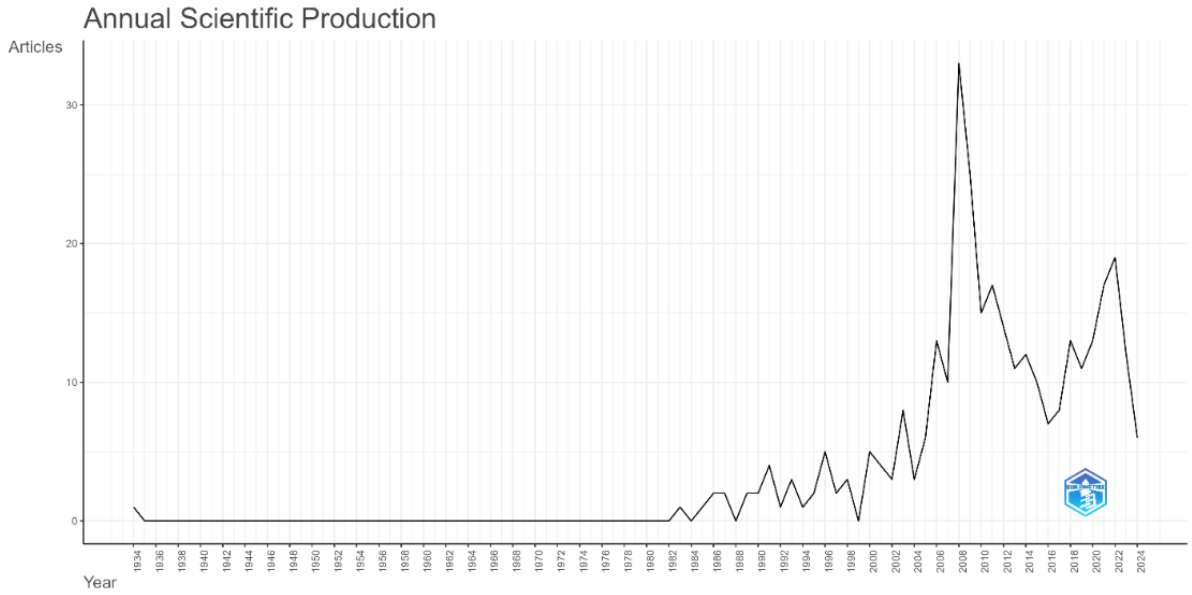


Table 1 summarizes the primary sources, institutions, and countries that significantly contribute to research in this field. The table presents prominent journals commonly referenced in the field, leading academic and research institutions, and the countries with the highest research output.

Table 1
Leading Sources, Affiliations, and Contributing Countries in the Field

Category	Name
Most influential journals	ETS Research Report Series, Applied Psychological Measurement, Educational and Psychological Measurement, Psychometrika, Journal of Educational and Behavioral Statistics, Educational Measurement Issues and Practice, International Journal of Testing, Frontiers in Psychology, Measurement, Journal of Measurement and Evaluation in Education
Top contributing institutions	University of Iowa, Umea University, University of California, University of Minho, University of Washington, South China Normal University, American Institutes for Research, Hacettepe University, University of Twente
Most cited countries	USA, Georgia, Netherlands, Australia, Japan, Germany, Sweden, China, Italy, Spain

Collaboration Between Countries and Institutions

Figure 4 depicts the distribution of the countries of origin for the authors. Authors from the United States demonstrate a significant advantage, as Multiple Country Publications (MCP) prevail over other nations. The other countries are identified as single-country publications, suggesting the presence of emerging or nascent equating research programs within their national contexts.

Figure 4
Corresponding Author's Countries

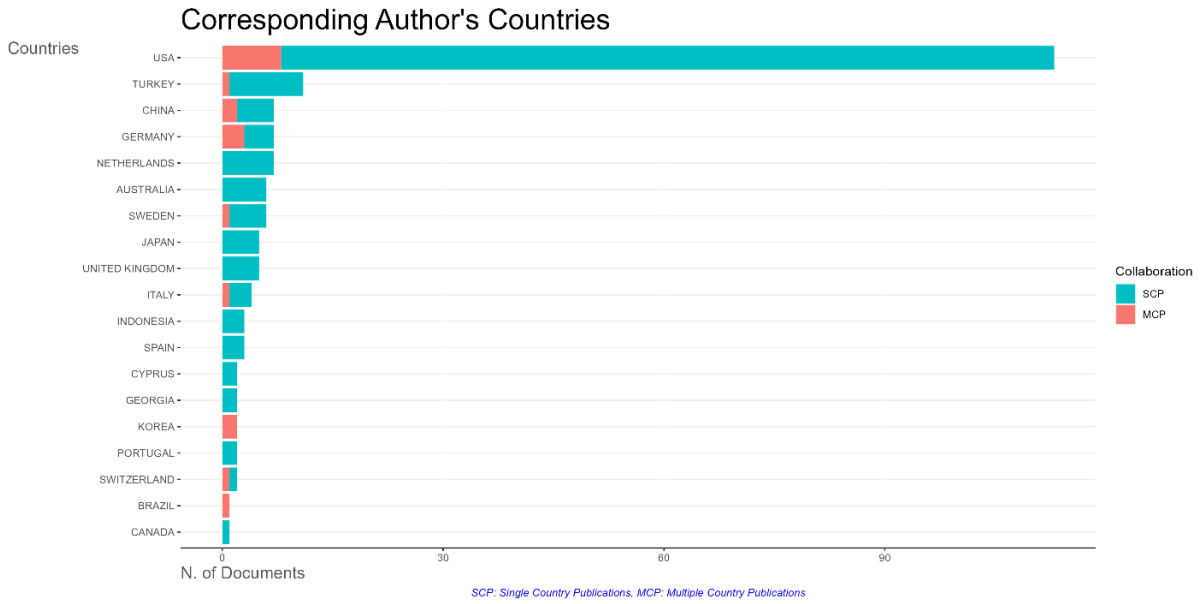
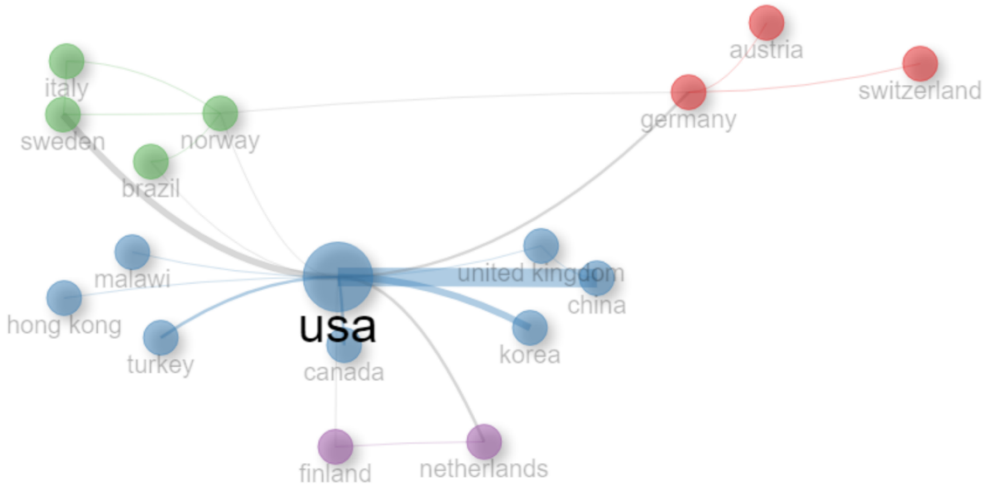


Figure 5 shows the international collaboration network among countries, identifying four distinct clusters. These clusters signify research collaborations that extend beyond national borders, facilitating the exchange of knowledge, expertise, and perspectives.

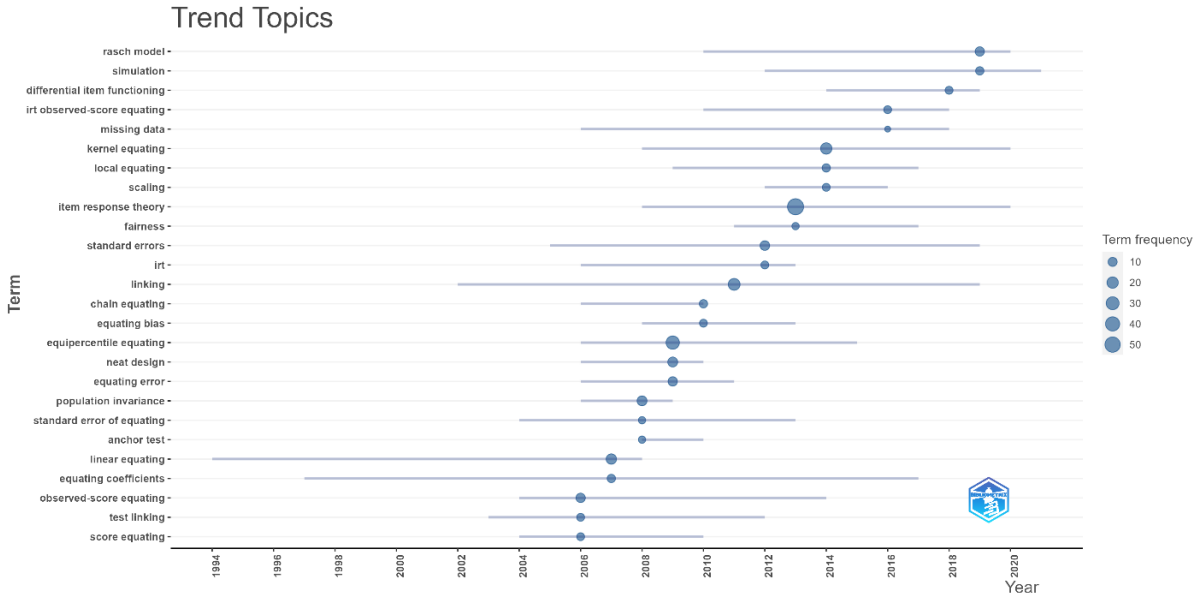
Figure 5
Collaboration Network for Authors Based on Countries



Most Frequent Words and Emerging Themes

The data presented in Figure 6 illustrates emerging research themes from 1994 to 2020, offering insights into the changing research landscape over this period. Item response theory, a significant statistical framework for analyzing and equating test scores, emerged around 2008 and remained a central focus until 2020. This temporal pattern indicates a continued focus on utilizing item response theory methodologies in equating research throughout this timeframe. The primary themes examined during this period focused on linear equating methods and estimating equating coefficients.

Figure 6
Trend Topics



VOSviewer Analysis Findings

The analysis performed with VOSviewer software identified seven distinct clusters (refer to Table 2), illustrating thematic groupings and interconnections within the field of equating research. The results present a network visualization that clarifies the relationships among different concepts and themes, facilitating the identification of central topics and their related peripheral themes. Figure 7 illustrates that equating, as a central theme, is linked to various related concepts and methodologies.

Figure 7
Network Visualization

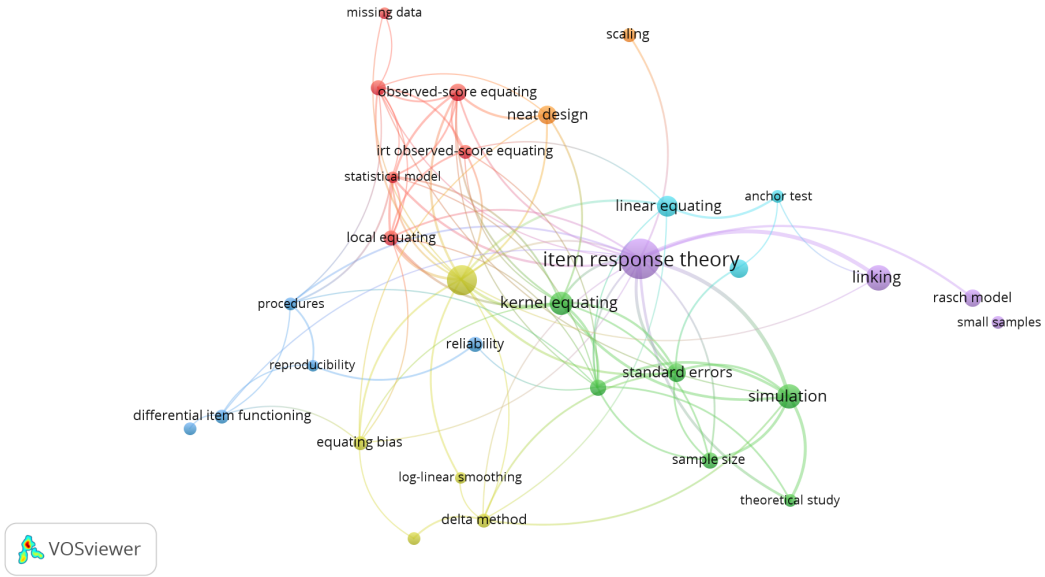


Table 2
Seven Clusters Formed in Equating Published Research

Number of clusters	Keywords	Cluster name
1	Chain equating; irt; local equating; missing data; observed-score equating; statistical model	Test score equating methodologies and associated complexities
2	Controlled study; kernel equating; sample size; simulation; standard errors; theoretical study	Accuracy and precision of score equating techniques
3	Differential item functioning; fairness; procedures; reliability; reproducibility	Issues in test score equating
4	Delta method; equating bias; equipercentile equating; log-linear smoothing; tucker equating	Development, evaluation, and comparison of equating methods
5	Item response theory; linking; rasch model; small samples	Applied IRT and Rasch models for equating and linking test scores
6	Anchor test; linear equating; population invariance	Population invariance in test score equating using anchor tests and linear equating
7	Neat design; scaling	Equating methods and evaluation within the NEAT design

Discussion

Overview of the Equating Research Ecosystem

The initial discussion examines the established environment within this research domain, analyzing its strengths and weaknesses. Several significant strengths are evident. Research in this domain has progressed for 90 years, demonstrating that scientific advancement in equating has been significantly developed. This longevity indicates a well-established and mature discipline characterized by a robust foundation of knowledge and theoretical advancements. The many sources (54) in Scopus dedicated to this topic underscore its significance and relevance in facilitating equivalence across diverse disciplines within the scientific community. The two strengths indicate a strong interest and commitment within the scientific community to advance knowledge in equating. The significant demand from various journals underscores the necessity of advancing and enhancing equating methods, techniques, and applications. The enduring nature of research in this area indicates that equating will continue to evolve and remain relevant in the scientific community, as it is essential for ensuring fair and accurate comparisons of test scores across various forms and contexts.

However, despite these strengths, specific weaknesses associated with the research environment in this area have been identified. A significant limitation is the comparatively low annual growth rate of publications, indicating that the rate of new research contributions in this field may not align with the demand for knowledge advancement. The low levels of international co-authorship raise concerns regarding the extent of global collaboration and knowledge sharing within the equating research community. A further weakness identified is the low average document rate, which may indicate challenges or barriers preventing researchers from actively contributing to this field. The weaknesses may be attributed to the inherent characteristics of equating research.

Equating research necessitates significant resources, including access to extensive testing data, specialized statistical analysis software, and a robust understanding of advanced psychometric and statistical methods. The analyses required for equating are complex, involving sophisticated statistical methods and stringent assumptions that must be satisfied. The factors may contribute to the perceived inaccessibility or lower popularity of equating research relative to other topics in measurement and psychometrics. Moreover, equating is generally a specialized domain within these fields, and researchers often do not engage with equating until they have developed a solid understanding of other pertinent areas, such as item response theory or classical test theory. This prerequisite knowledge poses a barrier, especially for early-career researchers, who focus on foundational topics before engaging with the complexities of equating. The growing dependence on standardized assessments for competency evaluation, both nationally and internationally, has introduced new challenges related to the fairness and accuracy of these tests. These challenges and their social implications have led to increased research on improving fair assessments. The study addresses enhancements in test construction processes and advancements in the associated statistical methodologies (von Davier et al., 2006).

Despite these limitations, the analysis indicates favorable trends in growth and opportunities for additional development. Beginning in 2006, the annual increase in publications showed significant improvement, exceeding 10 documents published annually. The most significant increase occurred in 2008, marked by a threefold rise in publications relative to the preceding year. The increase in research activity can be attributed to several factors, including introducing new equating methods, advancements in statistical techniques, and a heightened recognition of equating in high-stakes testing contexts.

The program is significant that following the peak in 2008, the number of publications experienced a consistent decline over the subsequent eight years. As of 2024, the publication output in this field remains below the record established in 2008. The observation prompts inquiries regarding the sustainability of research initiatives and the possible obstacles that may have impeded further development during this timeframe. In order to mitigate these weaknesses and enhance the research ecosystem in equating, researchers, academic institutions, and funding agencies need to identify and address the fundamental causes collaboratively. The following may include efforts to enhance resource accessibility, foster international collaborations, and offer training and support for early-career researchers engaged in equating research. Furthermore, initiatives to increase awareness of the significance of equating and its applications across diverse domains, including education, psychology, and high-stakes testing, may foster heightened interest and motivate additional researchers to engage in this study area.

The primary sources contributing to research on this topic are the ETS (Educational Testing Service) research report series and the journal Applied Psychological Measurement. These two sources significantly surpass others in publication output, demonstrating their commitment to the equating topic and positioning them as leaders in this field. The ETS research report series is a reputable and significant educational measurement and assessment publication. As a prominent entity in standardized test development and administration, ETS is committed to enhancing equating methods to guarantee fair and precise score comparisons across various test forms and administrations. The ETS research report series significantly equates research, underscoring the strong link between this area and its practical applications in large-scale testing programs. The equating methods and techniques explored in this series are expected to have significant implications for operational processes and decision-making at ETS and similar testing organizations.

Applied Psychological Measurement is a peer-reviewed journal that addresses various topics concerning measurement and assessment within psychology and related disciplines. The significant role of equating research highlights its importance in psychological testing and measurement. Psychological assessments frequently require various test forms or versions, which may be necessary for test development, accommodating specific populations, or addressing practical limitations. In these scenarios, equating is essential for ensuring that scores from various test forms are comparable and can be consistently interpreted across individuals and groups.

Given the prominence of these two sources, researchers might consider submitting their articles to the ETS research report series or Applied Psychological Measurement for equating research. These outlets serve as platforms for disseminating findings and enhancing the visibility and impact of work within relevant research communities. The analysis identifies that the primary sources focus on measurement and psychology, which aligns with equating strong connections to psychometrics, the discipline concerned with the theory and methods of psychological and educational measurement. Equating methods and principles are fundamentally grounded in psychometric theory and are extensively utilized in educational and psychological testing contexts, where the assurance of fair and accurate score comparisons is critically important.

Collaboration Between Countries and Institutions

The discourse on international and institutional collaboration in research offers significant insights into the landscape and identifies potential avenues for enhancement and development. The analysis indicates that certain countries continue to produce single-country publications (SCP), with research confined to their national borders. While adequate in the initial phases of equating research, this approach is now insufficient due to the growing complexity and global scope of assessment practices, necessitating a more collaborative and interconnected methodology.

Countries designated as SCP must acknowledge the significance of transitioning to multiple country publications (MCP), which entail collaborations with researchers from various nations. International collaborations provide numerous advantages. Collaboration among researchers from various countries facilitates exposure to diverse perspectives, methodologies, and approaches to equating, enhancing understanding, and potentially fostering innovative solutions. Equating research tends to depend on extensive testing data and particular assessment contexts. International collaborations enhance access to diverse data sources and testing scenarios, improving research findings' generalizability and applicability. Collaborations can effectively address resource gaps by allowing researchers from various countries to combine their expertise, infrastructure, and funding opportunities, promoting capacity building and facilitating more ambitious research initiatives. Methods and practices for equating may require adaptation or validation in various cultural and linguistic contexts. International collaborations offer significant insights into equating methodologies' cross-cultural applicability and robustness.

The analysis underscores the leadership and influence of the United States in standardizing research; however, it is crucial to recognize that a diverse and inclusive research ecosystem enhances the field. Facilitating collaborations among researchers from diverse countries, especially those with emerging equating research traditions, can enhance global knowledge advancement and ensure the relevance and applicability of equating practices across different

contexts. The designation of the University of Iowa, Umeå University, and the University of California as prominent institutions in research equivalence underscores the aggregation of expertise and resources within academic centers. Promoting collaborations between established institutions and other research groups, both domestically and internationally, is essential.

The emergence of seven distinct clusters of inter-institutional collaborations suggests that researchers from various institutions actively participate in collaborative endeavors. Researchers in these clusters should pursue collaborations with those from other clusters. Cross-cluster collaborations facilitate the exchange of diverse perspectives, methodologies, and expertise, potentially resulting in more comprehensive and innovative solutions in equating research.

Collaboration is essential for researchers and institutions in the nascent stages of research or those without established traditions in this domain. Collaborating with seasoned researchers and institutions offers significant mentorship, facilitates knowledge transfer, and creates opportunities for capacity enhancement. Collaborations can effectively address resource limitations and enhance access to specialized software, data sources, and infrastructure necessary for conducting research equivalently. The rapid global expansion of academic research, through multiple nations transforming into significant contributors, necessitates the proactive development of collaboration networks to match this growth. The rapidly evolving academic landscape suggests a reactive approach to developing collaborations may be inadequate. A proactive strategy that cultivates connections with rapidly advancing research communities is essential for effectively managing and adapting to these changes (Pohl, 2020).

Trend Transitions Over Time

The evolution of trending topics over time underscores the development of the field and its capacity to respond to emerging challenges and complexities. The emphasis on foundational theories and basic concepts established a basis for later developments, while the investigation of linear equating, anchor tests, and error analysis illustrated the field's adaptability to practical needs and the demand for more reliable and precise methodologies. The development of non-equivalent anchor test (NEAT) designs and equipercentile equating demonstrates the field's capacity to accommodate various testing contexts and adjust to the distinct features of different assessment programs. These developments indicate that equating methods should be adaptable and context-specific rather than adhering to a uniform approach. Incorporating item response theory (IRT) and the Rasch model into equating research exemplifies the exchange of concepts and the impact of adjacent disciplines on equating methodologies. IRT offers a robust framework for modeling item-level data and estimating latent traits, facilitating the equating of score distributions and considering item characteristics in the equating process.

Research Themes in Equating Studies

The VOSviewer analysis of keyword co-occurrences revealed seven thematic clusters within equating research. The initial cluster relates to methodologies for equating test scores and their complexities. This cluster of studies critically analyzes and compares various linking techniques, including equipercentile equating, IRT true-score equating, IRT observed-score equating, and kernel equating, to determine the most appropriate methods for tackling the complex challenges associated with equating. Additionally, assumptions, biases, population invariance, standard error estimation, and other issues are examined to comprehend better the complexities involved in the equating process and formulate more effective solutions.

The second cluster examines the accuracy and precision of score-equating techniques. Comparisons involve examining factors including sample size, test length, score distribution, and the equating design utilized. The influence of varying testing conditions on the performance of equating methods necessitates careful selection to ensure accuracy and efficiency in results.

The third cluster examines test score equating issues, including the effects of differential item functioning (DIF), the selection of anchor tests, equating under conditions of unequal reliability, and evaluating score equity. Identifying potentially biased items is essential for maintaining fairness in measurement. The appropriate selection of anchor tests is a critical factor that influences the overall accuracy of the equating process. Population invariance analysis, along with the consideration of unequal reliability, facilitates the assessment of score consistency and equity among varied populations.

The fourth cluster focuses on developing, evaluating, and comparing equating methods, including equal percentile equating, Tucker equating log-linear smoothing, and the delta method approach. The delta method is employed to derive standard error estimates in equating methods. Furthermore, bias across various methods is compared under distinct conditions and designs. Chained equal percentile equating and its integration with log-linear smoothing are also analyzed. Log-linear smoothing is utilized to refine score distributions, thus improving the precision of techniques such as equal percentile equating. The findings of this cluster offer significant insights into the strengths, weaknesses, and optimization of different equating methods.

The fifth cluster utilized Item Response Theory (IRT) and Rasch models for equating and linking test scores, especially in small sample sizes. IRT and Rasch enable the equating process by connecting scores from various test forms to a unified scale. In small sample contexts, bootstrapping and Bayesian methods enhance the precision of parameter inferences, thus improving the reliability of equating and linking processes.

The sixth cluster examines population invariance in test scores equating through anchor tests and linear equating, particularly within the non-equivalent groups with anchor test (NEAT) design. This research cluster assesses the invariance of the resulting equating function across various populations. The findings guide selecting suitable anchor tests and equating methods to guarantee fair and equitable score interpretation among different populations.

The seventh cluster focuses on aligning methods and evaluations within the NEAT design, wherein scores from two non-equivalent groups of test-takers are connected through a shared set of anchor items. The study examines aspects including appropriate anchor test selection, the influence of anchor length, various scaling and equating methods, and bias and error. This cluster's findings enhance the accuracy and reliability of the equating process in large-scale testing contexts, including national achievement tests and professional certification examinations.

Conclusion

The analysis of equating research reveals a well-established and significant field marked by ongoing scientific inquiry over several decades. The essential function of equating in facilitating fair and accurate score comparisons across various testing contexts has led to the

development of methodologies, including advancements in item response theory, simulation studies, and population invariance evaluation. Identifying significant contributors, key publications, and thematic clusters emphasizes the field's complexity and scope while indicating potential areas for further development and collaboration. Equating is vital to high-stakes assessments in education, psychology, and other fields. Ongoing research is essential to enhance current methodologies, create innovative strategies, and tackle new challenges. International collaborations, interdisciplinary perspectives, advanced statistical tools, and computational resources can enhance the equating research community's role in valid and equitable measurement practices, benefiting stakeholders and decision-makers across multiple sectors.

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Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

The author utilized OpenAI’s ChatGPT to refine the language, improve clarity, and enhance the academic tone of the manuscript. The AI tool was utilized mainly for linguistic improvement and did not play a role in creating original content, data analysis, or result interpretation. The author independently conducted all intellectual input and critical analysis.

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A Study on the Integration of Chinese Culture Into College English Teaching

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Abstract

China's strengthening of cultural soft power is mainly to promote international communication and cooperation with various countries. Since college English is a compulsory course for non-English majors at most colleges in China, it plays an irreplaceable role in higher education and holds a high position in supporting cross cultural dissemination and promoting cultural soft power. For a long period of time, traditional English teaching in China has been focused more on the cultural values of English-speaking countries, while neglecting the contributions and influence of Chinese local culture. Apparently, this teaching strategy has biases, and limits students' ability to effectively introduce Chinese culture on the international stage. To make students more culturally competent, it is particularly crucial for cultivating learners with a global perspective and cross-cultural communication skills in college English teaching. This, in turn, is conducive to further deepening the teaching reform. Based on an online survey of 137 first year non-English majored students, having finished studying Chinese culture in college English, this research attempts to explore their perceptions of the integration of Chinese culture into college English teaching, in terms of five cultural parts namely Philosophy, Literature, Customs, Tourist Attractions, and Curriculum Ideological and Political Construction. Findings show that students' interest and levels of mastery of the five parts are diverse, creating certain barriers to teaching. Through analysis and discussion, this paper proposes some effective teaching methods and strategies in the integration of Chinese culture into teaching process to meet the national educational requirements of the new era.

Keywords: college English teaching, soft power, China's cultural soft power, culture integration

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Introduction

Language is a symbol and embodiment of culture, as well as an effective measure to construct cultural soft power. Economic globalization and technological evolutions have closely connected people across boundaries and regions. English, the most widely used international language, is an important tool for global communication and cultural exchange. It is well known that any communication is two-way, and cultural exchange is no exception. As a matter of fact, cross-cultural communication is accomplished through a process of learning, experiencing, comparing, and discerning foreign cultures, based on a profound accumulation of local culture. For China, strengthening cultural soft power is decisive in achieving the Two Centenary Goals. Given these factors, the College English Teaching Guide (2023 Edition) has identified that one objective of learning and using English is to promote Chinese culture, facilitate extensive communication with people from other countries, and enhance national soft power.

The current situation in China is that college English textbooks are important resources for teachers to organize courses and implement teaching, and also the students' important English input for cultural learning, world outlook shaping, and channels of life values building. Nonetheless, there is a shortage of Chinese cultural elements in College English textbooks. Even if some colleges and universities considered teaching cultures of different countries in English elective courses, they mostly focused on the culture of Western countries, which prevented students from gaining the knowledge they need to present Chinese culture in English. As a consequence, Chinese culture has been ignored in English teaching. Most of the time, students have found themselves in an embarrassing situation of “cultural aphasia” while introducing and promoting Chinese culture, which has brought many negative impacts to cross-cultural communication. The direct negative consequence is that we may lose the opportunity to introduce China's excellent culture to the outside world. Even worse, it may result in some indirect, undesired outcomes. If we always cater blindly to foreign cultures, chances are that we will gradually lose our cultural awareness and confidence, which may evolve into a crisis of national cultural identity and lead to serious adverse consequences in terms of cultural soft power. Therefore, introducing and strengthening Chinese cultural education in College English teaching is not only a requirement for successful cross-cultural communication and facilitates the deepening of educational reform to improve teaching quality, but also a demand for the advancement of cultural soft power in the context of globalization.

Literature Review

Soft Power

The concept of soft power was coined by Joseph S. Nye, Jr (1990) in the book of Bound to Lead: the Changing Nature of American Power. Nye (2004, p. 84) referred “soft power” to mainly three aspects: culture (when it is pleasing to others), its values (when they are attractive and consistently practiced), and its policies (when they are seen as inclusive and legitimate), while culture is the most powerful among the three. Nye did not provide a clear, strict definition, nevertheless, what can be certain is that soft power differs from traditional “hard power” such as economic and military power, emphasizing more on persuading international audiences through cultural dissemination and political propaganda to align their beliefs and values more towards the country's policies, demonstrating the ability of persuasion, attraction, persuasiveness, cohesion, inspiration, charisma, assimilation, etc.

While history has proved that soft power has constantly been a prominent source of national influence, this global age has given the importance of soft power relative to hard power (Gallarotti, 2009). The world has become more networked, flexible, interconnected and even more complex, and it has become more difficult to influence the behavior or interests of other political entities by the use of hard power. Therefore, soft power is becoming a key element in terms of enhancing influence over international outcomes.

Cultural Soft Power

Cultural soft power is a comprehensive concept, intangible, stable, and immaterial. It refers to the attractiveness and influence of a country or region through cultural means (Liu, 2023). Nye's soft power can be applied to international strategy and diplomacy, though, China's emphasis on "cultural soft power" is not entirely consistent with Nye's theory of soft power. On the contrary, China's stress on "cultural soft power" mainly enhances and develops its construction of spiritual civilization and ideological construction, as well as promotes international communication and cooperation with various countries throughout the world (Zhang, 2017). It is aimed at achieving mutual understanding and common development with the rest communities of the world, instead of penetrating the thoughts of other countries' people with its own Chinese culture to gradually get rid of the confidence in other cultures. For China, cultural soft power contributes to introducing excellent Chinese culture to others, helping the world better understand China, building a better international environment, and reinforcing the building of a community with a shared future for mankind. Concerning higher education in China, the integration of Chinese culture into College English teaching may enhance teaching quality. Meanwhile, this teaching form is also more in line with the trend of the current global development, which aims to cultivate higher-quality English talents through high-quality English education as well as promote the development of cultural soft power.

Chinese Culture

Chinese culture is about the issue of national and ethnic identity that has not been self-evident for a long time (Chen & Song, 2020). Chinese culture is vast and profound, with a long and uninterrupted history. It is the only culture in the world that has continuously flourished and never been interrupted, contributing innumerable brilliant treasures to human civilization. Cui (2009) believes that Chinese culture mainly involves two aspects of content. One is the excellent traditional culture accumulated over thousands of years in China, including academic thoughts, religion, education, literature, art, science and technology, architecture, history, language, etc. The other is about the basic national conditions of China's current society. To cast light on relevant teaching strategies for teaching culture in college English, this study categorized culture into five aspects, Philosophy, Literature, Customs, Tourist Attractions, and Curriculum Ideological and Political Construction.

Data Collection

In order to deeply investigate college students' perceptions of the integration of Chinese culture into college English teaching, a survey questionnaire was delivered to 137 volunteers, who were non-English major first-year students after having been taught a certain amount of Chinese culture in college English for almost one term to ensure that they have enough information to make an informed choice. The questionnaire was created and distributed online via a Wechat mini program called WJX, a popular professional online platform for

conducting surveys. All participants were asked to complete the questionnaire during a 20-minute class break, and they were expected to express their real opinions towards each question. Three questions and corresponding options were offered in the questionnaire (Table 1). The respondents were required to choose at least one from the appropriate parameters, according to their previous personal learning
experience.

Table 1
Students' Perceptions About the Integration of Chinese Culture Into College English

Questions	Options	Students	Percentage
Which is /are your most favorite among the following five parts? (Multiple selections are allowed.)	Philosophy	39	28.47%
	Literature	76	55.47%
	Customs	89	64.96%
	Tourist Attractions	99	72.26%
	Ideological and Political Education	34	24.82%
Which part(s) do you find the most difficult to learn? (Multiple selections are allowed.)	Philosophy	109	79.56%
	Literature	61	44.53%
	Customs	44	32.12%
	Tourist Attractions	38	27.74%
	Ideological and Political Education	70	51.09%
Which part(s) do you find the most proficient in? (Multiple selections are allowed.)	Philosophy	19	13.87%
	Literature	48	35.04%
	Customs	42	30.66%
	Tourist Attractions	62	45.26%
	Ideological and Political Education	26	18.98%

Results and Discussions

From Table 1, it is apparent that the most popular part of cultural knowledge is about Tourist Attractions, where participants found it the easiest to learn as well. It is, therefore, suggested that Tourist Attractions serve as the most captivating teaching materials for introducing Chinese cultural knowledge in English to students, making their learning experience more enjoyable and confident. China, having abundant tourism resources, has countless scenic spots and historical sites for tourism. Up until now, the total number of scenic spots listed in the World Heritage List has reached 57, ranking first in the world. These world heritages are a microcosm of the country's cultural history, and each one is a gem. These are excellent materials that we can explore in the context of college English classroom teaching. What can be certain about using modern means to cleverly incorporate the cultural landscape, natural scenery, customs, and daily habits of world heritages into teaching sources is a topic worth teaching in college English. In addition, Customs can be one essential part penetrating into these teaching resources in terms of Tourist Attractions, since Customs is ranked the second attractive teaching source, though it is not simple to learn from students' perspectives. In the development of China's tourism industry, a tourism culture has gradually emerged. For foreign tourists, visiting China is an important way to understand the local customs and cultural traditions of China. Accordingly, to achieve effective cross-cultural communication,

it is important not only to introduce tourist attractions but also the local customs to incorporate the charm of Chinese culture into English.

In recent years, there has been a change in the overseas dissemination of Chinese literature from flat reading to three-dimensional appreciation, and the literary dissemination industry chain is full of vitality. For instance, Chinese genre fiction has gained wide popularity overseas. Genre fiction refers to works that use espionage, martial arts, science fiction, fantasy, and other themes, to satisfy readers' reading needs and bring them pleasure and solace. These novels have thrilling and fluctuating plots, making them easily accessible to readers, thus possessing unique advantages in overseas dissemination. Among them, the science-fiction novel “The Three-body Problem” by Liu Cixin, one of the most famous, won the 2015 Hugo Award for Best Novel, and Liu Cixin became the first Asian writer to win this award. Although Chinese literature has achieved gratifying results in its journey towards the world, there is still a long way to go, especially in the teaching of English in higher education. Chinese literature is still not common in English teaching materials at home. As it is shown in Table 1, learning literature is neither too difficult nor very easy for students. Even in terms of interest, it ranked third, placing it in a moderate position. Apart from the traditional way of explaining the masterpieces of Chinese literature by famous writers, literary education can be combined with social hot topics, cutting-edge academic discussions, and popular TV dramas to become an effective measure to better trigger students' interest, and even resonate powerfully with them. On top of that, teaching literature should not merely focus on the topic and vocabulary, but also on humanities and aesthetics.

In China, Chinese philosophy is a very practical discipline. Studying Chinese philosophy is a process of both exercising theoretical thinking and elevating the spiritual realm. For Chinese philosophy, knowledge is a way of life, and its philosophical principles are consistent with life. Teaching philosophy is recommended to pay great attention to introducing philosophers and their philosophical way of life. This will help students evoke a sense of familiarity, feel close to their own lives, and consciously apply philosophical principles in their daily practices. From Table 1, Philosophy is the most difficult yet not the most boring part in Chinese culture, which means the introduction of Chinese philosophy in college English to non-English majors is also a slow, gradual process that cannot be accomplished overnight. It is hereby suggested that philosophy teaching should start by presenting the main ideas of classic works of Chinese philosophy, such as Confucianism, Taoism, and Buddhism, as well as an interpretation of the ideas of Neo-Confucianism and the School of Mind. Philosophy teaching serves to provide a broader perspective on traditional Chinese philosophy and enables students to have a comprehensive and deeper understanding of traditional Chinese culture. The initiative of this section is to enable students to learn the basic concepts, categories, major philosophers, and philosophical ideas of ancient Chinese philosophy, and understand the academic and ideological development of the main schools of ancient Chinese Philosophy.

Curriculum ideological and political construction is an innovation in the reform of education teaching in higher education. It aims at cultivating moral character and nurturing talent. College English, an important stage for college students to understand foreign ideologies, may influence students' values through a process of osmosis. In regard to this, essential proper guidance should be provided in ideological and political education. From Table 1, ideological and political education are listed as the least attractive for respondents. Given that, arousing their learning interest and enthusiasm is of uttermost importance. Therefore, this study advocated that the personal development demands of the students involved should

be taken into serious account. Compared to pure theoretical courses on ideological and political education, this can make the knowledge of ideological and political education more relevant to students' own lives, which helps students understand theoretical knowledge and promotes a harmonious and friendly relationship between teachers and learners, and enhances the pertinence and affinity of ideological and political education in college English courses. What's more, if the input of ideological and political elements is too difficult to understand, students will spend too much time in the process of language learning. If the integrated elements are too simple, it means that learning can be done without reasoning. In light of these. reasonable control of difficulty is an important factor for teachers to integrate ideological and political elements and achieve a subtle effect.

Teaching Strategies

Incorporating traditional Chinese culture into college English teaching is one of the manifestations of the goal of building world-class higher education in China. It also plays a crucial role in promoting cultural soft power in the new era and cultivating international talents. However, the integration into college English is now at a bottleneck period, facing various barriers as mentioned above. Hence, researchers elaborated on the current situation and issues of contemporary college English teaching based on practical teaching experience, and hereby proposed the following teaching strategies for integrating Chinese culture into the blended teaching mode.

Optimizing Course Design

To optimize course design， it is more desirable to begin by defining the scope and level of the integrated Chinese culture closely related to college English teaching. In the process of designing the teaching content, because textbooks are the core part of college English teaching, they should be in line with the national conditions and have practical value to help students learn and understand Western culture, without neglecting the local culture. This is the basic guarantee to cultivate students' cross-cultural communication abilities. On top of that, interdisciplinary course design, which poses particular challenges in course design, is also of necessity. Due to the fact that it creates a multidimensional teaching platform, allowing students to gain a deeper understanding of Chinese culture through interdisciplinary exploration. College English is currently adopting the online and offline blended teaching mode, combining self-contained online learning and face-to-face classroom teaching, the high-quality online bilingual Chinese cultural courses, though noticeably inadequate and available for both students and teachers so far, are consequently alternative remarkable teaching sources that cannot be ignored. Likewise, the development and adjustment of English textbooks should be underscored, to integrate Chinese culture more systematically and completely. Colleges can independently develop and edit teaching contents both online and offline, by providing Chinese culture the appropriate portions in the textbooks. For example, while introducing Western food and catering culture, it is reasonable to present Chinese content correspondingly.

Constantly Innovating Teaching Methods

On account of the limited time of college English classes, the quality and efficiency of teaching are crucial to success. Most teachers currently lack effective teaching methods and strategies while integrating Chinese culture. Verbally explaining the cultural content to students is dull and inefficient, as a result, a large number of students are unable to deeply

understand the connotation of Chinese culture. This fails to foster genuine appreciation or engagement and leads to a superficial integration of Chinese culture. Therefore, it is essential to constantly explore more dynamic and engaging approaches, using diverse and rich ways to guide students to understand cultural content from multiple perspectives, and continuously improve their English comprehensive abilities. As an illustration, VR (Virtual Reality) technology can be applied to cultural dissemination, since culture is quite abstract, and cannot be fully conveyed through mere explanation. Incorporating VR technology into college English courses for teaching cultural content transforms traditional learning methods, making them more engaging, effective, and impactful. As in teaching practice, sharing successful teaching cases is also vital for promoting the integration of Chinese culture. It can inspire educators and demonstrate effective strategies.

Chinese culture and literature contain universal wisdom. Many classic works provide various strategies and ideas that can be applied in modern business, negotiation, and marketing, which enriches the teaching content and upgrades students' English proficiency. In daily teaching, listening, speaking, reading, and writing have always been the four major skills to be improved. However, traditional English teaching often focuses on reading and writing, with little emphasis on listening and speaking, which affects students' overall English proficiency improvement. To achieve effective penetration of traditional Chinese culture, teachers have to shift their attention toward listening and speaking. By prioritizing listening and speaking, teachers can transform cultural education from passive absorption to active participation and create immersive, interactive, and culturally rich learning experiences.

Cultivating the Professional Ability of English Teachers

The cultivation of the professional ability of English teachers has become increasingly important in the integration of Chinese culture. At present, most of the teachers teaching college English have insufficient knowledge of Chinese culture. They are also not sufficiently professional in the methods of integrating Chinese culture. They are encouraged to be fully aware of the importance of integrating Chinese culture into teaching and attain its completeness by upgrading their professional competence. Colleges are supposed to provide regular training, such as online courses, in Chinese culture systematically. It should also be noted that the latest trends in Chinese and Western cultures through the internet should be kept up with, to improve mutual understanding in culture and society from the latest fashions in intercultural communication. Seminars and workshops are among the mainstays of professional development programs, offering teachers the opportunity to connect with associates from different countries and backgrounds, share the latest research results, analyze cases of educational practices, and discuss future trends.

Organizing Diverse Chinese Cultural Extracurricular Activities

Extracurricular activities are a beneficial supplement and extension to classroom teaching, offering students opportunities to apply theoretical knowledge in real-world contexts and develop practical skills. Chinese cultural extracurricular activities in English are diverse in form and rich in content, such as English speeches, dubbing, poetry recitation, lectures, debates, drama performances, English corner theme activities, English broadcasts, competitions, etc. These activities provide students with a better English practice environment and opportunities outside of class so that students can have more exposure to English, enhance their language sense, and improve their interest and enthusiasm in learning English. The implementation of such activities has shifted English teaching from a single

small classroom setting to a larger English learning environment around the campus. It created a more immersive learning atmosphere, with a wider scope and greater participation. Through various forms, channels, and methods, it fosters students' ability to learn English independently, enhances their interest in English learning, and hones their practical English language skills, while fully showcasing each student's character. In order to promote learning enthusiasm and improve learning efficiency, extracurricular activity design is expected to be based on the English knowledge and application abilities that students have already mastered. Activities of different difficulty levels depend on the teaching schedule and students' learning progress.

Improving the Evaluation System of Intercultural Communication Skills

Developing students' cross-cultural communication skills is a dynamic teaching process. It not only requires the support of advanced teaching strategies but also necessitates a scientific evaluation system at each stage. This evaluation helps determine whether students are adapting to the English teaching methods, as well as how the teaching methods for the next stage can be improved. Through dynamic supervision, the achievements of educational reforms can be expanded. To improve the evaluation system for cross-cultural communication skills, teachers are required to evaluate students' theoretical knowledge, emotional attitudes, and behavioral abilities by the cross-cultural content corresponding to the textbook. At the same time, students are encouraged to summarize their evaluations, and objective evaluations are conducted using big data technology to form a combined mode of separate and comprehensive assessments. At the current stage, college English teaching has begun to pay attention to process-oriented assessment. There are still many problems in the actual operation, such as the lack of formulated execution documents, the lax execution of documents, unreasonable assessment structure, unsatisfactory assessment results, and the lack of emphasis on "process-oriented" phenomena. The effect of comprehensive evaluation of the curriculum is limited, and coupled with the drawbacks of terminal assessment, thus this is not conducive to the overall improvement of teaching quality. By dedicating to constructing a comprehensive evaluation system, colleges can address the limitations and foster holistic student development.

Conclusion

In college English teaching, cultural education is becoming an indispensable component, either for the development of cultural soft power, or higher education. In the implementation of Chinese cultural education, there are still a number of obstacles, including a lack of suitable teaching materials, a shortage of high-quality teachers, conservative teaching methods and tools, as well as limited English proficiency, and negative learning attitudes among students, etc. Nevertheless, it is obvious that teachers have been striving to promote intercultural communication among the students. The findings show that students' interest and levels of mastery of the five cultural parts are diverse, which makes the integration more complicated. From the preliminary observations and further explorations, this paper reveals some teaching strategies. Emphasizing the importance of cultivating composite talents with international vision and profound cultural heritage in the context of globalization, this study is expected to shed light on new ideas and methods for the reform of college English education, as well as future textbook writing.

Although this study has achieved certain positive results, it still faces challenges in terms of the depth and breadth of cultural integration. Future research will focus on exploring more

diverse cultural integration strategies, evaluating the role of emerging technologies such as AI in promoting cultural integration in teaching and conducting in-depth research on the long-term impact of cultural integration teaching on students' personal growth and career development, in order to provide richer references and inspirations for practical and theoretical research on college English teaching.

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Fostering Global Citizens: A Qualitative Study on Embedding the United Nations Sustainable Development Goals (UN SDGs) Into Primary Education

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Abstract

The United Nations Sustainable Development Goals (UN SDGs) offer a framework for educating future generations to address global challenges such as climate change. However, limited research explores their effectiveness in primary education. A balanced primary curriculum fosters a well-rounded foundation in academics and holistic development. However, enriching the curriculum with focus on real-world issues will help to develop international mindedness through the exploration of topics such as environmental issues, human rights and global interdependence. The UN SDGs, is a set of 17 goals that provides a framework to equip people with the knowledge of a more sustainable and equitable world. Integrating a programme to complement the core curriculum will provide learners with the skills to develop characteristics of an internationally minded learner - action oriented, empathetic and engaged. This qualitative study investigates how utilising the UN SDGs, particularly through a 5 to 6 month project will provide learners with the skills to become responsible and engaged in relevant, real world issues. The evidence will be a descriptive qualitative case study collected through the perspectives of teachers, students and parents on their experiences of the integration of the UN SDGs into their education. With the limited research existing on the effectiveness of embedding the UN SDGs, this paper aims to contribute insights by exploring those directly involved in the process through data collected from interviews and reflections. The findings of this paper suggest the development of the student's ability to better understand the challenges we are facing in the world, an awareness of the UN SDGs, as well as passion and awareness to engage in societal and climate issues.

Keywords: United Nations Sustainable Development Goals (UN SDGs), primary curriculum, education, international mindedness

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Introduction

Fostering internationally-minded citizens essentially takes root in their education. As the world faces increasingly complex challenges, there is a growing need to integrate the United Nations Sustainable Development Goals (UN SDGs) in primary education. However, despite the growing awareness of the United Nations Sustainable Development Goals (UN SDGs), there is limited research on its integration and effectiveness in early education. This integration is crucial to prepare students to understand global challenges and the impact of human actions on the world.

“International Mindedness (IM) is a concept that has evolved over time, with roots tracing back to the 17th century” (Hill, 2012). “It is an overarching construct related to multilingualism, intercultural understanding, and global engagement” (Hacking et al., 2018). It is also central to the International Baccalaureate (IB)'s educational policies and programmes. “The International Baccalaureate Organization (IBO) defines international mindedness as having three components: multilingualism, intercultural understanding, and global engagement” (Belal, 2017). The goal of the IB program is to develop internationally minded people who, recognizing their common humanity and shared guardianship of the planet, help to create a better and more peaceful world (Castro et al., 2013). In primary education, fostering a global perspective helps children recognize their links to the bigger world, nurturing empathy and critical thinking skills. Connecting this approach to the UN's Sustainable Development Goals, students can gain meaningful ways to explore real-world challenges.

“Since the 1970s, the UN has launched numerous international conferences and agreements with the common aim to reduce and eradicate inequalities while seeking environmental balance” (Robles-Moral, 2021). The UN's constant focus and continuous improvements on these projects further emphasizes the importance of the coming generations to deepen understanding and awareness towards human impact on the natural resources and imbalances caused by our consumption habits. Therefore, the adoption of the 17 goals were introduced with a series of targets that specifically define each problem to tackle. In 2017, The UN General Assembly also adopted a global indicator framework, presented as a dynamic review mechanism used to guide and monitor the implementation of each goal (United Nations General Assembly, 2018).

Promoting global awareness to encourage interconnectedness towards learning different cultures is crucial towards empowering people to contribute positively towards a more sustainable world. Cultivating a sense of informed humanitarian vision becomes an explicit aim of international schools. Expressions of IM can be found in International Baccalaureate (IB) schools. However, the question lies in the effectiveness of articulations of IM in the curriculum. How can IM become an essential component in nurturing global citizenship? According to the (UNESCO, 2020), there is a bigger discrepancy in integration of the UN SDGs and global citizenship education (12%). One of the biggest challenges being teacher training towards delivering. Other challenges that arise in integrating the UN SDGs into primary education include:

- Limited awareness and understanding among educators.
- Difficulties in simplifying complex global issues for young learners.
- Inadequate teacher training and resources.
- Fragmented and inconsistent implementation across curricula.

This paper explores the effectiveness of UN SDGs in fostering international mindedness. This study seeks to provide practical insights into how IM can be enacted in students' lives through targeted projects focused on the UN SDGs.

Literature Review

International Mindedness (IM)

“International Mindedness (IM) is a multifaceted concept central to international education, particularly within the International Baccalaureate (IB) framework” (Hacking et al., 2018, p. 3). International-mindedness is defined as "a multi-faceted and complex concept that captures a way of thinking, being and acting that is characterized by an openness to the world and a recognition of our deep interconnectedness to others" (Savva & Stanfield, 2018, p. 2).

“International Mindedness is an evolving concept that plays a crucial role in international education” (Hill, 2012, p. 246). While challenges remain in defining, implementing, and assessing IM, ongoing research and practical approaches continue to enhance its effectiveness in preparing students for a globalized world.

Challenges and Critiques

- **Lack of Clear Definition**: “A significant challenge is the absence of a single, universally agreed-upon definition of IM” (Cause, 2011, p. 3). This can further lead to confusion and ambiguity when implementing into teaching and learning.
- **Implementation Difficulties**: “Implementing IM can be difficult due to various factors at the teacher, curriculum, and context levels” (Lai et al., 2014, p. 83). It may not always be prioritized in lesson planning, and teachers may find it challenging to integrate it into certain subjects
- **Cultural Contexts**: “The underlying premise of IM, with its emphasis on critical inquiry and independent exploration, may create tensions with certain traditional cultural attributes” (Lai et al., 2014, p. 83). In some Asian contexts, it is possible that the strong academic ethos and exam oriented nature of the country may restrict the development of the IM.
- **Western Bias**: “There are concerns that IM may be rooted in Western thought and may not adequately address diverse cultural perspectives” (Lai et al., 2014, p. 83).

“International Mindedness is an evolving concept that plays a crucial role in international education” (Hill, 2012, p. 246). While challenges remain in defining, implementing, and assessing IM, ongoing research and practical approaches continue to enhance its effectiveness in preparing students for a globalized world. Integrating subjects in the curriculum may further enhance the ability to develop IM in primary students.

United Nations Sustainable Development Goals (UN SDGs)

The UN SDGs, adopted in 2015, offer a comprehensive framework for addressing global challenges and achieving a sustainable future. The 17 interconnected goals cover a wide range of issues, including poverty, hunger, health, education, climate change, and social justice. The SDGs are intrinsically linked to the principles of global citizenship education (GCE) and IM, which seeks to develop informed, responsible, and engaged citizens who can contribute to a more just and sustainable world. The 2030 Agenda for Sustainable

Development explicitly acknowledges the need for global citizenship in achieving the SDGs, emphasizing education's role in fostering responsible and collaborative action. Integrating the UN SDGs into primary education can greatly support global citizenship, but schools encounter several challenges in incorporating these goals into their curriculum.

Challenges in Implementing the UN SDGs Into the Curriculum

- (Lei & Tang, 2023, p. 5) suggests that the existing curriculum is often crowded, leaving limited time for implementing new approaches. Therefore teachers may find it difficult to expand on SDG topics due to limited teaching hours. Also, the examination-oriented nature of education can also hinder the holistic development of a subject by taking up lesson times.
- Teachers may lack sufficient knowledge and understanding of sustainable development (Lei & Tang, 2023, p. 5), and they may also lack experience in interdisciplinary approaches to teaching. Moreover, teachers may not have a clear understanding of the relationships between different approaches to sustainability.
- Difficulties in teachers who are used to teaching within specific subject boundaries as mentioned in (Lei & Tang, 2023, p. 5) Teachers may also find it difficult to cooperate and synthesize instructional materials across subjects.

Embedding the UN SDGs in Primary Education

Primary education offers a critical window of opportunity to nurture values, attitudes, and behaviors that support the SDGs and global citizenship (Abera, 2023, p. 70) mentions that learning the UN SDGs enhances the understanding of learners and the general public about the SDGs and how they connect with individual and collective lives. Integrating the SDGs into primary curricula can help learners understand global challenges, develop critical thinking skills, and cultivate a sense of responsibility for the planet and its people. UNESCO (2017) states that the UN SDGs makes education more relevant by linking it to real-world challenges and promoting skills and competencies needed for sustainable development (pp. 24, 30). Embedding and or integrating the UN SDGs can be done in stages.

- Project Integration: Using the UN SDGs as the basis for a International Baccalaureate Primary Years Programme (IB PYP) project offers students the opportunity to use it as a framework for real life issues. Students will have the ability to choose from a range of goals that provide a clear and relevant context. At the beginning of the project, students are given a general introduction and how to read the sub topics and goals. As seen in Figure 6F, implementation of the UN SDGs begins with choosing a goal. After completing research, surveys and conducting a local action, they present in front of visiting schools as seen in Figure 1.
- Special Events in the Academic Year: Having special days in the academic year that focuses on the UN SDGs helps students gain awareness. Integrating it into a specific week that celebrates an international event is helpful. This can be seen in Figure 6B.
- Curriculum Integration: Embedding the SDGs effectively requires a holistic approach that goes beyond adding stand-alone lessons or units. It involves infusing SDG principles and themes across various subjects and learning activities, making connections to students' lives and local communities. This can be seen in Figure 6D.
- Role of Teachers: Teachers play a crucial role in translating the SDGs into classroom practice. They need the knowledge, skills, and support to effectively integrate SDG themes into their teaching, facilitate discussions on complex global issues, and create

opportunities for student action. Professional development programs and access to high-quality teaching resources are vital for empowering teachers in this endeavor.

Monitoring Progress and Challenges. This can be seen in Figure 6A.

Seamless integration can be a challenge, however, strategies to implement this can be done in a number of ways. UNESCO (2017) calls for the systematic integration of ESD into national education policies to advance sustainable development (pp. 18, 30, 243). Align national education strategies with the SDGs by defining clear learning objectives with relevance to the targets of each goal. Other strategies include methods that foster sustainability competencies through active learning, such as collaborative real-world projects, vision-building exercises, analysis of complex systems, and critical and reflective thinking. Additional ways include implementing action learning approaches where people tune-in to new ways of living, talk among themselves, reflect on less harmful technologies and implement more sustainable ways of living.

Integrating the SDGs into education requires a multi-faceted and comprehensive approach that goes beyond curriculum changes to include teacher training, systemic support, and community engagement. By embracing these strategies, educational systems can effectively promote sustainability and empower learners to create a better future.

Challenges and Barriers

Integrating the SDGs into primary education faces several challenges, as noted in the literature and through surveys conducted.

From educators:

- Ideas in implementation of the UN SDGs into teaching and learning
- Understanding of the UN SDGs
- General training (including professional development)
- Student interest and motivation
- Concerns about overburdening existing curricula

Although there are challenges and changes to be made in implementing the UN SDGs into primary education, the benefits outweigh. Equipping young learners at an earlier age with the knowledge, skills, values and attitudes contribute to making them become informed, responsible and global citizens. This however, can only be achieved with the collective efforts of policymakers, educators and the community. Through this, education systems will effectively translate the UN SDGs into a transformative learning experience.

Methodology

The study follows a qualitative case study approach (Stake, 1995; Yin, 2018), focusing on in-depth exploration through interviews, surveys, and reflections to explore how embedding the United Nations Sustainable Development Goals (UN SDGs) into primary education can help foster global citizenship among students. A case study was chosen because it allows for an in-depth examination of the experiences and perspectives of key stakeholders—educators, parents, and students—within the context of a specific educational setting. Data collected came from students who have been through at least 2 years of schooling in this particular school, with emphasis on those who have been a part of the 5-6 month project.

Research Context and Participants

The research was conducted in a primary school that implemented a 5- to 6-month project using the UN SDGs as a backbone for their project. Participants included:

- **Educators**: Teachers who were mentors to the students leading the project
- **Students**: Primary and secondary students who conducted projects based on the UN SDGs, or used the UN SDGs as their focus
- **Parents**: Parents of students who conducted projects based on the UN SDGs, or used the UN SDGs as their focus

Participants were randomly selected to ensure a diverse range of perspectives and insights. Their experiences and reflections were integral to understanding how the UN SDGs influenced learning outcomes and awareness of global issues.

The project provides students with the choice of any of the UN SDGs as a focus as seen in the figures below:

Figure 1

A Group of Students Who Chose UN SDG 14 – Life Under Water, Focused on Spreading Awareness of Saving Coral Reefs to Protect Habitat and Food of Marine Animals

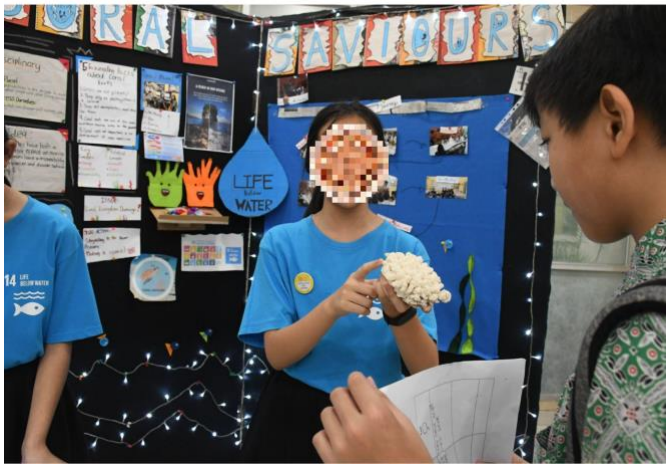


Figure 2

Students Who Chose UN SDG 13 – Climate Action As Their Focus Share Their Action of Installing a Hydroponics System Reducing Water Pollution and Waste As Well as Reducing Carbon Footprint

Students conduct research on a subtopic related to the UN SDG then provide ideas of action they can conduct. The action choices are taken from the International Baccalaureate (IB) and includes: participation, advocacy, social justice, social entrepreneurship and lifestyle choices. Students are asked to focus on local actions that can be conducted in their own community.

Data Collection Methods

Data collected from a 5-6 month project from various year levels starting from year 6 - 12. Some data was collected from alumni.

To gather comprehensive data, multiple methods were used:

- **Surveys:** Through google forms, participants were able to complete questions asked focused on their understanding of the UN SDGs and its influence towards learning outcomes using the mixed method design (Fowler, 2014).
- **Interviews**: Semi-structured interviews were conducted with educators, parents, and students. These interviews focused on understanding their experiences with the SDG projects, their perceptions of its impact, and their views on how it contributed to fostering empathy, responsibility, and global awareness (Kvale & Brinkmann, 2015; Patton, 2015).
- **Artifacts and Reflections**: Students' project work, teacher lesson plans, and written reflections from participants were collected to provide additional context and insight using the reflective learning framework (Kolb, 1984; Schön, 1983).

Data Analysis

The data collected were analyzed using thematic analysis. First, the interviews, surveys, observations, and artifacts were coded to identify recurring ideas and patterns. These were then grouped into themes such as:

- General knowledge of the UN SDGs
- Familiarity and awareness
- Integration into education
- Impact on understanding and behaviour (towards global issues)
- Challenges in teaching and learning

Triangulating data from different sources (e.g., interviews, observations, surveys and artifacts) ensured a richer understanding and enhanced reliability.

Limitations

While the findings provide valuable insights, this study focuses on a single school, which may limit the ability to generalize to other contexts. Other limitations include: subjectivity in data collection and analysis, participant bias, limited participant diversity and time constraints.

Findings

Increased Awareness of the UN SDGS

One of the key themes that emerged from the interviews was the increased awareness of the UN SDGs in the past years within the school community.

"I know about it because I see it around the school or sometimes in my child's worksheets." (Parent A)

"I see it in presentations that the school shows about upcoming student projects." (Parent B)

Similarly a student mentioned:

"I know quite a bit about it because we have to learn about it in school." (Student A)

"I know what UN SDG is, because we did it for the PYP (Primary Years Programme) Exhibition." (Student B)

This indicates growing awareness of the UN SDGs within the school community as seen in Figure 3A taken from parents perspective and Figure 3B taken from students perspective. Based on observations conducted within the school community, it is clear that the UN SDGs is seen throughout the school through planners and projects as seen in Figure 6E, a student completing a reflection of the UN SDGs.

Figure 3A

Parents Perspective of Awareness of UN SDGs

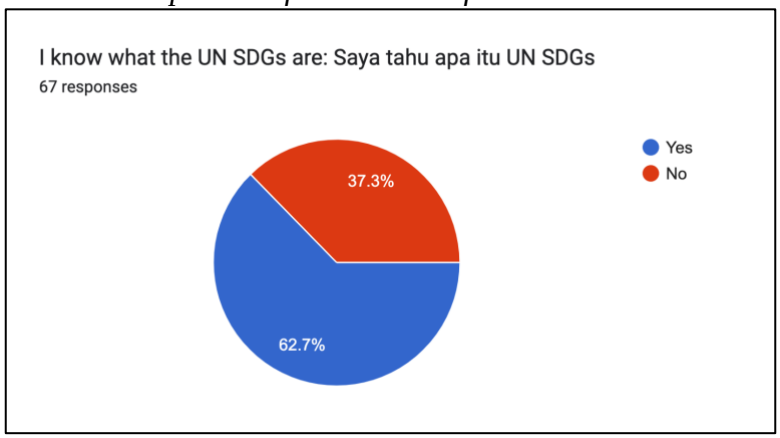
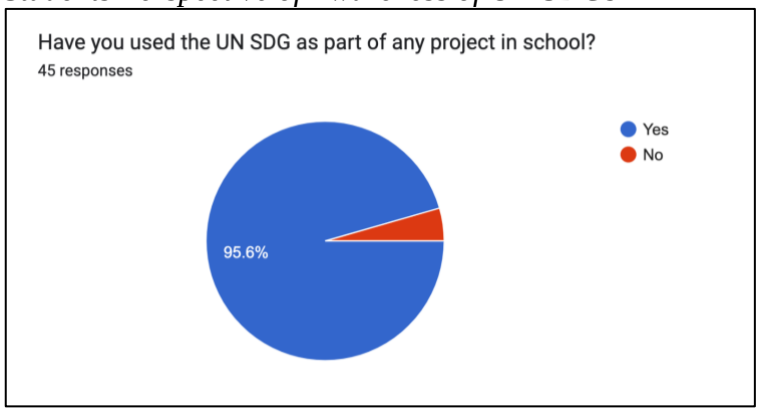


Figure 3B

Students Perspective of Awareness of UN SDGs



Understanding of the World Around Them

Following the increased awareness, students reported connections between global issues and their daily lives. Learning about the SDGs helped students understand how global challenges affect not just other countries but their own communities.

“I know about things that are going on around the world now.” (Student C)

“I know there are problems like poverty, health issues, malnutrition, gender equality in other places around the world now.” (Student D)

“When I did my PYP Exhibition project, I learned that there are pregnant people in other parts of Indonesia that do not eat well, and their babies end up having stunted growth.” (Student E)

As most of the awareness is seen when they take part in the PYP (Primary Years Programme) Exhibition, parents have also noticed a shift in their child's learning of local and global issues:

“Suddenly she (her daughter) started asking questions about why coral is important, and if she can see them and how she can help.” (Parent C)

“He began asking about reducing heat and energy in the house by growing a vertical garden, and using fans.” (Parent D)

These have demonstrated that the learning of the UN SDGs specifically, have helped them learn about local and global issues. Teachers have also mentioned an awareness towards engagements in discussing issues during class.

“I noticed that X is now engaging in the class when we talk about local and global issues. He now asks questions about the topic, and shows an interest in learning more about it.” (Teacher A)

“Generally speaking, it is much easier to discuss what project they want to take up as they have clear choices from the UN SDGs, and they are able to read the sub-targets on their own.” (Teacher B)

“Some students have shown initiative by asking their parents who they can interview with regards to learning more about the issue they are interested in (with regards to their PYP Exhibition topic).” (Teacher C)

The integration of the UN SDGs has made an impact on parents, students and teachers. There are changes in student attitude and understanding as shown in Figure 4A and 4B. Teachers also see the benefits of the UN SDGs in students as seen in Figure 4C.

Figure 4A

Student Perspective on the Effective of the UN SDGs

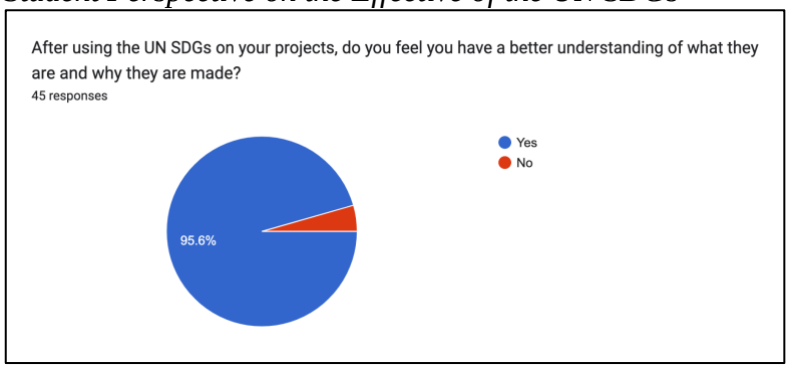


Figure 4B

Student Perspective on the Impact of Using the UN SDGs

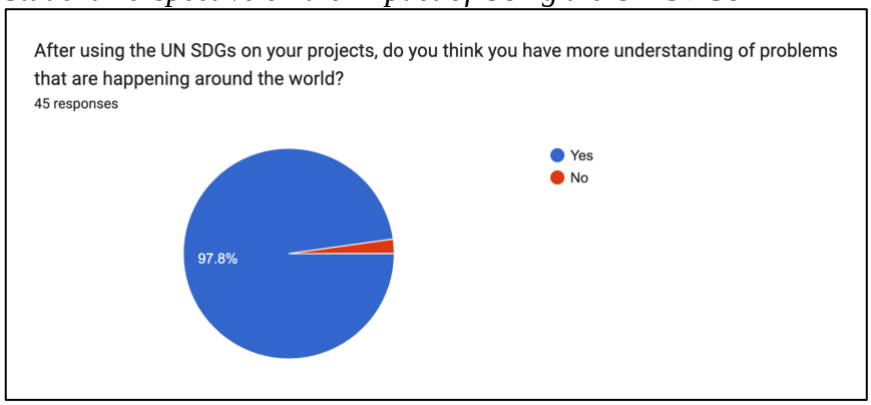
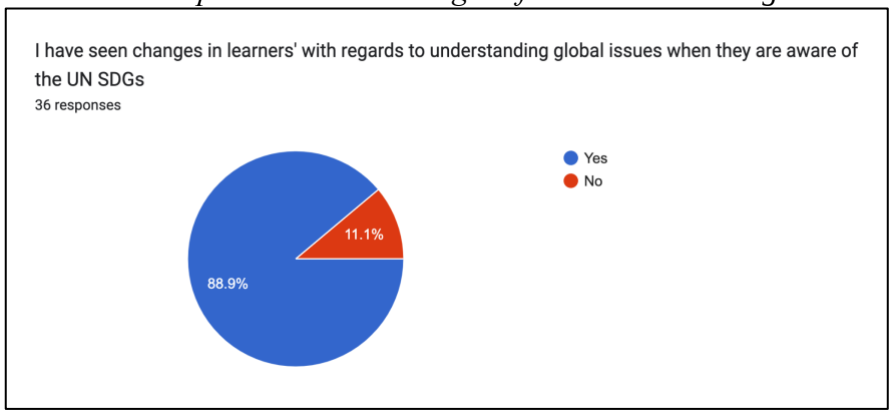


Figure 4C

Teachers' Perspective on the Changes of Learners With Regards to Global Issues



Support in Integrating the UN SDGs

Most parents, teachers and students have mentioned their support in integrating the UN SDGs into the curriculum to help develop global citizenship.

"I think this is the reason why I put my son in an IB school. To learn about global issues and take part in it." (Parent E)

Building on this point:

"I think using the UN SDGs as a focus for my project has really helped me understand more about the world and it can help me in secondary when I have to do my personal project." (Student E)

"I truly believe that the UN SDGs can help students become global citizens as using the target indicators can make it easier for them to focus on a project." (Teacher D)

There is strong support shown from parents, teachers and students on embedding the UN SDGs into the curriculum. The benefits of the integration could further enhance the development of IM in students as shown in Figure 5A, 5B and 5C.

Figure 5A

Parents' Perspective in Support of the UN SDGs as Part of the School Curriculum

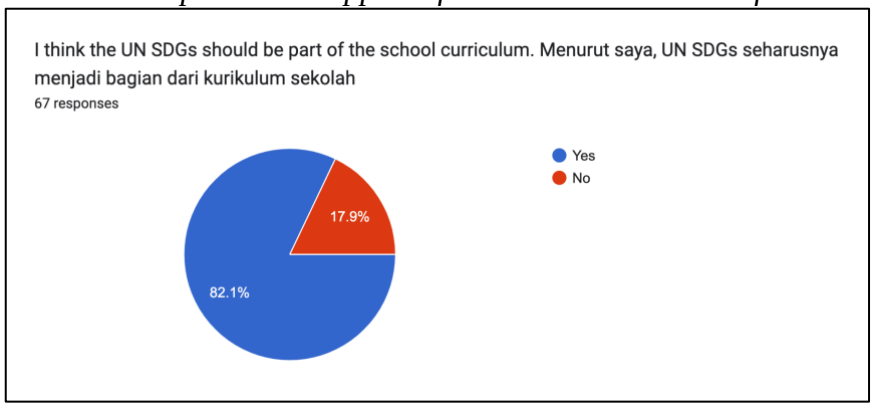


Figure 5B

Teachers' Perspective on Support of the UN SDGs as Part of the School Curriculum

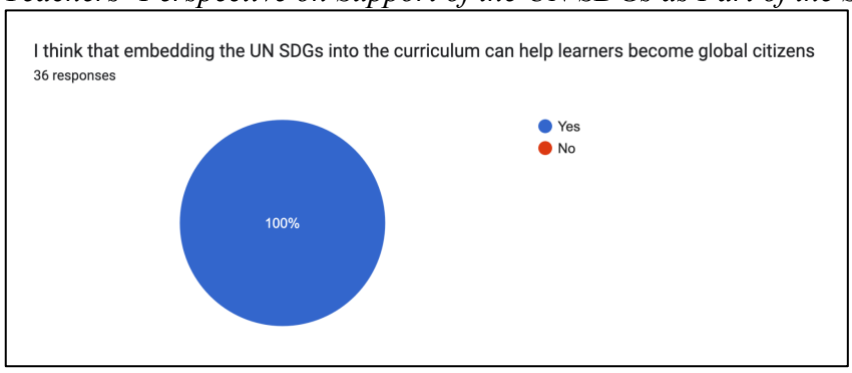
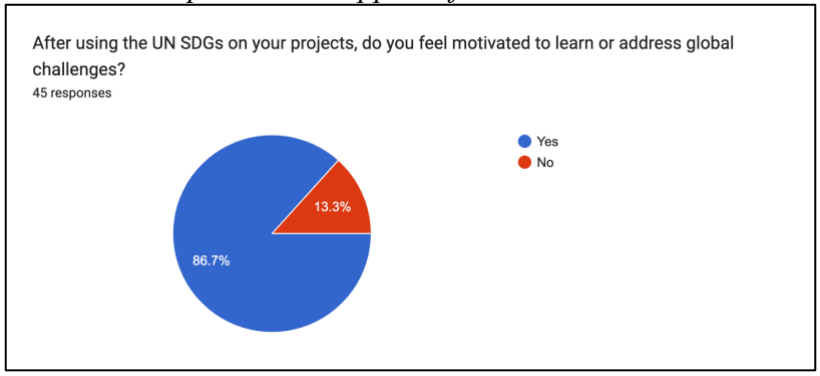


Figure 5C

Students' Perspective on Support of the UN SDGs to Become Internationally Minded



Challenges in Implementing the UN SDGs

Based on interviews and forms, there are recurrent themes on the challenges faced in implementing the UN SDGs.

“I think I need more training or seminars on understanding the UN SDGs.” (Teacher E)

Taking this further, a student mentioned:

“I don't really understand what my teacher is talking about when we are learning this (UN SDGs), it isn’t really exciting or fun either.” (Student F)

This demonstrates that although teachers are trying to teach the UN SDGs, some do not feel they have the ability or understanding to do so properly. Their lack of knowledge need for practical ideas affects students' understanding and development of the IM.

However, it is important to point out that during interviews, a recurrent theme was mentioned similarly by other teachers:

“I think the students do not care. Since the pandemic, they have no motivation or interest in learning what they think is not really graded.” (Teacher F)

Similarly, another teacher mentioned:

“I think the problem is they don’t care about something that has nothing to do with their current state. If it is not affecting them now, they don’t see why they have to bother.” (Teacher G)

This connects with interviews done with students that mentioned:

“I don’t think what I do can make a difference.” (Student G)

Another also said:

“Is it going to be graded?” (Student H)

This demonstrates that the cause and effect challenges encountered by students and teachers can be fixed by changing a part of the learning process. This can only be done through a collective agreement and change made by stakeholders.

Based on *other* challenges faced when teaching the UN SDGs, several key themes emerged from the feedback on integrating the UN SDGs into education. Teachers emphasized the need for *general training for both educators and students* to increase awareness and motivation. *Young children*, particularly those aged 4, present a challenge in understanding complex SDG concepts, and teachers noted that it’s important to *make the content relevant* and connected to *local actions* to engage students effectively.

“Sometimes it is difficult to find engaging activities that are suitable for the age group I teach.” (Teacher H)

A few teachers observed that students sometimes view SDG-related learning as a broad or abstract concept and struggle to recognize it as part of their everyday lives unless it is focused on specific topics like "sharing the planet." Additionally, teachers expressed the difficulty of integrating SDGs into subjects like *Mathematics* due to *time constraints* but acknowledged that it would be beneficial to do so when possible.

“If someone came in during my collaborative meeting and showed me how or some ideas on how I can integrate some of the UN SDGs into certain subjects, that would get me started. But, the hard part is explicitly teaching these given the time as well.” (Teacher I)

Many teachers mentioned that *additional training on SDGs* for teachers is necessary to ensure they can adequately motivate students and integrate SDGs meaningfully. There was also concern about *resources availability*, with teachers finding it difficult to access up-to-date and relevant materials.

“I wish there was some sort of platform made accessible to us from educators where I can learn on my own - but not just a bank of ideas, more like the teaching flow and various activities that can link to my unit.” (Teacher J)

Finally, while teachers agreed on the *importance of SDGs* for students' futures, some felt that these goals should be embedded into the curriculum in a balanced, less explicit way, rather than forcing them into every lesson, which may lead to diminishing interest. Teachers were generally supportive of integrating SDGs into units related to *environmental issues* and *inequity*, but noted the need for more practical *strategies and training* to help students engage deeply with these topics.

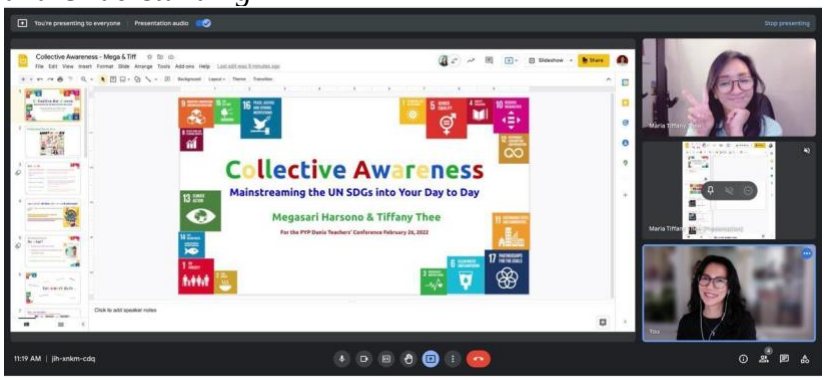
“I think it would be a great idea to make the UN SDGs as part of the curriculum. Have someone plot it or map it out, so we teachers can follow it. This start can really help the students learn more about the world, our local community and push them to take action. This action might not be now, but could be later on.” (Teacher K)

Discussion

Through this research, positive impact can be seen with the implementation of the UN SDGs into the curriculum. The data suggests that parents, students and teachers value the importance of UN SDG related experiences to foster international mindedness. To support this initiative, stages of a whole school approach would benefit the success. As seen in figure 6A below, professional development for educators can help provide a common and basic understanding as well as ideas and strategies for daily teaching.

Figure 6A

Professional Development for Teachers by Teachers on the UN SDGs to Support Learning and Understanding



Additionally, adding days on the academic calendar that focuses on the UN SDGs reinforces a whole school approach, such as seen in Figure 6B.

Figure 6B

Academic Calendar With Focus on the UN SDGs (Marked With a Red Box) to Support a Whole School Approach

TUNAS MUDA SCHOOL

School Calendar: First Semester 2023 – 2024

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
October (Week 11) 8	9	10 Nannies' Workshop for Kedoya Parents	11	12 Nannies' Workshop for Meruya Parents	13 Professional Development Day for Meruya School (Meruya Students Holiday)	14
October (Week 12) 15	16 (PYP/MYP/DP) Hari Bahasa Indonesia	17 English Language Week (Language Literacy Week)	18 Language Literacy Week	19 Language Literacy Week	20 Professional Development Day for Kedoya School (Kedoya Students Holiday) Edu Fair Y10-12 Language Literacy Week	21
October (Week 13) 22	23 PYP International/SDG Focus (PYP/MYP/DP) United Nations Day Asesmen Nasional Kelas 5 (Gelombang 1) (Tentative)	24 PYP International/SDG Focus Asesmen Nasional Kelas 5 (Gelombang 1) (Tentative)	25 PYP International/SDG Focus Y9 Adolescence Education for Students and Parents Asesmen Nasional Kelas 5 (Gelombang 1) (Tentative)	26 PYP International/SDG Focus Asesmen Nasional Kelas 5 (Gelombang 1) (Tentative)	27 PYP International/SDG Focus	28 Hari Sumpah Pemuda

Learning about the UN SDGs for students begins with understanding what they are. Students learn best when they share their understanding as seen in Figure 6C.

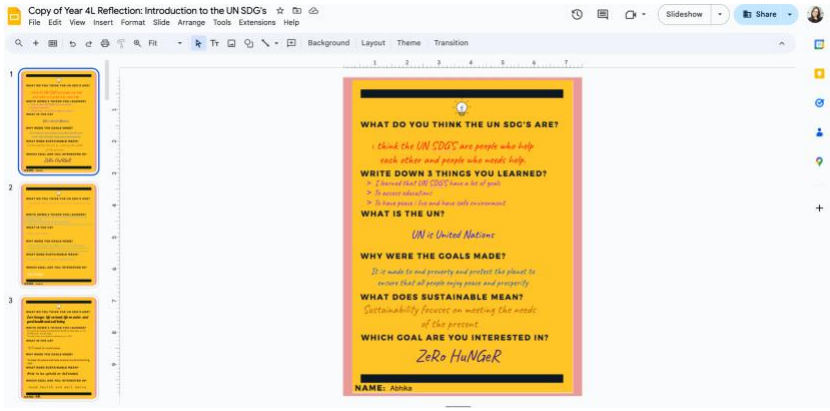
Figure 6C

Students Share Their Learning of the UN SDGs by Presenting Their Learning With Others

Furthermore, students solidify their learning by completing a reflection of their learning as seen in Figure 6D.

Figure 6D

A Student Reflection After Completing Their Presentation of the UN SDGs With Their Classmates



For younger students, starting with understanding everybody's prior knowledge is helpful to find out how best to let them share their learning as seen in Figure 6E.

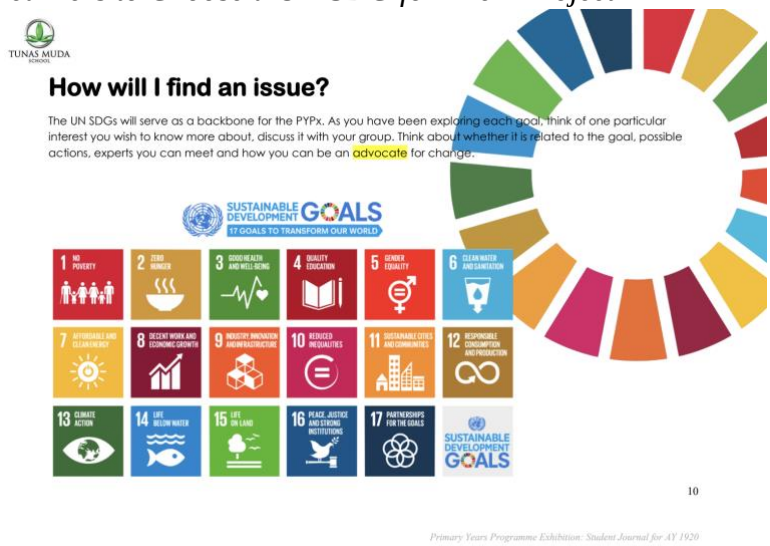
Figure 6E

Students Share Their Prior Knowledge of Each UN SDG by Writing Post Its of Ideas for Action

When conducting their 5-6 month project, focusing on a single goal together as a group, supported a deeper understanding of the goal indicators, as seen in Figure 6F.

Figure 6F

A Page From Their Work Booklet for Their 5–6 Month Project an – This Page Guides Learners to Choose a UN SDG for Their Project



Conclusion

Based on the paper, there is strong evidence to suggest that the implementation of the UN SDGs prove beneficial for students to develop awareness of local and global issues. As the world continues to face conflict and crises, fostering a sense of global responsibility and empathy in young learners is more important than ever. Embedding the goals into the curriculum aids students to gain a deeper understanding of global challenges and develop the skills, values, and attitudes necessary. The findings from this paper highlight the positive impact of conducting a project focused on a UN SDG.

To improve and enhance the implementation of the UN SDGs in primary education, essential focus is needed on teacher training, providing age appropriate learning and teaching, and working together with stakeholders to further enhance the implementation.

Ultimately, the paper contributes to the understanding of how IM can be integrated in primary education, emphasizing the importance of practical enactment of the UN SDGs in the lives of students to foster global citizenship or international mindedness. Further research is necessary to explore effective strategies for IM implementation and ensure that it truly empowers learners to become informed and responsible global citizens.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

In accordance with APA guidelines on the responsible use of artificial intelligence, I acknowledge the use of ChatGPT (OpenAI) in the development of this paper. The tool was used solely to support the structuring of academic writing and to assist with translation between Bahasa Indonesia and English. No content was generated by the AI; all analysis, critical thinking, and final composition were completed by the author.

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Do Gender and Learning Methods Matter? A Comparative Study of Rosetta Stone and Traditional Vocabulary Learning

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Abstract

Vocabulary is the building block of a language. It is crucial for mastering language skills such as grammar, listening, speaking, reading, and writing. Traditional teaching methods often fail to engage students in today's technology-driven world. The Rosetta Stone application presents a modern solution. Moreover, despite its potential, there is a lack of research examining how gender differences may influence learning. Thus, this study aimed to evaluate whether Rosetta Stone improves vocabulary mastery and examines any gender differences in its effectiveness. Employing a quasi-experimental design, the research involved 56 junior high school students (27 females and 29 males) from Bandar Lampung, divided into control (n = 28), which received traditional teaching, and experimental (n = 28), which received teaching with Rosetta Stone, groups. A purposive sampling technique was used, and the Wilcoxon Signed-Rank test was used to address the skewed data. Significant vocabulary improvements were observed in both groups, with p-values of 0.0006 for the control and 0.0013 for the experimental group. Using the Rosetta Stone, the experimental group showed greater gains than the control group (p-value = 5.614e-05). While both genders showed progress, the difference in effectiveness between males (p-value = 0.0006126) and females (p-value = 0.00135) was not statistically significant (p-value = 0.71). In conclusion, although traditional learning enhances vocabulary learning, it is pale compared to Rosetta Stone. Moreover, there are no statistically significant differences in effectiveness between genders, indicating that gender does not play a crucial role in the efficacy of these learning methods.

Keywords: English education, ICT, Rosetta Stone, vocabulary, writing skills

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Introduction

Vocabulary acquisition is a cornerstone in language learning, playing a vital role in developing communicative competence and overall language proficiency (Alrabadi & Harb, 2023). The process involves complex cognitive mechanisms, including memory and encoding strategies that fundamentally shape how learners internalize and retain new words (Agnes & Srinivasan, 2024). Recent research has established that vocabulary acquisition is influenced by multiple factors, with L2 proficiency emerging as the strongest predictor, followed by learning strategies, age of acquisition, and classroom exposure (Sun et al., 2023). This complex interplay of factors underscores the fundamental nature of vocabulary as a building block of language learning.

The significance of vocabulary as a foundational element in language acquisition is evident from early developmental stages. Research demonstrates that infants as young as 12 months can associate novel words with pre-existing visual categories, suggesting an innate ability to match prelinguistic knowledge with linguistic input (Pomiechowska & Gliga, 2019). This early capacity for lexical acquisition contributes to the development of a substantial conceptual repertoire even before mastering language. Moreover, recent studies have challenged traditional perspectives by highlighting the importance of multiword sequences as integral units in language learning and processing, moving beyond the conventional view of single words and rules as the sole building blocks (Christiansen & Arnon, 2017).

The mastery of vocabulary demonstrates profound implications across various language skills. Research has consistently shown strong positive correlations between vocabulary knowledge and both reading and listening comprehension (Ha, 2021; Zhang & Zhang, 2022). In particular, vocabulary knowledge, working in concert with grammatical competence, serves as a significant predictor of reading ability (Mahanani et al., 2017). For second language learners, both direct and indirect contributions of vocabulary and grammar to listening and reading comprehension have been documented (Babayiğit & Shapiro, 2020). Different aspects of vocabulary knowledge, including meaning recognition, recall, and form recall, contribute uniquely to comprehension across various modalities (Zhang & Zhang, 2022).

However, traditional vocabulary teaching methods face significant limitations in achieving these desired outcomes. Many educators continue to employ ineffective classroom-based vocabulary instruction techniques (Ford-Connors & Paratore, 2015), resulting in students typically knowing only 2,000-4,000 word families by the end of high school—a number insufficient for comprehending authentic texts (Laufer, 2017). These challenges are particularly evident in contexts where the target language is not used outside the classroom (Alrabadi & Harb, 2023). In Indonesia, for example, traditional teaching methods face numerous obstacles, including low student motivation and teachers' reluctance to use English in the classroom (Yulia, 2013).

The emergence of technology has transformed language learning landscapes, offering potential solutions to these traditional challenges. Mobile devices, multimedia tools, and digital games have become instrumental in enhancing language education (Zhang & Zou, 2020). While numerous studies have examined technology-enhanced language learning (TELL) broadly, experimental research specifically focusing on commercial applications' effectiveness remains limited (Nielson, 2011). This gap is particularly notable given the

widespread adoption of language learning applications and their increasing role in both formal and informal education settings.

Rosetta Stone, as a prominent language learning application, has been the subject of various studies, though methodological limitations persist in existing research. While some studies have demonstrated its effectiveness in improving English learners' listening and speaking skills (Bai, 2024; Harper et al., 2021), many investigations rely primarily on qualitative or correlational designs. The few experimental studies available have produced mixed results, with some showing benefits for vocabulary acquisition (Namaziandost et al., 2021) and others noting limitations in developing comprehensive communicative competence (Lord, 2015).

The role of gender in language learning technology adoption presents another critical dimension requiring experimental investigation. While research indicates that gender influences learning styles (Rafikova & Voronin, 2024) and technology acceptance (Brown et al., 2021), most studies examining these relationships have been observational. Experimental studies investigating gender differences in technology-enhanced vocabulary learning are particularly scarce, despite evidence suggesting that males and females may process and retain vocabulary differently (Wucherer & Reiterer, 2018). This gap becomes more significant when considering that gender differences in language learning strategy use (Montero-SaizAja, 2021) might interact with the effectiveness of technology-based learning tools.

The intersection of gender differences and vocabulary learning through technology presents a particularly understudied area requiring experimental investigation. While studies have shown that educational games can enhance vocabulary learning with notable differences between male and female students (Katemba et al., 2022), the specific mechanisms and causal relationships remain unclear without controlled experimental evidence. Furthermore, the relationship between gender, technology-enhanced vocabulary learning, and commercial applications like Rosetta Stone has yet to be examined through rigorous experimental designs.

An experimental approach is particularly warranted for this investigation for several reasons. First, experimental designs allow for the control of confounding variables that have plagued previous studies of language learning applications (Nielson, 2011). Second, the causal relationships between technology use and vocabulary acquisition can be more clearly established through experimental manipulation, addressing a key limitation in existing research (Zhang & Zou, 2020). Third, experimental designs enable the systematic examination of gender as a moderating variable, providing more robust evidence than correlational studies (Brown et al., 2021).

Recent meta-analyses of language learning technology studies have highlighted the need for more experimental research in this field. Lin et al. (2023) noted that while numerous studies examine vocabulary learning apps, few employ rigorous experimental designs that can establish causality. Similarly, Rasti-Behbahani (2021) emphasized the importance of controlled studies to understand the specific features of digital games that contribute to vocabulary acquisition. These gaps in the literature underscore the timeliness and necessity of experimental research in this area.

This study addresses these research gaps through a controlled experimental design examining the effectiveness of Rosetta Stone in vocabulary acquisition while considering gender as a potential moderating factor. The experimental approach allows for precise measurement of vocabulary gains while controlling for confounding variables that have affected previous studies. This methodology also enables the investigation of potential interaction effects between gender and technology-enhanced learning, providing more definitive evidence than existing correlational studies.

The findings from this experimental investigation will have significant implications for both theory and practice. Theoretically, it will contribute to our understanding of how gender differences influence technology-enhanced language learning, addressing a critical gap in the literature. The results will inform the design and implementation of language learning applications, potentially leading to more personalized and effective learning solutions based on gender-specific needs and preferences.

This research is particularly timely given the increasing reliance on technology-based learning solutions and the need for evidence-based approaches to their implementation. By employing a rigorous experimental design, this study will provide more definitive evidence regarding the effectiveness of commercial language learning applications while considering important individual differences. Such insights are crucial for developing more effective and inclusive language learning solutions in an increasingly technology-dependent educational landscape.

Research Methodology

This study employs a quasi-experimental design to investigate the effectiveness of Rosetta Stone in vocabulary acquisition and examine potential gender differences in learning outcomes. The quasi-experimental design was chosen because it provides experimental control while accommodating the realistic constraints of educational settings (Sugiyono, 2008).

Table 1
Table of Treatment

Experimental	O1	X1	O2
Control	O1	X2	O2

Where:
O1 = Pre-test
O2 = Post-test
X1 = Treatment using Rosetta Stone
X2 = Traditional instruction using flashcards

Two eighth-grade classes at Bandar Lampung were selected, comprising 56 students (28 students per class). The experimental group comprised 28 students (14 males, 14 females). While the control group comprised 28 students (15 males, 13 females). The first class served as the experimental group, utilizing Rosetta Stone for vocabulary learning, while the second class functioned as a control group, following traditional vocabulary instruction methods. This arrangement follows similar experimental frameworks used in previous studies

evaluating technology-based language learning tools (Harper et al., 2021; Namaziandost et al., 2021).

To measure vocabulary mastery, both groups completed pre-tests and post-tests focusing on nouns and verbs related to daily activities, allowing for direct comparison of learning outcomes between the two approaches while controlling for gender differences. The primary instrument is a vocabulary test measuring students' mastery of nouns and verbs related to daily activities and surroundings. The test consists of 20 multiple-choice items, administered pre-test and post-test. The test items focus on 10 items of word meaning and 10 items of word uses.

To ensure instrument quality, three types of validity will be examined. First, content validity checks the alignment with curriculum objectives and textbook content. Second, construct validity, to check the expert review of test items. Lastly, item validity will be checked using statistical analysis. Meanwhile, reliability will be assessed using Cronbach's alpha, with the following interpretation criteria:

Table 2
Cronbach's Alpha Criteria

Cronbach's alpha	Criteria
0.800 - 1.000	Very high reliability
0.600 - 0.799	High reliability
0.400 -0.599	Medium reliability
0.200 -0.399	Low reliability
0.000 - 0.199	Very low reliability

Table 3
Pre-test Cronbach's Alpha

Cronbach's alpha	N of Items
0.764	50

Table 4
Post-test Cronbach's Alpha

Cronbach's alpha	N of Items
0.788	50

From the table above, it can be seen that both tests exceed high reliability. Thus, the experimental group received vocabulary instruction over eight weeks using the Rosetta Stone application, while the control group used traditional flashcards. A post-test followed to evaluate vocabulary improvement in both groups.

Data analysis involved descriptive statistics to assess overall performance and gender differences. The Kolmogorov-Smirnov and Levene's tests checked data normality and homogeneity, respectively. Due to non-normality, the Mann-Whitney U test was used to compare group performance, applying a significance level of 95%. This ensured a robust evaluation of the instructional methods and their effectiveness across genders.

Finding and Discussion

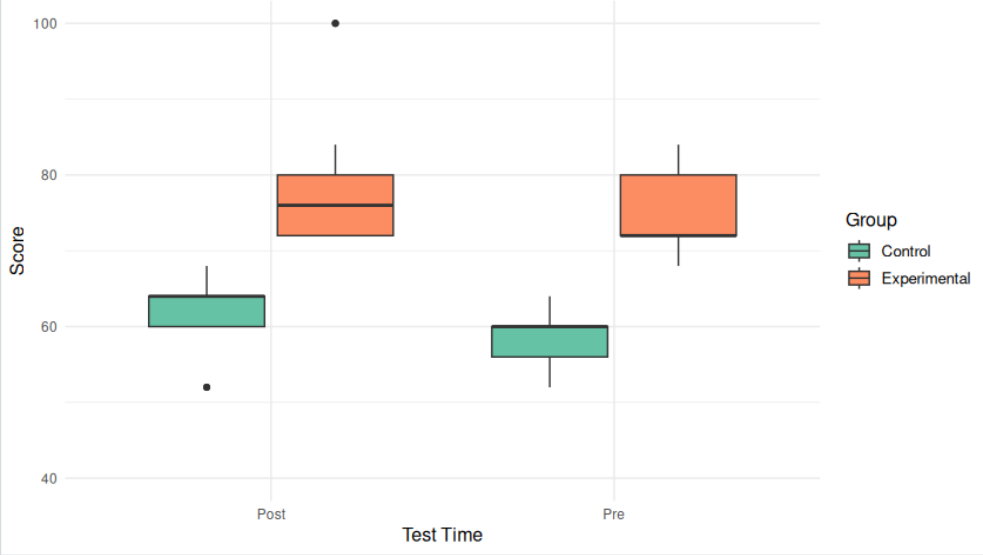
Findings

In this subsection, we present the results of a quasi-experimental study examining the effectiveness of the Rosetta Stone application on vocabulary mastery among eighth-grade students at Bandar Lampung, with specific attention to potential gender differences in learning outcomes. The findings address whether Rosetta Stone significantly impacts vocabulary acquisition compared to traditional flashcard instruction and how gender might moderate these effects.

Table 5
Descriptive Statistics Across Genders and Groups

Group	Gender	Test	Mean	Std.Dev	Min	Max
Control	Overall	Pre	58.29	3.989	52	64
		Post	62.43	4.122	52	68
	Female	Pre	58.93	3.73	52	64
		Post	62.13	4.32	52	68
	Male	Pre	57.54	4.27	52	64
		Post	62.77	3.98	56	68
Experiment	Overall	Pre	74.57	5.245	68	84
		Post	78.14	7.342	72	100
	Female	Pre	75.38	5.12	68	84
		Post	77.75	7.67	72	100
	Male	Pre	73.87	5.41	68	84
		Post	78.40	7.19	72	100

Figure 1
Boxplot of Descriptive Statistic



The pre-test and post-test scores analysis reveals distinct patterns between the experimental and control groups. The experimental group, which received instruction through Rosetta Stone, demonstrated higher overall performance before and after the treatment. Initially, students in the experimental group averaged 74.57 points (SD = 5.245), while the control group using traditional flashcards started with a mean score of 58.29 (SD = 3.989). Following the intervention, both groups showed improvement, with the experimental group reaching a mean score of 78.14 (SD = 7.342) and the control group achieving 62.43 (SD = 4.122).

Notably, while both groups improved, the experimental group exhibited greater score variability in the post-test, as evidenced by the increased standard deviation and wider range of scores (72-100). This suggests that while Rosetta Stone benefited some students significantly, leading to scores as high as 100, the impact varied across participants. In contrast, the control group maintained more consistent performance, with a narrower score range (52-68) and minimal change in standard deviation.

However, inferential statistics need to be done to make sure. Nonetheless, here is the normality test result.

Table 6
Test of Normality: Kolmogorov-Smirnov and Shapiro-Wilk

	Kolmogorov-Smirnov			Shapiro-Wilk		
Class	Statistic	df	Sig.	Statistic	df	Sig.
Pretest Control	.238	28	.000	.877	28	.003
Posttest Control	.220	28	.001	.847	28	.001
Pretest Experimental	.224	28	.001	.893	28	.008
Posttest Experimental	.222	28	.001	.747	28	.000

The results of the normality tests using Kolmogorov-Smirnov and Shapiro-Wilk indicate that the data across all groups—Pretest Control, Posttest Control, Pretest Experimental, and Posttest Experimental—significantly deviate from normal distribution ($p < 0.05$ in all cases). This non-normality suggests that non-parametric statistical methods, such as the Mann-Whitney U test, are more appropriate for analyzing the data, as they do not assume normal distribution.

Table 7
Mann-Whitney U Test Result

	Class	Mean Rank	Sum of Ranks	Sig.
Control v. Exp	Posttest Control	14.50	406.00	0.000
	Posttest Experimental	42.50	1190.00	

This study yielded several noteworthy results regarding the effectiveness of Rosetta Stone in vocabulary acquisition and the role of gender in language learning. Statistical analysis revealed that while both instructional methods led to improvement, the Rosetta Stone application demonstrated significantly higher effectiveness compared to traditional flashcard methods ($p = 5.614e-05$). The experimental group using Rosetta Stone showed substantial progress, advancing from a mean score of 74.57 (SD = 5.245) to 78.14 (SD = 7.342), while the control group using traditional flashcards progressed from 58.29 (SD = 3.989) to 62.43 (SD = 4.122).

Regarding gender differences, an unexpected finding emerged. Despite previous research suggesting significant gender variations in technology-enhanced learning, our analysis revealed no statistically significant difference between male and female performance ($p = 0.71$). Both genders showed comparable improvement patterns, with males ($p = 0.0006126$) and females ($p = 0.00135$) demonstrating similar progress regardless of the instructional method used. This finding challenges existing assumptions about gender-based learning preferences in digital environments.

An interesting anomaly emerged in the score distribution patterns. While the experimental group showed higher overall performance, it also exhibited greater score variability in the post-test (SD increasing from 5.245 to 7.342). This increased variation suggests that while Rosetta Stone was generally more effective, its impact wasn't uniform across all learners. Some students in the experimental group achieved perfect scores (100), while others showed more modest improvements, indicating that individual learning characteristics might play a more significant role than previously anticipated.

The control group, in contrast, maintained more consistent performance patterns, with minimal change in standard deviation (from 3.989 to 4.122) and a narrower score range (52-68). This consistency in the traditional method's results, while showing less dramatic improvement, suggests that conventional teaching methods might offer more predictable learning outcomes across different student profiles.

Discussion

The findings of this study contribute significantly to our understanding of technology-enhanced vocabulary learning and gender differences in language acquisition. This discussion examines our results in relation to existing literature, focusing on three main areas: the effectiveness of technology-enhanced vocabulary learning, gender differences in digital language learning, and methodological implications for future research.

Effectiveness of Technology-Enhanced Vocabulary Learning

The significant improvement in vocabulary mastery demonstrated by both groups, particularly the experimental group using the Rosetta Stone ($p < 0.005$), aligns with several previous studies on technology-enhanced language learning. Namaziandost et al. (2021) found that digital tools significantly enhanced vocabulary retention and engagement among EFL learners, similar to our findings, where the experimental group achieved higher overall performance (mean = 78.14) compared to the control group (mean = 62.43).

However, the increased variability in post-test scores within the experimental group (SD increasing from 5.245 to 7.342) reveals a more nuanced picture that supports Zhang & Zou's (2020) emphasis on learner variability in TELL implementation. This variability suggests that while Rosetta Stone is generally effective, individual learning styles and preferences are crucial in determining its impact.

The experimental group's performance pattern, particularly the achievement of maximum scores of 100 by some students, supports Harper et al.'s (2021) conclusions about Rosetta Stone's potential for facilitating rapid vocabulary acquisition. However, our findings provide a more detailed perspective on the application's effectiveness in an EFL context, which Harper's study did not cover extensively. The wider range of scores in the experimental group (72-100) compared to the control group (52-68) suggests that Rosetta Stone might be particularly beneficial for high-achieving students while potentially creating greater learning disparities within the classroom.

Unlike Lord's (2015) concerns about limited communicative competence in digital language learning environments, our study demonstrates that, at least for vocabulary acquisition, technology-enhanced learning can provide substantial benefits.

Gender Differences and Technology Adoption

One of the most intriguing aspects of our findings is the lack of significant gender differences in learning outcomes ($p = 0.71$). This result contrasts with several previous studies and warrants careful examination. Brown et al.'s (2021) research suggested significant gender variations in technology acceptance and usage patterns, yet our data shows remarkably similar improvement patterns between male and female students in both control and experimental groups.

This contradiction with previous findings, such as Wucherer and Reiterer's (2018) conclusions about gender-specific vocabulary processing patterns, can be understood in light of several contextual factors. One possible explanation lies in the evolving technological landscape. The widespread availability of digital tools in education has potentially narrowed traditional gender disparities in technology adoption, a trend supported by recent research

from Sun et al. (2022). Furthermore, the cultural context of this study, conducted in Indonesia, may reflect unique gender dynamics in technology usage that differ from those observed in Western contexts where much of the prior research has been conducted. Finally, the design of the Rosetta Stone application itself may play a critical role. Its user-friendly interface and inclusive learning methodology could make it equally appealing and effective for both male and female learners, addressing concerns about gender bias in educational technology raised by earlier studies.

The similar performance patterns across genders also challenge Montero-SaizAja's (2021) findings regarding gender differences in language learning strategy use. However, the increased score variability in the experimental group (SD = 7.342) suggests that individual differences, rather than gender, might be more significant in determining learning outcomes with digital tools.

Methodological Implications and Future Directions

Our study addresses several methodological concerns raised in previous research. Unlike Nielson's (2011) workplace study that faced severe attrition issues, our controlled educational setting maintained consistent participation, providing more reliable data about Rosetta Stone's effectiveness. This supports Lin et al.'s (2023) emphasis on the importance of rigorous experimental designs in studying vocabulary learning applications.

The pre-test/post-test design revealed important patterns in learning progression that contribute to Rasti-Behbahani's (2021) work on understanding specific features of digital games that contribute to vocabulary acquisition.

However, future research should explore several avenues to build on these findings. Investigating long-term vocabulary retention would provide valuable insights into whether the benefits observed in immediate learning outcomes persist over time. Additionally, a detailed analysis of specific Rosetta Stone features that most effectively support vocabulary acquisition could guide improvements in application design and instructional strategies. Moreover, examining learner characteristics beyond gender, such as cognitive styles, motivation, or prior digital literacy, could further optimize the integration of technology into language education by tailoring approaches to diverse student needs.

Practical Implications for EFL Teaching

The findings offer several practical implications for English as a Foreign Language (EFL) instruction. Firstly, they underscore the potential of blended learning approaches, where integrating digital tools like Rosetta Stone with traditional teaching methods could enhance outcomes. Secondly, the broader score variability observed in the experimental group highlights the importance of differentiated instruction. Teachers should tailor their support to address varying student needs, offering extra guidance to some while providing enrichment for others. Lastly, the variability in digital learning outcomes emphasizes the need for diverse assessment strategies. Incorporating multiple evaluation methods, as suggested by Sun et al. (2023), can better capture the range of student progress and ensure equitable assessment in technology-enhanced learning environments.

While our study offers valuable insights, it is important to acknowledge its limitations and propose directions for future research. Firstly, the relatively small sample size, confined to a

single school, limits the generalizability of our findings. Expanding the study to include a larger and more diverse sample across multiple schools could provide broader applicability. Secondly, the study's duration primarily focused on immediate outcomes, leaving longer-term vocabulary retention and learning sustainability unexplored. Future research should consider extended timelines to evaluate these aspects. Thirdly, while this study concentrated on vocabulary acquisition, further investigation into how these gains integrate into other language skills, such as writing or speaking, would yield a more comprehensive understanding of digital tools' effectiveness. Lastly, contextual factors, including socio-economic status, cultural influences, and varying levels of technological access, were not deeply examined. Exploring these dimensions could uncover additional variables influencing learning outcomes and inform more equitable instructional strategies.

Conclusion

Our findings contribute significantly to the growing body of research on technology-enhanced vocabulary learning, challenging some existing assumptions about gender differences while supporting others regarding the general effectiveness of digital tools. The results suggest that while Rosetta Stone can effectively enhance vocabulary acquisition, success depends more on individual factors than gender differences.

These insights have important implications for educational technology implementation, suggesting the need for flexible, learner-centered approaches that accommodate individual differences while leveraging the benefits of digital tools. Future research should continue to explore these relationships while addressing the identified limitations to further our understanding of effective digital language learning strategies.

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Advancing Racial Equity and Social Justice: A Case Study of a School District in Canada

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Abstract

In the world of advanced capitalism and growing international migrant populations, countries are becoming increasingly diverse and are therefore required to address the inequality and educational injustice experienced by students of diverse racial, ethnic, or linguistic backgrounds. Canada is no exception to this trend, with an increasing number of students of Aboriginal heritage and nonofficial (English or French) language speakers changing the student population. This study aimed to examine the perceived experiences of school administrators, students, and community leaders in a school district that was undergoing organizational change in advancing racial equity and educational justice. We conducted 39 focus group interviews with students, teachers, and community leaders in a school district in Canada as part of a racial equity environmental assessment and identified key themes in the areas of systemic change, workforce development, and stakeholder engagement. The analysis was supplemented with a review of the school district's historical documents, reports, policies, practices, and procedures. As a result of the school district's commitment to racial equity and educational justice, the opportunity for continued growth beyond the assessment findings was substantial. Despite this, the district faced challenges surrounding the leadership's lack of a coherent strategy to advance racial equity and educational justice, lack of proper communication of its continued commitment to its vision, and limited engagement with students, family, and community members. Given our findings, we present a new conceptual framework that can be used to analyze and advance racial equity and social justice in educational settings.

Keywords: racial equity, social justice, educational justice

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Introduction

As advanced capitalism continues to grow, many countries are faced with a rising international migrant population to meet labor market or population needs. Both migrating and native populations are often faced with balancing their cultural and ancestral identities and heritage with those of their neighbors. To address inequality and injustice, countries are starting to acknowledge and address inequalities in their multicultural populations, focusing on their youngest populations with diverse racial, ethnic, or linguistic backgrounds. Canada is no exception to this trend, with an increasing number of students reporting Aboriginal heritage or fluency in a nonofficial language (English or French). Canada has one of the largest indigenous populations in Western countries. Canadian people of Aboriginal ancestry (First Nations, Métis, and Inuit) are the fastest-growing population in Canada, having grown by over 9% between 2016 and 2021 (Statistics Canada, 2022). In 2016, 38% of all Canadian children under the age of 15 reported at least one foreign-born parent. The frequency of children exposed to or fluent in nonofficial languages is expected to continue to rise (Statistics Canada, 2017). Both trends signal the presence of a growing society that is increasingly diverse and multicultural. While some nations are in the earlier stages of developing a society in which differing groups coexist and blend, Canada has taken several steps to integrate multiculturalism into its societal fabric.

The Canadian government has a strong commitment to multiculturalism, which emphasizes diversity and difference. Such multiculturalism is referred to as a "cultural mosaic" in which people can integrate into Canadian society while keeping, celebrating, and appreciating their diverse identities, cultures, ethnicities, and perspectives. The importance of this mosaic was codified in the Canadian Charter of Rights and Freedom as the Canadian Multiculturalism Act of 1971 and was later established as law in 1988 (Campbell, 2021). In addition, Canada formally acknowledged the profound negative impact of its past Indian residential school policies, according to which children were forced to assimilate into the dominant culture and were subject to abuse and mistreatment; this mistreatment was described by the 2015 Truth and Reconciliation Commission (TRC, 2015). The Commission called for systematic change in education for people of Aboriginal ancestry through improving legislation, policies, resources, and support, and it also called for education for reconciliation through curriculum and teaching to educate all people in Canada about the historical and contemporary experiences and contributions of the First Nations, Métis, and Inuit (Campbell, 2021). While the government formally apologized and accepted all the recommendations made by the commission, the implemented actions have not been adequate to fully address the inequity and injustice experienced by other Black, Indigenous, and People of Color (BIPOC) people (MacDonald, 2020). While truth commissions take the step of identifying and acknowledging the need for societal reforms, they do not provide or change legal structures to shift societal beliefs and pathways to protect marginalized populations (Dancy & Thoms, 2022). One barrier may be the scope and understanding of what equality means for BIPOC people in Canada. Aligning what inclusion and equality mean to all key stakeholders (students, school staff, families, and community members) is vital for creating a foundation on which effective equality practices can be created (Ainscow, 2020a). This can help ensure a more comprehensive approach to addressing systemic inequities and improving student performance across all genders, races, religions, and other multicultural characteristics (Campbell, 2021). Without establishing an agreed-upon baseline of equity related measures for the unique needs of a diverse population, it is challenging to develop effective structures and metrics by which strategies can be implemented in advancing racial equity and social justice.

Addressing Equity in School Settings

The Organisation for Economic Co-operation and Development (OECD) describes equity as follows:

> Equity in education means that schools and education systems provide equal learning opportunities to all students. As a result, during their education, students of different socio-economic statuses, genders, or immigrant and family backgrounds achieve similar levels of academic performance in key cognitive domains, such as reading, mathematics, and science, and similar levels of social and emotional well-being in areas such as life satisfaction, self-confidence, and social integration. Equity does not mean that all students obtain equal education outcomes, but rather that differences in student outcomes are unrelated to their background or to economic and social circumstances over which students have no control. (OECD, 2018)

While a wealth of research has examined educational equity in Canada and other parts of the world, educational equity remains a complex and multifaceted topic for schools and their governing bodies to absorb and integrate into school systems (Sahlberg & Cobbold, 2021). One reason for this is that, at times, an equal distribution of resources may not effectively lead to improvements in the educational equity of all children. Children of less advantaged backgrounds may require potentially more resources than those from more advanced backgrounds due to their varying needs, and the lack of these resources can lead to students dropping out of school and not reaching their full potential (Ainscow, 2020b). As a result, the equal distribution of resources may not necessarily contribute to the student outcomes that the OECD aspires to achieve through its concept of educational equity (Levinson et al., 2022).

In this paper, we discuss educational equity from the lens of racial equity and social justice and describe a conceptual framework for advancing racial equity and social justice in educational settings through a case study of a school district in Canada. Using the Racial Equity Environmental Assessment previously conducted by Racing to Equity (RACING TO EQUITY) as a case study, we focused on the methods through which racial equity and social justice frameworks can be applied to educational settings. While RACING TO EQUITY's project examined a single school district in British Columbia, Canada, this paper details how a racial equity environmental assessment can be used as a guide to implement and track measurable changes in well-being and school outcomes for students of diverse backgrounds (known as Black, Indigenous, and People of Color, or BIPOC). Furthermore, we describe a conceptual framework based on three pillars—system change, internal stakeholders, and community relationships—and explore how schools can track their progress across the pillars over time.

Racial Equity Environmental Assessment

The Racial Equity Environmental Assessment (REEA) is a comprehensive, data-driven tool used by school districts and educational institutions to evaluate and address the systemic barriers and biases that impact student academic achievement, particularly for students of different racial and ethnic backgrounds. The purpose of the REEA is to apply a research-based framework to deeply analyze how a school district's policies, practices, climate, and culture affect student outcomes; the focus is on racial equity, social justice, and inclusive educational practices. In addition, it examines both explicit and implicit biases, inequities in resource allocation, disparities in opportunities and access, disciplinary practices, and the

overall educational environment for BIPOC students. Conducting an REEA typically involves the collection of both quantitative (e.g., student achievement data, discipline records) and qualitative (e.g., focus groups, teacher surveys, student interviews) data, engaging a wide range of stakeholders, including educators, administrators, students, families, and community members. The goal is to critically examine the practices that perpetuate inequality and contribute to opportunity gaps, particularly for historically marginalized racial and ethnic groups. The assessment is often structured around several key areas:

1. **Curriculum and instruction**: Evaluating whether the curriculum is culturally relevant and reflects the histories, experiences, and contributions of diverse racial and ethnic groups. For example, a district might assess whether the literature studied in English Language Arts classrooms includes works by authors from historically marginalized communities or whether the math curriculum includes real-world applications relevant to diverse student populations.
2. **Disciplinary practices**: Analyzing whether disciplinary policies disproportionately affect students of color, leading to higher rates of suspension, expulsion, and other punitive actions. For instance, research has shown that Black students are more likely to face harsher discipline for subjective infractions, such as "disruption" or "disrespect," which may disproportionately impact their academic outcomes.
3. **Staff diversity and professional development**: Assessing the racial diversity of school staff and evaluating whether educators receive adequate professional development to effectively support students from diverse racial and ethnic backgrounds. For example, districts may analyze the racial composition of faculty in advanced placement or honors programs and assess whether professional development in culturally responsive teaching is offered districtwide.
4. **Student support services**: Investigating whether support services (e.g., counseling, special education, gifted programs) are equitably accessible and culturally competent. For example, a district might look at whether students of color are underrepresented in gifted education programs or whether special education services are disproportionately assigned to Black and Latino students.
5. **School climate and culture**: Examining the school environment to ensure that it fosters inclusivity and belonging for all students. This includes assessing the prevalence of racially discriminatory behavior, student–teacher relationships, and the physical environment (e.g., representation in school décor and extracurricular offerings). A positive school climate is one in which every student feels that their culture, identity, and experiences are valued and respected.

Importance of Conducting an REEA

1. **Complying with legal and social expectations**: Legal and societal expectations increasingly demand that school systems address racial disparities and create inclusive environments for all students. An REEA helps school districts comply with these expectations while taking a proactive stance on racial equity and social justice. For example, recent federal and state education policies in the U.S. emphasize closing achievement gaps and ensuring equitable access to educational resources for all students. Conducting an REEA allows districts to stay ahead of these mandates and take action to create positive change.
2. **Fostering equity-minded Leadership**: The process of conducting an REEA requires educational leaders to engage deeply with issues of power, privilege, and bias—both in themselves and in the systems they oversee. This reflection helps leaders become

more equity-minded and better equipped to lead systemic change. For example, a district that provides training on implicit bias for administrators and teachers helps them recognize how their own biases may affect their interactions with students. When leaders are committed to racial equity, they can better champion inclusive practices and policies that promote educational success for all students.

3. **Addressing systemic inequities to improve student academic achievement**: Historically, school systems in the U.S., Canada, and many other countries have been shaped by exclusionary policies and practices that reinforce racial disparities in student outcomes. These inequities are often reflected in achievement gaps, disproportionality in disciplinary actions, and unequal access to high-quality academic resources and programs. For example, a study might reveal that schools in predominantly Black or Latino neighborhoods have fewer AP course offerings or less access to advanced technology, creating barriers to student success. Conducting an REEA helps uncover these systemic issues so that they can be addressed through targeted and strategic interventions.
4. **Creating a more inclusive and supportive school environment**: A racially equitable school environment creates a sense of belonging for every student, regardless of race or ethnicity. Addressing exclusionary practices, implicit biases, or discriminatory behaviors creates a psychologically safe learning environment in which all students can thrive. For example, a district that implements restorative justice practices in response to discipline issues not only addresses racial disparities but also creates an environment where students feel empowered to engage in open dialog and build stronger relationships with peers and educators.
5. **Promoting a positive school climate**: Schools that actively assess and address racial equity tend to have more positive climates. This translates into lower rates of student absenteeism, fewer incidents of bullying, and reduced racial conflicts, which contribute to better academic performance and social–emotional outcomes. For instance, research has demonstrated that schools with inclusive curricula and equitable disciplinary practices experience fewer behavioral problems and higher student engagement. A positive school climate also encourages greater family and community involvement, which further supports student success.
6. **Building trust with families and communities**: BIPOC families often feel alienated or marginalized by school systems that fail to meet their children's needs. By conducting a racial equity assessment, school districts can demonstrate a commitment to addressing the specific needs of historically underrepresented groups, helping to rebuild trust. For example, a district that actively involves BIPOC parents in the assessment process—through surveys, town halls, and focus groups—shows that it values their input and is invested in creating a more inclusive educational environment.
7. **Improving academic outcomes for all students**: While an REEA focuses on identifying and addressing the barriers facing students of color, it also provides a broader understanding of how systemic inequities affect all students. For example, the lack of a culturally relevant curriculum or inequitable access to advanced coursework not only harms students of color but also limits the academic growth of nonminority students. By correcting these inequities, schools can foster a more equitable learning environment that benefits every student, not just those from historically marginalized groups.

Conducting an REEA is an essential process for school districts aiming to identify and address systemic inequities that hinder student success. It provides a comprehensive

understanding of how policies, practices, and school culture contribute to disparities while offering actionable steps for creating more equitable and inclusive educational environments. By committing to long-term systemic change, districts can create schools in which every student, regardless of their racial or ethnic background, has an equitable opportunity to succeed and thrive.

Data-Driven Equity and Social Justice Approach

There have been tremendous efforts in North America to address racial equity for organizations through the Diversity, Equity, and Inclusion (DEI) approach. According to Pinkett (2023), diversity is defined as the range of human differences and the representation of people within organizations; equity refers to fairness and equality in outcomes and choices; and inclusion is defined as involvement, empowerment, and action. These three concepts are related to belongingness, where people in organizations can feel valued, heard, and accepted. Furthermore, "justice" is defined as "dismantling barriers to resources and opportunities in society so that all individuals and communities can live a full and dignified life" (Pinkett, 2023, p. 29). Dr. Pinkett developed a data-driven diversity, equity and inclusion approach that allows individuals and organizations to use data to measure, analyze, and improve diversity, equity, and inclusion. This data-driven approach derives inspiration from the Global Diversity, Equity, & Inclusion Benchmarks (GDEIB) model. GDEIB provides a comprehensive framework for advancing DEI in organizations across sectors and industries of all sizes. This model, in particular, offers a universal, adaptable approach to guide diversity efforts effectively and to measure progress toward organizational goals with 16 measurable categories (Pinkett, 2023).

Data and Methodology

The goal of this study was to develop a conceptual framework that can be used to examine and advance racial equity and social justice in various educational settings through a case study of a REEA. The research team reanalyzed the findings from 39 listening circles of students, teachers, educators, leaders, families, and community members and developed recommendations from an REEA conducted in a school district in Canada (Racing to Equity, 2021). We compared key themes identified in the findings from the qualitative data with measurable metrics and outcomes developed by Pinkett (2023) in the data-driven racial equity and social justice (RESJ) approach and identified the following three pillars for advancing racial equity and social justice in school settings: 1) systemic change (school district leadership, policy, curriculum, and teaching); 2) internal stakeholders (teachers and school staff); and 3) community relationships (youth, family, and community). In the following section, we further describe each pillar.

Systemic Change

We identified the following themes that were discussed by stakeholders as critical factors for implementing changes at the systemic level described as systemic change: a) leadership commitment to racial equity and accountability; b) a racially and linguistically diverse student population; and c) a school climate that addresses explicit racism. These themes aligned with the following categories in Pinkett's data-driven RESJ approach: 1) vision, strategy, and impact, in which school districts develop a charter, a school board statement, and a strategic plan that addresses racial equity and social justice; 2) leadership accountability, which includes activities such as the development of an internal or public-facing scorecard or

dashboard that tracks outcomes related to RESJ, as well as objectives and goals that are tied to leadership compensation; 3) structure and implementation, which includes the development of an RESJ council, committee, taskforce, and champions program, all of which focus on developing diverse and equitable leadership; and (4) sustainability, which focuses on the development of an RESJ-based environmental, social and governance plan, a social, community and environmental investment plan, and the development of RESJ benchmarking, metrics, and key performance indicators (Pinkett, 2023).

From REEA, we learned that central leadership in the district expressed a strong commitment to racial equity. For example, they created the Annual Anti-Racism and Cultural Sustaining Pedagogy Symposiums for district educators, and as of 2022, over 3000 teachers and staff have participated. The leadership also created strong community partnerships with the district parent advisory council and Aboriginal communities. Although these steps were taken to address inequities and strengthen community bonds, some community stakeholders, such as parents and students, felt that the leadership did not effectively communicate its strategies to address racism and social injustice. The level of diversity within the school district's leadership was also called into question. Second, of the more than 74,000 students of diverse racial, ethnic, and linguistic backgrounds in the district, about 4% of students had Aboriginal ancestry (First Nations, Métis, and Inuit), with the majority speaking languages other than English at home. Of the 150 languages spoken among the students, the top five were Punjabi, Tagalog, Mandarin, Hindi, and Arabic. Third, the district had not yet developed a school climate that did not tolerate verbal aggression toward students of diverse backgrounds. The continuous and pervasive use of the most damaging slur for Black Canadians was discussed in the listening circles.

Internal Stakeholders

For internal stakeholders, our focus was on teachers and school staff, and workforce development, and the following key themes identified in the environmental assessment: a) the school staff's commitment and increased capacity to address RESJ; b) staff diversity; and c) investment in staff training. Internal stakeholders aligned with six categories identified in Pinkett's data-driven RESJ framework: Staff Recruitment, focusing on diversity recruiting, diverse interview panels, diverse interview slates, and inclusive hiring strategies; advancement and retention, focusing on RESJ human resource policies and practice evaluation, mentorship, allyship, or group-specific diverse leadership development programs; job design, classification, and compensation; work, life, integration, flexibility, and benefits that promote work-life balance; learning and development, focusing on RESJ learning and development, coaching, courageous conversation, and micro-commitment; assessment, measurement; and research, focusing on inclusive recruitment and workforce diversity and state retention and empowerment (Pinkett, 2023).

All the teachers and staff members who participated in the interviews agreed with the statement that the district should focus on advancing educational equity and social justice for each and every student. Internal stakeholders also discussed the district's progress toward equity and inclusion of students with disabilities. Staff members expressed their desire to learn how to better communicate and develop strategies that could lead to improved engagement with their students. Aboriginal stakeholders also discussed the school staff's inability to have conversations about Canada's history, which includes both Indigenous and non-Indigenous people.

Staff diversity was another recurrent theme that arose. BIPOC parents in particular felt that there was a need for greater representation among staff. As a result of their underrepresentation, there was also a lack of safe space for BIPOC educators and staff to discuss their experiences of racism and microaggressions. Many BIPOC educators and staff did not feel respected, honored, or included as professionals, and they did not feel comfortable initiating discussions to address their experiences of racism and microaggression within the school.

Finally, investment in staff training was another common theme discussed regarding internal stakeholders. Educators and staff pointed out the need for mentorship, training, and career opportunities, although the leadership neither communicated with staff about available resources nor incorporated RESJ training as part of the overall staff training. Furthermore, regarding RESJ training, the BIPOC staff members were unsure of the efficacy of training in light of "performative allyship"[1] and emphasized that: "having authentic outcomes is a huge part of the work." Other comments included: "How do I put myself out there and let people know that I want to have that dialogue, but I may not be able to do so without saying something wrong or unintentionally upsetting someone?" Another mentioned "I want to talk about it, but I want to be sure that the words and language I'm using are appropriate." School staff also reported: "We need more training, including clerical staff—anyone that interacts with families and students" (Racing to Equity, 2021, pp. 12-13).

Community Relationships

Community relationships addressed RESJ work in relation to the community stakeholders who are served by the school district, including students, family members, community leaders, and community-based organizations that work with the school district. Key organizational assessment themes were a) community stakeholders' partnership with schools, teachers, and staff; b) comprehensive support for students' socioemotional well-being and academic achievement; and c) subtle acts of exclusion that students and parents experience. In Pinkett's data-driven framework, community-related categories included Communication on the development of an RESJ communications plan; community relations; development of equity-centered curriculum, student services, and programs; community engagement to evaluate multicultural messaging, and RESJ student service training; responsible sourcing that includes the development of a group-specific contract development program that designs and delivers a contract training program for minority or women-owned businesses (Pinkett, 2022).

During the interviews, community stakeholders expressed a strong desire to work closely with school leadership and teachers. At the same time, some of the interview participants also reported challenges in developing a partnership with the school due to differences in cultural norms or language barriers. One respondent mentioned, "It's been a challenge for other people mainly related to expression or lack of that expression. Stems from those basic issues—language barrier or somehow a disconnect with the school or parents' lifestyles" (Racing to Equity, 2021, p. 17).

Families reported a sense of confidence in the level of support services the community could provide should their children require additional attention:

[1] "Performative allyship" occurs when an individual from a privileged or majority (e.g., white, straight, abled) shows their support of and/or solidarity with disadvantaged or marginalized groups in a way that is not helpful to the group.

> 'I really feel that you know in regards to emotional, social support in the journey with [the] district that if my granddaughters had any kind of barriers or blocks or any kind of experience, whether it's mental wellness, their own personal mental wellness or an experience that really affected them, that all the staff involved would act without any judgment, without any stigma.' Another parent mentioned: 'Each of my boys have a one-to-one support worker to help them with their academics and social skill building, and when I have concerns academically, they address them. They don't ignore it.' (Racing to Equity, 2021, p. 17)

Despite positive reporting on the school's comprehensive socioemotional support, community stakeholders also reported "the subtle act of exclusion," defined by Jana and Baran (2023, p. 1) as:

> Subtle, confusing, insidious things that people say and do that end up excluding people with marginalized identities. This happens even though, for the most part, people are not intending to exclude others at all. In fact, it's quite the opposite. They may be trying to compliment someone or learn more about a person or be funny or build closeness. These are called microaggressions.

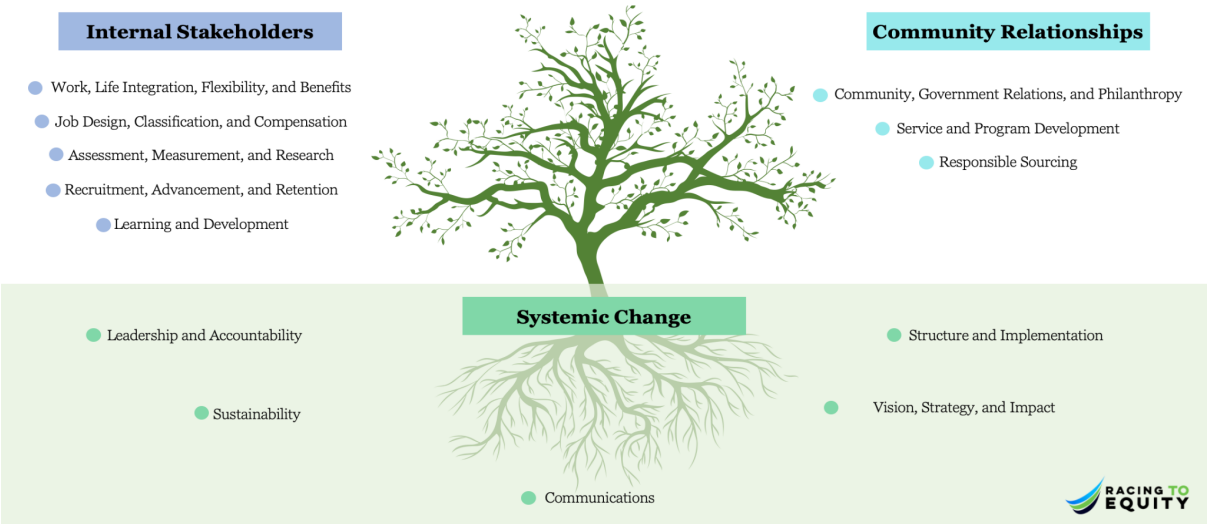
Community stakeholders reported experiences of language-based inequity through discrimination or barriers due to English fluency. Moreover, exclusion through mispronunciation of names and a focus on White Western culture and perspectives that value individualism as a prefe'rred school value were cited as deeper-seated methods of exclusion.

> 'My older son has a really hard time with the teachers pronouncing his name. Kids would feel more connected to their teachers if the teacher takes the extra time to learn how to pronounce their names.' A parent elaborated that her 18-year-old child 'was told she doesn't have to live with me. She could continue to go to school, and they can support her.' (Racing to Equity, 2021, p. 17)

Based on the findings, we developed the following conceptual framework.

Figure 1

A New Framework for Racial Equity and Social Justice (RESJ) in School Settings



Systemic Change

Systemic change is represented as the roots of the visualized tree, symbolizing the foundational elements necessary to build a strong RESJ initiative. These elements are critical for the effective operation of all other groups and categories. Systemic change includes the following categories of Pinkett's data-driven metrics:

- **Vision, strategy, and impact:** Developing a strong rationale for an RESJ vision and a strategy that aligns with the organizational goals of schools and school districts.
- **Leadership and accountability:** Holding schools and school district leadership accountable for implementing the school's or school district's RESJ vision, setting goals, achieving results, and serving as role models.
- **Structure and implementation:** Providing support and a visible structure with authority and a budget to effectively implement RESJ initiatives.
- **Sustainability:** Connecting a school's or school district's RESJ and sustainability initiatives to increase the effectiveness of both.
- **Communications:** Making communication clear, simple, and a crucial force in achieving the school's or school district's RESJ goals.

Internal Stakeholders

Internal stakeholders are represented as one of the branches of the visualized tree, focusing primarily on strengthening policies, systems, and processes that can best support the workforce. Internal stakeholders include the following categories of the data-driven RESJ approach (Pinkett, 2023):

- **Recruitment, advancement, and retention:** Ensuring the attraction, sourcing, and recruitment of teachers and school staff are conducted through an RESJ lens, and further integrating RESJ into talent development, performance management, advancement, and retention strategies of teachers and school staff.
- **Job design, classification, compensation:** Evaluating school job design and classification for bias and ensuring equitable compensation.
- **Work–life integration, flexibility, and benefits:** Achieving work–life balance, flexibility, and equitable benefits that are widely accessible and available for teachers and school staff.
- **Learning and development:** Educating all teachers and staff about RESJ to create the confidence and competence needed for an inclusive organization.
- **Assessment, measurement, and research:** Ensuring evaluation and data-driven insights to inform and guide RESJ strategies.

Community Relationships

Community relationships are represented as another branch of the visualized tree, emphasizing how the organization offers services and interacts with its communities, students, and caregivers. Community relationships include the following data-driven RESJ categories:

- **Community, government relations, and philanthropy:** Proactively working with students, caregivers, community leaders, local government agencies, the private sector, and philanthropic organizations.
- **Service and program development:** Embedding RESJ into school-based services, and programs to serve all students, their caregivers, and community leaders.
- **Responsible sourcing**: Practicing responsible and ethical sourcing and contracting while developing and nurturing underrepresented communities.

Conclusion

In this paper, we used a racial equity environmental assessment in a Canadian school district as a case study and described a conceptual framework for advancing racial equity and social justice in school settings. We found that as a result of the school district's commitment to racial equity and educational justice, the opportunity for continued growth beyond the assessment findings was substantial. However, the district faced challenges surrounding the leadership's lack of a coherent strategy to advance racial equity and educational justice, lack of proper communication of its continued commitment to its vision, and limited engagement with students, family, and community members. We identified three pillars: systemic change, internal stakeholders and community engagement that are critical drivers for racial equity and social justice, and our framework uses Pinkett's data-driven data metrics to determine three pillars based on key themes identified through interviews with stakeholders in the school district. This new framework describes how school districts and educational organizations can analyze, measure, and improve racial equity and social justice, where people in the district have a sense of belongingness. This framework has the potential for wider application in various school and county settings for assessing, analyzing, and advancing educational justice, as the core principles of racial equity and social justice are universal. The limitation of our study is that it is based on a case study of a school district in Canada, and future research can further evaluate the effectiveness of this newly developed conceptual framework in other educational or country settings.

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Will I Share This With My Teammates? Knowledge Sharing Among Pre-service Teachers in Vietnam

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Abstract

Interdependence and common goals are often emphasized over other social standards in a collectivist community. Under this influence, pre-service teachers in Vietnam typically engage in group-based activities as part of their training to benefit from the collective knowledge. Knowledge sharing has long been known to improve the quality of teaching and is a vital component of education. According to previous research conducted at higher education institutions, intention to share was strongly correlated with social factors and situational cues. The present study investigated this experience among pre-service teachers to explore how they share knowledge in group settings and how various factors influence their decision to share. Data was collected through semi-structured interviews with 13 pre-service teachers. The findings revealed that they are more likely to share knowledge when they perceive personal benefits from doing so. How the sharing behavior itself was carried out could differ: commonality among group members and confidence in one's knowledge was identified to be necessary for the participants to share their “know-what” information; job characteristics as future teachers, on the other hand, inclined them more toward sharing “know-how” information rather than comprehensive knowledge all at once. The findings suggest that individual factors may influence how knowledge is shared among teammates, even when knowledge sharing is anticipated. It highlights the need to focus more on the decision-making processes behind knowledge sharing to maximize its benefits.

Keywords: knowledge sharing, decision-making process, preservice teachers

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Introduction

Knowledge sharing is essential for learning and professional development, especially in educational organizations (Fan & Beh, 2024; Iqbal, 2021; Zamiri & Esmaeili, 2023). Among pre-service teachers, sharing knowledge occurs through social interactions with peers, mentors, and instructors during their training. In the beginning, research about knowledge-sharing mostly focused on how to make people share what they know. But in recent years, the focus has changed to understanding how people find useful knowledge, especially in informal situations.

Some studies look at how willing a person is to share knowledge and show that a person's intention plays an important role. However in teaching practicums, sharing knowledge is not always so simple. Apart from formal learning in the classroom, pre-service teachers also share knowledge in informal ways, such as casual talks, observing each other, working together on projects, or talking about experiences they had. These ways of sharing depend on who is involved, how much they trust each other, and the situation of each practicum.

Because of this, knowledge-sharing often means people have to decide what to share, how much to say, and if the other person is ready to hear or use the information. For instance, a pre-service teacher may hesitate to share a classroom strategy unless they perceive the other person as nonjudgmental, or they might adjust what they share based on contextual signals. It becomes more of an open and adaptable process this way, always changing based on the people involved and the situation they're in.

To better understand this complexity, notable researchers have used the Theory of Planned Behavior (TPB) and Social Capital Theory (SCT). TPB, which was proposed by Ajzen (1991), focuses on individual decision-making and explains knowledge-sharing behavior based on people's attitudes, social expectations, and sense of control (Charband & Navimipour, 2018). Meanwhile, SCT, popularized in the late 20th century, pays attention to how trust, shared values, and relationships within networks can influence whether and how people share knowledge (e.g., Asrar-Ul-Haq & Anwar, 2016; Cai et al., 2020; Han et al., 2020).

This study builds on those ideas by looking at how a group of pre-service teachers made decisions about sharing knowledge during their practicum experiences. Instead of aiming to prove a specific theory, the study explores how these teachers evaluated, filtered, and decided what to share while working with peers. In doing so, it aims to add to the growing body of work that sees knowledge sharing not just as an individual action, but as something deeply shaped by social and contextual factors.

In this study, a pre-service teacher is defined as someone who is currently enrolled in a program for teacher preparation or training and to acquire the essential set of skills and knowledge to become a certified teacher (Chand et al., 2022).

Methods

To understand the individual decision-making process when engaging in knowledge sharing and explore the factors attributed to the outcome i.e. the act of sharing, this present study adopted a qualitative approach. Data was collected through semi-structured interviews with the assistance of a brief questionnaire to collect descriptive information.

Participating Organization

The study was conducted at a university of education located in Hanoi, Vietnam. This institution is among the national normal universities designated by the Ministry of Education of Vietnam as a key center for teacher education. Its main training areas include education science and teacher training, humanities, social and behavioral sciences, life science, mathematics and statistics, social work, hospitality and sports management. Since the study focused on the phenomenon of sharing among pre-service teachers, only students majoring in teacher training programs were included.

Procedure

In this study, the data collection was conducted in four stages.

Stage 1.

Questionnaire Development

We divided the interview questions into two sections that were (1) a set of questions about the nature of their major, specifically training activity, coursework, and past and present group projects, and (2) a hypothetical scenario aiming to explore the factors influencing their decision-making process upon the request to share knowledge. The given question was:

Imagine that you are in the teaching practice and are part of a pre-service teacher group preparing lesson plans for K-12 classes.

- What would you do if a team member asked you to share your knowledge e.g. resources, information, experience, documents relevant to the lesson plan you all are assigned to prepare individually?
- Could you elaborate on your process of making that choice?

Explanatory questions were posed during each participant's explanation to help gain insights into the reasoning behind their responses.

Questions Validation

Two senior students and one faculty member voluntarily reviewed the questionnaire. One student was from the department of mathematics while the other was from the department of literature. The faculty member involved in this process was also a researcher familiar with the targeted research subject. They helped review the wording of each question and increase overall clarity. The researchers then used their suggestions to revise and finalize the questions.

Stage 2.

Participant Recruitment

We reached out to coordinators of each department offering teacher training majors and asked for their support in distributing the invitation to join the research to their students. We received student responses from 12 of 21 departments, with 75% showing initial interest. These students then received an email attached with an information form aiming to collect

contextual data and schedule interviews. At this step, only 31 students confirmed their participation and showed up, with personal issues cited as the primary reason for non-attendance.

Participant Background Survey

In the pre-interview information form, the students were given certain demographic questions and provided information regarding:

- the frequency of participating in knowledge-sharing activities;
- the types of knowledge they often are asked to share and/or request others to share;
- the formats in which the knowledge being shared (e.g., speech, documents, text);
- the people they mostly share the knowledge with.

Stage 3.

Data Collection

The semi-structured interview with the students began with a set of questions about the characteristics of their major concerning training activities, coursework, and current and previous group projects. The aim was to verify the information gathered in the initial stage and to grasp the general concept of their knowledge-sharing practices in real life.

The second set of questions was based on a hypothetical situation coming from a teacher-familiar experience, which is preparing lesson plans. The interview questionnaire then focused on exploring four pillars:

- willingness to share, concerning the conditions under which they are willing to share knowledge and resources with their peers;
- the motivations and considerations that drive their decisions to share or withhold information;
- the influence of social dynamics on the act of sharing knowledge;
- the social anxiety or concerns that may arise during the sharing process.

The advantage of using a hypothetical setting is to reduce the students' memory bias and encourage them to focus on their decision-making process. During the interviews, additional questions were used to invite more experience elaboration.

The interviews were conducted and recorded by the researchers, then transcribed using qualitative analysis software along with human effort from the researchers. Each group interview was scheduled to last 45 minutes. Although some ran longer.

According to Bryant and Charmaz (2007; as cited in Hennink and Kaiser, 2021), data collection can cease when saturation occurs, meaning no new insights or further development in their characteristics, dimensions, and relationships. After 13 interviews, because the identified categories did not develop further, we decided to end the data collection. The number of interviews conducted in this study falls within the range identified by Hennink and Kaiser (2021) as being likely to yield data saturation. The information of the participants can be found in Table 1.

Table 1
Demographic Data of the Participants

No	Gender	Department	Year
1	Female	Information Technology	Sophomore
2	Female	Psychology-Education	Senior
3	Female	Psychology-Education	Senior
4	Male	Information Technology	Junior
5	Female	History	Senior
6	Male	Literature	Junior
7	Female	History	Senior
8	Male	Special Education	Freshman
9	Female	Literature	Senior
10	Female	Special Education	Junior
11	Male	Mathematics	Sophomore
12	Male	Biology	Sophomore
13	Male	Biology	Freshman

Stage 4.

Data Analysis

All the interviews were transcribed, open-coded, and categorized for data analysis. The researchers then took Corbin and Strauss's (2008) technique, generating significant themes through continual comparison. The research participants were then asked for their opinions on the preliminary findings. We revised the theme based on their feedback and determined the factors involved in the four pillars that were mentioned in stage 3.

Findings

The results of this study were summarized into a four-stage model illustrating the factors involved in the decision-making process about sharing information in group situations (see Figure 1). They generally supported earlier studies, emphasizing that knowledge sharing is a complex process influenced by contextual, interpersonal, and social aspects (e.g., Asrar-Ul-Haq & Anwar, 2016; Charband & Navimipour, 2018; Wang & Noe, 2010; Zamiri &

Esmaeili, 2023). In other words, it is not a simple act, but rather a tactical process with several layers that influence the final decision.

Self-Perceived Benefits as a Motivator to Share

Many pre-service teachers in our study initially motivated to share knowledge because they believed it would benefit them personally or professionally (see Table 1). Sharing was perceived by some participants as a way of showing competence and collaboration and to make a positive impression. This perspective is in line with earlier studies that found that self-worth, reciprocity, and reputation are personal benefits that encourage people to share information (Amayah, 2013; Safa & Solms, 2016; Sedighi et al., 2016; Yan et al., 2016).

This discovery is directly related to the TPB (Fauzi et al., 2023; Hosen et al., 2022; Nguyen et al., 2019), namely the impact of attitudes toward behavior. Participants who believed that sharing knowledge resulted in beneficial consequences were more likely to feel comfortable doing so. For some, social expectations supported their positive attitude: when their peers recognized their expertise, it became something they were proud of and wanted to share.

This phenomenon can also be understood through the lens of Social Exchange Theory (Li, 2015; Yan et al., 2016; Zhao & Detlor, 2021), which states that people share knowledge when they believe it will result in future benefits, such as stronger interpersonal relationships and opportunities to receive help in return. In the interviews, some participants even said they saw knowledge sharing as a chance to receive professional feedback and build connections, showing that these perceived benefits significantly impacted their commitment to share.

Figure 1

Decision-Making Process in Group Knowledge Sharing

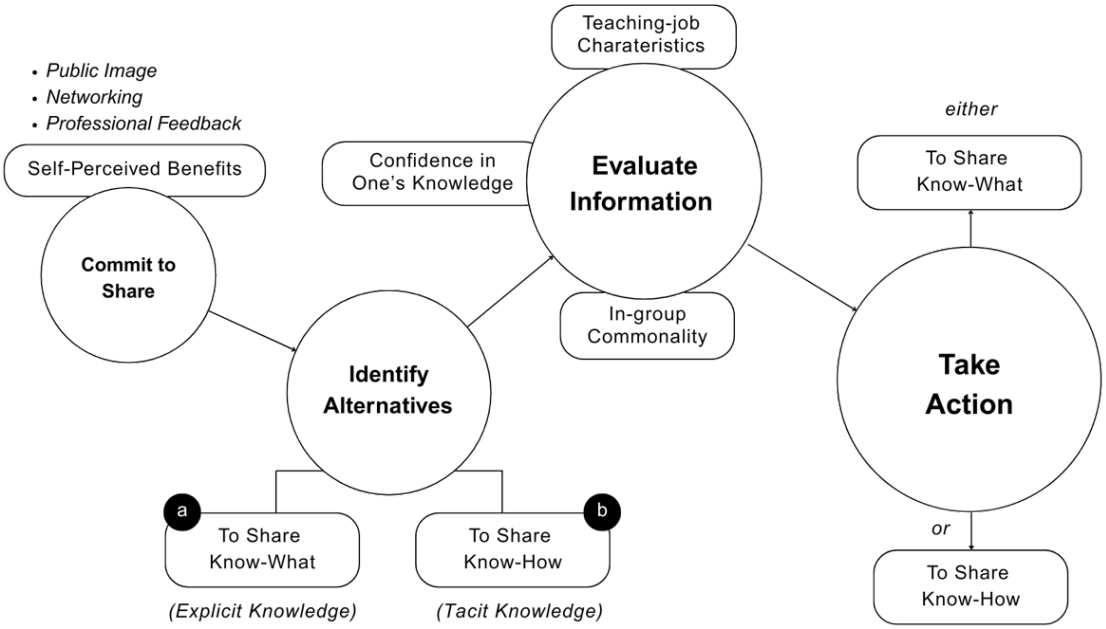

Table 2
Thematic Summary Table

Emerging Theme	Description	Excerpts From Interviews
Self-perceived benefits	Participants highlighted several personal and professional benefits of participating in knowledge sharing. These included improving their public image, making social relationships, and receiving constructive comments that would benefit their teaching abilities.	"It helps me make a good impression on people. That's also why I decided to take the time to respond positively to their requests." "I want to create the impression that I'm knowledgeable and willing to share with everyone." "I use knowledge-sharing as a way to foster good connections." "Sharing information is also a way to practice communication skills." "It's also an opportunity to exchange professional expertise."
Commonality among team members	Sharing explicit knowledge became more comfortable and open when participants felt a sense of alignment among their teams, such as similar teaching styles, common goals and experiences, or personalities.	"I'd prefer my team members to have the same level of expertise or teaching experience as I do for me to share my lesson plans with them." "It would be more comfortable to share, in the sense of without holding anything back, when the team shares similar personality traits." "I feel comfortable sharing my work in a group where everyone believes we're here to contribute to the group's work, as long as we have a collaborative attitude and support one another." "My lesson plan might suit my students or my teaching style, but it might not work for others."

Table 2
Thematic Summary Table (continued)

Emerging Theme	Description	Excerpts From Interviews
Confidence in one's knowledge	Participants stated that their trust in their own expertise was directly related to their readiness to share what they knew. Confidence promoted openness, while uncertainty often resulted in selective or limited sharing.	"If I'm confident in my knowledge, I can share it as a whole without hesitation. Otherwise, I'll admit that I'm not sure about it." "If I'm not very familiar with the materials I'm working on, I don't feel confident sharing it. Instead, I'd just share where I found the sources so they can look into it themselves."
Teaching-job characteristics	Participants' approaches to knowledge sharing were influenced by their perception of what makes effective teaching. Instead of providing direct answers, they preferred to demonstrate the thought processes involved and foster critical thinking in others.	"Sharing knowledge isn't just about telling everything you know. I prefer to give them instructions or explanations of how I came up with the ideas so that they could apply similar logical steps to work on their own." "Teaching is about communicating knowledge, not forcing it on others … That's why I don't always immediately share ready-to-use answers." "Learning *how* is better than memorizing *what* … that was my approach when sharing my knowledge with my peers." "I'd rather guide them through my thinking process … than instantly give them the answers."

Knowledge Types: Know-What and Know-How

The process continued with Step 2, where participants identified the available alternatives, particularly the types of knowledge they had available to share.

In the scenario given to the participants, when asked to share a lesson plan, two types of knowledge emerged from their responses: *know-what* (in an explicit form, i.e. the documents directly contributed to the final lesson plans or a "ready-to-use" lesson plan itself) and *know-how* (in a tacit form, which was more experience-based, requiring further explanation from

their side and/or adaptation from the peers' point of view). At this step, our background as lecturers helped us better grasp the participants' experience.

According to Bergquist et al. (2001), many researchers find tacit information more difficult to express, whereas explicit knowledge, which has already been transformed into guidelines and concrete files easier to communicate. Interestingly, participants in the present study reported feeling more at ease sharing *know-how* knowledge; however, sharing the *know-what* required a deeper level of social capital between the participants and their peers. This contrast emphasizes the complexities of knowledge delivery, especially in contexts where stakeholders are still developing professional identities–in this case, future teachers.

The findings from this step have shifted the conversation from exploring factors influencing the decision to share to understand how each of them leads to a specific sort of knowledge.

Factors Affecting the Choice of Sharing

Step 3 focused on the internal evaluation of the social and contextual cues influencing how pre-service teachers decide *what they choose to share*. This includes the level of trust, perceived expectations from the peers, or the social setting.

Confidence in the Possessed Knowledge

Confidence in knowledge is a fundamental factor in sharing explicit knowledge, particularly content like lesson plans that can be evaluated, critiqued, or compared. Participants in this study said they were more inclined to openly share their *know-what* when they were confident in the validity, clarity, and relevance of what they had developed.

Insecure individuals like Le and Lo tend to hide knowledge or refer their peers to secondary sources they used when creating lesson plans than to show the final work. Le said:

> A written lesson plan is easily criticized by others, unlike personal experiences or general tips. Therefore, if I am not confident in the accuracy or quality of my lesson plan, I would prefer not to share. I don't want to be judged. (Le, senior pre-service teacher, August 15, 2024)

According to T. Tran, Bui, Vu, and Q. Nguyen, who described themselves as experienced in teaching practices, the higher the confidence they felt, the more likely they took ownership of their teaching ideas and decisions. As a result, it made them more willing to stand behind their *know-what* and share it with others. T. Tran further explained, "The lesson plan is my original work… [it] reflects my unique thoughts and styles,... [so] I don't mind sharing the entire document if requested. No matter what, others will notice it's mine" (August 16, 2024).

The interview findings demonstrated that sharing knowledge might serve as a way to confirm a person's professional identity in learning communities such as the one in this study, which includes pre-service teachers. While confident individuals see sharing knowledge as an opportunity to showcase their skill and earn respect within their peer group, those who lack confidence in the knowledge they had may hesitate. This is due to the concern that it will reflect negatively on their teaching abilities or harm their professional image.

In-Group Commonality

Participants in this study reported that it was easier to share explicit knowledge when they had a strong feeling of commonality with their peers. According to them, this connection came from similar teaching techniques and experiences, shared goals, and even matching personalities.

First, the participants use of the word "similar teaching styles" refers to similarities in instructional choices, classroom tactics, or pedagogical theories. The pre-service teachers in this study highlighted that differences in teaching styles would pose a barrier for others to understand the lesson plans they had been developing, “thus, they may not appreciate my work and the effort I have put into it,” interviewee Chu mentioned (August 14, 2024). In the given scenario, most participants weren’t just sharing content; as T. Nguyen said, they were sharing work that reflected their professional identity, and it was easier to do that with someone “on the same wavelength” (August 18, 2024).

Some participants (Bui, N. Nguyen, and Le) who felt that their team members had similar goals (e.g., succeeding in practicum, building a teaching portfolio) or had been through similar experiences (e.g., classroom challenges, mentor feedback) reported higher comfort in sharing *know-what* knowledge. Bui noted that this helped them feel more relatable, proving their knowledge relevant and valuable.

Lastly, they mentioned personality fit as a factor in feeling safe while sharing explicit knowledge. N. Tran described this fit as “a similar sense of humor, characteristics, or communication style” (August 14, 2024), whereas Lo saw it as “a comparable pattern of acting, feeling, and behaving” (August 12, 2024).

Another idea behind this factor’s influence on the choice of sharing was that the participants felt less inclined to justify the reasoning behind their work.

Occupational Norms

Social norms can be implicit rules, desirable values, or a set of behaviors that are considered acceptable within a certain group. Individuals internalize these standards through learning, care about what others think, and strive to meet expectations, even if there are no consequences for transgressions (Gross & Vostroknutov, 2021).

Among pre-service teachers aspiring to be educators, the occupation norms may motivate them to share their teaching ideas and practical experiences. As a result, pre-service teachers tend to share *know-how* rather than *know-what* knowledge.

In this study, the participants’ understanding of the teaching profession also influenced their decisions. Rather than simply sending over materials, many emphasized guiding their peers toward understanding. O. Nguyen stated: “I think sharing the ‘why’ behind my lesson plan helps us grow more as teachers” (August 16, 2024). N.H.B. Nguyen also stated that it was not about passing along the content: “I want my peers to see how I build the activities based on student needs, not just copy and paste a lesson plan,” because eventually, “are we all here to become teachers?” (August 13, 2024).

This phenomenon can be explained by their emerging professional identity as educators, seeing teaching as mentorship and facilitation rather than knowledge transmission. This insight proposes that occupational norms may influence how and what individuals prefer to share.

Discussion and Implications

This study's findings have highlighted that the decision to share knowledge among pre-service teachers is a context-sensitive process. Tracing the journey from the intention to share to the act of sharing revealed that self-perceived benefits (i.e., enhancing public image, improving relationships with peers, and learning from one another) motivated the participants to participate in group knowledge sharing. However, the decision about *what to share* was shaped by additional contextual factors, including the nature of the teaching occupation, group dynamics, and the individual's confidence in the possessed knowledge.

Furthermore, this study identified two types of knowledge that pre-service teachers often engage in: *know-what* (explicit knowledge such as files or concrete sources) and *know-how* (tacit knowledge such as strategies or personal experiences). Pre-service teachers felt more comfortable sharing their *know-what* when confident in the knowledge they had and sensed a strong commonality within their peer group. On the other hand, they were more likely to share their *know-how* when the situation reminded them of their future teaching roles. Together, these findings imply that knowledge sharing is a purposeful, intentional, and connection-based process influenced by projected professional identities and social expectations.

The insights from this present study offer some implications for teacher education programs with the goal of promoting knowledge sharing among pre-service teachers.

Promoting Peer Review and Networking

Since professional feedback was identified as one of the motivators for knowledge sharing, embedding structured peer review systems within teacher training, such as practicum seminars or professional learning communities, can help reinforce its value (Bergquist et al., 2001). According to Cheng (2017), these feedback-seeking activities can contribute to a culture of continuous improvement and professional growth within the community, eventually normalizing the open exchange of both successes and challenges.

Networking sessions between seniors who are more experienced pre-service teachers or early-career in-service teachers) and juniors can further support this process. Since senior peers are often viewed as having developed strategies for teaching, interacting with them can also help reduce anxiety or fear of judgment. As a result, this networking can boost pre-service teachers' confidence to participate in group knowledge sharing.

Approaching Knowledge Sharing As Progressive Learning

Because pre-service teachers were more comfortable sharing the *know-how* when the situation reminded them of their future teaching roles, a progressive approach can promote knowledge sharing as it starts with sharing tacit knowledge and gradually introducing explicit knowledge. For example, teacher training programs may begin with guided activities in which pre-service teachers demonstrate their teaching approaches, discuss their own

experiences, or explore various lesson planning strategies. As they collaborate more and gain trust and confidence through group projects, they might gradually be encouraged to share their lesson plans, study materials, and other academic resources. These informal and practice-based exchanges help build a sense of connection, reduce anxiety, and encourage open communication. More importantly, with a strong foundation for mutual learning, training programs could support both types of knowledge sharing and help pre-service teachers develop the resources they need in teaching environments.

Conclusion

By exploring the process of knowledge sharing among pre-service teachers–from the intention to share to the actual act of sharing–this study reveals that the decision to share is more complex than a simple "yes" or "no" response to the question, "Will I share this with my teammates?" The collected data implies that self-perceived benefits (i.e., enhancing the public image, improving the relationships with peers, and mutual learning) helped strengthen the commitment to engage in knowledge sharing among the participants. Yet, how they make decisions on what to share, categorized in this study as sharing *know-what* and sharing *know-how*, depends on the contextual clues. While job characteristics encouraged participants to share a more instructional *know-how*, group commonality and confidence in their knowledge made them feel more comfortable to share the direct *know-what*. Given the collaborative nature of the teaching profession, where sharing is constantly anticipated, these findings suggest the complexity of knowledge sharing as a tactical process. Additionally, by identifying different types of shared knowledge among pre-service teachers, the present study moves beyond the initial research aims that focus on knowledge sharing itself as the final outcome. It offers new insights for future research to examine the correlation between these factors and each knowledge type and how they might interact with one another to bring out the desired type of knowledge, making knowledge sharing an intentional and proactive process.

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What Culturally Responsive Pedagogy Brings to New Teachers: Investigating K-6 Teacher Candidates' Experience in Teaching Diverse Learners

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Abstract

The aim in conducting this study was to investigate the experiences of 16 elementary teacher candidates (TCs) working with diverse learners during a 16-week student teaching experience. Culturally responsive pedagogy (CRP) methods were provided to the TCs; these dealt with theoretical assumptions underpinning CRP, and practical implementations. Less than 10% of TCs have any experience teaching diverse learners; they have, however, taught white, middle-class students. The study centered on TCs' experiences attempting to deploy CRP in diverse settings. I employed qualitative interviews to assess their experience; these were based on four essential interview principles, including 1) perceptions of learners' diversity, 2) levels of cultural identity and how those diversity learners differed from their own culture, 3) experiences of responsive teaching action in the context, 4) perspectives about teachers' dispositions regarding CRP. TCs clearly articulated how their newly acquired sociocultural perceptions supported implementation of CRP. The TCs argued that diverse learners' cultural identity varied along several dimensions; most interestingly, including the degree to which they proved interested in other cultures. The study offered recommendations for (a) successfully deploying CRP with emerging teachers and (b) maximizing positive change.

Keywords: culturally responsive pedagogy, elementary teacher candidates, sociocultural perception, diverse learners' cultural identity

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Introduction

Most of teacher preparation programs in the U.S.A. are required to include culturally responsive pedagogy (Ladson-Billings, 2014) along with education policy during the past ten years. However, the research showed (Chang & Viesca, 2022; Daniel, 2016) the national force provides teacher candidates a broad perspective from theoretical points of view only. There is a shortage of research of how teacher candidates' implementation of culturally responsive pedagogy in their real teaching situations. The report of teacher candidates (Franco et al., 2024) showed the majority of K-6 teacher candidates are white, middle-class, female, and English as their native language. It showed that future teachers potentially do not have the same cultural background, experiences and social value as their growing diver learners (Howard, 2019; Sleeter, 2008; Zeichner, 2010; Zeichner, et al., 2015).

Teacher candidates, with knowledge from a teacher education training program for two years, normally focus more on their teaching performance to meet the curriculum-centered requirements rather than the sense of a student-centered curriculum. The sense of each student's needs or a diverse student's cultural background might be slightly ignored by candidate's less experience in other cultures (Howard, 2019). It does not mean candidates do not recognize the concept of "equity" in their teaching, but there is the shortage of experience of how they can implement the concept of equity in the real life. Research (Gay, 2023) showed teacher candidates showed strongly their attitude of understanding students' cultural background affects students' learning outcomes. However, how candidates bring the cultural component into their instructional process is the critical point.

In this study, I explored how teacher candidates implemented Culturally Responsive Pedagogy (CRP) in the K-6 school setting, where diverse learners represent the most students' population in schools. The investigation of the study focuses on teacher candidates' implementation of the CRP used by students who have significantly different cultural backgrounds from the teacher candidates.

Literature Review

The Importance of Culturally Responsive Pedagogy (CRP)

Based on the report from the National Center for Education Statistics (2024), 1 of the 2 K-12 students are students with different cultural backgrounds in the U.S.A. When K-12 classrooms have more diverse learners, teacher candidates are required to teach students who do not have the same cultures as candidate's natural culture. CRP turns out to be important for teacher candidates to know how to provide effective pedagogy for diverse learners.

In the past so-called diverse learners may refer to students who have linguistic differences or a lack of understanding knowledge of English. The definition of "diverse learners" has lightly changed (Carter & Darling-Hammond, 2016) after the COVID-19 pandemic that the so-called diverse students may include students with linguistically differences, students from high-poverty, students with different races (minority), different social cultures or family cultures (Gandolfi et al., 2021). This definition showed that our future teachers are facing more challenges than before because they are required to establish their teaching knowledge by responding to wider students' "culture." The understanding of CRP turns out to be important, and the implementation of CRP turns to be vague because the gap between theory and practices has a wide variety of cultural backgrounds. It is important for teacher

candidates to learn how to stand on the students' cultural considerations to design their curriculum in order to build a connection between students' own culture and the targeted knowledge that students need to learn.

When the American population continues to increase the students who are in racial, ethnic, linguist diversity, the classroom represents a variety of multicultures as their background. Teacher candidates are required to take CRP courses along with their teaching licenses in their teacher preparation programs in order to prepare them to work with diverse learners (Kent & Giles, 2016). This means teacher candidates may need to show their efforts to understand the value of cultural-related teaching (Gay, 2023) and know how to implement their CRP in the real classroom. Teacher candidates in the Midwest showed their original race are the majority of white Caucasian culture (Lowenstein, 2009). They do not have rich learning experience with diverse learners when they are in high schools. Research (Ingersoll et al., 2014) suggests that teacher candidates may receive experience teaching in high-diversity schools so they may expand their cultural awareness for doing culturally responsive teaching preparation. Cultural awareness plays an important role in designing a student-center curriculum by leveraging cultural responses to their teaching. The challenge for Midwest teacher candidates may come from the different differentiation strategies (Wiggins & McTighe, 2005) in their pedagogical practices along with the cultural considerations.

CRP Provides Equal Learning Opportunities and a Safe Environment

Eventually, CRP is thinking of a pedagogy in which teacher candidates include their students reference to produce students' effective learning in any related content subjects. It means teacher candidates may learn how to use a pedagogy which provides equal access to any student. Teacher candidates recognize the differences between each student's needs. It means teacher candidates have the capacity to face cultural differences, include a worldview in their classroom and control the cultural hegemonic in their curriculum design (Jay, 2003). An obvious example may come from the curriculum materials, in which the majority of designs are based on a white-Caucasian cultural background to teach content knowledge. Teacher candidates play a role in bridging the gap between academic content knowledge and students' real-life experiences (Horowitz et al., 2018). Students' cultural differences cannot be treated as limited to their academic learning. Instead, teacher candidates may learn how to use students' cultures to make the best practices and effective instruction in order to bring high expectations to diverse students.

Teacher Preparation Programs for CRP

Most teacher candidates build their teaching profession by required courses which are aligned with state teaching license requirements. CRP played a key role in ensuring teacher candidates not only know what CRP knowledge is, but also how to implement CRP skills in real-life teaching performance. To achieve the knowledge and skills in CRP, teacher preparation programs not only need to offer a CRP course but also require candidates to implement CRP in real-life instruction, so candidates need to leave their cultural safe zone to response to diverse students' own cultures to maximize students' learning performance.

Research Question

The research question of this study is as follows.

- How do white teacher candidates deploy CRP in diverse setting after learning CRP method from CRP courses?

To explore the research question, I designed four essential interview principles as four different angles to explore white teacher candidates' perceptions, cultural identity, experiences, and disposition regarding CRP. The following is the list of the four essential interview principles.

1) perceptions of learners' diversity,
2) levels of cultural identity and how those diversity learners differed from their own culture,
3) experiences of responsive teaching action in the context, and
4) perspectives about teachers' dispositions regarding CRP.

Methods

Participants

Sixteen participants, as K-6 teacher candidates, were in their third year in the K-6 teacher preparation program. All 16 candidates grew up in a white-Caucasian family. Less than 10% of candidates have any experience teaching diverse learners. Most of their teaching experiences have been taught in white middle-class students in Central Minnesota, U.S.A. These 16 candidates took my CRP method course in first-8 weeks to learn the CRP knowledge and skills. The method course provided candidates with theoretical assumptions underpinning CRP. In the second-8 weeks, the 16 candidates were assigned to the diverse learners' school setting to implement their CRP.

Research Methods and Design

The study is implemented from 2022 fall to 2024 fall semester. The 16 participants were my CRP method course students and signed a consent form at the beginning of the semester. The participants did not affect their grade on the CRP course because all grades have done grading before they went to the field to implement the CRP.

Qualitative interview was the research method in this study. I, as a researcher and participants' student teaching supervisor, used interviews to assess their teaching experience in the diverse learners' school settings. Four essential interview principles were 1) perceptions of learners' diversity, 2) levels of cultural identity and how those diversity learners differed from their own culture, 3) experiences of responsive teaching action in the context, 4) perspectives about teachers' dispositions regarding CRP.

Data Collection and Analysis

The data collection from each student's interview scripts had three stages, which were before they went to the diverse learners' schools, during they implemented their CRP practices in the schools, and after they completed their CRP practices in the schools. Open coding is based on participants' interview scripts in the four essential interview principles. The interview scripts were read and approved by the interviewees before I did the open coding process in the interview scripts to explore the research questions. The open coding terms are aligned with the four essential interview principles about teacher candidates' perceptions,

their own cultural identity, their teaching action in the context of diverse learners, and their disposition regarding CRP.

Findings

The findings of the interview scripts may be represented as follows.

Perceptions of Learners' Diversity

Most of the participants are white teacher candidates, majoring in K-6 education. Before they go to deploy CRP in real life, CRP for them is knowledge and knowledge only. They assume they can do it as well as other subject methods courses. When they were placed in a diverse learners' school setting, they found that learners' cultural backgrounds are multiple kinds and played a main power in controlling the classroom environment.

> I assume it is just a simple cultural transition from my white culture to non-white culture in my classroom. However, reality is not like that. The non-white culture is not just one culture. For me, at least there are 7 different cultures because 7 different languages are used by different students. (4th grade, Kenzie)

For most teacher candidates, the perception of being a future teacher still stands on the "self-centered" perception. The so-called diverse learners for them are students whose cultures are different from theirs. They don't pay attention to understanding other cultures and how to use their cultures to improve their learning performance.

Levels of Cultural Identity and How Those Diversity Learners Differed From Their Own Culture

After interviewing 16 white teacher candidates, I found the CRP implementation provides a great opportunity for them to think about what exactly the white Caucasian culture is in the current K-12 education system. It means the CRP implementation provides a chance for them to identify their own culture which is different from their diverse learners.

> In the 4th grade language art lesson, I invite students to read Three Little Pigs to teach students how to identify the plot in the story. I found it so difficult for my diverse students because none of them have heard the story before. I was shocked! On the other hand, I know nothing about my students' culture or any stories I can use to teach a story plot for them. (4th grade, Jessie)

I found 12 of 16 white teacher candidates insist on following the school curriculum to teach all students, including their diverse students. Certainly, the curriculum design is white-Caucasian based with little differentiation strategies in their homework assignments.

One scenario happened. Here is the scenario. In a language art curriculum, one homework assignment in one school curriculum is that students are required to read a certain number of pages from the book they checked out from the library. Students are required to get their parents' signature to prove their reading. It is a very normal and popular reading assignment in all candidates' experiences. The reality is, even though the normal and easy assignments won't work for the diverse students, 12 of 16 teacher candidates still insist on doing the homework without any alternative way. Here are the reasons.

"This is the assignment I used to do when I was a 4th grader. I am comfortable letting my diverse students do it because I feel confident in them to do the assignment." (3rd grade, Amber)

"I think the diverse students will get used to it. This assignment can also push them to increase their reading habits at home." (3rd grade, Erin)

"I honestly speak, I want to be safe and follow the curriculum is my culture. I grew up with this kind of assignment and all my elementary teachers taught me this way." (3rd grade, Julia)

Only four of the 16 teacher candidates reflect on what students' learning outcomes and provide alternative assignments for their diverse students. They provide alternative ways to complete the homework assignment. For example, they prepare books which are related to diverse students' cultures so diverse students feel interest that their culture is described in a book. One teacher candidate used peer-reading strategies, so they count count the reading minutes by reading to each other.

Experiences of Responsive Teaching Action in the Context

Teacher candidates implemented the CRP strategies in their diverse students. The purpose of candidates doing CRP practicum is to experience how CRP can keep in their mindset so they can show CRP in their real teaching action.

Most teacher candidates showed nice and effective at teaching math lessons. It seems that problem-solving knowledge did not relate to cultural considerations a lot. Some meaningful concerns were found in teaching math content knowledge.

> To engage students' culture, I changed the story problem's names like John, Mary, to be my diverse students' names so some pop names in their cultures like 'Ayan' 'Ismahan' and so on. I found my students feel happy and belonged. (4th grade, Allie)

> I think you saw the boy spinning around on the floor and I did not stop him. The reason is this is the way he can focus on what I am teaching. Only if the boy does not interrupt other students' learning behavior and does not make the learning environment worse, will I OK with that. (4th grade, Hannah)

The two cases demonstrated that CRP. In the first case, it showed leveraging cultural response in teaching content knowledge. The second case showed the asset-based teaching in the CRP, so diverse students feel comfortable keeping learning with teachers.

Perspectives About Teachers' Dispositions Regarding CRP

Eventually, teacher candidates carry rich knowledge learning from the teacher preparation programs with limited teaching experience. I see most candidates strongly agree that culturally responsive pedagogy helps them open their minds and be willing to learn different cultures.

> I do appreciate the CRP course and the practicum. At least I don't feel I am a stranger in my family to explore some African or Somali culture in mid-night. The more I explore, the better I see my cultural identity. (4th grade, Kate)

> I found my teaching disposition is extended from family culture, my community culture and the curriculum materials. They are good, but I don't want my professional teaching knowledge to be limited by what I already had. Instead, I want to develop myself from what I knew (white-Caucasian culture) to other cultures through CRP in my mind. (5th grade, Anna)

I can see all teacher candidates show profession in doing their CRP practicum and feel positive about having the experience. Some teacher candidates need more time to adjust themselves to fit into the diverse learners' cultural differences. Some other teacher candidates are brave enough to show their mindset in CRP and learn from the outcomes they get.

Conclusion

To answer the research question "How do white teacher candidates deploy CRP in diverse setting after learning CRP method from CRP courses?", I would conclude that the 16 white teacher candidates showed the best at learning CRP from the textbook. However, they have experienced that it is a challenge to deploy the knowledge of CRP in the real life. The reason is that diverse learners' cultural identities vary along several dimensions. The findings showed all 16 teacher candidates through this CRP practicum begin to be interested in other cultures and explore strategies to include students' culture in their pedagogy.

The study is limited to 16 white teacher candidates with little experience in teaching diverse learners. It is a big challenge for them to deploy CRP right after the course is completed. After conducting this research, the study recommended successfully deploying CRP with emerging teachers because CRP can help teacher candidates to maximize positive change.

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A Case Study on Gamified Classroom: How Game-Based Instructional Design Support Students' Active Learning

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Abstract

The purpose of this study was to explore the impact of creating a gamified classroom on students' active learning experiences. As education shifts towards a more student-centered mode of delivery, a potential transformation could be the introduction of a game-based instructional design in classrooms. This approach goes beyond simply using educational games; it applies game-based thinking to guide the entire instructional process, from analyzing learner needs and structuring course content to developing teaching materials, delivering lessons, and conducting evaluation. We reviewed current literature to understand how game elements and mechanics, when incorporated into instructional design, shapes classroom environment and teacher-student interactions. A qualitative case study was conducted in an art class to investigate the benefits, limitations, and challenges of gamified class in a practical teaching scenario. The class focused on teaching students about color categories, with 24 middle school students aged 12 to 13 participating in a game-based learning environment. The data was collected through observations and interviews. Compared to traditional classroom, where teachers rely on explanations to impart concepts, our gamified instructional design emphasized experiential learning and perception. We used role-playing as a framework, developing game rules and a reward-punishment system embedded with color knowledge. While we hypothesized that the game's progression would deepen students' understanding of color theory, the findings indicated positive outcomes to demonstrate how gamified instructional design can shift students from passive learning to a more student-centered and active learning.

Keywords: gamification, art education, student-centered learning

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Introduction

Gamification is becoming a new trend in educational contexts. Recent studies have demonstrated the effectiveness of gamified learning in enhancing educational practices from a multidisciplinary perspective, indicating that gamification can increase motivation, improve student achievement, and positively influence both cognitive development and learner perceptions (Buckley & Doyle, 2014; Lampropoulos & Sidiropoulos, 2024; Manzano-León et al., 2021). Moreover, gamification has been shown to enhance students' social and practical skills, such as problem-solving, collaboration, and communication (Putz et al., 2020). However, research focusing on gamified instructional design in art education is still scarce, with limited research on its practical challenges in art classrooms.

In this paper, we investigate how gamified instructional design impacts student learning in art classrooms. We first clarify the definition of gamification within educational contexts through an analysis of existing literature. Building on this foundation, and then discuss the nature, potential, and challenges of gamified education, drawing on our data collection and analysis from the educational setting.

Literature Review

Gamification in Educational Context

The term "gamification" originated from the digital media industry. Although its definition remains ambiguous across different academic contexts, researchers have advocated against confining the term to specific scenarios. Therefore, a consensus has been reached that gamification is understood as the use of game design elements in non-game settings (Buckley & Doyle, 2014; Deterding et al., 2011; Manzano-León et al., 2021). It is considered a paradigm that employs game-based mechanisms, aesthetics, and game thinking to engage people, motivate actions, promote learning, and solve problems (Kapp, 2012).

Gamification in education represents a pedagogical approach designed to foster engagement in learning activities through enjoyable experiences and structured reward systems (Buckley & Doyle, 2014). Its primary objective is to increase learners' intrinsic motivation toward the content and the learning process itself, as well as to guide and regulate learning behaviors through extrinsic motivation provided by rewards (Lampropoulos & Sidiropoulos, 2024; Ryan & Deci, 2000).

Gamified Instructional Design in Art Class

This case study focused on the application of gamified instructional design within the context of arts education. Arts education values the multidimensional and holistic experiences of students, which can be cultivated through a variety of pedagogical approaches. Firstly, educators should aim to create an environment rich in evocative stimuli to encourage imagination and visualization. Additionally, students should be encouraged to engage in continuous visual thinking, as opposed to relying solely on linguistic approaches; for example, providing opportunities for students to understand and manipulate elements such as color, shape, and form in a logical manner (Pavey, 1979/2024).

The incorporation of gamified design establishes an enjoyable learning environment for all participants, emphasizing a balance of conflict, competition, and cooperation. Nevertheless, it

is important to minimize the negative impacts of competition during the design process, at least until participants' motivation reaches a certain level, ensuring that competition and failure do not hinder enjoyment (Kapp, 2012; Pavey, 1979/2024).

Research Questions

With these considerations in mind, the gamified instructional design employed in this case differs from the traditional approach of relying on rewarding within classroom games. This study adopts a holistic perspective, extending the influence of gamification to pre-class preparation, in-class instruction, and post-class evaluation. This study aims to explore the impact of creating a gamified classroom on students' active learning experiences. The research questions are framed as follows:

1. How can gamification elements be comprehensively integrated into instructional design?
2. Does the gamified classroom foster active learning behaviors among students?
3. What challenges are encountered in a gamified classroom setting?

Methods

To understand students' experience in game-based learning environment, this study adopted a qualitative case study approach. Case study research allows close examination of participants' experiences through detailed analysis and multiple data collection methods, making it suitable for small-scale research (Creswell, 2014; Flick, 2022).

This study was conducted in a middle school in Beijing, with participants consisting of 24 students aged 12 to 13. The research team consisted of two graduate students, with one serving as the teacher and the other acting as a participant-observer. The course design was collaboratively developed by both graduate students.

Course Description

This arts course focused on developing students' understanding of the color wheel, with particular emphasis on two fundamental concepts: complementary colors and analogous colors (Lewis, 2018). In class, students were introduced to a story about the "Kingdom of Colors" and divided into groups representing various tribes with a specific color, each representing a different tribe within the kingdom. Two students were chosen in advance by the teacher to take on roles of the kingdom's wizards, they were tasked with gathering relevant knowledge and presenting it to the class; this process was kept confidential from the other students.

Figure 1
Color Wheel (Lewis, 2018)

Figure 2
Complementary Colors (Block, 2021, p. 167)

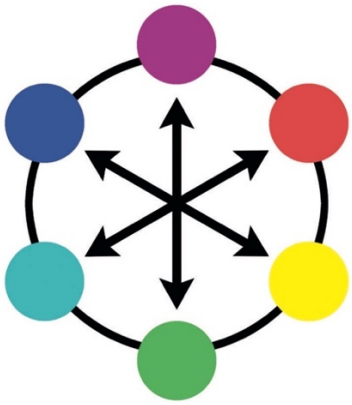
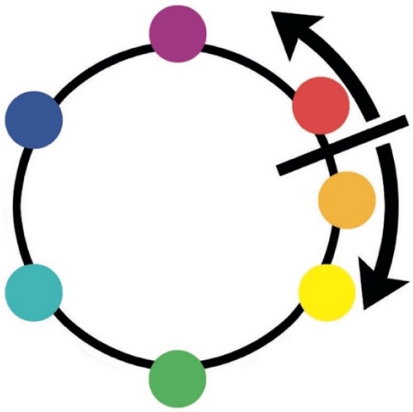


Figure 3
Analogous Colors (Block, 2021, p. 172)



The course included a game involving physical movement, where color tribes formed a circle based on the arrangement of the color wheel. When the teacher named a color, the corresponding group should have a member step forward to identify either its complementary or analogous color, with the instructions dynamically changing in real-time based on the situation. Finally, students collaborated by forming alliances among the color tribes to create an artwork in a larger group.

Data Collection

Data were collected through observations and focus group interviews. The participant-observer conducted observations before, during the gamified lessons. After the class, focus group interviews were held with a subset of students who volunteered to participate.

Results and Discussion

Student-Centered Classroom Interaction

Glasgow (1997) described student-centered learning as students determining what they need to know in order to succeed in the classroom and within various educational formats. Although teachers may bear responsibility in facilitating inquiry and discovery activities, students are expected to gradually take responsibility for their own learning. Brush and Saye (2000) demonstrated that student-centered learning allows students to take on an active role in their learning, rather than merely acquiring content from the teacher, and to assume responsibility for organizing, analyzing, and synthesizing information.

In gamified classrooms, there needs to be a paradigm shift in the roles of both students and teachers, with students transitioning from information recipients to owners of their learning objectives, decisions, and actions (Lee & Hannafin, 2016). Based on researcher's observation, as the teacher began to read the story setting to the students, noticeable changes in student expressions were captured, such as increased focus and anticipation. When the identities of two students as wizards were revealed, some students appeared surprised. Unlike traditional classrooms, where teachers are responsible for delivering knowledge, the facilitators in this lesson were peers, which significantly altered the classroom atmosphere.

During the presentations, the teacher suggested to the first presenter, who seemed somewhat nervous, to start by asking the class some questions. The student decided to project some prepared pictures on the screen and asked, "Can you find the parts in these images that represent analogous colors?" The question immediately sparked enthusiastic responses and friendly debates among the students, and the presenter successfully responded to the comments, with the teacher only providing some professional additions.

Another presenter, while discussing complementary colors, introduced a visual experiment that had been designed prior to the lesson. The presenter instructed students to first stare at these color blocks without blinking. After ten seconds, they should immediately shift their gaze to the whiteboard and then described the faint colors they see. Due to the principles of vision, students may perceive afterimages in red, yellow, and orange. Students actively participated in the response session and some students drew connections to their own experiences, which was an unanticipated outcome for teacher.

Figure 4
Images Collected for the Class

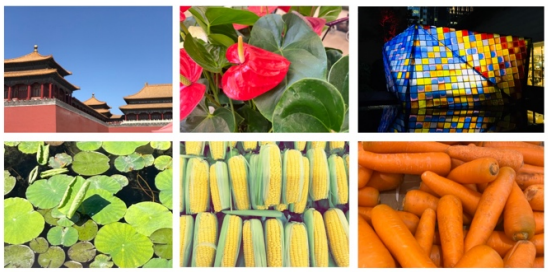
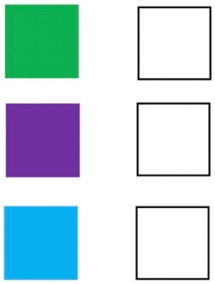


Figure 5
The Color Visual Experiment



Although the teacher provided certain professional support to two students responsible for presentations before the class, the learning process was driven by the students' own actions. One of the presenters went beyond the typical preparation, she borrowed teaching aids from the mathematics teacher to help peers visually comprehend the concept of analogous colors. During interviews, students reported that they were more attentive when listening to their peers, and the real-time interactions during the class also demonstrated the positive impact of this approach.

Active learning also involves facilitating activities that help students construct knowledge. Before the game officially started, some students were confirming color knowledge with "wizards." Notably, their first instinct was not to ask the teacher but rather to seek help from their peer. Additionally, the research team did not assign specific roles to students during the game's design, which allowed students to elect their tribe leaders if needed. The strategies for playing the game also varied among groups. In some groups, specific members took responsibility for identifying complementary or analogous colors, while others relied on tacit understanding and speed. These unplanned scenarios reflect spontaneous and self-directed learning processes undertaken by the students.

Display and Impact of the Gamified Classroom

The instructional design was based on storytelling elements, which introduced a narrative prelude to the actual gameplay activities. Instead of following a conventional knowledge-structured design, this course was framed around the theme of the "Kingdom of Colors," with a crafted narrative setting (Fullerton, 2019). Before the class, two students were invited by the teacher to take on the role of wizards. In the game's setting, wizards symbolized wisdom, and their main task was to research relevant learning materials for their classmates.

During the class, all participating students played roles within the game and were provided with action mechanics involving elements of attack, competition, and cooperation (Kapp, 2012). The game rules were established based on the logic of color categories, with students having a "target" to win the game, which required them to apply their understanding of color theory throughout the lesson.

Additionally, the reward and punishment system were not implemented through tangible means; in other words, the teacher did not prepare any physical rewards. During the game, students had access to some washable oil paint, and players who answered incorrectly would receive a colored "mark" on their body. However, this form of punishment carried low risk. During after-class interviews, researchers inquired about the students' gaming experience, and students expressed that they did not perceive this as a true punishment. While they still desired to win, being marked with oil paint was seen as enjoyable. Some students mentioned that they preferred this type of lesson over sitting in a classroom listening to dull theoretical lectures, despite they made mistakes during the game due to incorrect recollection of color rules.

Challenges and Limitations in the Gamified Classroom

Due to the unexpected situations that may arise during in-class gameplay, teachers must provide real-time feedback and adjustments to the rules and reward mechanisms (Kapp, 2012). This dynamic adaptation contrasts with the typical scene in traditional, static classrooms. The gamified classroom environment is inherently more fluid and interactive, requiring immediate responses. For instance, when the teacher gave two instructions simultaneously, it led to confusion among students. Since some rules could not be clearly specified at the outset, students were uncertain about their actions, which means teacher had to prompt rule adjustment to ensure the game progressed smoothly.

Furthermore, managing gameplay time within the planned schedule can be challenging. Initially, students need time to adapt to game rules, and since this game involves physical participation, it takes time for players to get fully engaged. Given that part of the class time was also allocated to students' instructional presentations, the remaining time was insufficient for them to keep playing the game because the teacher had to move on to the next stage of the lesson.

Additionally, the students' progress in absorbing knowledge and understanding game rules was asynchronous, with substantial differences in their gaming experience and familiarity. This led to some chaos during gameplay, which also hindered comprehensive data collection by the observer. Since the research team expected to capture more of students' gameplay experiences, they decided that the unfinished group art creation would be assigned as homework, and the follow-up evaluation of their work continued with the "Kingdom of Colors" theme.

The problems identified during this study highlight non-negligible challenges and insights of gamified classrooms: (i) Gamified instructional design requires a complete system, but within the constraints of limited classroom time, it is crucial to account for unforeseen circumstances and variations in student progress. Therefore, simplifying gamified elements during the design phase is advisable; (ii) Students with limited gaming experience may feel pressured in a gamified environment, teachers should carefully prepare relevant plans to address such situations.

Conclusion

This study has explored the positive impact of gamified instructional design on students' active learning experiences in art classrooms. The positive influence primarily stems from the gamified design creating an environment where students are more inclined to engage in learning under low-stakes conditions. Additionally, the peer-led nature of the learning process enhances their motivation. However, the study also identifies several challenges, such as time management, differences in students' prior experiences, and managing the dynamics of in-class games, all of which require ongoing reflection by teachers during practical implementation.

Furthermore, this study has clarified that the concept of a gamified classroom is not limited to rewarding but rather involves gamified elements as structured mechanisms integrated throughout the course design and delivery. In this study, the gamified elements were primarily narrative-based, with all students participating in role-playing, which fostered a strong sense of immersion.

This also indicates that there is no one-size-fits-all approach to gamified classrooms. Given the differences in disciplinary knowledge structures and student age groups, instructional designers must pay close attention to the appropriateness and integration of gamified elements. Future research can focus on optimizing gamification elements and conducting longitudinal studies, such as unit-based courses, to examine the sustained impact of gamified instructional approaches over time.

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Developing Virtual Communication Skills in an English for Business Course

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Abstract

This paper presents a pedagogical innovation project aimed at enhancing virtual communication skills in language courses, specifically within an English for Business Communication context. The initiative, conducted at the Universitat Politècnica de València, Spain, spanned two academic years and involved the design, implementation, and evaluation of simulation-based teaching units. During Phase I (2023-2024), three independent teaching units were developed, each targeting a specific communicative context: online job interviews, online presentations, and online meetings. Phase II (2024-2025) involved the implementation of these units in a Business English course attended by approximately 90 undergraduate students. Data collected through pre- and post-tests, surveys, and performance assessments indicated varying degrees of improvement in students' virtual communication competencies. Results showed significant improvement in online meetings, slight improvement in job interviews, and no significant change in online presentations. Teachers' evaluations and student feedback highlighted the clarity, usefulness, and motivational impact of the activities. The findings support the integration of simulations and role-playing as effective strategies for developing digital communication skills in higher education.

Keywords: virtual communication, business English, simulations, language teaching, digital skills

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Introduction

With the increasing relevance of remote work and digital collaboration, virtual communication skills have become essential in professional contexts. Language courses in higher education, particularly those focusing on English for business purposes, must adapt to this shift by incorporating pedagogical strategies that replicate real-life digital interactions. The ability to navigate online platforms, interpret non-verbal cues in a digital environment, and manage discourse in real-time are now vital skills for students entering the workforce.

This study is part of an educational innovation project conducted at the Universitat Politècnica de València (UPV) in Spain, aimed at fostering these skills through simulations and role-playing activities in foreign language instruction at the Faculty of Business Administration and Management (FADE). It is titled "Development of Communication Skills in Virtual Environments through Simulations and Role-Playing in Language Courses" at FADE (2023-25) and is funded by UPV. It is grounded in communicative language teaching (CLT) principles and task-based learning approaches that emphasize learner engagement, authenticity, and meaningful interaction. The project targeted the development of virtual communication skills in French (*French for academic and professional purposes B2*), English (*English for business purposes B2* and *English for business purposes C1*), and Valencian, the co-official language used in the autonomous region of Valencian Community (*Valencian for administration C1* and *Valencian for administration C2*) within the Faculty of Business Administration and Management. There are around 450 students involved in the project, which unfolded in two phases. The first one consisted of field research and design of teaching units and was developed in the academic year 2023-24. The second phase included the implementation and evaluation of the teaching units designed in the different language courses involved in the project. This second phase is taking place in the current academic year (2024-25).

The impetus for the project emerged from a post-pandemic educational context where digital communication tools became a staple of both professional and academic environments. As students increasingly engage with hybrid and online modes of learning and working, the need for specialized training in digital communication has become more apparent. The project aimed to bridge this gap by embedding virtual communication practice into language education in a structured and pedagogically sound manner. The literature review conducted in the first phase of the project indicated that in the pre-pandemic period much attention had already been paid to the development of communicative skills in professional virtual environments (Anders, 2016; Darics & Gatti, 2019). Later, one of the main interests of educational institutions was the incorporation of appropriate digital tools and resources to support teaching and facilitate language instruction, and particularly languages for specific purposes (Monferrer, 2022; Ramos & Martín, 2022; Wachs & Weber, 2021). In the field of digital literacy, research concentrated on the effective inclusion and development of language competencies and on practical aspects of language teaching in the classroom (Póltorak, 2022; Soubrié et al., 2021). Other studies showed students' positive perception of the use of applications in virtual learning environments, as they assist language skills development, as well as the acquisition of grammar and vocabulary (Chiablaem, 2021).

Virtual work had been viewed as gaining in importance within public administrations (Català-Oltra & Penalva-Verdú, 2019) and in international professional relations, particularly in multinational companies, requiring effective interactions in virtual international teams. For this reason, higher education institutions offering degrees in business administration and

management, as well as in public administration aim to train individuals capable of performing a variety of virtual tasks effectively. However, the constant evolution of digital technology and the implicit assumption that global virtual teams inherently foster and develop similar intercultural and digital competencies makes it difficult to measure their actual scope and development (Cathro, 2021).

The rapid globalization of business and the changing nature of job roles mean that more and more employees are working in multinational companies (MNCs), forming teams without clear geographical, linguistic, or cultural boundaries. This opens new lines of research aimed at establishing adapted linguistic patterns based on specific communicative objectives (Yu Wing Mao, 2022). These new research directions explore real interactions between members of virtual work teams during online business meetings held via videoconference. Moreover, it is clear that the development of new technologies has significantly influenced communicative exchanges around the world, and the success of this "intercultural dialogue" depends on the constant negotiation and reinterpretation of meaning (Chung, 2022; Savlovska et al., 2021; Uskova & Lihn, 2019).

Apart from the literature review, which has been presented here briefly, phase I of the project included the evaluation of the published textbooks, from the point of view of the type, number and extension of virtual communication activities. The total of 28 textbooks were analysed and the general conclusion drawn pointed to the over-representation of written digital genres, such as emails or blog posts, and the under-representation of oral virtual genres, particularly in the case of French and Valencian textbooks. Besides this type of analysis, a student opinion survey conducted in the language courses mentioned previously revealed significant interest and motivation of students regarding the implementation of a broader variety of activities focusing on virtual communication skills. The importance of the development of this type of skills was also confirmed by professionals from local and international companies, as well as from the public administration institutions through semi-structured interviews. Phase I also included the evaluation of a broad variety of communicative activities and their suitability for developing virtual communicative skills, highlighting simulations, role-plays, problem-solving and brainstorming activities as the most adequate. Finally, this phase ended with the design of different teaching units to be implemented in the following academic year.

In the case of English for business communication B2 course, which is taught in the degree of Business Administration and Management, as well as in the double degree of Business Administration and Management and Telecommunications Management, three teaching units were designed: "Online job interviews", "Online presentations", and "Online meetings", and integrated into the course. Each unit involved two hours of classroom activity in small groups. The instructional design included analysis of virtual vs. face-to-face communication features, strategy identification, language and vocabulary practice, and short role-plays. Activities were designed to be highly interactive, simulating professional scenarios and requiring students to apply linguistic and pragmatic knowledge in context. Students prepared and recorded simulated communicative situations using Microsoft Teams.

Phase II consisted of implementing the mentioned teaching units in the first semester of 2024-25 academic year. Around 90 students participated in this part of the project. The course was taught by five instructors trained to facilitate the simulation activities and provide feedback using a standardized rubric. The study was approved by the UPV Ethics Committee, with informed consent from all participants.

Methodology

To evaluate the effectiveness of the intervention, multiple data sources were employed. First, pre- and post-teaching test scores were analysed to assess improvement in the targeted skills. Second, student opinion surveys were administered after the teaching intervention to measure perceived utility and levels of engagement. Third, the teaching units were evaluated by instructors based on criteria such as ease of use, clarity, and overall impact. Fourth, student performance in recorded simulations was assessed using an analytic rubric. Finally, unstructured classroom observations were conducted to capture qualitative insights into student engagement and any challenges encountered during the learning process.

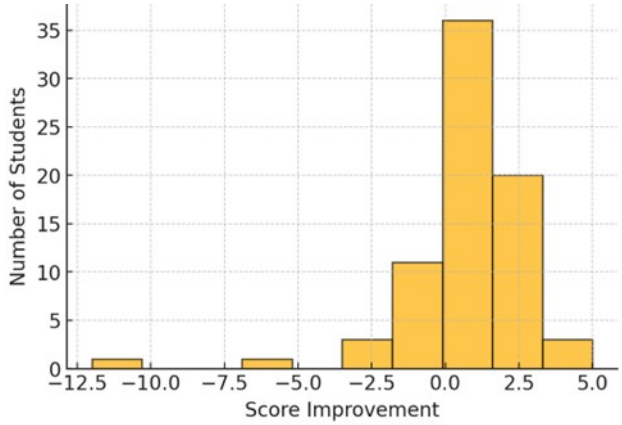
Results and Discussion

Pre- and Post-teaching Score Improvement

Pre- and post-teaching tests revealed differential impacts across the three teaching units. Regarding online job interviews, the mean scores increased from 11.4 to 11.95 (out of 15 points maximum), indicating slight but statistically significant improvement (t-statistics 2.14, p-value 0.0358 < 0.05). Students demonstrated better structuring of responses and increased confidence.

Figure 1

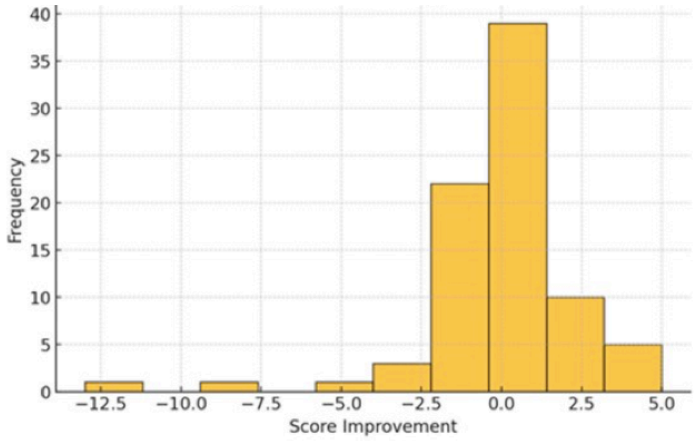
Online Job Interviews: Histogram of Score Improvement



As can be seen in Figure 1, most students showed certain improvement. A large portion of the bars are above zero, meaning that many students had a positive improvement in scores. Some bars are at zero, meaning that a number of students had no change in their score. Moreover, a few students scored worse in the post-test, as some bars below zero show. It can be concluded that while many students improved, a few either stayed the same or performed worse. The variation suggests that not everyone benefited equally from the teaching session, possibly due to differences in learning ability, engagement, or prior knowledge.

In what refers to online presentations, the scores slightly decreased from 11.49 to 11.45 (out of 15), with no statistical significance (t-statistics = 0.128, p-value = 0.899 > 0.05). Despite well-prepared slides and clarity in delivery, issues with spontaneity and pronunciation were noted.

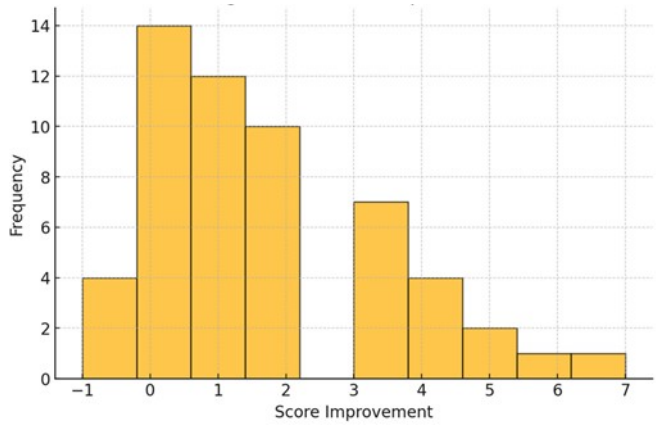
Figure 2
Online Presentations: Histogram of Score Improvement



As Figure 2 shows, most values are centered around zero, which indicates that many students had minimal or no improvement, and therefore, they did not benefit from the teaching intervention. The histogram likely suggests that while a few students improved, many remained the same or even did slightly worse.

Regarding online meetings, a notable improvement was noted, from 6.32 to 8.02 (out of 15) (t-statistics = -6.55, p-value $2.21 \times 10^{-8} < 0.05$), showing significant gains. The collaborative nature of this task likely contributed to its effectiveness, fostering real-time negotiation and turn-taking.

Figure 3
Online Meetings: Histogram of Score Improvement



As can be seen in Figure 3, most students had positive score improvements, meaning they scored higher in the post-teaching test compared to the pre-teaching test. A few students experienced no change in their scores, and a very small number of students had negative score improvements, meaning their post-teaching scores were lower than their pre-teaching scores. The highest frequency appears around small to moderate improvements (e.g., +1 to +3 points). Some students showed substantial improvement, with a few gaining up to seven points.

Student Opinion Survey

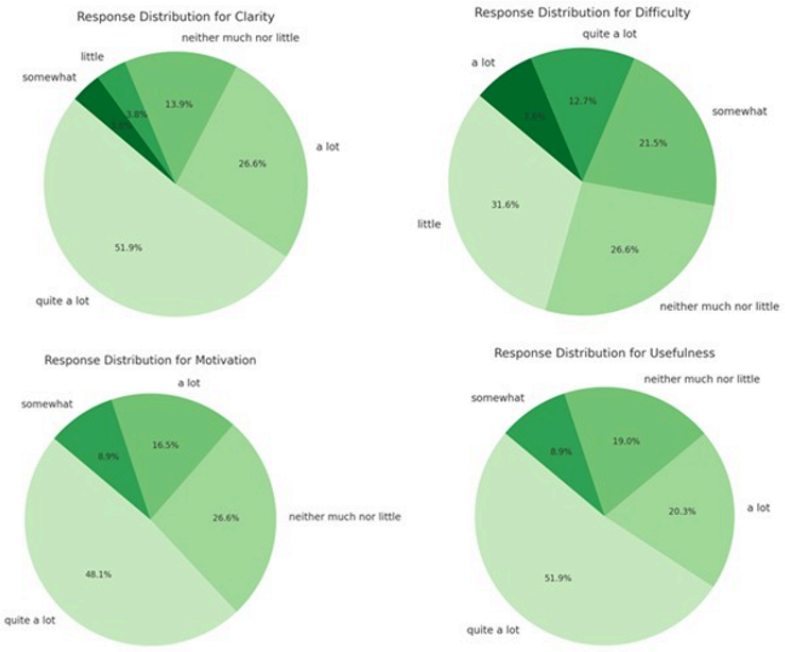
After the completion of activities included in each teaching unit, the students were asked to fill a questionnaire and express their opinion about the following statements using a five-point Likert scale (1 – little, 2 – somewhat, 3 – neither much nor little, 4 – quite a lot, 5 – a lot):

- The activities carried out in class have been useful for improving communication skills in virtual environments;
- The activities for improving communication in virtual environments are clear and well-organized;
- I found it difficult to carry out the activities for improving communication in virtual environments.
- My level of interest and motivation in improving communication in virtual environments has increased after completing the activities.

The survey results indicated that the majority of students found the activities useful (mean score above 4 on a 5-point Likert scale), with positive comments on the authenticity of tasks and their relevance to real-world communication scenarios. Students appreciated the opportunity to practice speaking in a low-stakes environment and to receive targeted feedback from instructors.

Figure 4

Student Opinion Survey: Online Job Interviews



As can be seen in Figure 4, most of the students evaluated the teaching unit on online job interviews as quite or very clear, not very difficult, very useful and motivating.

Figure 5
Student Opinion Survey: Online Presentations

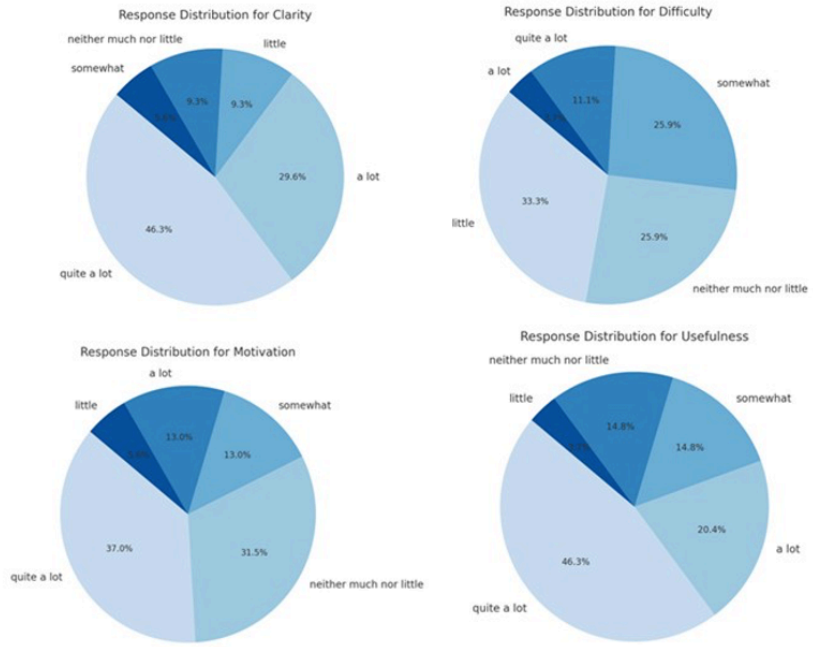
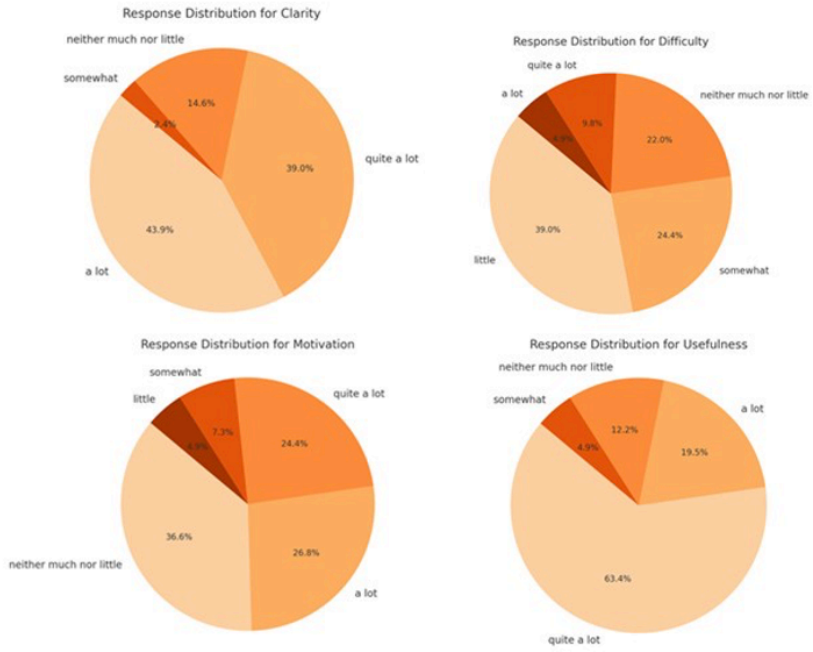


Figure 5 shows the results of the student opinion survey about the teaching unit on online presentations. As can be noted, the students considered it very useful, not very difficult, very clear and fairly motivating.

Figure 6
Student Opinion Survey: Online Meetings



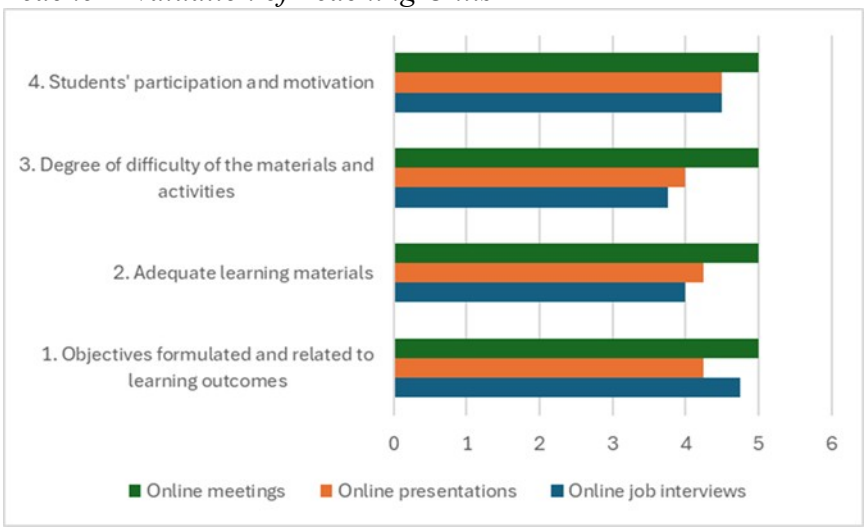
The results of this survey (Figure 6) highlight that this unit was the clearest and well-organized, the most useful and motivating, as well a fairly difficult.

Teacher Evaluations

The teachers participating in the project used analytic rubric to rate the three units in terms of students' participation and motivation, the degree of difficulty, the adequacy of learning materials for the objectives set, and the correct formulation of objectives and learning outcomes. As can be seen in Figure 7, the instructors rated the "Online meetings" unit highest in terms of the criteria established. This is in line with the positive students' opinion about this unit and the significant score improvement reported previously. "Online job interviews" unit and "Online presentations" were rated less positively, even though the mean score obtained was around 4 (out of 5). "Online job interviews" unit obtained the lowest score for the degree of difficulty and the adequacy of learning materials.

Figure 7

Teacher Evaluation of Teaching Units



Student Performance Assessment

The role-plays recorded by students were assessed according to the dimensions, which allowed instructors to provide detailed feedback and track progress over time:

- interaction and discourse adaptability;
- genre-appropriate structure and coherence;
- use of connectors and cohesive devices;
- non-verbal communication (eye contact, gestures);
- lexical variety and grammatical accuracy;
- pronunciation, intonation, and fluency;
- digital competence (managing software, audio-visual settings, and ethical sourcing).

The mean scores obtained by students ranged from 40.2 (out of 44 points) for job online interviews, 41.8 (out of 46 points) for online presentations, to 40.8 (out of 44 points) for online meetings. As can be noted, the scores were notably high. Many students showed substantial improvement in turn-taking, register adaptation, and use of discourse markers, while others needed additional support in pronunciation and grammar.

Observations indicated that while students often demonstrated good structural command and content relevance, spontaneity and natural interaction were sometimes lacking. In particular,

some students relied on reading scripts, which reduced the authenticity of the interaction. Nevertheless, confidence and participation improved over time.

Conclusions

This study demonstrates the value of using simulations and role-plays to enhance virtual communication skills in business English contexts. The approach allowed students to develop a nuanced understanding of digital communication, moving beyond language mechanics to include pragmatic, intercultural, and technical competencies. While all three units contributed positively, the most notable improvement occurred in online meetings, which required the most collaborative interaction. Online job interviews showed moderate progress, and presentations had limited impact, possibly due to over-rehearsed delivery and reduced interactivity. Future iterations of the project will focus on increasing spontaneity through improvisational tasks and peer-led simulations. Additional training for instructors in digital pedagogy and feedback techniques may further enhance the program's effectiveness. The project serves as a model for integrating real-world communication practice into language courses, aligning educational outcomes with professional demands in the digital age.

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Improving University Students' Oral Communicative Competence in French L2 Using a Virtual Environment

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Abstract

Developing students' oral communicative ability is a primary goal of learning a foreign language. However, certain factors specific to the academic field often lead to the prioritization of other skills, such as writing or reading comprehension. Furthermore, some classroom limitations make it difficult to carry out activities or tasks that enhance oral communicative competence. Consequently, the use of virtual environments has increasingly become an advantage. This study aims to present research on the use of virtual tools to develop oral speaking skills among students learning French as a foreign language (FFL) at the Universitat Politècnica de València in Spain. Data were collected through observations, student performance tests, and questionnaires. We also considered previous studies, most of which focused on English as a foreign language, to investigate the effectiveness of virtual speaking activities in online or blended courses. However, research in the context of French as a foreign language remains relatively limited. The focus of this study is on the use of virtual environments to develop oral skills and how they impact and improve students' oral abilities in FFL, exploring new methods to enhance their oral communicative competence. The results suggest that using virtual environments helps build student confidence and promotes interaction, facilitating faster and more autonomous development of oral communication skills. These conclusions may contribute to further advancements in virtual speaking instruction and learning.

Keywords: blended learning, virtual environments, French as a foreign language, oral communicative competence

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Introduction

The use of virtual environments to practice oral expression in foreign languages has gained significant importance in contemporary education, especially with the advancement of digital technologies and the rise of globalization. These environments provide students with opportunities to engage in more dynamic and realistic contexts, allowing them to practice language skills in everyday, authentic situations. From our teaching experience, especially in the last five years, we can advance certain advantages and disadvantages of these environments derived from observation. By eliminating geographic and time barriers, virtual environments promote linguistic and cultural immersion, facilitating language learning and boosting fluency and confidence in oral expression. Moreover, these tools offer instant and personalized feedback, optimizing the learning process. In this sense, the use of virtual environments represents an innovative and accessible solution to overcome the traditional limitations of foreign language teaching, enhancing interaction and active language use beyond the classroom.

A key advantage using virtual environments to practice oral expression in foreign languages offers is time optimization in learning. Unlike traditional methods, which often require coordinating schedules and physical travel, virtual environments allow students to practice anytime and anywhere. This eliminates logistical barriers and facilitates consistent practice, an essential aspect of improving oral fluency. Additionally, virtual environments provide opportunities to interact with native speakers or peers from different parts of the world, enriching the experience and exposing students to a variety of accents and cultural contexts. By being able to practice at any time, students can make the most of their time, dedicating more effective hours to oral expression without location or schedule constraints. In this way, learning becomes more efficient, maximizing the available time to perfect language skills.

Working with large groups of foreign language students in the classroom using virtual environments offers several significant advantages, especially when it comes to developing oral skills. First, virtual environments enable more equitable interaction among students, as technology facilitates active participation from everyone, even in large classes. In a traditional classroom, it can be difficult for each student to get enough opportunity to practice oral expression due to time and space limitations. However, in a virtual environment, activities can be organized in small groups, discussion rooms, or interactive tasks, ensuring that each student has more opportunities to interact and practice the language. Moreover, these environments allow for personalized teaching, adapting activities to the level and pace of each student, resulting in a more inclusive and effective learning experience. By integrating technological tools like conversation simulators or applications that provide instant feedback, students can receive corrections and suggestions without waiting for the teacher's intervention, which accelerates the learning process. In this sense, virtual environments not only enhance the quality of teaching but also optimize the available time, allowing all students to actively participate in developing their oral skills, even in large classes.

However, it also has several disadvantages that can affect the quality of learning. One of the most significant disadvantages is the limited face-to-face interaction. Oral communication in foreign languages benefits greatly from practice in real social contexts, where learners can experience spontaneous conversational situations. This face-to-face interaction with native speakers or classmates creates an additional motivating environment. In the virtual

environment, although interactions are possible, often the lack of a physical personal connection can diminish interest and motivation for further speaking practice.

Also, especially if limited to chats or video calls, it does not replicate the spontaneous and natural situations that occur in a face-to-face context. Lack of non-verbal communication, such as gestures or facial expressions, can hinder understanding and fluency in conversation. In fact, the interaction is often structured, which can limit learners' ability to respond naturally or handle unexpected situations. Moreover, in e-learning, teachers cannot always provide immediate feedback as effectively as in a face-to-face environment. Pronunciation corrections or errors in oral fluency are sometimes not detected in real time, which could delay the learner's progress. On the other hand, Internet connectivity and the quality of devices can interfere with the learning process, and may even be perceived as a barrier by some learners. In addition, there are often distractions from the environment that affect their concentration and ability to practise effectively. In a face-to-face classroom, the environment is often more controlled.

A matter of note in the context of foreign language learning, particularly with regard to speaking proficiency, is the anxiety experienced by some students when using technology. Despite the advantages that technological tools can offer, it has also been identified that some learners experience high levels of anxiety when using them, particularly in spoken interaction activities. In some cases, when learning takes place via technological platforms, this communicative anxiety may be heightened.

In summary, although virtual platforms offer many advantages for foreign language learning, especially in terms of flexibility and access to resources, we think that these disadvantages can impact on the development of speaking if not managed properly. With these premises in mind, we decided to carry out a study on the use of virtual tools to develop oral speaking skills among students learning French as a foreign language (FFL) at the Universitat Politècnica de València in Spain.

The objectives of the research presented here are first, to present the results of an ongoing study on the use of virtual tools to develop oral speaking skills among students learning French as a foreign language (FFL) at the UPV in Spain. Firstly, we review previous studies on the issue that may shed light on our study. In order to analyse the suitability of the use of virtual environments for the development of oral skills and how they have an impact and improve students' oral communicative competence, we consider the convenience of combining these activities with face-to-face activities in order to obtain better results. Finally, the aim is also to share knowledge and experience and provide useful feedback to contribute to further advancements in virtual speaking instruction and learning.

Literature Review

The use of virtual environments for the practice of speaking skills in foreign language learning has been the subject of several studies highlighting their effectiveness and the technological tools employed. These previous studies, mostly focused on English as a foreign language, investigate the effectiveness of virtual speaking activities in online or blended courses. They also highlight how virtual environments offer valuable opportunities for practicing and improving speaking skills in foreign language learning through the use of a variety of technological tools and methodologies adapted to students’ needs. However, research in the context of French as a foreign language remains relatively limited.

Nevertheless, there are some recent studies that address the use of virtual environments in the teaching-learning process, most of them from a global point of view, but including resources for the practice of oral skills.

Among them, we can highlight the work of several authors (such as Grosbois, 2012; Guichon, 2012; Soubrié, 2020) who have recently taken stock of the digital environment and its potential for language learning. Whether it is a tool for learning with digital technology, or an environment for learning in digital technology, digital technology is also seen as a place for exchange and socialization (Trujillo Sáez et al., 2019). Technologies no longer simply support teaching and learning, but also enable learners to immerse themselves in a linguistic and cultural environment (Soubrié, 2020, p. 32).

With regard to studies focused on the field of higher education and the need to train university students (Area Moreira et al., 2010; Gisbert & Esteve, 2011), digital competences prevail, as they must be able to access new information, develop research skills, develop their capacity to construct knowledge through interaction, know how to express themselves and communicate with new languages and tools and, finally, acquire skills for learning in enriched spaces built with technologies. The foreign language classroom thus becomes a learning community in which the development of learners' mutual learning skills is encouraged. In addition, a variety of digital resources and electronic environments are made available to create this community and help it produce linguistic and cultural knowledge (Puren, 2013).

In the case of distance learning, Beacco (2000) and Mangenot (2003) suggest that in order to achieve this it is necessary to adapt teaching materials to the linguistic needs of learners. Moreover, digital resources (videoconferencing platforms, Internet, apps, etc.) favour certain interaction and interpersonal production skills. In addition to learning materials, the guidance of the teacher, who must assist the learner at all times, seems important. This assistance can be provided by the many communication devices available to students in higher education (videoconferencing, chat, phone calls, messaging, etc.). Some authors agree that LMS (Learning Management Systems) platforms, such as WebCT or Moodle, have been an excellent advance in this sense, facilitating access to this material (Lebrun, 2011). Moreover, students highly value these accessible technological supports (Abadía Valle et al., 2015; Guichon, 2012).

The relationship between DLEs (Digital Learning Environments) and the everyday use of digital devices is present in our society. The Digital Competence Framework for Citizens (Carretero et al., 2017) defines digital inclusion as one of the digital competences to master the strategies and challenges of online presence in teaching and learning processes. In this sense, the daily use of digital devices fosters changes in students' routines and habits (Soubrié, 2020) and constitutes a form of access to information. These scenarios influence the university system, specifically the rapid development of ICT applied to teaching in general and language teaching in particular.

An important variable that especially affects online teaching is the temporality of communication, as it can be issued between teachers and students synchronously or asynchronously. Synchronous communication allows two or more people to dialogue simultaneously, in real time, through a digital environment (Montero Curiel, 2019). This communicative variable influences the type of learning: work involving reflection or complex information processing will be more facilitated by the asynchronous world, while socio-

affective, interactional aspects and those linked to the development of fluency will be more favoured by the synchronous modality (Guichon, 2012).

In this sense, the issue of anxiety in relation to the use of the Internet or virtual environments in language teaching and learning has been addressed by different authors. Recent previous studies (Bárkányi, 2024) highlight the importance and impact of the affective dimension on the success of foreign language acquisition. They also point to the interrelationship between learners' self-efficacy beliefs, perceptions of the possibilities of technology-mediated speech and anxiety when speaking in a foreign language in asynchronous contexts. According to some studies, the use of asynchronous technologies maximizes the linguistic and cultural benefits of electronic exchanges (Kern, 2006), while others highlight that the use of synchronous technologies encourages learners to collaborate and actively participate, while reducing the anxiety associated with speaking in a foreign language.

Methodology

Research Questions

For the purposes of this study, the following research questions have been posed: What is the learners' previous experience of online French-language learning, and more specifically of activities to improve oral expression? What is their perception of the self-efficacy of these online activities? By using materials adapted to the learners' needs, and combining virtual and face-to-face activities, can we improve the results achieved when working with this type of technology, as well as improve their self-perception?

The Context

The Polytechnic University of Valencia (UPV) is one of Spain’s leading educational institutions, noted for its focus on engineering, architecture, science and technology. It offers a variety of programs in which foreign language learning is a key component, especially in undergraduate degrees. The university recognizes the importance of foreign languages as a fundamental part of the integral formation of its students, especially due to its international focus and the need for language skills in today's global context. As part of the requirements to obtain the university degree, students must demonstrate B2 level language skills in a foreign language, especially in English. The UPV offers foreign language courses within the curricula of several degree programs, with the aim of improving students' language skills in a professional and global environment. In addition to English, students can learn other languages such as French, German or Italian as optional subjects to complete their education. In this case, we are dealing with groups of students from different degrees, and we can affirm that these students are highly motivated to complete their training in foreign languages.

However, since it is a complementary training for students not integrated in their degree programs, it is difficult to adapt the practical characteristics of teaching (class schedule, timetable, evaluation) to all of them. In addition, the availability of students is often limited for any autonomous task they may have to perform. Therefore, in addition to face-to-face classes, the use of the virtual platform is especially necessary to facilitate the completion of tasks and activities for all students. The levels currently offered range from A1 to B2. The number of students per group is around 25 students, with a maximum of 30.

The Study

For this study we have chosen students who are studying at level B1. At this level of learning, the improvement of oral expression is particularly important. The Common European Framework of Reference for Languages (CEFR), which establishes a series of linguistic competences that students should achieve at different levels, defines several speaking competences for level B1 (independent user, threshold level). Speaking skills focus primarily on the ability to interact, describe, narrate and give opinions in an understandable manner, even if linguistic accuracy is not always perfect. Among them we highlight the control of the language in everyday situations, the construction of a simple but well-organized discourse and the improvement of fluency in interaction with respect to previous levels. Current students, because of their age, have experienced prolonged periods of online teaching in the past and, more recently, shorter periods during their university studies. It is important to note that these periods are linked to difficult life situations such as the Covid or as a result of natural disasters.

Consequently, the study is based on Spanish students of French as a foreign language at level B1. The pilot group consists of 25 students. An oral production activity (interaction) was carried out in a virtual environment (Teams), followed by a face-to-face reinforcement activity. Two questionnaires were carried out: one before and one after the oral production activity. The results must be analyzed quantitatively and qualitatively, with the use of observation. This study will be implemented alongside other control groups at the same level, so this will provide conclusive results.

The initial questionnaire aims to get students to reflect on their learning process and on their personal perception when carrying out online speaking activities. First of all, we want to find out how often they have done speaking activities and what their perception of this type of teaching is. Subsequently, in the pilot group class, we propose a learning module in which we include a guided speaking practice or activity using the Teams platform. Students work on the interaction in pairs in different rooms, during the time of the class session. The teacher provides feedback to all of them at different times, without the rest of the students being present. In the following face-to-face session, a similar group activity is proposed as a continuation of the online activity. Subsequently, a questionnaire is used to collect feedback from the students and their opinion on the proposed activity. The activity will be carried out again and at the end of the course a questionnaire similar to the initial one will be proposed in which it will be observed whether the results have changed.

This proposal is intended to response to a twofold purpose: to develop learners' analytical competence towards their own learning and to improve students' oral skills on the basis of the evaluation received, optimising the time available.

Results and Discussion

From the initial questionnaire the following most relevant results are obtained. To question 1: How do you feel about the following skills?, from “very insecure” to “very confident”, oral production is the skill in which students perceived themselves as the most insecure, with a percentage of 72.7% (just ahead of written expression: 68%).

When asked whether in previous French classes, they have done speaking activities online using Teams or another platform, such as interaction exercises, preparing oral presentations

or practising dialogues with other students or with the teacher, the positive and negative answers were evenly balanced at 50%. Among the students who answered in the affirmative, the vast majority (90.8%) only carried them out 3 times at most in their entire learning experience.

As for the perception of these experiences, the rating given is above average: 63.6% rated them with 4 points out of 5, and there are no ratings below 3. The main reasons given are the following statements:

- Speaking French online is always less stressful for me than in person. (22,7%)
- Practising speaking online gives me more stress than in face-to-face mode. (18,2%)
- For me, it's the same for me to practise speaking in French online or in person. (31.2%)
- I prefer face-to-face speaking practice. (50%)

Despite this positive assessment, when comparing these online and face-to-face activities, 50% of students say that they have a preference for face-to-face speaking practice, while 31.2% of students show no preference for one format or the other. On the other hand, while 22.7% say that speaking in French online is always less stressful for them than in person, 18.2% say the opposite (that speaking online is more stressful than face-to-face). As for the general evaluation of face-to-face versus online teaching, the average is 3.00 out of 5 for online teaching, compared to 4.32 for face-to-face teaching.

After having carried out the oral production activity using the Teams platform through different rooms for the students, followed by a face-to-face reinforcement activity, the final survey is a questionnaire including open-ended questions, in which the students assessed the activity and reflected on two aspects.

First, their perception of the effectiveness of the task performed in terms of the learning process itself was assessed, with regard to the acquisition of new competences or the improvement of competences. In this aspect, the majority of students (68%) rated it positively, in terms of: optimisation of time (as they had been able to talk for longer); feedback from the teacher (more personalised); and variation in the type of activity (compared to face-to-face classes).

Secondly, the rating refers to their general evaluation of the activity in relation to other face-to-face speaking activities. In this case there were approximately 58% positive responses compared to 42% negative or very nuanced.

Conclusion

In the absence of extending the research with more objective data, with the other control groups throughout the semester, this initial study offers us results that do not always confirm the statements derived from the previous studies consulted. As we have seen, the results confirm that students value these technological supports for their learning in general, with a score that exceeds that given to face-to-face teaching. However, as far as oral production is concerned, the assessment of both types of teaching is equivalent. In this sense, the students' initial perception was confirmed after the activity. Nevertheless, they rated the online activity positively in terms of effectiveness, time optimisation and feedback from the teacher. We have observed that the use of synchronous technologies encourages students to collaborate and participate actively. Especially in the case of students who are more blocked in their face-

to-face oral participation during lectures, the use of the online platform provides them with an environment in which they feel more confident, reducing their sense of stress.

Therefore, and while awaiting further data, the analysis of these initial results shows the need to incorporate virtual activities of oral expression in the teaching and learning of French as a foreign language, adapted to the needs of the students and with the supervision of the teacher providing the necessary feedback.

In the light of these results, and pending verification within the full study, we believe that we are on the right track as the combination of both modes of teaching, virtual and face-to-face, seems to correspond better to students' needs and their perception of self-efficacy, which at the same time contributes to improving students' confidence in their own learning progress.

We strongly believe that developing oral production competence should be a priority for university students moving in an international environment. Today's multiple teaching and learning methodologies require constant practice and updating in terms of familiarisation with technologies and in the areas of communication and collaboration, digital content production, security and problem solving. Therefore, more research is needed to pave the way and promote the adoption of new solutions to improve virtual education. To ensure the quality of higher education, it is necessary to act quickly and update it to the world in which both teachers and students find themselves. As a consequence, the impetus for online education is opening up, with a critical eye that allows us to reflect on the new challenges that lie ahead.

With this in mind, we would like to conclude by talking about awareness of good practice in teaching and research, which invites us to critically review our ideas about what "good teaching" means, to discuss them and to contrast them with the findings of research. This is necessarily the starting point for updating and improving our shared teaching culture, the basis on which we build our practices.

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Japanese University Students' Use of the Golden Week Holiday Period: A Preliminary Look

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Abstract

In 2019 many Tokyo educational institutions made plans to better accommodate the start of the then-upcoming 2020 Tokyo Olympics by truncating, postponing, or eliminating altogether the 2020 academic year's Golden Week holiday, which essentially spans the first week of May. Because this long-established week-long national spring holiday period occurs early in academic years in Japan, it was determined that this would be an opportune time to investigate Japanese university students' and instructors' perceptions and uses of this time off from school and work duties. The research study was to involve a series of questionnaires and interviews with students and teachers both in and outside of Tokyo. Unfortunately, the full research study was cancelled due to the COVID-19 pandemic. However, the preliminary 2019 fall semester student questionnaire had already been administered to 233 students at three Tokyo metropolitan area universities, with the main purpose of it being to gain background information on students' typical Golden Week activities, their views regarding the holiday period, and if and how the period influences their academic studies. Results revealed that while students generally viewed Golden Week to be both fundamental and essential for engaging in non-academic pursuits, they also experienced a mixture of holiday-induced positive and negative academic and motivational disruptions. These results not only echo those revealed from research investigating the effects of vacations and holidays on work and productivity, but given the diversity of disruptions students attributed to the holiday period, they also indicate that further research into this topic is warranted.

Keywords: Japanese university students, Golden Week, holiday, vacation, study

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Introduction

Many who live in Japan look forward to the spring holiday period known as Golden Week (hereafter, GW). This holiday period provides many a week or so of time off from work and study responsibilities, thereby allowing people the freedom to engage in their choice of activities. However, during AY2019, educational institutions at all grade levels in the greater Tokyo metropolitan area had planned to do something unprecedented with the 2020 GW holiday period: either truncate, postpone, or eliminate it altogether from their upcoming academic calendars.[1] The reason for doing so was directly connected to the 2020 Tokyo Olympics that were to be held the next summer in the nation's capital.

By way of explanation, the spring (first) semester for educational institutions in Japan ends around the last week of July. Because this week coincided with the planned start of the 2020 Tokyo Olympic games,[2] it was thought that ending the semester one week early would ease congestion on the capital's notoriously crowded public transportation system, as nearly all students, instructors, and institutional staff would have no need to commute that week. With fewer of this sizeable group commuting on the nation's trains and roadways, travel would be less onerous for the massive influx of Olympic athletes, coaches, spectators, and media personnel just as the games were to get underway. The most convenient means of finishing the spring semester early without decreasing class time or impeding students' studies, therefore, was through once-in-a-lifetime manipulation of the long-established GW holiday period.

Considering the unique situation surrounding AY2020's GW holiday period, a grand comprehensive GW-centered research project was planned, with a series of questionnaires and interviews scheduled to span a year, beginning from fall semester AY2019 (i.e., the last full semester just prior to the next GW holiday). However, the research project, which was to gather data from students and instructors at numerous institutions of higher education both within Tokyo and outside of the metropolitan area (where GW manipulation was not needed) and which had already begun via the administering of student questionnaires at universities in Tokyo in the fall of AY2019, was necessarily halted due to the onset of the unforeseen COVID-19 pandemic in early 2020. Even so, there were cogent reasons for investigating the GW holiday period at this particular time, that is, as opposed to during regular academic years with unaltered GW holiday periods.

The decision to manipulate the AY2020 GW holiday period was made in a top-down manner, with little or no input from students or instructors. As the various national holidays that compose GW were established in 1948, GW itself typically stands as a fundamental element of the Japanese calendar, meaning that it is both *expected* and *counted upon* yearly by all in Japan and by all who deal with Japan, for instance, travel agents who work outside of Japan. Indeed, the holiday's very existence has been famously credited with reinvigorating those who have become mentally and physically exhausted and, paradoxically, partially blamed for causing a peculiar kind of springtime apathy called *gogatsubyō* (discussed below).

Given how ensconced GW is in Japan's national psyche, the author of the current article deemed the timing of the erasing of this holiday from Tokyo-area school calendars ahead of the 2020 Tokyo Olympics conducive to the investigation of the holiday's role in educational

[1] Academic school years in Japan officially begin on April 1 and end on March 31.
[2] The 2020 Tokyo Olympics were originally scheduled to begin on July 24 and end on August 8.

spheres, particularly regarding English language learning at the university level. Specifically, the author believed that once Tokyo-area university students learned that they would not be provided the opportunity to experience GW during AY2020 as they normally would as in typical years, they would then be able to more consciously consider this holiday period and examine more deeply how they typically spend their time during this holiday period, what the holiday means to them specifically, and how its existence impacts their studies and responsibilities both as students and as individuals. Considering the holiday's timing, the final point is of particular importance, as the GW holiday period begins roughly two weeks after the commencement of each academic year, that is, just after students have been introduced to new courses at their educational institutions, met new instructors, and began new routines brought about by new course schedules and other responsibilities (e.g., searching for and starting part-time jobs).

Although the current article presents results and analyses of an investigation that, due to the COVID-19 pandemic, fell short of the more expansive goals of the research project as it was originally envisioned, the findings from the curtailed study as implemented nevertheless illuminate core targets of the planned research, namely, they reveal how Japanese university students studying in Tokyo typically use their GW holiday time, if and how the typical GW holiday period impacts their studies—either for good or for ill—and their thoughts about the expected loss of the typical GW holiday in AY2020. It is contended that the results of the current study present aspects of students' thoughts and beliefs that are not only worthy of reflection and consideration by both educational institutions and those who teach within them, but are also indicative of the need to continue and expand research that investigates the role and impact of GW on educational endeavors, for both students and instructors alike.

Literature Review

GW Background

The GW holiday period is a span of time in the Japanese calendar that contains no fewer than four national holidays: Shōwa Day (April 29), Constitutional Memorial Day (May 3), Greenery Day (May 4), and Children's Day (May 5). When adding the days in between these national holidays, weekends, and "compensation holidays" should any of these dates fall on a Sunday, GW can last well over a week. The name "Golden Week" dates back to the early 1950s and was inspired by the term "golden time," which indicated a period of peak radio listener ratings (Chambers, 2013). The GW holiday thus gives many a "golden" opportunity for activities, particularly travel, making it one of the busiest and most congested travel times of the year. Besides travel, during GW people commonly engage in hobbies, catch up on long-neglected duties (e.g., house chores, work tasks, personal studies), and even just rest. No matter the activity, for many, the GW holiday represents a brief yet valuable period of freedom and opportunity.

GW's Influence on Learning

All this is not to say that the GW holiday is challenge-free. Of particular relevance to—not to mention impetus for—the current article are two issues, the first being how the block holiday seems to break the flow of the new academic school year (which begins in April), as students typically attend between two and three weeks of lessons before taking a break and beginning their GW holiday. This break can be said to literally break the rhythm and flow of the spring semester, as any learning gained and momentum gathered in those few weeks must be

reviewed and rebuilt, respectively. This can be an arduous undertaking, particularly if classroom participants (i.e., both students and instructors) had either an overly leisure or hectic GW holiday.

Also of concern is *gogatsubyō*, which is often translated into English as "May blues," "May illness," or "May sickness." The term was popularized in the late 1960s (Kuroki, 2009, as cited in Tachikawa, 2011) and is typically described as a condition of temporary listlessness, usually (but not solely) experienced by university freshmen sometime in May. Symptoms can include depression, languor or fatigue, and a desire to shirk one's duties, such as attending classes (Tachikawa, 2011). The causes of *gogatsubyō* can be varied and commingle:

- The excitement of March's high school graduation and April's university entrance has faded.
- There is a sudden change in schedules as well as a need to navigate a completely new and sometimes confusing environment.[3]
- Students are disappointed in their university classes, thereby triggering student apathy (Matsubara, 1987).
- The GW holiday period provides a long-overdue rest period for students, especially those taxed by their university entrance examination ordeals, which can inadvertently precipitate unrestrained introspection, confusion, and a consequent lack of motivation and/or direction.

The condition shares many similarities with adjustment disorders as described in the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed., *DSM-5*; American Psychiatric Association, 2013). Fortunately, *gogatsubyō* does not last long for most, but for others, it marks the beginning of more serious mental health issues (Nippon.com, 2019). Considering the causes and timing just described, *gogatsubyō* has been called "a case of the mental bends" (Kasahara, 1997, as cited in Tachikawa, 2011) and even renamed *gōkaku utsubyō* (success depression) by some since pre-tertiary-level stressors are replaced by tertiary-level ones (Oda, 1987, as cited in Yamazaki, 2005).

GW's Connection to Schooling

Indications are that the GW holiday may foster *gogatsubyō*. Just three weeks or so into the new academic school year, the break provides students at all university grade levels the opportunity to relax and take stock of their lives (which includes their classes, living situation, university clubs, and part-time jobs) and ponder the general direction their lives are headed. For freshmen, it is likely the first time for them to "catch their breath," as their life-changing and stressful university entrance examinations, high school graduation, and university matriculation (all having occurred recently within the span of a few months) are over. They may consciously realize that their years of tedious entrance examination study (i.e., study that dominated their lives) are behind them and that there is no similarly monumental objective poised to take its place. Those dismayed or uncertain about their current lot may succumb to feelings of burnout and apathy and hence experience *gogatsubyō*. Afflicted students (particularly freshmen) have been known to ignore their university studies and concentrate solely on distinctly non-academic diversions like club activities or part-time jobs (Matsubara, 2009) or, in extreme cases, take a leave of absence from school or drop out altogether (Tachikawa, 2011).

[3] This is why new office workers can also sometimes be said to be afflicted with *gogatsubyō*.

These considerations on the relationship between GW and *gogatsubyō* raise a much larger question, however: does the GW holiday (i.e., its timing and the time off it affords) influence students' academic endeavors at university, including but not limited to their English language studies? A cursory look at the literature indicates that there may be some influence from GW, either directly or indirectly, and that, overall, it may not necessarily be positive.

Directly speaking, while students can use this holiday to release pent up April tension (Nakamura, 2017), they may also use the time for personal reflection. Their academic engagement may suffer if they conclude that they are dissatisfied with one or more aspects of their lives. Also, considering research on vacation effects, should there be any beneficial or restorative outcomes to be had from this holiday period, they are likely short-lived (see Kühnel & Sonnentag, 2011). Indirectly speaking, there is a clear changing of the seasons between April and May. Seasons have been found to affect cognitive functioning differently (Meyer et al., 2016). As temperatures increase fewer resources get allocated to cognitive processes (Ward, 2013). Consequently, students may not experience optimal cognitive positioning just as the GW holiday gets underway.

Connecting GW and English Language Studies

With both GW's timing and students' cognitive processes in mind, cognitive load theory (hereafter, CLT) may potentially help explain student springtime distress. As relayed by Sweller et al. (1998), cognitive load is a construct explaining how tasks impose loads on the cognitive system. Cognitive load has been defined as "the total amount of mental energy imposed on working memory in an instance in time" (Cooper, 1998, p. 11). Given that the CLT framework posits varied cognitive load types in learning situations (i.e., intrinsic, extraneous, and germane; see Sweller, 2010), students experiencing a high cognitive load with any of these types could find themselves overwhelmed and at a loss as to how to make sense of their lessons and proceed with their studies.

The weight of this cognitive load could be enormous in university-level English classes—particularly for freshmen—for several reasons. First, students who could understand most of their high school class content may suddenly be confronted with university class content of which they can make little sense. Post-GW holiday, they may become lost in their classes, especially if classes go at the lecturer's rather than the students' pace (Matsubara, 2009). This can result in students becoming more susceptible to *gogatsubyō*.

Second, students cannot rely upon the study methods they used to study English in high school for their university English courses. Because the demands for foreign language learning have changed post-university matriculation (i.e., from being essentially examination-preparation oriented to being communicative), students must strive to drastically alter their study methods or abandon them altogether if they wish to make advancements (Rubrecht, 2004, 2005, 2006, 2008). Consequently, students are introduced to a new and often unexpected source of stress and confusion.

A further potential cognitive drain may come if a native English instructor helms their university foreign language courses. The potential embarrassment of making mistakes in front of a native speaker notwithstanding, some students may find it stressful comprehending or interacting with their instructor, especially if they have had little or no direct contact with foreigners previously (instructors or otherwise). Being expected to follow strict English-only classroom language policies, for instance, may also add to their misery (Rubrecht, 2020).

Materials and Methods

Multiple questionnaires were to be constructed for the research study as originally planned. These questionnaires were to be administered at different times in different locales to different groups of university students, that is, to students who were to have a typical GW holiday period and those who would not, and at times prior to and during the 2020 academic school year. University instructors were also to be asked to complete several similar sets of questionnaires. However, only one set of questionnaires had been distributed by the time the COVID-19 pandemic began. This set had been administered to Tokyo-area university students in AY2019's fall semester.

The participants at this early stage of the planned research were students (n = 233) from three universities in the Tokyo metropolitan area. All were native Japanese with Japanese as their first language. Additionally, all claimed to have had GW holidays every year throughout their public education experience. As students of the author, they were all either enrolled in university English language courses or university courses where English was the language of instruction. The students ran the gamut in terms of academic year (from freshman to senior level), English ability (TOEIC scores between 100 and 940), and university major (e.g., law, commerce, management). Not all participants answered all questionnaire questions, and in some cases, participants gave multiple responses to open-ended questions. All had given consent to allow their questionnaire responses to be used for research purposes, as students' identities would not be revealed.

The questionnaire was written in Japanese, but students were told that their responses could be written in either Japanese or English. Because open-ended question responses were wide ranging, they were carefully analyzed before being categorized and tallied. For the sake of brevity, only the most common responses are discussed here, though responses of interest are also mentioned.

The overall purpose of this first questionnaire was to gather information regarding students' (a) general background, (b) typical GW activities, (c) thoughts and impressions about GW, (d) views of GW's influence on their studies, and (e) impressions about the impending loss of the 2020 GW holiday period, as all three universities had already officially unveiled AY2020 calendars with the GW holiday removed from its usual spring timeframe.[4] In effect, this first of several planned questionnaires was meant to collect background information on students and their views of the GW holiday period. This information was also to be used to guide the construction of later questionnaires, that is, those to be administered in spring and fall AY2020, both within and outside of Tokyo.

Results

Being partly preliminary in nature and the first of several planned questionnaires, there were only four main questions asked of students that centered on the GW holiday period.

[4] Some students were still unaware of the impending loss of the 2020 GW holiday at the time of questionnaire administration, which occurred in mid-December 2019.

Question 1

This question provided a list of activities students were thought likely to participate in during a typical GW holiday. They were asked to indicate which were their typical GW activities. Students could select multiple activities, and there was space for students to indicate other activities not on the list. The student participants reported the following:[5]

- play: 197 (85%)
- university club/group activities: 190 (82%)
- part-time jobs: 129 (55%)
- travel: 119 (51%)
- study: 90 (39%)
- hobbies: 50 (21%)
- household chores: 31 (13%)
- other (e.g., return to hometown): 12 (5%)

Question 2

When asked if it was good to have a GW break (as it is usually experienced each year in mid-spring), 198 students (85%) overall responded affirmatively, with the following being the top four reasons:

- GW bolsters positive physical and mental well-being: 69 (30%)
- Students fundamentally like, want, or need breaks: 34 (15%)
- GW is a familiar/cultural national holiday: 24 (10%)
- GW provides free time to do most anything: 23 (10%)

Some also mentioned how GW is the only meaningful holiday in the spring semester and that it is the only travel/family time they have (10 students, or 4%, each), particularly since parents would likely have the same week off from work as students have off from school. The top-mentioned reason for students having a negative impression of the GW break was that places (e.g., stores, restaurants) become quite congested at this time (11, or 5%). It is also of note that a student mentioned that they had never thought deeply about GW before, so they could not adequately decide if GW was fundamentally positive or negative in nature.

Question 3

This question asked students if they believed the GW holiday period had an influence on their education, that is, on their academic studies. The 133 students (57%) who believed there to be little or no influence outnumbered the 100 students (43%) who thought the opposite. The top reasons cited for its lack of influence include the following:

- GW is specifically a break from studying: 28 (12%)
- The break cannot change one's own abilities or grades: 20 (9%)
- The break is too short to make a difference: 17 (7%)

In contrast, students who believed there to be an influence cited its numerous direct study benefits, specifically (a) time afforded to refresh, which impacts motivation and study efficacy (49, or 21%), and (b) days off for review or study time (29, or 12%). Yet, as suspected, some students mentioned specific negative impacts on their studies, that is, that motivation to study is lost and that GW breaks the rhythm of the semester (4, or 2% each).

[5] Some calculation percentages evince rounding error.

One student mentioned the concern that GW is wasteful since students are just getting used to their new academic environment.

Question 4

Finally, when asked to provide their impressions about the impending loss in AY2020 of the GW holiday period in May, students' negative responses outnumbered the positive ones three to one. That is, 169 participants (73%) viewed the loss of their typical and expected GW holiday as being unfavorable while 57 participants (24%) found something positive about the change. The most common negative comments were as follows:

- No GW (at its normal time) is a sad situation: 37 (16%)
- The Olympics are causing disruptions (e.g., to plans/schedules): 36 (15%)
- The GW break at its normal time is needed/wanted: 22 (9%)
- It is shocking or surprising: 13 (6%)
- The loss is unfortunate: 13 (6%)
- Students despise losing GW: 11 (5%)
- Students cannot return home/mismatch in family vacation time: 10 (4%)
- The decision was one-sided/top-down without student input: 8 (3%)

The students who looked more favorably upon the situation said the following:

- Summer break will be longer: 24 (10%)
- There will be less congestion during the GW holiday period: 14 (6%)
- The Olympic games are special, so they take priority: 13 (6%)

Because of the open-ended nature of the questionnaire, for this final question, many students provided additional responses that could not easily be classified as being either positive or negative. In other words, 64 students (27%) provided comments or additional responses that could only be described as fatalistic, if not simply balanced, including:

- Losing the GW holiday period cannot be helped: 38 (16%)
- The amount of time off does not change: 11 (5%)
- There is no opinion either way: 6 (3%)

Discussion

The current article presents findings from the first set of questionnaires from a planned research study about Japanese university students' studies and the yearly Golden Week holiday break that typically happens in mid-spring. Although the study was truncated due to the COVID-19 pandemic, based on the results discussed above, several points of discussion can nevertheless be related, and several determinations can be made.

The list of GW activities the author generated for Question 1 seemed for the most part to mirror those activities that the students actually engage in (e.g., club activities, part-time jobs). Very few students (i.e., only 12) added activities not on the list, and of those, 10 were "return to hometown," which, it is suspected, was what many students in fact meant when they checked the "travel" box on the list. Given that students would not realistically consider returning to their hometowns in AY2020 until summer break,[6] the GW holiday appears to be a valuable and precious week of time.

[6] Marine Day, the next national holiday in the spring semester, comes either just prior to or during the final exam period.

More than one-third of the participants (90, or 39%) claimed to use GW to study, with the breakdown by year as follows:

- freshmen: 36 of 91 (40%)
- sophomores: 51 of 121 (42%)
- juniors: 2 of 15 (13%)
- seniors: 1 of 6 (16%)

Without the use of the planned follow-up questionnaires or interviews, it is impossible to know why some students would opt to use the GW break to study, but several possible explanations may be proffered. First, because the question asked students what they typically do during GW, student responses indicate what their activities have been *in the past*, or rather, *up to and including AY2019's GW holiday period*. The higher underclassmen percentages (i.e., those of freshmen and sophomores) might indicate those students remembering their entrance examination studies (e.g., in high school), with upperclassmen (e.g., juniors and seniors) responding more with answers based on what they have typically done during the GW holiday periods experienced while at university. Second, considering what has been relayed about cognitive load theory (see above), it may be that the underclassmen are striving to adjust to university life and are either trying to catch up after getting behind the first few weeks of classes, get ahead while they have the time to do so, or just get organized as they look ahead to the rest of the semester and school year. Third, this large discrepancy could also possibly come from differing course loads and academic responsibilities between the two groups, as underclassmen must often register for numerous required courses that they have little interest in taking.

It is also worth noting that, as seen from the percentages above, the upperclassmen reported studying far less during GW than their underclassmen counterparts. This may partly be explained by the fact that the upperclassmen might realize that their time at university is limited. They may prefer to use their final university GW holiday periods as opportunities to step away from their studies and enjoy their time as relatively care-free university students before they graduate and enter the far more responsibility-laden work world. Given the discrepancies discovered here between the under- and upperclassmen, it appears that the upperclassmen may not view the GW holiday period as an opportunity to study. In fact, for them, this holiday period might be acting as an academic and/or motivational *disruptive force*, thereby negatively impacting their studies. Further research investigating this possibility is warranted.

Because one of the major aims of the original study was to examine the relationship between GW and students' education—particularly as it extends to their learning of English—future questionnaires and interviews could be designed to explore these and other possible reasons. Regardless, as expected, students spend their GW time engaged in a myriad of activities.

Regarding Question 2 and Question 3 responses, it was largely expected that most students would harbor positive views of the GW holiday, particularly if they could briefly distance themselves from their studies. As could be seen, some students saw the break as a way to rebuild their motivation and study efficacy, and in essence regenerate (see Fritz & Sonnentag, 2006; Meijman & Mulder, 1998). The open-ended responses indicated that at least a few students shared the author's concern that the GW break disrupts the rhythm of the newly begun semester and dampens any motivation generated thus far. Just as stress levels do not remain static before, during, and after vacation periods (see Etzion, 2003, for a review), these results lend credence to the impetus behind the originally planned research study and point to

the need to conduct longitudinal motivation studies to explore potential fluctuations in student motivation before and after the GW holiday break.

As described above, all participants were students in English language courses. This was by design. One of the ultimate aims of the original research study was to explore the impact of the GW holiday period on students' English language learning. Unfortunately, as the research project was cut short, there were no questions on this first questionnaire that specifically asked about GW's influence on their English language studies. However, as the current article indicates that students are cognizant of GW's natural yet early placement within the spring semester, future research should be carried out to explore if students engage specifically in English language study during the GW holiday break, and if so, how and why.

Finally, regarding Question 4's responses, it was clear that the GW holiday period is valued by many students. This may be due to the *opportunities* it affords. While being told that there would be no typical GW holiday period early in the 2020 spring semester largely triggered negative feelings in the students, as people desire to avoid losing what they possess (see Kahneman & Tversky, 1979, for their principle of loss aversion and other subsequent research on the subject), the students may have viewed the shift of the GW holiday to the end of the spring semester as a bona fide loss because *it would have deprived them of what they could only experience during a free week in mid-spring* (e.g., travel to/with parents, the attending of specific concerts).

Those who were positive about the shift in GW timing may have simply tried to be optimistic in the face of this unprecedented change. Some may have focused on the positive point of having a longer summer vacation, and it is conceivable that some students planned on watching the Olympic games, either live on television or in person, so for them, having already completed the spring semester and being free from academic responsibilities during the entire run of the Olympics would have been welcomed.

Conclusion

In the end, the data garnered from this first and only questionnaire, though limited, are enlightening and point the way to further research avenues. Since educational institutions and the instructors who work for them should strive to prioritize student wellbeing, especially when language education is involved (see Mercer et al., 2018), further research into the connections between the GW holiday period and Japanese university students and their academic endeavors—including but not limited to those related to English language learning—would almost certainly lead to a better understanding of both the students' personal and education-oriented goals and aspirations, not to mention overall improvement in the teaching and learning experience. This further research would naturally also entail investigating instructors' use of the GW holiday period, which was part of the vision of the original full research study.

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The Impact of Homework on Enhancing Critical Thinking Skills in STEM Education: A Literature Review

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Abstract

Students' critical thinking skills can be enhanced through various approaches. Homework, as one of these pedagogical strategies, has been integrated into teaching to foster critical thinking across different subjects. This paper aims to review research on homework, with a specific focus on its integration in STEM education. The study reviewed fifteen (15) research articles that examined the effectiveness of homework in STEM education. The results indicate that, among the various types of homework, project/research-based and collaborative homework have significant potential to improve students' critical thinking skills. However, while there are many benefits to using homework to develop critical thinking skills, this review also highlights those limitations in resources, along with variations in students' learning styles and social skills, can negatively impact the improvement of critical thinking. Moreover, the findings suggest that well-planned, high-quality homework, when assigned in smaller quantities, can significantly enhance students' critical thinking. Nevertheless, the generalisability of these results is subject to certain limitations, as most studies claiming the effectiveness of homework in promoting critical thinking are short-term. Therefore, longitudinal research is necessary to evaluate the long-term impact of homework on enhancing students' critical thinking skills.

Keywords: homework, critical thinking, STEM, science education

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Introduction

In the ever-evolving landscape of education, particularly within the fields of Science, Technology, Engineering, and Mathematics (STEM), the development of critical thinking skills has become a cornerstone of effective learning. As educators and policymakers strive to prepare students for complex problem-solving and innovation, homework continues to play a central role in reinforcing classroom instruction. However, beyond its traditional function of practice and review, homework has the potential to cultivate deeper cognitive abilities. This paper explores the impact of homework on enhancing critical thinking skills in STEM education, examining how well-designed assignments can encourage analysis, evaluation, and creative problem-solving skills which are essential for success in both academic and real-world contexts.

Therefore, this review aims to fill that gap by synthesizing current literature on homework and its impacts on developing students' critical thinking. The objectives of this study are to examine existing research and explore the influence of homework on the development of critical thinking skills, with a particular focus on STEM education. The review starts by presenting a summary of the literature on homework and its connection to students' critical thinking abilities. It then outlines the methods used for selecting and analysing relevant studies. The findings are discussed, followed by a conclusion that highlights the study's contributions, acknowledges its limitations, and offers recommendations for future research aimed at designing effective homework strategies.

Literature Review

Homework

In academic research, the concept of homework is approached from multiple viewpoints. Cooper (1989a) describes homework as any task assigned by educators that learners are expected to complete outside of normal classroom hours, giving them the flexibility to work in various environments. These assignments, for instance, can be completed at home, within the classroom, online, or even in other educational settings outside of school. Similarly, Olympia et al. (1994) define homework as school-issued tasks meant to extend students' academic practice into non-school hours and settings. What is particularly noteworthy in these definitions is that homework doesn't have to be confined to the home, where it is completed often depends on the student's preference or circumstance.

Another interpretation suggests that homework consists of tasks aimed at helping learners prepare for upcoming instructional content (Kaur, 2011). Moreover, such assignments are intended to reinforce, broaden, and revisit classroom learning during out-of-school hours. According to Kazantzis and Ronan (2010), homework can take many forms, tailored to students' individual needs, and often encourages deeper investigation, critical analysis, and engagement with classroom topics. It also functions as a tool to help guide students through focused exploration and understanding of specific subjects. However, homework refers to any assignment (individual work, group projects, or research activities) given by a teacher to be completed outside regular school hours, regardless of the location or format. This definition also includes any task intended to strengthen students' capacity to apply independent and critical thinking to what they have learned in class.

Critical Thinking in STEM

In scholarly literature, critical thinking is portrayed as a complex and layered concept, with definitions shaped by the insights of philosophers, psychologists, and educators (Lewis & Smith, 1993). These varied viewpoints have produced differing definitions of critical thinking by analysing the unique considerations relevant to each academic discipline. Giving a single, precise definition of critical thinking is not an easy task. Nonetheless, it is commonly described as a metacognitive process involving a combination of sub-skills and mental dispositions (Magno, 2010). When used effectively, critical thinking increases the chances of arriving at a sound conclusion or solving a problem logically. Although it is widely regarded as a fundamental educational goal, many students report having limited opportunities to learn about or practice their critical thinking abilities (Dwyer et al., 2014). Fisher (2011) defines critical thinking as "reasonable, reflective thinking that is focused on deciding what to believe or do" (p. 45). This definition highlights the idea that decision-making (whether about belief or action) is inherently practical, framing critical thinking as a functional skill. In other words, students with well-developed critical thinking abilities can identify issues, gather and evaluate relevant information, examine it from multiple perspectives, and reach thoughtful, independent decisions about beliefs or actions. As a result, many educators and policymakers prioritize content delivery, often overlooking the importance of encouraging curiosity, questioning, and creative thought among students. Even though there is still debate about the exact meaning and necessary components of critical thinking, terms such as creative thinking, deep thinking, and cognitive skills can be used interchangeably with critical thinking which also considered as a cognitive process that involves complex reflection, analysis, and the ability to generate innovative solutions (Moore, 2013).

Methodology

Research Design

This research adopts an approach similar to a systematic review, commonly referred to as a systematized literature review, which includes selected features of the systematic review methodology (Grant & Booth, 2009). According to Moher et al. (2009), conventional literature reviews are often described as "unsystematic and unfocused," lacking the precision and discipline associated with systematic reviews.

Unlike traditional reviews, which typically do not prioritize transparency or follow specific procedures, systematic reviews follow a clearly defined process for identifying, selecting, and synthesizing original research (Moher et al., 2009). However, carrying out a full systematic review is highly demanding in terms of time and resources, often requiring collaboration among multiple researchers and extended time periods (Moher et al., 2009). Given these limitations, a traditional, desk-based literature review that integrates aspects of the systematic review framework is more suitable for this study, considering the constraints related to available time, resources, and the objective to examine empirical research.

Search Strategy

This study conducted a literature search using the keywords "Homework" AND ("critical thinking" OR "thinking skills") and was limited to empirical studies. The initial round of searching produced an extensive number of results which indicate the need for a more focused and refined search approach. To narrow down the results and improve relevance, the search

criteria were revised to include only those publications where the keyword “homework” appeared in the title rather than in the abstract or full text. This change helped ensure that the selected studies placed gamification at the core of their investigation, rather than merely mentioning it as a peripheral or background concept.

Study Selection

The initial search identified a total of 135 articles. After a preliminary screening process, 73 articles were removed due to duplication, irrelevance based on their titles, or abstract. The remaining 62 articles were then reviewed in more detail to assess their suitability. An additional 47 articles were excluded for not aligning with the focus of this literature review. This process ultimately resulted in 15 relevant articles, which were then included in the final review.

Data Extraction and Analysis

The data from the chosen articles were thoroughly examined, and preliminary insights were noted. The homework strategies and methods discussed in the studies were carefully analysed and systematically coded based on the research questions. These homework strategies/methods were then organized into three primary categories: Project based, research based, collaborative or other. Furthermore, studies that highlighted negative effects of homework or reported a decrease in critical thinking skills were also recorded. In the final step, the impact of homework on each of these categories was assessed to offer a comprehensive overview.

Results

This study reviewed fifteen (15) research articles to investigate the role of homework in enhancing students' critical thinking skills within the context of STEM education. The analysis focused on the various types of homework and their effectiveness in fostering critical thinking.

The findings suggest that certain types of homework have a particularly strong impact on the development of critical thinking skills. Specifically, project-based/research-oriented and collaborative homework assignments were found to be the most effective in promoting critical thinking (Galloway et al., 2013; Olympia et al., 1994; Tyser & Cerbin, 1991; Watkins, 2012). These types of homework encourage students to engage in deeper analysis, synthesis, and problem-solving, all of which are essential components of critical thinking. Additionally, collaborative homework, which involves group work and peer interactions, also demonstrated considerable benefits in enhancing students' critical thinking (Arthurs & Templeton, 2009; Simpkins et al., 2015; van Voorhis, 2000). The collaboration required in these assignments allows students to evaluate different perspectives, engage in meaningful discussions, and work together to solve complex problems, further developing their analytical skills.

In contrast, traditional homework formats, such as problem sets or simple rote memorization tasks, were found to have less significant effects on critical thinking. These assignments generally reinforce existing knowledge but do not foster the deeper cognitive processes required for critical thinking. Overall, the research highlights the importance of incorporating project/research-based and collaborative homework into STEM curricula as they contribute significantly to the development of critical thinking skills. These approaches encourage students to apply their knowledge in real-world contexts and to work collaboratively with others, both of which are crucial for cultivating strong critical thinking abilities.

Contrary to previous findings from various studies, it has been shown that approaches such as project-based and research-based homework may not effectively promote critical thinking skills in students who are accustomed to traditional instruction aligned with national curricula (Kong, 2014). Students who are familiar with teacher-centered teaching methods often face challenges when engaging in project work. Additionally, for students with limited reading and writing skills, project or research-based homework may not be an effective learning strategy (Noble, 2004; Westwood, 2016). Teachers typically assign project or research-based homework with the aim of helping students grasp subject concepts through the work itself (Livengood et al., 2012). However, such projects may not adequately provide clear examples, illustrations, or practical applications of the concepts, particularly for students who are used to more traditional, teacher-directed learning methods.

Conclusion

This study has examined how critical thinking skills can be enhanced through various homework strategies. The study highlights a significant positive impact of homework on the development of critical thinking skills. While the homework approaches such as project based and collaborative assignments offer several advantages for fostering critical thinking, the study also emphasizes that limitations such as resource constraints, as well as differences in students' learning styles and social skills, can negatively affect the expected learning outcomes. Despite these challenges, the findings suggest that well-designed, high-quality homework assignments, when assigned in moderation, can significantly boost students' critical thinking abilities. However, the generalizability of these results is subject to certain limitations. For instance, while many studies supporting the effectiveness of homework in promoting critical thinking are short-term and conducted by researchers rather than teachers themselves, the outcomes could differ if the perspectives of experienced teachers who regularly implement homework approaches were considered. Therefore, incorporating teachers' firsthand experiences could provide a more holistic understanding of how homework strategies impact the development of critical thinking skills. Nevertheless, the generalisability of these results is subject to certain limitations, as most studies claiming the effectiveness of homework in promoting critical thinking are short-term. Therefore, longitudinal research is necessary to evaluate the long-term impact of homework on enhancing students' critical thinking skills.

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Game-Based Learning With Traditional Games: Integration of Local Wisdom to Strengthen Character Education

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Abstract

Traditional games are one of the Indonesian cultural that are full of local values. The values of local wisdom reflect the values, knowledge, and practices that are passed down from generation to generation and show the cultural identity of the local area that is constructively able to face increasingly dynamic global developments. The rapid development of technology poses challenges for everyone to be adaptive and to provide solutions in responding to every change and problem that has never been faced before. The integration of local wisdom of traditional games in learning can be a learning innovation that strengthens students' character as a provision to face global challenges. The aim of this research is to explore the use of traditional games in a game-based learning approach as a way of integrating local wisdom with character education. This research employed a literature review using ScienceDirect and Google Scholar search engine. The review includes 27 articles published in 2014-2024. The study found four study themes, namely Game-Based Learning (GBL); Traditional Games; Local Wisdom Approach in Learning, and Strengthening Character Education. The use of traditional games in learning includes aspects of physical and spiritual health, child growth and development, as well as religious values, integrity, collaboration, sportsmanship, togetherness, responsibility, and others that are positive in forming children's character.

Keyword: game-based learning (GBL), local wisdom approach in learning, strengthening character education, traditional games

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Introduction

The rapid expansion of the modern era poses challenges in the field of education, necessitating innovations in learning methods. According to the Organization for Economic Co-operation and Development (OECD), we are currently confronted with mega-challenges such as climate change, the impact of Artificial Intelligence (AI) and technological innovations, mass migration, and global taxation. The education sector faces significant challenges in designing learning experiences to prepare students for jobs that have never existed, the use of technologies that have never been encountered before, or solving social problems that were previously unimaginable (Taguma & Frid, 2024). Curriculum adaptation is essential to ensure alignment between educational content and the demands of society, which are influenced by technology (Asmayawati et al., 2024). The integration of local wisdom can serve as a strategy for empowering character education and act as an educational innovation by optimizing educational institutions as facilitators of this innovation. Internal institutions that can support the implementation of educational innovation include students, teachers, and management teams (Sánchez & Gutiérrez-Esteban, 2023). This integration of local wisdom can be a step toward aligning local wealth to face global society.

The rapid technological advancements in recent years have led to an increased need for students to develop lifelong learning skills that will enable them to adapt to the workforce (Smith et al., 2022). Students must develop skills such as critical thinking, problem-solving, creativity, active learning, collaboration, and teamwork to live and work in the future (Videnovik et al., 2024). In response to these needs, teachers need to prepare adaptive pedagogical strategies to spark students' interest, motivation, and enthusiasm for learning. Teachers, as educators, can use Game-Based Learning (GBL) strategies, especially for digital native generations who are characterized by relatively short attention spans and a preference for exploration over traditional lecture-based learning. Several studies on GBL show that this strategy, which incorporates game concepts into education, and the integration of traditional games, can influence the formation of character traits such as discipline and honesty (Atmaji, 2019; Liu et al., 2020; Winardy & Septiana, 2023). Local wisdom embedded in traditional games in Indonesia carries moral values that equip students with social skills such as working together in teams and facing rapidly evolving global challenges. Traditional game experts Mohamad Zaini Alif and the Hong Community have researched 2,600 traditional games across Indonesia, and these games play a significant role in promoting moral values, teachings, attitudes, beliefs, norms, and behaviors that are deeply embedded in the societal belief systems (Alif & Community, 2023). This local wisdom can significantly contribute to character education through learning.

Special attention to character education is necessary to ensure that students have a strong identity to face the increasingly competitive global environment. Character education serves as the foundation of a nation, in building individuals who are creative, religious, innovative, and have a broad national perspective (Arif et al., 2023). The character developed is expected to address educational problems in Indonesia, such as bullying, sexual harassment, intolerance, and mental health issues (Juliansen et al., 2024; Septiana & Afifah, 2022). These issues faced by Indonesian youth must be urgently addressed as this generation is expected to be the golden generation and demographic bonus for Indonesia’s future. Therefore, the urgency of this research on educational innovation through GBL with traditional games becomes an effort to strengthen character education with local wisdom that can be used to face increasingly complex issues. This effort aims to create a sustainable lifestyle, uphold human rights, promote gender equality, support peace and anti-violence campaigns, and build

global citizenship and multiculturalism principles while considering cultural contributions to sustainable development (Bappenas, 2024).

Method

Research Approach

This study employed a qualitative approach with a literature review methodology. A literature review aims to map and analyze the existing intellectual domains and determine the research questions for further development of the existing body of knowledge (Guler, 2019). The intellectual domains covered in this study include the integration of traditional games into Game-Based Learning (GBL) in character education. This research focused on reviewing scholarly articles published between 2014 and 2024. This approach was chosen because it allows the researcher to understand and summarize trends, findings, and gaps in the existing literature, which can help formulate relevant learning strategies in the current context.

The data sources for this research were scientific articles obtained from two main search engines: ScienceDirect and Google Scholar. These search engines were selected for their wide access to quality international and national journals that are relevant to the research topic. The researcher conducted searches using keywords such as “traditional game in education,” “local wisdom in education,” and “character education.” A total of 27 articles considered relevant to the research topic were selected for in-depth analysis.

The data collected from the 27 articles were analyzed using thematic analysis. This analysis aimed to identify the main themes emerging from the articles and determine the relationships between these themes. The process of analysis involved several steps: initial reading, grouping themes, and data synthesis.

Findings and Discussion

Findings

Based on the findings from the 27 selected articles, this study identified four major themes: Game-Based Learning (GBL), Traditional Games, the Local Wisdom Approach in Learning, and Strengthening Character Education. These themes are explained in detail as follows:

Game-Based Learning (GBL)

The concept of "games" should be understood as an existential phenomenon, as play is inseparable from human culture and represents an activity that does not produce a product (either material or ideal), except in business games and design (Shalaev et al., 2019). This explanation underlines that games can also be used in education as a strategy to achieve educational goals. The concept of play in learning is known as the Game-Based Learning (GBL) approach. Learning through games is one of the oldest and most effective pedagogical ideas, based on the use of video games and game-related elements such as reality, content, subjects, and visuals in the educational process (Liu et al., 2020; Raybourn, 2014; Ucus, 2015). The literature related to GBL is summarized in Table 1 below.

Table 1

Major Potential Issues Associated With GBL

No	Author	Country	Research Focus	Research Result
1	(Mansoor & Nugraha, 2021)	Indonesia	An effort to preserve one of traditional scripts that exist in Indonesia	Educational games with the memory game genre can help improve children's mastery of the lontara script
2	(Pramono et al., 2021)	Indonesia	The implementation of thematic games for children's education	The efficiency of the game showed that there was an increase in child socio-physical expertise and skills, as well as changes in learning models for children and assessment models by the teacher.
3	(Cheong et al., 2014)	Australia	The development of a game-like learning system	Students favored social interaction, engagement, feedback, and increased learning, which suggests that gamification is particularly suited to learning approaches such as social constructivism.
4	(Crocco et al., 2016)	n/a	Conducted on the efficacy of GBL offer mixed results	Games increased reported enjoyment levels, especially in subjects where students reported the greatest anxiety about learning, and this increase in enjoyment correlated positively with improvements in deep learning and higher-order thinking.
5	(Hsiao et al., 2014)	Taiwan	How different instructional strategies (i.e., traditional instruction and instruction using digital games) affected the students' creativity and their performance on manual skills	There were three interesting findings related to the use of DGBL: (1) the ToES was an effective learning tool for cultivating the students' creativity; (2) there was a positive effect of creativity and their performance of manual skills; and (3) the ToES accelerated the improvement of practical behaviors regarding manual skills
6	(Huizenga et al., 2017)	Netherlands	The perceptions of teachers who actually used digital games in their teaching and investigate what they see as the games' effects on learning and motivation	Most teachers who actually use games in class perceived student engagement with a game and cognitive learning outcomes as effects of the use of games in formal teaching settings. Fewer teachers mentioned motivational effects of learning with digital games

7	(Lester, et al., 2014)	n/a	The design of the Crystal Island learning environment	Crystal Island produced significant learning gains on both science content and problem-solving measures. Importantly, gains were consistent for gender across studies
8	(Hussein et al., 2019)	n/a	To classify learning outcomes from studies of DGBL applications in the area of elementary science education	Promising potential of DGBL, particularly in the area of content understanding. However, the finding of the review also suggest that there is a need to provide additional research in order to gain a more comprehensive picture of the educational effectiveness of DGBL
9	(Ucus, 2015)	Turkey	To understand elementary school teachers' views on GBL related to elementary school courses	GBL activities were exemplified as e-learning activities, creative drama activities, digital games, values education and character education.
10	(Anastasiadis et al., 2018)	n/a	Students' new needs and requirements for more interactive and engaging learning experiences and analyzes the concept and the impact of serious games in education	The characteristics and features of serious games and the significance of motivation in students' learning procedure. It analyzes the digital game-based learning approach and presents some of its benefits
11	(Tokac et al., 2019)	n/a	The effects of learning video games on mathematics achievement of PreK-12th-grade students compared with traditional classroom instructional methods	Video games are a slightly effective instructional strategy for teaching mathematics across PreK-12th-grade levels
12	(Shi & Shih, 2015)	Taiwan	Macro design concepts that elucidates 11 crucial game-design factors	clearly define each factor and analyze the relationships among the 11 factors to construct a game-based learning design model. Two application examples are analyzed to verify the usability of the model and the performance of these factors. It can assist educational game designers in developing interesting games

Several studies mentioned above show that GBL contributes positively to improve students' academic achievements, both in cognitive areas and practical skills. GBL has been proven to be effective in enhancing content understanding and problem-solving abilities in the context of science education and also affects the improvement of mathematics skills, although the effect size is moderate (Hussein et al., 2019; Lester et al., 2014; Tokac et al., 2019). The study by Hsiao et al. (2014) emphasized that GBL can enhance students' creativity and manual skills. GBL is also utilized as culture-based learning and thematic character education, thus functioning as a medium for transmitting cultural and national character values (Mansoor &

Nugraha, 2021; Pramono et al., 2021). Several studies highlight that GBL can increase student engagement and motivation through feedback, social interaction, and various challenges in the games (Anastasiadis et al., 2018; Cheong et al., 2014; Huizenga et al., 2017).

GBL has become a transformative tool in education and an innovative pedagogical approach. Literature evidence strengthens the notion that GBL is effective in enhancing learning, 21st-century skills, and student engagement (Liu et al., 2020; Smith et al., 2022; Videnovik et al., 2024). However, the success of GBL implementation may depend on well-designed games, teacher support, and contextualization within the local culture and curriculum (Huizenga et al., 2017; Shi & Shih, 2015; Ucus, 2015).

Traditional Games

Traditional games fall within gamification in learning because their implementation involves elements of game mechanics, aesthetics, and thinking to attract and motivate students in solving specific problems (Liu et al., 2020). Traditional games give children the freedom to develop their creativity by making game tools and combining them with materials available in their surroundings, such as seeds, shells, and other materials (Rahmawati, 2010). Traditional games in learning can serve as an enjoyable alternative to learning and can help improve children's mastery of their local culture (Asrial et al., 2022; Mansoor & Nugraha, 2021). The literature findings in this study are presented in Table 2 below.

Table 2
Major Potential Issues Associated With Traditional Game

No	Author	Country	Research Focus	Research Result
1	(Asrial et al., 2022)	Indonesia	Integrate the traditional games of Petak Umpet into learning process.	The integration of traditional games in learning can be used as an alternative to fun learning and in accordance with the age of elementary school children.
2	(Hendrowibowo et al., 2018)	Indonesia	The implementation of character education based on traditional games	Show that the implementation of character education based on traditional games in the three kindergartens is different from one another, character values are internalized through several traditional games, namely gobak sodor; cublak-cublak suweng; dakon; jamuran and engklek or sundamanda, character education based on workable traditional becomes a character education model in kindergarten.
3	(Ali et al., 2021)	Indonesia	Study and analyze about the traditional games that can be played in-home environment that can help early childhood social development	Some traditional games can be introduced from early childhood in the family environment to introduce traditional games and children's social development

4	(Mahfud et al., 2023)	n/a	Conduct a literature review on game strategies in developing students' self-control.	Game strategy can be used as a medium to develop self-control in self-control students. This includes behavioral control, cognitive control, and decision control
5	(Bazaz et al., 2018)	Iran	Assessing the effects of traditional games on preschool children's social development and emotional intelligence.	Traditional games are effective in improving preschool children's social development and emotional intelligence
6	(Hasanah, 2018)	Indonesia	Describe the type and characteristics of traditional games in nonformal educational institution and to describe the character values contained in traditional game Kaulinan Barudak Lembur for children learnig.	Cultural literacy through the Kaulinan Barudak Lembur is able to develop the values of character education, such as religious value, cooperation value, responsible value, honesty value, caring value, selfconfidence value and curiosity value.

The literature on traditional games primarily comes from research in Indonesia. Traditional games in Indonesia, such as "petak umpet" and "Kaulinan Barudak Lembur," have been proven to contain character-building values, such as religiosity, cooperation, responsibility, honesty, caring, curiosity, and self-confidence (Asrial et al., 2022; Hasanah, 2018). Other traditional games, such as "gobak sodor," "cublak-cublak suweng," "dakon," and "engklek," can serve as adaptive models for character education in kindergarten, although their implementation varies depending on the institutional context (Hendrowibowo et al., 2018). Based on the above literature, traditional games have proven to possess high educational value, such as character development, emotional regulation, strategy-making or decision-making skills, and cooperation (Ali et al., 2021; Bazaz et al., 2018; Mahfud et al., 2023). These studies indicate that traditional games are relevant to both formal and non-formal education systems as an effort to preserve culture while simultaneously strengthening children's character values.

The Local Wisdom Approach in Learning

Traditional games, when integrated into a game-based learning approach, become one of the strategies for internalizing local wisdom. This strategy can internalize elements of local wisdom while also integrating character values such as creativity, perseverance, responsibility, love of knowledge, honesty, politeness, wisdom, and cooperation (Asmayawati et al., 2024). Literature findings related to this can be seen in the following Table 3.

Table 3

Major Potential Issues Associated With Local Wisdom Approach in Learning

No	Author	Country	Research Focus	Research Result
1	(Baharun, 2017)	Indonesia	Character education model developed by pesantren and offers an alternative perspective of the development of character education	The model of character education in pesantren is carried out through a multi-disciplinary approach so as to provide maximum results for the development of character education

2	(Asmayawati et al., 2024)	Indonesia	Investigates the relationship between Pedagogical Innovation (PED), Curricular Adaptation (CUR), Local Wisdom Approach (LWA), and Digital Literacy (DIGLI) in Early Childhood Education	The main findings reveal significant impacts of PED and CUR on both the LWA and DIGLI. Moreover, the LWA mediates the relationships between PED and DIGLI, as well as CUR and DIGLI.
3	(Hidayati et al., 2020)	Indonesia	Investigating the strategies for implementing local wisdombased character education among Indonesian higher education students by focusing on the values sated in Jamuskalimasada book of Samin Community.	Teaching character education in the higher education based on local wisdom could be conducted by integrating values and aesthetics in the course, internalizing positive values to students, habituation and training, providing example and model, creating characterized-situation based on local wisdom, and civilizing.
4	(Pornpimon et al., 2014)	Thailand	Application of local wisdom in primary school and application of local wisdom in primary school	The appropriate model in applying local wisdom in curriculum and learning and teaching development in elementary school included: 1) governmental and private sectors had to cooperate in promoting learning and teaching of community, 2) the Educational Institute and organization in community had to cooperate and support creativity of leaders and villager philosophers, 3) temple or church had to be the centre of local wisdom development, learning source, learning process, 4) the Educational Institute Administrators had to lead their local Education, motivate, encourage the family and community to be aware, and collaborate in learning process, and 5) for the teachers' role, they had to study their community as well as information and select the villager science combining with local wisdom emphasizing on local wisdom application. The strategy challenges of the local wisdom for sustainable use in schools were: 1) Leadership Approach, leadership-related wisdom was more likely to be displayed at the societal, and at the organizational levels through fulfilling visions, solving problems, and founding organizations. 2) Combination of humility and strong professional.

5	(Hidayati et al., 2020)	n/a	Etnopedagogy as a cultural activity and the culture of teachings	The values of local wisdom as a source of innovation in the field of culture-based education of local communities through social contacts that are educational pedagogical to the communicant, namely cognitive (know about something), affective (formation attitude), and conative (behavior, act to do something).
6	(Sugiyo & Purwastuti, 2017)	Indonesia	Developing the integrated character education model based on local wisdom in elementary schools in Bantul, Yogyakarta, Indonesia	(1) batik making on pottery piggie banks which integrates creativity, determination, and responsibility; (2) traditional song called "Cublak-cublak Suweng" integrating knowledge loving value, honesty, and responsibility; and (3) traditional game and song "Gundhul-gundhul Pacul" integrating some values such as modesty, carefulness, and cooperation.
7	(Suprapto et al., 2021)	Indonesia	The issue of Indonesian curriculum reform in policy and local wisdom.	curriculum policy and policy borrowing, philosophy of Indonesian local wisdom, cultural-based learning, science local wisdom and ethnoscience, and policy borrowing versus local wisdom.

Studies in Indonesia show that local wisdom is effectively used to strengthen character education (Baharun, 2017; Hidayati et al., 2020; Sugiyo & Purwastuti, 2017). Meanwhile, a study from Thailand provides cross-country insights that the implementation of local wisdom in primary schools requires collaboration from various sectors, such as educational institutions, community leaders, places of worship, and the active role of teachers (Pornpimon et al., 2014). Based on the above findings, the local wisdom approach in learning contributes to character education processes, cultural preservation, and serves as a bridge between tradition and modernity in the context of educational innovation and digital transformation. The success of this process depends on curriculum design, the role of teachers, and support from local communities.

Strengthening Character Education

The findings of studies on character education can be seen in Table 4 below.

Table 4
Major Potential Issues Associated With Strengthening Character Education

No	Author	Country	Research Focus	Research Result
1	(Singh, 2019)	n/a	Identify and define the place of character education in education system reviewing of the Character Education Partnership's (hereafter CEP) eleven (11) principles of character education in the future	The Classroom/Activity-Based Character Education Program Implementation and finally the Models of Character Education: Perspectives and Developmental Issues, teaching Strategies and benefits of character education were also discussed
2	(Pattaro, 2016)	n/a	Exploratory research on the main tendencies in the international literature	character education can play an important role in the construction of children and adolescents' identity and can be a distinctive intervention for youth education and socialization

Based on the literature above, strengthening character education requires a systematic design based on proven principles and models. This design must be implemented through activities that are contextual and relevant to the students' lives. Strong character education can build a solid moral identity and good social skills. Character education emphasizes values or ideals, which is why it is categorized as a type of pedagogy known as idealist pedagogy. The definition of idealist pedagogy is a focus on teachings or values that are historical cornerstones (Koesoema, 2023). Koesoema (2023) explains in his book Character Education: Strategies for Educating Children in the Global Era that there are three dimensions that are considered important in conducting educational actions for achieving holistic education, namely individual, social, and moral dimensions. Therefore, innovations and creations in the field of education should consider these three dimensions to achieve integral reforms.

Discussion

The findings from the literature suggest that the Game-Based Learning (GBL) approach contributes positively to students' academic achievements, engagement in learning, and the character empowerment through the integration of traditional games based on local wisdom. This discussion elaborates on the comprehensive contribution of GBL in the three main dimensions of character education according to Koesoema (2023): individual, social, and moral dimensions, as well as its relevance to the context of pedagogical innovations based on local culture. GBL has proven effective in improving cognitive understanding and practical skills, including in the context of science and mathematics learning (Lester et al., 2014; Tokac et al., 2019). These findings confirm that game-based approaches can create a constructive and challenging learning environment, aligning with the spirit of idealist pedagogy that emphasizes the importance of meaningful values and learning experiences. Additionally, the enhancement of creativity, manual skills, and problem-solving, mediated by GBL, supports the formation of students' moral identity and reflective abilities (Cheong et al., 2014; Hsiao et al., 2014).

The integration of traditional games within GBL provides space for the preservation of local culture while also transmitting national character values. For example, games like *Kaulinan Barudak Lembur*, *gobak sodor, engklek*, and *cublak-cublak suweng* carry values such as

cooperation, honesty, responsibility, and self-confidence (Asrial et al., 2022; Hasanah, 2018). This shows that GBL with traditional games is not only a tool for improving academic outcomes, but also an instrument for building social morality in learning. In the context of digital transformation, GBL based on traditional games offers an approach that bridges local values with the demands of the 21st century. This aligns with the OECD Learning Compass 2030 framework, which emphasizes the balance between knowledge, skills, attitudes, and values. Traditional games, when contextualized digitally, can become an innovative strategy in strengthening students' character without losing their cultural roots.

Conclusion

The integration of GBL with traditional games offers significant opportunities to strengthen education in Indonesia. Traditional games are rich in local wisdom values that not only develop motor and social skills but also build character traits such as cooperation, creativity, responsibility, and sportsmanship. These local wisdom values are highly relevant in facing the increasingly dynamic and complex global challenges. This study demonstrates that through an ethnopedagogical approach, education can become more contextual and meaningful for students while contributing to the transmission of Indonesian culture. The use of PBL with elements of local wisdom from traditional games in education has been shown to enhance student engagement, learning motivation, and problem-solving skills, which are essential competencies for the 21st century.

Recommendations

This research opens up opportunities for future researchers to further investigate the integration of game-based learning with traditional games, to be applied at various educational levels. Future studies could focus on developing more comprehensive measurement tools to assess the impact of traditional games on character development. In addition, further exploration is needed regarding the use of digital technology to integrate traditional games into a more modern learning context, while still being able to internalize local wisdom amidst global developments.

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Cultivating Inner Peace, Innovate Education and Building the Community: The Case of Schoenstatt

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Abstract

This paper explores the foundational role of education in shaping cohesive, participatory, and economically resilient societies, emphasizing its contribution to peace and development. The case of Schoenstatt—a Catholic movement founded by Father Joseph Kentenich in the early 20th century—illustrates the powerful interplay between inner peace, educational innovation, and community formation. Kentenich's transformative pedagogy, grounded in freedom-oriented learning, trust, and individual dignity, offers a compelling model of faith-based education that continues to influence spiritual and communal life. The Schoenstatt Shrine serves as both a spiritual center and a pedagogical space where pilgrimage becomes a multidimensional experience, integrating personal transformation, collective identity, and sacred spatial engagement. The ten in-depth interviews reveal that the Schoenstatt Shrine fosters transformative learning through sacred space, community encounters, and nature-based pedagogy. Pilgrimage emerges as a multidimensional experience, integrating spiritual formation, emotional healing, and relational learning—demonstrating how informal, place-based education can cultivate inner peace, personal growth, and a deepened sense of community belonging. The findings highlight the importance of environmental and symbolic dimensions—such as silence, simplicity, and nature—in enhancing contemporary spiritual journeys. Schoenstatt demonstrates how education, spirituality, and community life can converge in a holistic framework that promotes individual growth and strengthens social bonds. This case contributes to broader discussions on religious tourism, sacred space, and the role of pilgrimage in modern society, suggesting that spiritually grounded pedagogy can foster not only personal development but also enduring, values-based communal life.

Keywords: pedagogy, religious education, religious tourism, shrine, Schoenstatt

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Introduction

Every functioning society is based on education: It prepares people for community life, political participation and economic contribution. It is widely acknowledged that the provision of high-quality education is a crucial factor in fostering economic development, peace, and stability.

The case of Schoenstatt illustrates the mutually reinforcing relationship between the cultivation of inner peace, innovation in education, and the construction of the community. Schoenstatt is one of the oldest movements and new communities of the Catholic Church, founded by Father Joseph Kentenich (1885-1968).

Father Kentenich initiated transformative changes at the beginning of the 20th century, pioneering a novel approach to education that was respectful of individual differences, founded on trust and initiated a new vision of freedom-oriented learning.

Moreover, the pedagogical tone of the Schoenstatt founder, and its vibrant project, can be experienced in the atmosphere of the original shrine. The shared experiences of events, religious rituals and sacred spaces in the context of pilgrimage foster community cohesion and strengthen community identity. Furthermore, they serve to enhance faith communities and enliven individual faith. These services, individual prayers, intentional encounters or community events provide peace and spiritual and religious experiences, as well as fostering intentional encounters and strengthening community identity.

The case of Schoenstatt powerfully illustrates the interconnectedness between inner peace, educational innovation, and community formation. Founded by Father Joseph Kentenich in the early 20th century, Schoenstatt is one of the oldest Catholic movements and new ecclesial communities. Kentenich introduced a transformative educational model grounded in freedom-oriented learning, trust-based relationships, and deep respect for individual uniqueness—principles that continue to inspire faith-based pedagogy today. These values are not only reflected in Schoenstatt's philosophy but are tangibly experienced in the atmosphere of the Original Shrine. The shrine, through its rituals, pilgrimages, and sacred spaces, functions as a vibrant pedagogical environment that cultivates spiritual reflection, fosters intentional encounters, and reinforces a shared community identity. As pilgrims engage in services, personal prayer, and communal events, they experience a deep sense of peace, belonging, and renewal. In this way, Schoenstatt exemplifies how holistic education, spiritual experience, and community life can mutually reinforce one another in the construction of spiritually enriched and socially cohesive communities.

Schoenstatt's Educational Philosophy

Education is widely recognized as a foundational pillar of any society, equipping individuals not only with technical and intellectual competencies but also with the human capacities necessary for civic participation, social cohesion, and economic sustainability. Contemporary scholarship affirms the integral role of education in fostering development, peace, and stability (Raj et al., 2015). However, beyond formal institutional structures, education through religious traditions, community engagement, and experiential processes has been equally formative in cultivating personal identity and collective purpose (França et al., 2024).

The educational vision of Father Joseph Kentenich (1885–1968), founder of the Schoenstatt Movement in 1914, constitutes a distinctive contribution to religious pedagogy and socio-spiritual formation. Conceiving Schoenstatt as a "movement of education and educators" (Astell & Peters, 2014), Kentenich positioned formation as the core vocation of the movement. His pedagogy, grounded in love, freedom, trust, and a holistic anthropology, aimed to form individuals capable of living sanctity within the ordinary conditions of modern life. He envisioned education as a transformative journey toward human maturity and spiritual depth, emphasizing the formation of "firm, free, and autonomous personalities" capable of responsible participation in both ecclesial and societal life (Schoenstatt Movement Official Resources).

Central to Kentenich's philosophy was the principle of education in freedom. He opposed any pedagogical model grounded in coercion or passive conformity, advocating instead for a formational process that respects inner autonomy and conscience. As early as 1931, he stated that the educator's task is to form individuals who are internally motivated and guided by ethical discernment. This necessitates creating an environment in which personal initiative, moral decision-making, and authentic commitment are fostered. Rigid uniformity and didactic imposition, Kentenich argued, suppress the development of self-directed personalities and fail to engender sustainable transformation.

A key manifestation of this approach is the pedagogy of trust (Vertrauenserziehung), which involves a relational and dialogical model of education wherein trust is both offered and earned. Kentenich's strategy of Bewährungspädagogik, or pedagogy of proving, consists in entrusting youth with real responsibilities as a means of affirming their capabilities and nurturing self-confidence. Such a method contrasts sharply with overprotective educational practices and aligns closely with modern theories of experiential and project-based learning (Dowson, 2020; Timothy & Olsen, 2006).

Underlying this trust-based pedagogy is a theological conviction: that God Himself educates through trust and providence. Educators are thus called to reflect divine pedagogy by approaching learners with a "pedagogical love," which Kentenich defined as a selfless and life-giving attitude that fosters growth. This model of accompaniment evokes pastoral imagery—educators acting as shepherds—and fosters familial, community-centered relationships. The resulting climate is characterized by mutual respect, emotional security, and spiritual dynamism.

Kentenich's educational approach is also distinguished by its holistic character. He proposed an integrative model in which intellectual, emotional, moral, social, and spiritual dimensions are harmonized. Rejecting the fragmentation of the person prevalent in modern educational systems, he championed an organic worldview that sees education as both natural and supernatural, aimed at the full realization of the human vocation (Astell & Peters, 2014). He maintained that every person is a unique life given by God, and education must facilitate the discovery and cultivation of this unique identity.

A crucial component of this holistic model is the concept of the "organism of attachments." Kentenich recognized that human beings thrive within networks of meaningful relationships—attachments to persons, places, and ideals. Modern psychosocial challenges such as alienation and purposelessness, he argued, often stem from disordered or absent attachments. Schoenstatt pedagogy actively cultivates deep bonds with mentors, communities, sacred spaces (such as the Shrine), and guiding values or ideals. These

attachments, which engage the whole person—intellect, will, and emotions—serve as anchoring points for resilience and spiritual growth (Collins-Kreiner & Gatrell, 2006).

Closely related is the pedagogy of ideals, which aims to inspire learners by helping them articulate and internalize a personal ideal that expresses their God-given vocation. This ideal becomes a moral compass, motivating aspirational growth and ethical self-direction. Kentenich extended this framework to include collective ideals for communities and groups, thereby reinforcing a shared ethos and spiritual mission. This ideal-based approach to education stands as a compelling antidote to the cultural tendencies toward mediocrity and identity fragmentation (França et al., 2024).

Kentenich's innovations anticipated many elements of contemporary integral education, including student-centered methodologies, reflective practice, and spiritual pedagogy. His emphasis on self-education positioned learners as active agents of their own formation. Youth in Schoenstatt were often encouraged to assume leadership roles, engage in self-assessment, and participate in federative structures that nurtured democratic values and cooperative learning. In many ways, his method foreshadowed the educational strategies now associated with transformative and participatory pedagogies (Reader, 2014).

Another notable aspect of his vision was the integration of psychological insight into religious formation. Kentenich displayed an intuitive grasp of attachment theory, emotional development, and the subconscious dynamics that shape personality. He sought to create educational environments that offered corrective emotional experiences, particularly for those affected by broken familial bonds. The family-like structure of Schoenstatt groups offered a therapeutic space of belonging, trust, and affective support (Sherman et al., 2015).

His approach to religious education was equally innovative, emphasizing experiential, covenantal, and relational dimensions. The Covenant of Love with Mary—central to Schoenstatt spirituality—functioned as a pedagogical tool for engaging youth in a deeply personal, affective relationship with the divine. Rather than transmitting faith merely as doctrine, Kentenich made it tangible, affective, and participatory. The Shrine itself served not only as a place of grace but also as a pedagogical space—a workshop of sanctity where everyday life was offered and transformed (Astell & Peters, 2014).

The Role of Pilgrimage in Schoenstatt's Religious Education

Pilgrimage occupies a central place in Schoenstatt's religious pedagogy, functioning as a powerful medium for experiential faith formation. The act of pilgrimage—journeying to a sacred site—transcends mere devotional practice and becomes a pedagogical process that integrates corporeal, emotional, and spiritual engagement. As Kentenich emphasized, pilgrimage is a metaphor for the journey of Christian life, encapsulating sacrifice, perseverance, encounter, and transformation (Schoenstatt Movement Official Resources).

Schoenstatt Shrines around the world are considered "places of grace," where pilgrims receive three foundational graces: the grace of being at home, the grace of inner transformation, and the grace of apostolic mission. Each of these dimensions corresponds to essential educational objectives—emotional integration, moral and spiritual growth, and vocational engagement in society (Astell & Peters, 2014). In this sense, pilgrimage serves not only a devotional purpose but becomes a curriculum of spiritual and social formation (Aulet Serrallonga, 2020).

Moreover, pilgrimage reinforces communal identity. The shared experiences of traveling, praying, and reflecting foster bonds among participants and generate a sense of belonging. Pilgrimages undertaken by youth groups, families, or communities become moments of intense communal formation and socialization. These encounters exemplify the role of collective memory and ritual in shaping religious identity (Dowson, 2020; Eade & Sallnow, 1991).

On an individual level, many pilgrims describe moments of personal clarity and spiritual insight during their visits to the Shrine. These turning points often lead to life decisions, vocational commitments, or deeper engagement with community life. The Shrine thus functions as a locus of spiritual discernment and transformation—a "workshop of sanctity" in Kentenich's words—where pedagogy and spirituality converge (Lopez, 2019).

In sum, pilgrimage within Schoenstatt is a dynamic and transformative pedagogical act. It embodies the movement's integrative vision of education—one that forms the whole person through freedom, trust, relationality, and spiritual encounter. The educational relevance of pilgrimage in this context confirms scholarly findings on the evolving functions of religious tourism as spaces of learning, identity construction, and socio-spiritual development (Collins-Kreiner, 2010; Wang et al., 2023).

The Schoenstatt Movement thus offers a unique and deeply relevant model of faith-based education, one that integrates religious tradition with human development and communal formation, responding effectively to both spiritual and pedagogical challenges of the contemporary world.

Methodology

This research adopts a qualitative case study methodology in order to explore the lived religious and spiritual experiences of individuals who visit the Schoenstatt Shrine. A case study approach is particularly effective for investigating complex social phenomena within their real-life contexts, allowing for a detailed examination of how pilgrimage and sacred space interact with personal and collective spiritual experiences (Collins-Kreiner, 2010; Reader, 2014).

The empirical data were collected through semi-structured, in-depth interviews with two distinct groups: responsible individuals directly involved in the organization and spiritual facilitation at the shrine, and pilgrims who had engaged with the shrine's environment in varied ways. This methodological choice is grounded in the recognition that subjective experiences in religious tourism require a phenomenological and context-sensitive approach (França et al., 2024; Raj et al., 2015).

The research design aimed to capture the multifaceted nature of the pilgrimage experience, drawing attention to the sensory and symbolic role of the shrine's natural surroundings, the significance of communal rituals, and the immersive atmosphere that fosters introspection, spiritual renewal, and a sense of belonging. As emphasized by Astell and Peters (2014), the Schoenstatt Shrine is conceived not merely as a devotional site but as a pedagogical space where spiritual formation and community identity are cultivated.

Furthermore, the study is informed by theoretical perspectives on spirituality and religious tourism that highlight the transformative role of sacred space and natural environments in

promoting transcendence and healing (Sherman et al., 2015; Wang et al., 2023). In line with Aulet Serrallonga (2020), pilgrimage is also approached as a peace-building and meaning-making endeavor, deeply rooted in personal motivations and broader sociocultural dynamics.

Results

The interviews with key institutional actors yielded a comprehensive understanding of the structure, values, and experiences associated with the Schoenstatt Shrine. Among the interviewees were Fr. Ignacio Camacho, the recently appointed rector of the Original Shrine, who oversees both pastoral and administrative responsibilities; Fr. Raul, Director of the Schoenstatt Priests' Training Institute at Mount Sion; Fr. José Melo, Co-director of the Secular Institute, who is primarily responsible for coordinating spiritual activities in the shrine's outdoor spaces; a Brazilian religious sister charged with the liturgical organization and sacristy; and Bernadette, a German lay volunteer serving as sacristan and providing logistical support to pilgrims.

Their testimonies reveal a diversity of spiritual experiences facilitated by the shrine, encompassing formal religious rituals such as pilgrimages, Eucharistic celebrations, prayer services, and retreats, as well as more individualized and informal modes of spiritual engagement. These range from silent contemplation and personal introspection to experiences of rest and existential renewal. These findings resonate with recent scholarship that emphasizes the hybrid nature of contemporary pilgrimage, situated between tradition and innovation (Collins-Kreiner & Gatrell, 2006; Eade & Sallnow, 1991).

The motivations that draw visitors to the shrine are multifaceted, frequently driven by a desire for spiritual nourishment, emotional healing, inner peace, and an encounter with the sacred. The shrine's natural beauty and symbolic resonance further contribute to its appeal as a space of refuge and transformation. This aligns with Lopez (2019), who underscores the importance of sacred landscapes in facilitating spiritual consciousness and transcendental experiences.

The spatial structure of the shrine and its surrounding environment emerged as central to the pilgrims' experiences. Core values articulated by respondents include simplicity, silence, harmony with nature, and a pervasive sense of serenity. These values are not merely aesthetic or symbolic but are deeply pedagogical and formative, shaping the ethos of pilgrimage and contributing to the cultivation of inner peace and community identity (Astell & Peters, 2014; Schoenstatt Movement Official Resources, 2023).

Pilgrimage experiences at the Schoenstatt Shrine vary widely in duration, ranging from brief devotional visits to extended retreats. Participation may be either individual or communal, guided by spiritual leaders or self-directed. This flexible structure accommodates a wide spectrum of spiritual needs and preferences, reflecting the dynamic and personalized nature of modern religious tourism (Dowson, 2020; Timothy & Olsen, 2006).

Moreover, through the voices of those responsible for pastoral and formative life at Schoenstatt, we observe a deeply integrated pedagogy that combines spatial, symbolic, affective, and community dimensions. The shrine becomes a living educational environment, where formation is not limited to structured programs but flows organically through the encounter with the sacred, the relational network, and the aesthetic and spiritual qualities of the place.

Father José Melo emphasizes the pedagogical function of the shrine's atmosphere: “People value the religious place, which is the sanctuary, a place of pilgrimage, also associated with the beauty of the surrounding space.”

He continues, “There’s a need to withdraw from their world, a need for personal balance and a deeper encounter with God.”

This idea is echoed by Father Ignacio Camacho: “The pilgrim only has to come and arrive. That experience is already strong.” and “Peace and silence, the tranquil environment and nature—people value simplicity.”

These statements highlight how space, silence, and nature function as pedagogical elements, enabling spiritual reflection and interior growth.

Father Raul, responsible for priestly formation, describes the educational purpose of the Monte Sião house: “The priest comes here for three months of formation. It’s spiritual and human formation. There is guided study.”

He also emphasizes the role of daily life in formation: “The priest who spends time here experiences the importance of the community dimension.”

Even though there is no rigid pedagogical plan for general pilgrims, Father José Melo points out that “We offer retreats, formative offerings, study days, and broad religious experiences.”

This confirms that formal and non-formal education coexist, blending academic study with experiential spirituality.

The role of religious celebration and ritual emerges as a key medium of learning. A Sister working in the sacristy says “We have religious celebrations, religious cantatas, the Rosary, and the night blessing. Also, moments for individual prayer in silence.”

She adds “Even those who say they don’t believe feel something here. The place speaks for itself. The environment moves people.”

This illustrates how rituals act as symbolic pedagogical tools, fostering affective learning, reflection, and internalization of values.

The notion of learning through encounter with others and personal guidance is recurrent in the interviews. Father Ignacio states, “There’s organization, people who can explain and guide—especially the Sisters.”

Bernadete, a volunteer at the shrine, reinforces this: “People go to the Sisters to ask questions. They want to understand what they are experiencing.”

She also observes how visitors engage with the spiritual narrative: “They want to know the history, listen to the story. That’s also educational—it’s not just spiritual, it’s formative.”

Multiple interviewees refer to the three graces of the shrine—welcome, transformation, and mission—as a spiritual and pedagogical journey. Father Ignacio explains: “The shrine offers three special graces: feeling at home, transformation, and being sent forth.”

Father Raul adds: “These graces are felt even in our houses—they make people feel welcome, part of a family. If someone wants more, the contact continues.”

These testimonies point to a relational pedagogy, where belonging and transformation are mediated through space, encounter, and care.

Finally, several participants highlight how learning and transformation happen even when not explicitly intended. The Sister in the sacristy reflects: “Not intentionally, but everyone ends up experiencing that there is something special in this place.”

Such reflections resonate with the idea of a hidden curriculum, where the environment itself educates by transmitting meaning, values, and emotional resonance without formal instruction.

The interviews with five individual pilgrims further corroborate the institutional perspectives. Debora, a Brazilian visitor, emphasized the restorative power of silence and natural surroundings in her search for renewal. Joana, a Portuguese long-term pilgrim, highlighted the shrine’s capacity to foster deep reflection and tranquility. Maria Inês, an Argentinian pilgrim, described her short but intense experience as spiritually transformative. A German pilgrim, a frequent visitor, underscored the communal dimension and the role of the shrine in facilitating inner transformation. Another volunteer pilgrim, initially visiting for a meeting, described an unexpected experience of spiritual renewal and a strengthened sense of community belonging.

Synthesizing these narratives, the findings indicate that pilgrimage to the Schoenstatt Shrine encompasses a continuum of religious and spiritual practices. These include liturgical rituals, personal prayer, meditation, and informal communal gatherings. Pilgrims articulate a search for healing, renewal, connection with the divine, and a deeper understanding of self. Simplicity, silence, and the natural setting of the shrine function as mediating elements in facilitating these experiences. The shrine serves as a sacred space that enables both personal transformation and collective bonding, as theorized in the broader literature on pilgrimage and religious tourism (França et al., 2024; Wang et al., 2023).

The participants interviewed between September 7 and 21, 2024, highlight the multidimensional nature of the pilgrimage experience at Schoenstatt, presenting it as a space of both spiritual retreat and informal education, where transformation, reflection, and community encounter play central pedagogical roles. Below, selected direct quotes are categorized according to relevant pedagogical themes.

Pilgrims strongly identify the natural environment and atmosphere of the place as central to their experience. The landscape acts not only as a backdrop but as a co-educator, supporting inner processes of reflection and transformation.

“I like the green, the place, the whole package. Nature is important, being able to express myself is important too.” (Debora, pilgrim)

“It's a calm place; it brings peace. The silence, the sound of the water – it all invites you to listen to yourself.” (Maria Inês, pilgrim from Argentina)

“The most important thing is the place, the landscape, the silence.” (Maria Inês)

“Even though it’s a different country, it feels like home. There’s always a new little corner to discover. There’s always something new.” (Joana, Portuguese pilgrim)

This shows that the aesthetic, spatial, and sensorial qualities of the place facilitate interior learning, aligning with theories of embodied and place-based pedagogy.

Pilgrims repeatedly describe their experiences as deeply transformative. The shrine becomes a space for self-knowledge, healing, and inner change, aspects closely linked to reflective and affective pedagogy.

“It helps me organize myself internally.” (Debora)

“I came because of burnout. I needed a quiet place, nature and spirituality.” (Debora)

“It’s a reconnection with God and with people. People are kinder here, more gentle – it makes you think better.” (Debora)

“It’s so comforting, so peaceful. It leads to self-knowledge, to reflection, and recharging. It’s like discovering a new part of myself each time.” (Joana)

“I feel more peaceful. I feel that Our Mother Mary is waiting for us here. It’s good to have this time.” (German pilgrim, retired)

The role of community encounters and group dynamics emerges as a significant pedagogical component. Pilgrims highlight how learning happens through sharing, presence, and belonging.

“There’s always balance. Sometimes I go alone, other times with a group. And it’s joyful to meet others. It’s all one big family.” (Joana)

“The contact with the group is very important. Normally three or four people stay in this house together.” (German pilgrim)

“It’s crucial to meet people. These gatherings are very important.” (Participant attending a volunteer group meeting)

“Even though we don’t know each other, we become community – God makes us community.” (Maria Inês)

“It’s very important to be with others, to share this space. We help each other.” (German pilgrim)

This dimension resonates with relational pedagogy and dialogical education, where knowledge is constructed through meaningful relationships and group participation.

The repeated nature of the visits and the variety of learning pathways (retreats, spiritual programs, voluntary service, group meetings) highlight the idea of lifelong spiritual formation.

"I've come many times. Since I was a child with my parents, for retreats and encounters, and alone." (Joana)

"I've been here more than 10 times a year. We work with our group in this house." (German pilgrim)

"I participate in meetings from the movement, courses, visits to the shrine. I come about five times a year." (Participant in volunteer group)

This illustrates the role of the shrine in providing a continuum of educational and spiritual development opportunities across different life stages.

Informal Pedagogy: Guidance, Symbolic Learning and Autonomy

Although formal guidance is not always available, participants value both autonomous spiritual exploration and moments of guided support, often mediated by priests or community leaders.

"Having a guide on a first visit is helpful. There should be more online programs and information available." (Debora)

"We support ourselves, but we can have a priest to help." (German pilgrim)

"There is a priest who helps, but I usually manage myself. If I need, I ask." (Participant in volunteer group)

This reflects a hybrid pedagogical model, combining self-directed learning with occasional mentoring.

Pilgrims report significant emotional, cognitive, and spiritual outcomes resulting from their experiences—indicators of transformative learning.

"It's so comforting, peaceful… it leads to self-knowledge, auto-reflection. You always leave recharged." (Joana)

"When I go back, I feel different. What changes me most is the communication with God." (Volunteer group participant)

"I leave with more energy and strength. There's always something to reflect on." (Same participant)

These insights reflect deep-level learning processes, where spiritual growth intersects with emotional resilience and cognitive integration.

In conclusion, the testimonies gathered reflect how the Schoenstatt Shrine functions not only as a religious site, but also as a pedagogically rich environment, where spiritual, emotional, and interpersonal learning converge. Through symbolic ritual, natural space, personal retreat, and community dialogue, pilgrims undergo experiences of holistic formation. This reinforces the idea that pilgrimage is a lived pedagogy—a transformative path where the sacred space, relational encounter, and self-reflection act as core educational mediators.

Conclusions

The case study of the Schoenstatt Shrine reveals that pilgrimage is not merely an act of religious devotion but a multidimensional experience that integrates personal spirituality, communal identity, and engagement with sacred space. The findings suggest that the Schoenstatt model fosters a profound sense of spiritual peace, inner transformation, and social cohesion, grounded in its pedagogical, aesthetic, and symbolic dimensions (Astell & Peters, 2014; Raj et al., 2015).

The role of nature, silence, and simplicity emerges as central to the pilgrims' experiences, reaffirming the importance of environmental and spatial factors in contemporary spiritual journeys (Lopez, 2019; Wang et al., 2023). The shrine's capacity to accommodate diverse spiritual motivations—ranging from healing and introspection to community participation—illustrates the evolving nature of pilgrimage as both a personal and collective endeavor.

More broadly, the Schoenstatt Shrine offers a compelling example of how faith-based pedagogy can contribute to personal development, spiritual consciousness, and community building. It exemplifies the integration of education, spirituality, and tourism in a holistic and transformative framework. This convergence provides valuable insights for broader discussions on religious tourism, sacred space, and the role of pilgrimage in modern society (Collins-Kreiner, 2010; Dowson, 2020; Timothy & Olsen, 2006).

Ultimately, the Schoenstatt experience highlights the enduring relevance of pilgrimage as a spiritual, cultural, and social practice, capable of fostering not only individual transformation but also a cohesive and values-based community life.

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Designing an Artificial Intelligence Chatbot to Enhance Information, Media, and Technology Literacy Skills for Learners in Distance Learning Systems

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Abstract

The rapid development of artificial intelligence (AI) technologies, particularly AI chatbots, has significantly influenced innovations in educational delivery, especially within distance learning contexts. This study aimed to design an AI chatbot to enhance information, media, and technology literacy (IMT literacy) skills among learners at Sukhothai Thammathirat Open University (STOU), Thailand. Employing a purposive sampling method, five experts in educational technology and communication were invited to evaluate the chatbot prototype. Research instruments included (1) the AI chatbot developed for enhancing IMT literacy skills, and (2) an expert evaluation form measuring the chatbot's quality across several dimensions. Data analysis was conducted using mean and standard deviation statistics. Findings revealed that the experts strongly agreed that the STOU Smart Chatbot effectively fosters IMT literacy skills for 21st-century learners (M = 4.79, SD = 0.15). Particularly, experts unanimously praised the presence of a user manual (M = 5.00, SD = 0), the chatbot's user-friendly design (M = 5.00, SD = 0), and its alignment with learners' needs (M = 5.00, SD = 0). The results underscore the potential of AI chatbots as critical tools for advancing digital literacy skills in distance education systems.

Keywords: AI chatbot, information, media, technology, distance education

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Introduction

The application of AI chatbots has several effects on learners' performance in teaching and learning. Kooli (2023) showed that integrating AI systems and chatbots into the academic field has gained significant attention in recent years. AI technologies can potentially transform the way research and education are conducted by automating tedious and repetitive tasks, assisting in data analysis, and enabling new forms of learning and assessment (Adamopoulou & Moussiades, 2020). However, the adoption of AI in the academic field is not without challenges and controversies. There have been numerous studies and articles exploring the potential benefits of using AI systems and chatbots in the academic field (Chen, et al., 2020; Ebadi & Amini, 2022). One of the main benefits is the improvement of the efficiency and accuracy of research. AI systems can quickly process vast amounts of data and identify patterns and relationships that might be difficult for humans to detect. This can lead to more efficient and effective research, enabling researchers to focus on more complex and creative tasks. Another benefit of AI systems and chatbots in education is the ability to personalize learning pathways (Huang et al., 2022; Kuhail et al., 2022). AI systems can analyze students' learning styles and abilities and provide individualized recommendations and support to help students achieve their goals. Additionally, AI systems can facilitate online learning and make education accessible to students in remote areas, leading to more equitable and inclusive education (Mahmoud, 2022). Kim et al. (2021) showed that learners improved in terms of intonation, stress, and fluency in speaking skills after using chatbots. The findings revealed that chatbots enhanced students' engagement in developing speaking skills inside and outside the classroom.

Overall, the findings from the detected experimental studies indicated that there had been a significant positive effect of using chatbots on learners' learning of language skills. The design and development of an educational chatbot in Thai distance education aims to enhance the information, media, and technology literacy skills in the 21st century and covers topics such as information, media, and information technology skills, information literacy, media literacy, and Information and communication technology literacy. The teaching and learning in chatbot can be integrated into educational platforms and learning management systems for student support, tutoring, and enhancing the overall learning experience. These educational chatbots can interact with students conversationally and provide personalized, real-time support by leveraging natural language processing and machine learning capabilities.

Research Methodology

This research employed a developmental research design aimed at designing and evaluating an artificial intelligence chatbot to enhance information, media, and technology literacy skills for distance learners. The process integrated expert validation to ensure the educational and technological quality of the developed chatbot.

Participants

The participants were five experts specializing in educational technology and communication, selected through purposive sampling. Selection criteria included: (1) possessing at least five years of experience in educational technology or communication fields, (2) having previous experience in evaluating digital learning innovations, and (3) being willing to participate in the research process.

Research Instruments

Two key instruments were employed:

1. STOU Smart Chatbot: A custom-designed artificial intelligence chatbot aimed at enhancing 21st-century IMT literacy skills among distance learners.
2. Evaluation Form: A structured evaluation form developed to assess the quality of the STOU Smart Chatbot across dimensions such as usability, accessibility, content relevance, learner engagement, and technological functionality. The form used a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5).

Data Collection

Experts interacted with the STOU Smart Chatbot and subsequently completed the evaluation form. Their feedback encompassed both quantitative ratings and qualitative comments regarding the chatbot's design, usability, and perceived impact on enhancing IMT literacy skills.

Data Analysis

Quantitative data were analyzed using descriptive statistics, specifically mean and standard deviation, to summarize expert evaluations across different dimensions. Qualitative feedback was reviewed to identify common themes and recommendations for further development.

Results

The results of designing an artificial intelligence chatbot to enhance information, media, and technology literacy skills for learners in distance learning systems are as follows.

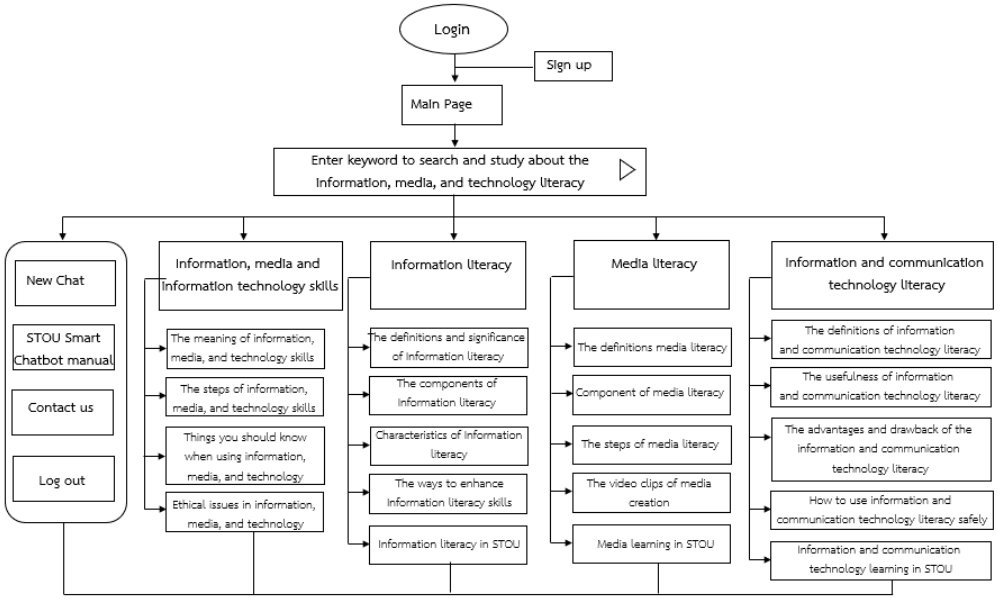
1. The learning processes of artificial intelligence chatbot to enhance the information, media, and technology literacy skills in the 21st century for learners in distance education include three steps, as shown in Table 1.

Table 1
The Steps of the Artificial Intelligence Chatbot Learning Process (STOU Smart-Chatbot)

The steps of STOU Smart-Chat	Details of the process
Step 1: Pre-learning process	- The researchers gave the course introduction, presented learning activities, learning outcomes, the learning roles, duration time, assessment, and the significance of learning. - The learners were evaluated on their 21st-century information, media, and technology literacy before the treatment. - The instructors gave instructions on the STOU smart-chatbot manual.
Step 2: Self-learning process	- The learners learned the content from each learning unit or by entering a keyword to search and study the information, media, and technology literacy in the STOU smart chatbot. It took four weeks to complete the course. - Each week, the researchers played a role as the STOU smart-chatbot administrators who managed the activities.
Step 3: Self–Evaluation	- The learners were evaluated for their 21st-century information, media, and technology literacy by doing a post-test after the treatment. - The learners gave suggestions on how to improve the STOU smart chatbot.

Regarding the components and steps of the STOU smart chatbot to enhance the information, media, and technology literacy skills in the 21st century, the design of the structures is shown in Figure 1

Figure 1
Flowchart of STOU Smart-Chatbot to Enhance the Information, Media, and Technology Literacy Skills



2. The development of STOU's smart chatbot to enhance information, media, and technology literacy skills in the 21st-century distance learning system includes the following processes.

2.1 The design of the STOU smart chatbot considered the possibilities of the systems and technology. The designs of the overall education chatbot system included three main parts as follows:

2.1.1 The front End is to display the screen of the web application by using Angular to coordinate with UI and using PHP API to connect the web application with the database and display the screen on any device.

2.1.2 Back End is the developed MySQL database technology, which is the database for storing the information of the users and details of the web application, including conversation storage.

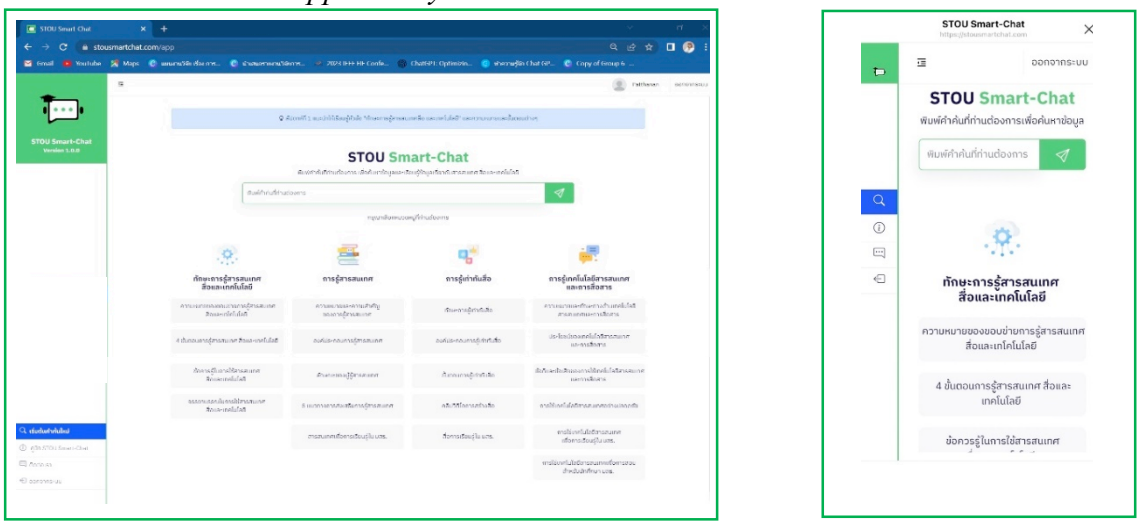
2.1.3 The Chatbot platform organizes the content from the users of the ChatGPT API using information via an intelligent technology system. It is a popular chatbot platform because it is an artificial intelligence chatbot that uses natural language processing (NLP).

2.2 The display screen for the user interface

The display screen for the user interface includes the main webpage for the artificial intelligence chatbot to enhance the information, media, and technology literacy skills in the 21st century in distance education. The content menu is organized with the information, media, and technology literacy skills for the learners to study and enter keywords to search for the information, media, and technology literacy in STOU smart-chatbot on any device, as shown at URL: https://stousmartchat.com in Figure 2.

Figure 2

STOU Smart-Chatbot Supports any Device



3. The results of the evaluation of the STOU smart chatbot system used five Likert scales. The results were interpreted by using the notion of Boonchom Srisaard (2002) as follows:

4.51 – 5.00 means Strongly agree
3.51 – 4.50 means Agree
2.51 – 3.50 means Neutral
1.51 – 2.50 means Disagree
1.00 – 1.50 means Strongly disagree

It was evaluated by five experts the details of the results are shown in Table 2

Table 2
The Results of the STOU Smart Chatbot

The statement	Mean	S.D.	Interpretation
1. There is a manual on how to use the STOU smart chatbot for learners.	5.00	0.00	Strongly agree
2. The content includes information, media, and technology literacy skills in the 21st century.	4.67	0.57	Strongly agree
3. The structure of the content is appropriate.	4.80	0.44	Strongly agree
4. The learners can control the order of learning appropriately.	4.67	0.57	Strongly agree
5. There are feedback tools to encourage the learners appropriately.	4.67	0.57	Strongly agree
6. The STOU smart chatbot is easy to use and access without the suggestions.	5.00	0.00	Strongly agree
7. The learning management system of the STOU smart chatbot is interactively presented and varied.	4.60	0.54	Strongly agree
8. The STOU smart chatbot meets the needs of the learners.	5.00	0	Strongly agree
9. The functions of the STOU smart chatbot facilitate the learners (pressing buttons such as the menu button, copy button, the notify, symbol, and the other connections)	4.80	0.44	Strongly agree
10. The STOU smear chatbot is fast to process and is covered with the overall content that needs to be presented.	4.67	0.57	Strongly agree
The over all	**4.79**	**0.15**	**Strongly agree**

The experts strongly agreed that the STOU smart chatbot can enhance information, media, and technology literacy skills in the 21st century ($\bar{x}$ = 4.79, S.D. = 0.15). When considering each aspect, the result showed that the experts strongly agreed with each aspect. The three top agreements are 1) There is a manual on using the STOU smart chatbot for the learners ($\bar{x}$. = 5.00, S.D. = 0). 2) The STOU smart chatbot is easy to use and access without the suggestions ($\bar{x}$ = 5.00, S.D = 0), and 3) The STOU smart chatbot meets the needs of the learners ($\bar{x}$ = 5.00, S.D = 0).

Conclusion

The research found that the opinions of the experts about artificial intelligence chatbot to enhance the information, media, and technology literacy skills in the 21st century for learners in distance learning systems were at the highest level. The experts strongly agreed that the STOU smart chatbot could enhance information, media, and technology literacy skills in the 21st century (M = 4.79, S.D. = 0.15). When considering each aspect, the result showed that the experts strongly agreed with each element. The three top agreements are 1) There is a manual on using the STOU smart chatbot for the learners (M = 5.00, S.D. = 0). 2) The STOU smart chatbot is easy to use and access without the suggesters (M = 5.00, S.D. = 0), and 3)

The STOU smart chatbot meets the needs of the learners (M = 5.00, S.D. = 0). There are various advantages of using AI chatbots in education, including 24/7 availability, personalized learning, quick feedback, cost-effectiveness, accessibility, stress reduction, and increased student engagement. AI chatbots are set to become an increasingly important part of the educational setting as technology advances, providing students with the tools they need to fulfill their academic goals and excel in their chosen fields.

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Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

In the preparation of this research article, the author utilized artificial intelligence tools, specifically ChatGPT, to assist in structuring ideas and enhancing the clarity of the language. Grammarly was also used to review grammar, spelling, and overall linguistic accuracy. All research content, analysis, results, and conclusions presented in this article are solely the work of the author.

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From Rattrap to Inclusion: School Personnel Insights on Supporting Learners With Special Educational Needs in Tertiary Education

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Abstract

This descriptive study assessed the insights and challenges of non-teaching, teaching, and administration of the University of Makati in managing learners with special educational needs (LSEN) at the tertiary educational level. From the thirty (35) respondents, the biggest challenge was a lack of teacher competency in managing inclusive classrooms, as the teacher has insufficient experience with inclusion settings. Another major challenge was the lack of proper communication with parents and discussion of the overall needs of students in the social, academic, behavioral, and health areas. This highlighted the need for better communication between parents and the school and improved record-keeping by teachers and administrative staff responsible for identifying, assessing, and placing LSEN. The findings also revealed that many participants recognized the importance of including LSEN in decisions about their educational needs and adjusting the curriculum for inclusivity. However, staff cited the difficulty in providing equal attention to LSEN and other students and addressing the issue of difficult access to school facilities. Although the University has taken steps to make physical spaces more accessible, there is still a need to improve to ensure that the support offered truly addresses the varied needs of all learners. Recommendations emphasize the need for professional development, enhanced parental engagement, and systemic efforts to align policy with practice in creating an inclusive and accessible educational environment.

Keywords: inclusion, learners with special needs, tertiary education

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Introduction

In the Philippines, several laws support including students with special needs in higher education. One of the most important is the Republic of the Philippines 1987 Constitution, specifically Article 14, Section 1, which mandates that states shall promote quality education for all and ensure access to it, regardless of their special needs. In addition, Magna Carta for Disabled Persons (Republic Act No. 7277, 1992) explicitly states that "the State shall ensure that disabled persons are given enough access to quality education and enough opportunities to develop their skills. This emphasizes that educational institutions shall not deny admission to any individual based on their disability. Furthermore, this act promotes auxiliary services to support the learning process of individuals with disabilities. It emphasizes the importance of considering the unique needs of these individuals when creating educational policies and programs.

This study is anchored in the Policy and Guidelines on Inclusion in Education of the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2009), which states that inclusive education (IE) is a process of strengthening the capacity of the education system to reach all learners and is an essential component in achieving education for all (EFA). As an overarching principle, inclusive education should inform all educational policies and practices, rooted in the understanding that education is a fundamental human right and the foundation for a more just and equitable society. An inclusive education system can only be established if ordinary schools become more adept at educating all children in their communities. Furthermore, the Commission on Higher Education (CHED) (2017) has also aimed to make education in the Philippines globally competitive, thereby strengthening higher education institutions (HEIs) and promoting the inclusion of LSEN. In response, the University of Makati has been encouraged to comply with the CHED memorandum that mandates universities and colleges to establish centers to provide access to education for learners with special educational needs.

Many students with special needs still face challenges in higher education despite supportive policies and legal frameworks (UNESCO, 2020), such as inadequate resources, teacher training, and a lack of institutional support. This quantitative study investigates the perceptions and observations of school staff at the University of Makati regarding their experiences in managing LSEN. This research used structured surveys and statistical analysis to identify key trends in how thirty-five school personnel approached the identification, assessment, curriculum development, academic support, and resource allocation for LSEN. The findings of this study are expected to provide valuable insights into the effectiveness of current practices and policies, thereby promoting evidence-based recommendations for enhancing the inclusion of LSEN in higher education.

Results, Discussion, and Conclusion

The following highlights the findings of the study;

In Table 1, the study shows that a great majority of the respondents pointed out the inadequacy of teachers' ability to handle inclusive classrooms as one of the challenges in the provision of support for learners with special educational needs (LSEN) in the University of Makati, which seemed to stem from their inexperience with inclusive classrooms. Parent communication gaps, as noted by 28 respondents, and insufficient discussions with families, indicated by twenty-six (26) respondents, regarding the holistic approach to students' needs

were also prominent. On the other hand, less emphasis was placed on the difficulty of distributing attention to LSEN students alongside other students and not being able to access school facilities, implying these issues are perceived as less necessary in the prevailing situation.

Table 1

Observations Encountered in Handling LSEN at the Tertiary Level That Were Identified by the School Personnel of the University of Makati

No.	Indicators	F	%	Ranking
1	Acceptance in the society/ university	**21**	**7.6**	**7.5**
2	Assessment of learners with special needs	**22**	**8.0**	**5.5**
3	Absence of any mechanism in university's student handbook discussing about LSEN	**14**	**5.0**	**11**
4	Shortage of classroom and poor learning environments	**25**	**9.0**	**4**
5	Large number of class	**14**	**5.0**	**11**
6	Inaccessibility of school facilities	**5**	**2.0**	**15**
7	Curriculum structure of the university	**14**	**5.0**	**11**
8	Insufficiency of instructional materials appropriate to learners with special needs	**21**	**7.6**	**7.5**
9	Lack of communication among administrators, teachers, specialists, staff, parents, and students.	**15**	**5.5**	**9**
10	Lack of communication with the parents about concerns or a home-school connections	**28**	**10.2**	**2**
11	Lack of parents'/ families' discussion about the student's total needs -social, academic, behavioral, health-related.	**26**	**9.5**	**3**
12	Absence of training and orientation due to which teachers find it difficult to understand the LSEN	**22**	**8.0**	**5.5**
13	Lack of appreciation and motivation among teachers	**10**	**3.6**	**13**
14	Lack of teacher's competency in managing inclusive classroom due to absence of experience in an inclusion setting	**32**	**11.6**	**1**
15	Attention provided to a learner with special needs without neglecting other students	**6**	**2.2**	**14**
	TOTAL	**275**	**100.0**	

Children with disabilities remain underrepresented within inclusive education systems, marking it as a persistent global difficulty. As per UNESCO (2020), students with special needs are among the most marginalized in educational settings. Oftentimes, disability poses a more significant challenge to accessing education than considerations such as geographical location or gender. Children from economically disadvantaged families, as well as those with parents with disabilities, are more likely to suffer from disability exclusion. For the most part, parental involvement is crucial to the success of students with disabilities, taking advantage of all the opportunities, especially in the admission process. Faculty members stress the importance of active parental or guardian participation with the school to fulfill the child's needs.

Table 2 shows that most respondents acknowledged the importance of educators and administrative staff in identifying, screening, and placing students with special educational

needs (LSEN), with twenty (20) respondents stating their obligation to create, review, and administer Pupil Profile Sheets. Similarly, seventeen (17) respondents said that filing all LSEN under admissions, the registrar, and faculty requires a particular standard of accurately maintaining records. Similarly, only twelve (12) respondents highlighted the lack of parental involvement in expressing the child's needs at the admissions stage, indicating minimal participation in this process. Non-teaching personnel also noted that due to the university's lack of proper assessment tools and facilities, the identification of LSEN largely relies on observable physical characteristics, submitted documents, and prior records.

Table 2
School Personnel's Response to These Observations in Terms of Identifying, Screening, and Assessment of LSEN

No.	Indicators	F	%	Ranking
1	Admission arrangements are outlined in the prospectus and published on the school website and in the Local Authority Admissions Booklet.	13	17.0	4
2	Placement for learners with or without a special educational need is allocated in line with the whole School Admissions Policy.	15	19.0	3
3	In the admission, parents are encouraged to report their child/ students' needs to all members of School staff.	12	16.0	5
4	Teachers and administration offices including admission, registrar and clinic will draw up, review and monitor Pupil Profile Sheets for those LSEN and others, as required.	20	26.0	1
5	Admission, registrar and faculty will keep accurate records of all LSEN.	17	22.0	2
	TOTAL	**77**	**100.0**	

The faculty members emphasize the vital role of school personnel in screening and identifying learners with special educational needs (LSEN). They stress the importance of providing and maintaining confidential documentation supporting a student's unique needs, in compliance with institutional and legal standards (AHEAD, 2020). However, it was noted that parents are often underutilized in this process. Even though parents are urged to assess their child's requirements and report them to the school personnel, this practice is not consistently emphasized. The National Council for Special Education (2013) advises parents to interact with the schools and local Special Educational Needs Organizers (SENOs) in advance, allowing for discussion concerning the child's needs and enrollment. This early contact enables the school to prepare by, amongst other things, applying for extra teaching assistance, preparing teacher development programs, and having the relevant provisions ready for the child's admission to school.

Presidential Decree No. 603 (The Child and Youth Welfare Code) highlights the rights of all children, Article 3 states that every child is entitled to well-rounded development with special emphasis is placed on children who are emotionally disturbed, social maladjusted, or physically or mentally handicapped ensuring they are given appropriate treatment, education, and care commensurate to their needs. Hence, Article 74 states that special classes or schools should be created in every province to meet the needs of learners with disabilities and encourages private sector involvement in establishing facilities. Also, the Association on

Higher Education and Disability (AHEAD) recommends a consistent documentation process for accommodations for students with disabilities, promoting equity across institutions (AHEAD, 2020).

The results from Table 3 show that twenty-four (24) teaching and non-teaching staff respondents stressed the importance of encouraging learners with Special Educational Needs (SEN) to actively participate in the decision-making processes related to their needs and transitions. Additionally, twenty-one (21) responses offered that personnel devoted to advancing the curriculum should focus more on revising strategies to increase all students' access to the curriculum. Each of the two most essential points that received sixteen (16) responses emphasized the importance of teachers attending to challenging students' interactions outside class and expanding instructional skills to meet the diverse needs of the students. However, only nine respondents identified the problem of scheduling time for collaborative staff meetings as a concern. Faculty respondents also noted the absence of orientation sessions on LSEN, which causes some instructors not to adjust to standards and instead offer conversations revolving around academic problems for active discussions with students.

Table 3

School Personnel's Response to These Observations in Terms of Instruction and Curriculum Development

No.	Indicators	F	%	Ranking
1	Curriculum development school personnel will revise strategies and identify appropriate different methods of access to the curriculum appropriate to both LSEN and other students.	21	14.0	2
2	No curriculum activity will exclude any student due to any disability or learning need.	13	9.0	5.5
3	Teachers and non-teaching personnel are advice to encourage LSEN to actively participate in all decision-making processes and contributing to the assessment of their needs, meetings and transition process.	24	16.0	1
4	Teachers will take a point of interacting with the most challenging students outside of class time as required.	16	11.0	3.5
5	Teachers will write anecdote of any untoward events in class involving students with special needs and will inform department head/dean.	11	8.0	8.5
6	Timetabling of collaboration time (even if this means less face-to-face teaching time for students).	9	6.0	10
7	Increase skill base - stretch teachers' range of instructional tolerance.	16	11.0	3.5
8	Teachers and other school personnel will monitor individual progress and make revisions where necessary.	13	9.0	5.5
9	Teachers, non-teaching personnel and administration support each other in the planning and implementation of the strategies (teaching, accommodation, assessment, etc.) appropriate to LSEN.	12	8.0	7
10	University staff could collaborate with collection and analysis of data of direct relevance to research and practice.	11	8.0	8.5
	TOTAL	**146**	**100**	

In addition, Center for Learner Equity (2024) pointed out the lack of suggested academic preparedness as a crucial gap in the disabling framework provided for most students, where no guidance is offered for enabling take, including strategies for relevant course selection needed to gain college access. Even those enrolled in college preparatory programs frequently lack the necessary modifications for success. After the Salamanca Conference, the Philippines adopted the Inclusive Education system, which declared that "all children should learn together, wherever possible, regardless of any difficulties or differences" (UNESCO, 1994). Colleges and universities have a responsibility to provide adjustments that are reasonable for students with disabilities and provide necessary supplementary aids and services. This approach recognizes that the best educational strategies for these students align with general educational practices, which include strong shared leadership, a positive attitude, high expectations for all students, parental involvement, and diverse teaching strategies (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2020).

Table 4 reveals that the most common response, with twenty-two (22) responses, was the need to provide a comprehensive curriculum and examination syllabi, plans of progression, and continuity that cater to all students. Additionally, conducting some skill development training, such as a two-day seminar for the staff on how to deal with learners with special educational needs (LSEN), was considered significant. On the contrary, only thirteen (13) respondents stated that teachers must accommodate instructional class practices and lesson planning. The functions of the Dean and Department Head were also noted to be central in providing and managing academic support and transition services. One (1) dean remarked that all people involved in the admission process must purposefully ensure the flexibility of the curriculum to meet differing student needs.

Table 4

School Personnel's Response to These Observations in Terms of Academic Support and Transition Opportunities

No.	Indicators	F	%	Ranking
1	University staff/personnel (teachers, clinic personnel, department head/dean) will make regular reports regarding LSEN issues to raise awareness and to aid implementation of processes and procedures.	19	15.0	3
2	Teachers will provide necessary class accommodation and lesson modification.	13	10.0	7
3	Colleges/department will provide an appropriate curriculum and examination syllabus, continuity and progression, and school and departmental development plans that suits to all type of students.	22	18.0	1
4	University personnel who's responsible in preparation of departmental examination will also consider modification of examination appropriate to LSEN.	17	14.0	5
5	The office of the registrar together with the college deans and department heads will discuss the availability of program/courses suits to LSEN towards degree requirements.	15	12.0	6
6	University will provide seminars or coaching sessions (it could be a two day workshop for several staff) focus on the development of the new skills or strategies related on the accommodation of LSEN.	21	17.0	2
7	University will also provide seminars for teachers related in handling LSEN in terms of instructions and teaching strategies.	18	14.0	4
	TOTAL	**125**	**100.0**	

Moreover, Kiuhara and Huefner (2020) highlight that college and university settings serve as primary avenues for students to access knowledge, and faculty members are responsible for understanding this diverse student population. If the classroom environment is perceived unfavorably, students may hesitate to disclose their disabilities to obtain necessary accommodations. This consideration of campus climate emerged as a significant theme during the literature review. Sakız et al. (2021) found that public and private educational students exhibit similar patterns in identification, accommodation experiences, and support. Students express satisfaction with their academic support offices and staff. Appropriate accommodations that students identify include alternative ways of taking the examination, forwarding documents to lecturers, and assisting with registration. Reportedly, some students believe and seem to possess some self-advocacy skills, but most have not been trained adequately. Their lack of understanding about the legal aspects of disabilities, the rights accompanying them, and the available provisions is also evident. In addition, students describe their experience of transitioning from the secondary level to the postsecondary level as very poor, which also aligns with current research findings.

Regarding the responses from non-teaching, teaching, and administrative officials indicated in the five areas of resources and physical facilities, the findings revealed that the highest frequency, with twenty-four (24) responses, was attributed to the University's provisions for accessible facilities. These include hygiene facilities, a dedicated LSEN room on the ground floor, disability toilets placed strategically throughout the building, and changing facilities. The University further pledges to implement physical changes to facilities by removing architectural barriers, installing ramps, creating curb cuts in sidewalks and entrances, rearranging shelves, and other necessary modifications. As indicated by eleven (11) respondents, there is a need for large standard rooms that would be more appropriate for faculty rather than smaller spaces.

Table 5
School Personnel's Response to These Observations in Terms of Resources and Physical Facilities

No.	Indicators	F	%	Ranking
1	University will provide accessible facilities like hygiene facilities, LSEN room on the ground floor, disabled toilets distributed throughout the building and appropriate changing facilities.	24	27.0	1.5
2	University will provide physical facility modifications, such as removing architectural barriers, installing ramps, making curb cuts in sidewalks and entrances, repositioning shelves and other.	24	27.0	1.5
3	Nurturing community of teachers are available in classrooms.	14	16.0	4
4	Large common rooms rather than faculty offices would seem to be more appropriate and will be provide.	11	13.0	5
5	University offer the usage of suitable technology for LSEN (hardware, peripherals and software packages) together with appropriate technical support.	15	17.0	3
	TOTAL	**88**	**100.0**	

Finally, to complement the last finding of the research, Republic Act No. 11650 mandating a policy of inclusion and services for learners with disabilities in favor of inclusive education, thoroughly encompasses accessibility and support for students with disabilities. The law requires all public and private schools to offer equal access to good-quality education for learners with disabilities. It encompasses provisions for flexible facilities and programs adjusted to the students' needs, and resource allotments, relocation of classes, construction of alternative testing procedures, and provision of auxiliary aids in order to ensure sufficient support. Additionally, the law mandates designing and constructing proper building structures, campus physical landscapes, and other institutional infrastructures to promote accessibility. Consolidating support systems requires the creation of Inclusive Learning Resource Centers (ILRCs) in every city and municipality. Moreover, specific academic supports like tutorial sessions, time extensions during exams, and deadline extensions are highlighted to suit various learning needs. These integral measures ensure that learners with disabilities have equal opportunities and appropriate support to thrive in an inclusive learning environment.

Such legislation reflects the country's dedication to educational equity and mandates the compliance of tertiary education institutions and other learning settings with holistic inclusion standards for students with disabilities, as noted in Republic Act No. 11650, upon enrollment, specialized offices and staff authenticate documents and coordinate access to academic accommodations to provide learners with the required assistance. Further support comes from teaching staff, who are important in creating a supportive learning environment. It also prioritizes the training of faculty and staff, allocation of resources, and opening Inclusive Learning Resource Centers (ILRCs) across all cities and municipalities, stressing the necessity of a conducive institutional climate to effectively support students with disabilities (Department of Education, 2021).

Despite numerous attempts to solve the problem, students with disabilities in the Philippines continue to fail to receive a quality education, highlighting the urgent need for systemic change and improved institutional support. Although legislative frameworks like the Magna Carta for Persons with Disabilities (RA No. 7277) and the Special Education Act (RA 9442) propose solutions, they lack practical implementation. Other barriers, such as insufficiently trained instructional staff, lack of resources, and negative attitudes, are additional hindrances to these students' educational and societal experiences. The Child and Youth Welfare Code in the Presidential Decree No. 603 affirms their right to proper education and care. Family members are equally important as educators in ensuring the student's achievement, and working on their engagement priorities shifts the burden of responsibility.

Moreover, fostering a constructive faculty attitude and effective coping mechanisms to support learners of different abilities requires professional development. Accessibility features and other supports require regular evaluations to adjust to students' evolving needs. Prioritizing collaboration between parents, informed faculty, and policies is needed to create a more equitable education system for all learners.

Concerning the participation of students with disabilities in Philippine educational structures and systems, there is a need to address the particular issues these students encounter. Thus, clarifying which expected outputs this study aims to achieve is relevant. The framework is designed to critically review current practices and policies to explain how some remaining barriers, such as insufficiently trained educational staff, lack of good-quality materials, and low parental involvement, may hinder successful inclusion. It seeks to intervene to support

the inclusion of students with special educational needs (SEN) in higher education by synthesizing existing empirical research and providing evidence-based recommendations.

As Hornby and Lafaele (2011) and Guo and Keles (2024) suggest, parental engagement is one of the most critical factors for learners with disabilities. This framework will assist schools in creating offers to the parents of students, which will guarantee their participation in the education process. This collaborative approach is supported by prior studies showing how parents actively engaged ensure much more useful support is given to students (Epstein & Sheldon, 2002; Jeynes, 2021). Engaging parents empowers them and creates a supportive network that benefits students academically and socially. The framework encourages educational institutions to implement strategies recognizing and enhancing parental involvement, thereby enhancing support from the parents to teachers and giving better aid to learners with special educational needs (LSEN).

Furthermore, the advocacy within the framework for enhanced faculty training will build on the discipline focused on practitioners' readiness to teach basic education and develop inclusive approaches (Musendo et al., 2023). The framework intends to improve teachers' diverse competencies by advocating for active training and the induction of professional development opportunities.

Additionally, regarding the importance of sufficient resources, the framework aligns with the findings from the National Council for Disability (2023) that when appropriate strategies for including children with disabilities are known but not adequately funded, most are ineffective. The framework aims to facilitate an environment conducive to inclusive education by suggesting strategies for allocating resources and establishing support services.

Finally, the output of the study seeks to serve as a comprehensive guide that aligns with national policies and international best practices while advocating for evidence-based recommendations for the mainstreaming of LSEN in higher education. This is in harmony with the call for opening up the Philippine education system in ways that can facilitate engagement in enriching educational experiences for all learners, while embodying the principles of inclusive education in meaningful ways.

As Hornby and Lafaele (2011) suggest, parental engagement is one of the most critical factors for learners with disabilities. This will help schools develop parent–school partnerships and ensure parents participate in their children's education. This cooperation is validated by research that shows that when parents are involved, students get more tailored help that resonates with their actual requirements (Epstein & Sheldon, 2002; Jeynes, 2021). Involving parents enables them to devise strategies that create networks that aid the students psychologically and educationally. This empowerment framework compels educational institutions to formulate policies with a positive approach to parental exclusive involvement, thereby helping create a balanced education system for learners with special educational needs (LSEN).

A framework suggests that the training offered to faculty members needs to be strengthened, referencing other literature that considers educators' preparedness in promoting inclusivity practices. Focusing on continuous professional development programs is one way the framework seeks to develop teachers 'attention to student diversity.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

I hereby declare that in completing this academic/research work, generative AI tools and AI-assisted technologies were utilized responsibly and ethically to support the writing process.

Specifically, the following tools was used:

1. Grammarly**:** Employed to assist in identifying and correcting grammar, spelling, punctuation, and sentence structure issues to enhance clarity and coherence.

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His Majesty King Maha Vajiralongkorn of Thailand the Royal Policy on Thai Higher Education: Induction Into Practice for Sustainable Local Development

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Abstract

The research aims to study the achievements of higher education institutions under the implementation of His Majesty King Maha Vajiralongkorn's Royal Policy on Higher Education for Sustainable Local Development. The informants who were interviewed to study administrators, lecturers, students, representatives of government and private sectors, and representatives of local administrative organizations of higher education institutions that had successful results in implementing. In this research, 4 higher education institutions, 5 people each, totaling 20 people, were selected from the group of higher education institutions for developing local communities or other communities according to the classification of the Ministry of Higher Education, Science, Research and Innovation, which came from 4 Rajabhat Universities: Chiang Mai Rajabhat University Loei Rajabhat University, Nakhon Ratchasima Rajabhat University, and Surat Thani Rajabhat University, all four universities have the results of THE (Times Higher Education) impact rankings world-class university rankings in order to achieve the Sustainable Development Goals (SDGs) of the United Nations (UN). The study results found that the university has had an important goal of being a higher education institution for local development for a long time, according to the Rajabhat University Act of 2004. This has resulted in collaboration with various communities, such as organizing teaching and learning alongside community development, transferring knowledge and innovations necessary for community development and problem solving, conducting area-based research, integrating with teaching, research, and community services, as well as creating collaborative networks both inside and outside the university.

Keywords: His Majesty King Maha Vajiralongkorn, higher education, sustainable local development

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Introduction

By the grace and foresight of His Majesty King Maha Vajiralongkorn who has placed importance on education and intended for education to create Thai people with 4 characteristics: 1) Having the right attitude towards the country, which means having knowledge and understanding of the country, adhering to religion, being loyal to the monarchy, and being compassionate towards one's family and community. 2) Having a solid foundation in life with morality, which means knowing how to distinguish between right and wrong, good and evil, in order to do only what is right and good, and rejecting what is wrong and evil, in order to create good people for the country. 3) Having a job and a career, which means having children love work, work hard, and work until they succeed. Training them to learn how to work so that they can support themselves and their families. And 4) Being a good citizen, which means being a good citizen is everyone's duty. Educational institutions and businesses must promote everyone's opportunity to be a good citizen. Being a good citizen means being kind and compassionate, volunteering, and doing charity work. "If you see something that can be done for the country, you must do it." All of these will be important parts in creating stability for the country.

His Majesty King Maha Vajiralongkorn has been presiding over the granting of degrees to graduates of Rajabhat Universities for over 30 years since he was Crown Prince Maha Vajiralongkorn. He has also closely followed and observed the potential and deeply understood the essence of the university's graduate production, which was established to be a source of quality graduates, a source of academic knowledge, and a philosopher of local development, which is an important mechanism that can reach the root of the problems of his subjects in each area and can proceed to solve and develop them with a goal in order for the people to have a better quality of life in all aspects. Therefore, he assigned the mission to the Privy Councilor to advise the university to work towards the goal of raising the level of education and developing the local areas in their areas. In the past, higher education institutions across the country have followed the royal policy of His Majesty King Maha Vajiralongkorn, which is his intention to work for tangible local development, work towards the goal, raise the quality of education, and develop the local areas in their areas to participate in creating national security. Importantly, it must reach the people. And we must analyze and acknowledge the problems and needs of local people.

In 2021, the Ministry of Higher Education, Science, Research and Innovation has divided higher education institutions into 5 groups, one of which is "Group of higher education institutions for the development of local communities or other communities." Therefore, higher education institutions selected for this group must carry out their main missions and strategies aimed at developing local communities and communities with shared objectives or benefits, being a source of knowledge and technology transfer to strengthen communities, and providing people with lifelong learning opportunities that will lead to sustainable development, according to the following 5 considerations: 1) Focus on developing local communities and building the potential of educational institutions, community organizations, and people to be strong in developing education, economy, and society in the community; 2) Produce graduates and be a source of developing the potential of local personnel to have awareness and knowledge and skills as a principle for driving development and change at the local level; 3) Conduct research and create innovations to apply the knowledge gained to community development; 4) Continuing and preserving local arts, culture, and wisdom; Applying and developing local arts, culture, and wisdom to keep up with the times to increase value and worth; and 5) Promoting the inheritance and development of knowledge from those

with local arts, culture, and wisdom. (Ministry of Higher Education, Science, Research and Innovation.

In the past, the higher education institution that has closely worked with the community and locality is Rajabhat University, which is a higher education institution that is located in the locality and is close to the community. Since being a teacher training school, teacher college, and Rajabhat Institute that are spread out in many provinces in every region and have been elevated to Rajabhat University at present. The reason why Rajabhat University can clearly work with the community and locality is that the Rajabhat University Act of 2004 stipulates in Section 7 that "The university shall be an institution of higher education for local development that strengthens the power and wisdom of the country, restores the power of learning, honors local wisdom, creates arts and sciences for the stable and sustainable progress of the people, participates in the management of the maintenance of the use of natural resources and the environment in a balanced and sustainable manner. The objectives are to provide education to promote higher academic and professional studies, conduct teaching, research, provide academic services to society, improve, transfer, and develop technology, nurture arts and culture, produce teachers, and promote the qualifications of teachers." This clearly shows that the establishment of Rajabhat University has the main goal or objective of local development. This can be considered as the intention of the drafting of the law that aims to make Rajabhat Universities different from the original universities that Thailand used to have. Working for the local area and staying close to the community is what makes each Rajabhat University gradually build a working approach that is more than teaching and more than activities within the university. When the scope of work has expanded to the community, local/community development has occurred from the drive of various sectors, with Rajabhat Universities participating as both hosts and network partners. When the Sustainable Development Goals were announced and the ranking of universities that achieved the sustainable development goals was made, the foundation of the work that Rajabhat Universities have been doing for a long time has been able to respond to many sustainable development goals (Rajabhat University Act B.E. 2547; 2004).

With great concern and consideration for the well-being of the people, His Majesty has a firm determination to make the country stable and the people have a better life. With the intention to continue, preserve and develop the royal projects and various royal initiatives of His Majesty King Bhumibol Adulyadej the Great and Her Majesty Queen Sirikit the Queen Mother to relieve suffering and promote happiness for the people and develop the country to progress. His Majesty has graciously granted permission for the royal government agencies to collaborate with other government agencies and people of all groups who volunteer to volunteer as royal volunteers to perform public services in various areas to alleviate suffering and solve problems for the people. His Majesty has also graciously granted permission for the royal volunteer projects to be implemented in accordance with the royal initiatives, which is a model for holistic community development and integrated operations. It is a development model that is appropriate for the geographical, social and cultural conditions of Thailand, with an emphasis on development that begins with human development. It is considered a great genius and wisdom in the field of development and community development. It can be said that he is a complete and complete developer, both as an academic and a practitioner. Therefore, the research project on "His Majesty King Maha Vajiralongkorn Royal Policy on Thai Higher Education: Implementation for Sustainable Local Development" will be a set of important knowledge and data in determining the operational guidelines according to the strategies of higher education institutions in order to achieve the goals of sustainable local development. It will also be data to support higher education institutions, especially "groups

of higher education institutions for the development of local communities or other communities," to operate according to the strategies to create rapid results for the community and the people and to encourage all parties to participate in driving the operations. This is an implementation of His Majesty King Maha Vajiralongkorn's Royal Policy on Thai Higher Education to implement for sustainable local development.

Research Objective

To study the achievements of higher education institutions under the implementation of His Majesty King Maha Vajiralongkorn's royal policy on higher education for sustainable local development.

Population/Informant Scope

Interviewers to study the success of higher education institutions under the implementation of His Majesty King Maha Vajiralongkorn's Higher Education Policy to sustainable local development, consisting of executives, lecturers, student club presidents, students, representatives of government and private sector agencies, and representatives of local administrative organizations of higher education institutions, with qualifications and numbers as specified by the researcher.

Interviewers to provide recommendations on guidelines for implementing His Majesty King Maha Vajiralongkorn's Higher Education Policy to sustainable local development, consisting of executives of higher education institutions and qualified persons, with qualifications and numbers as specified by the researcher.

Research Methodology

The study of the achievements of higher education institutions under the implementation of His Majesty King Maha Vajiralongkorn's royal policy on higher education to sustainable local development has the following research methods:

Informants

The informants were interviewed to study the achievements of higher education institutions under the implementation of His Majesty King Maha Vajiralongkorn's royal policy on higher education to sustainable local development. They consisted of administrators, lecturers, students, representatives of government and private sectors, and representatives of local administrative organizations of higher education institutions that have successfully implemented His Majesty King Maha Vajiralongkorn's royal policy on higher education to sustainable local development. In this research, 4 higher education institutions were selected, 5 people each, totaling 20 people, from the group of higher education institutions for developing local communities or other communities according to the grouping of the Ministry of Higher Education, Science, Research and Innovation, which came from 4 Rajabhat Universities: Chiang Mai Rajabhat University, Loei Rajabhat University, Nakhon Ratchasima Rajabhat University. and Suratthani Rajabhat University, all 4 universities have THE (Times Higher Education) Impact Rankings world university rankings in their efforts to achieve the United Nations (UN) Sustainable Development Goals (SDGs), with data providers having the qualifications specified by the researchers.

Development of the Data Collection Instrument

1. The researcher conducted a study of documents and various related research studies to develop a research instrument to study the achievements of higher education institutions under the implementation of His Majesty King Maha Vajiralongkorn's higher education policy for sustainable local development.
2. The researcher used the data obtained from item 1 to create a semi-structured interview to study the achievements of higher education institutions under the implementation of His Majesty King Maha Vajiralongkorn's higher education policy for sustainable local development.

Data Collection

1. The researcher sent a letter to the president of Rajabhat University to request permission to collect data.
2. The researcher collected data from self-interviews.

Data Analysis

Content Analysis technique was used in conjunction with Grounded Theory data analysis. This method was used only to analyze data, without aiming to create a theory. The researcher then presented the data in a descriptive manner.

Summary of the Research Results

A study of the achievements of higher education institutions under the implementation of His Majesty King Maha Vajiralongkorn's royal policy on higher education to sustainable local development. The results of the study are as follows: Chiang Mai Rajabhat University, Loei Rajabhat University, Nakhon Ratchasima Rajabhat University, and Surat Thani Rajabhat University have all had important goals of being higher education institutions for local development for a long time. They have emphasized and given importance to the implementation of the Rajabhat University Act B.E. 2547, which is specified in Article 7. Throughout the past, there has been collaboration with various communities, starting from the mission of organizing teaching and learning alongside community development, transferring knowledge and innovations necessary for the development and problem solving of local communities, promoting and supporting personnel to conduct area-based research to respond to the needs of communities and local areas, emphasizing integration with teaching, research, and community services, including creating networks for collaboration both inside and outside the university.

The important context is being a higher education institution for local development for a long time. There are costs of working with society, communities and local areas until it is well trusted by the local people. The most obvious import factor is the Rajabhat University Act of 2004, which clearly states in Section 7 that "The university shall be an institution of higher education for local development that enhances the power and wisdom of the country, restores the power of learning, honors local wisdom, creates arts and sciences for the stable and sustainable progress of the people, participates in the management of the maintenance of the use of natural resources and the environment in a balanced and sustainable manner, with the objectives of providing education to promote higher academic and professional studies, conducting teaching, researching, providing academic services to society, improving,

transferring and developing technology, nurturing arts and culture, producing teachers and promoting teachers' qualifications." It also follows the royal policy of His Majesty King Maha Vajiralongkorn who intended for Rajabhat to work for local development in a tangible way. In addition, all 4 Rajabhat universities have personnel with expertise, precise knowledge, dedication, sacrifice and teamwork, focusing on presenting data on operations according to the research mission and academic service mission as the main principle to proceed to achieve the Sustainable Development Goals (SDGs), and integrating in joint operations. Various committees have been established and play an important role in driving Rajabhat Universities to achieve sustainable development goals. There are main agencies responsible for collecting, analyzing, and synthesizing various data to support operations. The administrators of Rajabhat Universities are all interested in and play an important role in being higher education institutions for true local development.

The process of Rajabhat Universities to achieve Sustainable Development Goals (SDGs) leading to good practices found that all 4 Rajabhat Universities will assign people directly responsible, establish special working groups, and establish formal and informal working groups. Internal agencies that play an important role in integrating work together include International Relations, Public Relations, Information Technology, and various faculties. There will be main agencies that the universities have designated to collect, compile, analyze, and synthesize data. It was also found that all 4 Rajabhat Universities use participatory processes to create close collaboration between personnel both inside and outside the organization informally, resulting in a grouping together in a shared ideology for achieving Sustainable Development Goals (SDGs), or what is known as collaborative volunteer work. It was also found that all 4 Rajabhat Universities have implemented operations to create a university environment that is conducive to achieving sustainable development goals, such as creating an educational environment, having a curriculum and courses related to sustainability. Including organizing the teaching and learning format that encourages students to learn about sustainability in both curricular and extra-curricular activities. Physical environment arrangement: All 4 Rajabhat Universities promote physical environments that respond to various SDGs, such as tree planting, waste management, policies on electricity and renewable energy saving, water management, and the Green University Project. The environment is also organized to support personnel's work in order to support the achievement of sustainable development goals. All 4 Rajabhat Universities support all 4 missions, build morale and encouragement in work, and implement policies and announcements that respond to the indicators of sustainable development goals as specified by the universities. The results of operations and impacts can be divided into 4 areas as follows:

1) Personnel and related persons, such as administrators, lecturers, students, parents, and communities, are aware of, understand, and accept the direction of university development that will go hand in hand with the achievement of sustainable development goals (SDGs) for the community.
2) Work aspect: Integrate the work of faculties, units, and universities to achieve sustainable development goals (SDGs), such as joint academic service projects, sending basic work data for work analysis, with the Research and Development Office acting as a medium to provide data to be used as a sustainability development task in the area.
3) University atmosphere: The university has developed knowledge in community and local development, resulting in knowledge for working on the Sustainable Development Goals (SDGs) according to all 17 goals. Knowledge gained from working is applied in the area, problem-solving, and finding new ways. In addition,

working to achieve the Sustainable Development Goals (SDGs) has resulted in many new work assignments in the area, which will lead to the determination of research issues and academic service projects for faculties and lecturers.

4) Community and networking: Working to achieve the Sustainable Development Goals (SDGs) of the four Rajabhat Universities has resulted in work and coordination with the communities, the creation of internal and external networks, communication with the communities, and greater community acceptance. The communities want lecturers from the four Rajabhat Universities to help and play a role in providing academic advice, thinking together, working together, solving problems, and working together, creating opportunities to generate income for farmer groups and community enterprises. This has led to continuous and sustainable cooperation and trust, making parents more confident in sending their children to study at the four Rajabhat Universities. Success factors from the study of good practices in the operations of Rajabhat Universities to achieve the Sustainable Development Goals (SDGs) of the 4 Rajabhat Universities, it was found that the success factors:
    - 4.1) Having executives with vision and leading the implementation, pushing through the administration to various parts within the university. "Clearly setting the goals for achieving the Sustainable Development Goals (SDGs)" is set as an important agenda for the operations and various activities of the university.
    - 4.2) Having clearly designated responsible persons, led by the highest executive of the university, which is the president, giving policies and assigning them to vice presidents, assistant presidents, and executives at all levels of the university.
    - 4.3) Having continuously developed the work system and integrating the implementation of the sustainable development goals based on the missions that the 4 Rajabhat Universities are already implementing according to the operational plan.
    - 4.4) Having teamwork and participation of personnel from all sectors, which is the collaboration of relevant people both inside and outside the university.
    - 4.5) Having jointly evaluated the results of the operations to control, monitor, and evaluate the operations to identify the strengths, weaknesses, opportunities, and threats to the university's operations that need to be further developed.
    - 4.6) The 4 Rajabhat Universities have been higher education institutions for local development for a long time. It has had a long history of working with society, communities and the local area and is highly trusted by local people.
    - 4.7) It uses information technology systems to collect data in order to analyze and synthesize data, as well as to use the data in decision-making processes, resulting in fast, reliable data that can be used to achieve sustainable development goals (SDGs) quickly and accurately.

Conclusion

A study of the achievements of higher education institutions under the implementation of His Majesty King Maha Vajiralongkorn's royal policy on higher education to sustainable local development, by studying Chiang Mai Rajabhat University, Loei Rajabhat University, Nakhon Ratchasima Rajabhat University, and Surat Thani Rajabhat University. The study found that all 4 Rajabhat Universities have an important goal of being higher education

institutions for local development for a long time. They have the capital to work with society, communities, and the locality until they are well trusted by the local people. They have carried out their missions according to the Rajabhat University Act of 2004, which is clearly specified in Article 7. This may be because it was found that having personnel with expertise, precise knowledge, dedication, sacrifice, and teamwork, focusing on presenting data on operations according to the research mission and academic service mission as the main principle to proceed to achieve the Sustainable Development Goals (SDGs), there is integration in joint operations. It was also found that all 4 Rajabhat Universities used the participatory process to create close collaboration between personnel both inside and outside the organization informally, resulting in a grouping in the same ideology to achieve the Sustainable Development Goals (SDGs). This may be because they have arranged the educational environment, the physical environment, and the environment that promotes the work of personnel. This has led to many subsequent results in the area, which is consistent with the Rajabhat University Act of 2004, Section 7, which states that "The university shall be an institution of higher education for local development that enhances the power and wisdom of the country, restores the power of learning, honors local wisdom, creates arts and sciences for the stable and sustainable progress of the people, and participates in the management of the maintenance of the use of natural resources and the environment in a balanced and sustainable manner" (Rajabhat University, 2018).

The objectives are to provide education to promote higher academic and professional studies, conduct teaching, research, provide academic services to society, improve, transfer, and develop technology, nurture arts and culture, produce teachers, and promote teachers' qualifications. This is consistent with the research of Kongsathit and Suksamran (2018, p. 1-11) who conducted a study on Rajabhat Universities and Local Development: A Comparative Study of Rajabhat Universities in Rural and Urban Areas. The research results found that Rajabhat Universities are still universities for local development in accordance with the Rajabhat University Act of 2004, which intended for Rajabhat Universities to be educational institutions for local development in accordance with the original intention, even though the context of Rajabhat Universities has changed. And it is consistent with the research of Pudphad (2014, p. 1-11) who studied the participation of the people in the development of the area of Chiang Mai Rajabhat University, Mae Rim Center, Mae Rim District, Chiang Mai Province. The research results found that the university should create understanding among the people in the area about the objectives and roles of the university. The university must have activities with the community by opening opportunities for the people or community leaders to participate more and create cooperation with various agencies in the area to develop the area of the university and the community to coexist sustainably.

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The Effects of Using Mind Maps to Assist Self-Learning for Pre-aging and Aging Undergraduate Students in Thailand's Distance Education System

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Abstract

This research aims to investigate the effects of using mind maps to facilitate self-directed learning among middle-aged and elderly students in distance education systems in Thailand. The study used two group pretest-posttest experimental design with a sample of 70 participants, divided into an experimental group and a control group, each consisting of 35 participants. The data were analyzed using descriptive and inferential statistics. The findings revealed that utilizing mind maps to support self-directed learning, which includes six steps : 1) Selecting a central idea (S1), 2) Skimming the content (S2), 3) Specifying keywords (S3), 4) Sequencing and organizing the keywords (S4), 5) Structuring by linking (S5) keywords to subtopics and subtopics to the central idea, and 6) Providing short explanations or notes (S6) to expand on the keywords—resulted in the following outcomes: 1) The experimental group demonstrated significantly higher academic achievement after the intervention compared to both their pre-intervention scores and the control group, with statistical significance at the .05 level; 2) There was no significant difference in academic achievement among students with different fields of study or learning styles; and 3) There was no significant difference in academic achievement between students with different fields of study or age groups.

Keywords: learning using mind map, academic achievement, mind mapping skill, middle-aged and elderly undergraduate students, the distance education system

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Introduction

With the proportion of elderly individuals in Thailand steadily increasing, it is projected that by 2030, more than 20% of the population will be aged 60 or older (National Statistical Office, 2022). Biological and cognitive changes across different life stages inevitably influence learning objectives. Lovell (1980) explains that adults and the elderly (aged 40 and above) experience physical and cognitive decline, leading to limitations in learning. Similarly, Ratana-Ubol (2016) notes that adults and elderly learners face challenges due to physical, emotional, intellectual, and cognitive deterioration, alongside personal constraints. Nevertheless, providing effective learning opportunities to these groups can foster both personal and societal development. In Thailand, Jumnaksarn (2021) highlights that elderly students in distance education frequently struggle with memory retention, particularly with subjects involving large amounts of content, which require extensive memorization. It has been suggested that content summaries, key point emphasis, and the use of mind maps or concept diagrams could help elderly learners engage in self-directed learning and better understand the material.

A mind map is a tool that uses diagrams, lines, symbols, words, and accompanying text to systematically represent the relationships between concepts, main ideas, and supporting details (Buzan, 1995). Fisher et al. (1999) employed mind maps as a key tool to assist learners with reading difficulties in understanding texts according to the author's intention. Moreover, mind maps were shown to improve reading comprehension among learners. As such, the use of mind maps is beneficial for elderly learners, helping them organize their thoughts, enhance memory, connect knowledge, and foster creativity (Chuawong, 2020; Khammanee, 2002; Limtasiri, 2014; Wiboolyasarin, 2013). This aligns with Phongsaksri et al. (2017), who found that undergraduate students using mind maps in learning scored significantly higher in creativity and design outcomes, with statistical significance at the .05 level.

Sukhothai Thammathirat Open University, a state institution offering distance education, organizes its course content into six-credit units, with each unit divided into 15 learning modules. The extensive reading required by these modules directly impacts adult and elderly students, emphasizing the need for tools, techniques, and methods that enhance self-directed learning for this group. Self-directed learning requires learners to take responsibility for planning, executing, and assessing their learning progress. Learners are encouraged to transfer knowledge and skills from one learning context to another (Hiemstra, 1994). This process involves identifying personal learning needs, setting learning goals, seeking appropriate resources, selecting suitable learning methods, and continuously assessing one's learning (Dixon, 1992). Based on this understanding and a review of related literature, the advantages of mind maps for supporting self-directed learning are evident. However, no research has yet developed a self-directed learning model using mind maps to enhance learning outcomes for middle-aged and elderly undergraduate students in a distance education setting. Thus, this study aims to develop a self-directed learning model using mind maps to improve the academic achievement of middle-aged and elderly undergraduate students in distance education at Sukhothai Thammathirat Open University.

Literature Review

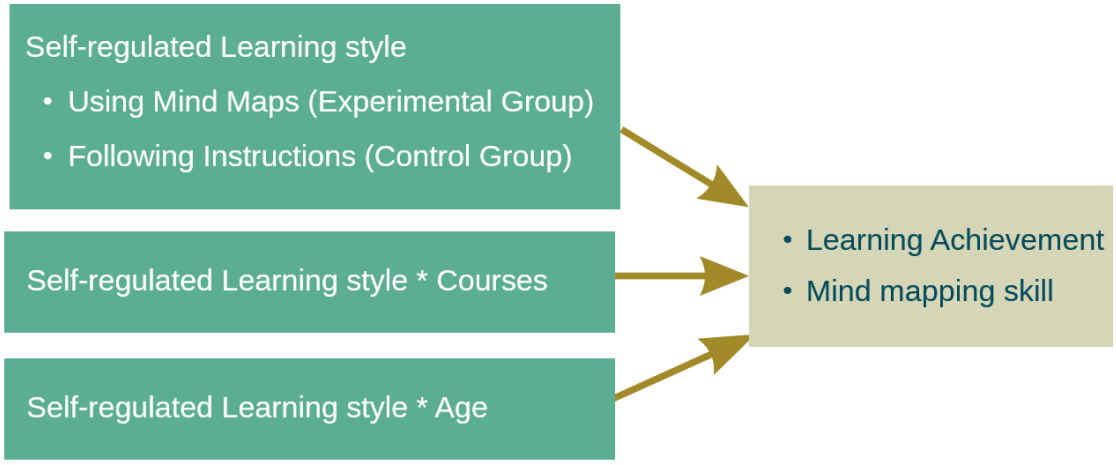
This conceptual framework focuses on the ability of learners to use cognitive mapping as a tool prior to experimental tasks, which serves as a control variable to measure the impact of

such pre-experimental strategies on learning efficacy. Mind mapping is recognized for its ability to enhance learners' capacity to organize, analyze, and internalize complex information (Novak & Canas, 2019). The framework divides the learners into two distinct groups: an experimental group and a control group. The experimental group employs mind mapping as a self-directed learning tool, which allows them to independently organize and visualize their learning process. In contrast, the control group follows traditional learning strategies, providing a baseline for comparison. This structure enables a deeper analysis of the effects of cognitive maps in fostering independent learning and metacognitive skills (Mayer, 2018).

Additionally, the framework explores how the self-directed learning approach varies across different subject courses and age ranges, highlighting the adaptability and effectiveness of cognitive mapping in various learning contexts. This approach aligns with the growing body of research that advocates for adaptive and personalized learning systems, tailored to individual learner needs and contexts (Darling-Hammond et al., 2020). The ultimate goal of this framework is to examine how these variables collectively influence educational outcomes and to provide actionable insights for improving instructional strategies across diverse educational environments.

Conceptual Framework

Figure 1
The Conceptual Framework of This Study



Hypothesis of Research

1. The experimental group of students had higher academic achievement than the control group.

2. The experimental group of students had greater mind mapping skill after the experiment than the control group.

3. The experimental group of students had higher academic achievement and mind mapping skill after the experiment than before the experiment.

4. Students with different courses of study and learning styles had different academic achievement and mind mapping skill.

5. Students of different age groups and learning styles had different academic achievement and mind mapping skill.

Research Methodology

This research adopted a two-phase design involving development and experimental evaluation. In the first phase, the sample consisted of 385 undergraduate students aged 40 and above, selected through stratified random sampling from the STOU population of 30,009. Participants completed online surveys designed to gauge their opinions on self-directed learning using mind maps. In the second phase, an experimental group of 70 students was selected for further study. Experimental design type is control group pretest-posttest design.

R O_{1E} X_E O_{2E} ……. Experimental group

R O_{2c} X_C O_{2c} …… Control group

First: Randomize students and treatment to experimental and control group
Second: Pre-testing student's knowledge and mind mappings skill
Third: The experiment was conducted according to the specified intervention long 1 month
Fourth: Pos-testing student's knowledge and mind mappings skil

Experimental phase assessed the effectiveness of the developed learning model through pre-tests and post-tests, employing inferential statistics like t-tests and MANOVA to analyze the results.

Results

Results of Hypothesis Testing

1. The comparison of academic achievement between the experimental and control groups revealed that the experimental group had significantly higher academic achievement scores than the control group, with a statistical significance level of 0.05. The test statistic was $t(68) = 7.07$, $p < .001$.

2. The comparison of mind mapping skill between the experimental and control groups after the experiment showed that the experimental group had significantly higher mind mapping skill than the control group at the 0.05 level. The test statistic was $t(68) = 11.50$, $p < .001$. For the experimental group, the average score of mind mapping skill after the experiment was significantly higher than before, with a test statistic of $t(34) = 4.39$, $p < .001$. Meanwhile, the control group's average score after experiment is not difference from before.

3. Comparison of academic achievement and mind mapping skill between students of different learning styles and courses.

3.1 The two-way MANOVA analysis to compare the multiple dependent variables (academic achievement and mind mapping skill) categorized by learning style and courses showed that students from different learning styles and courses did not differ in their mean scores for the multiple dependent variables. However, students with

different learning styles showed significant statistical differences in their mean scores for academic achievement and mind mapping skill at the 0.05 level. The test statistic was F (2, 63) = 97.07, $p < .001$, with an effect size ($\eta 2$) = .75. Students from different courses showed no significant difference in their mean scores for academic achievement and mind mapping skill.

3.2 The two-way ANOVA analysis to compare academic achievement and mind mapping skill categorized by learning style and courses showed that learning style and courses together explained 49% (R^2 = .49) of the variance in academic achievement and 70% (R2 = .70) in mind mapping skill.

3.3 The interaction influence of learning style and courses did not affect academic achievement, with a test statistic of F (2,64) = 1.04, p = .36, nor did it affect mind mapping skill, with a test statistic of F (2,64) = 1.04, p = .36. Therefore, the main influences of learning style and courses were considered, revealing that:

(1) Learning style significantly affected academic achievement at the 0.05 level, with an effect size ($\eta 2$) of .40. The test statistic was F (2,64) = 41.84, $p < .001$.

(2) Learning style significantly affected mind mapping skill at the 0.05 level, with an effect size ($\eta 2$) of .69. The test statistic was F (2,64) = 142.29, $p < .001$.

(3) Courses significantly affected academic achievement at the 0.05 level, with an effect size ($\eta 2$) of .09. The test statistic was F (2,64) = 3.20, p = .05, with law students achieving higher academic results than those in management studies.

(4) Courses did not affect mind mapping skill, with a test statistic of F (2,64) = 0.93, p = .40.

4. Comparison of academic achievement and mind mapping skill between students of different age groups and learning styles

4.1 The two-way MANOVA analysis to compare the multiple dependent variables (academic achievement and mind mapping skill) after the experiment categorized by learning style and age group showed that students with different learning styles had statistically significant differences in their mean scores for academic achievement and mind mapping skill at the 0.05 level. The test statistic was F (2, 61) = 88.68, $p < .001$, with an effect size ($\eta 2$) = .74. Students from different age groups did not...

4.2 The two-way ANOVA analysis to compare academic achievement and mind mapping skill after the experiment categorized by learning style and age group showed that learning style and age group together explained 46% (R2 = .46) of the variance in academic achievement and 70% (R^2 = .70) in mind mapping skill.

4.3 The joint influence of learning style and age group did not affect academic achievement, with a test statistic of F(3,62) = 0.57, p = .64, nor did it affect mind mapping skill, with a test statistic of F (3,62) = 0.77, p = .51. Therefore, the main influences of learning style and age group were considered, revealing that:

(1) Learning style significantly affected academic achievement at the 0.05 level, with an effect size ($\eta 2$) of .44. The test statistic was F (1,62) = 48.19, $p < .001$, and it also significantly affected mind mapping skill at the 0.05 level, with an effect size ($\eta 2$) of .66. The test statistic was F (1,62) = 119.33, $p < .001$.

(2) Age group did not affect academic achievement, with a test statistic of F (3,62) = 0.57, p = .64, nor did it affect mind mapping skill, with a test statistic of F (3,62) = 1.77, p = .16.

Table 1

Results of Hypothesis Testing

Result	Summary
1. The experimental group had significantly higher academic achievement scores than the control group at the .05 level.	consistent with the research hypothesis.
2. The experimental group had significantly higher mind mapping skill after the experiment than the control group at the .05 level.	consistent with the research hypothesis.
3. The experimental group had significantly higher academic achievement and mind mapping skill after the experiment than before at the .05 level.	consistent with the research hypothesis.
4. Students with different fields of study and learning styles had no significant difference in academic achievement and mind mapping skill.	Inconsistent with the research hypothesis.
5. Students of different age groups and learning styles had no significant difference in academic achievement and mind mapping skill.	Inconsistent with the research hypothesis.

Discussion

The self-directed learning model using mind maps was developed based on Buzan's (1995) framework, which emphasizes the use of diagrams and symbols to organize and retain information. The research aligns with existing studies, such as Phongsaksri et al. (2017), which indicate that mind maps can improve creativity and critical thinking in undergraduate students. The experimental findings strongly support the efficacy of this model in enhancing learning outcomes for middle-aged and elderly students, as evidenced by the improved performance of the experimental group.

Furthermore, the findings highlight the versatility of the model, which proved effective across different courses and age groups. The model's flexibility makes it a valuable tool in distance learning environments where students are responsible for managing large amounts of information.

Conclusion

This study successfully developed and validated a self-learning model using mind maps, which significantly improved academic performance among STOU students aged 40 and above. The model's six-step process can be applied across coursess, providing a structured and effective method for enhancing student learning. Further research should explore the application of mind maps in postgraduate education and other adult learning contexts.

Recommendations

1. Future applications of the model should ensure that students are given training in how to create and use mind maps effectively, using either software or traditional paper methods.

2. The model should be implemented at the beginning of the academic term to allow students sufficient time to practice mind mapping techniques.

3. Additional research is needed to explore other tools or techniques that may further enhance self-directed learning in adult education, especially in distance learning environments.

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The Causal Relationship Model of Assessment as Learning Factors Influencing the Learning Success of Undergraduate Students in Distance Education

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Abstract

This study aimed to develop a causal relationship model of Assessment as Learning (AaL) factors influencing the learning success of undergraduate students in distance education in Thailand and to assess model fit with empirical data. It involved two phases: Phase 1 involved surveying 400 bachelor's degree students at Sukhothai Thammathirat Open University using a questionnaire. The reliability of the survey instrument was confirmed with a Cronbach's alpha of 0.967, indicating high reliability and construct validity, which was evaluated through confirmatory factor analysis (CFA). The CFA results showed strong construct validity (χ^2 (185, N = 400) = 214.90, p = 0.065, CFI = 0.99, TLI = 0.99, RMSEA = 0.02, SRMR = 0.02). Phase 2 assessed model fit using Structural Equation Modeling (SEM), revealing that the conceptual model aligned well with empirical data (χ^2 (184, N = 400) =214.19, p = 0.063, CFI = 0.99, TLI = 0.99, RMSEA = 0.02, SRMR = 0.03). The findings indicated that AaL factors significantly influenced learning success, with four key factors identified in descending order of total effect: goal-setting, self-reflection, self-assessment, and metacognitive strategies. In conclusion, this study recommends prioritizing these four factors in the development of learner competencies to enhance students' success in distance education. Emphasizing these factors will empower learners to set goals, assess and monitor their learning progress, and develop the strategies essential in 21st-century learning skills.

Keywords: assessment as learning, self-assessment, metacognitive strategies, self-reflection, learning success, distance education

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Introduction

The 21st-century educational landscape requires a reevaluation of traditional assessment methods in response to rapid technological advancements, globalization, and the demand for critical skills such as creativity, collaboration, and digital literacy. Modern assessment practices now emphasize evaluating students' abilities to apply knowledge in real-world contexts, integrating authentic, formative, and digital assessments (Nelson, 2021; Smith, 2021; Taylor, 2021a; Thompson, 2021). Key frameworks include: Assessment as Learning (AaL): This approach focuses on student-centered learning, encouraging students to engage in goal-setting, self-assessment, and reflection, thereby fostering ownership of their learning. AaL promotes self-regulated learning and critical thinking, rooted in constructivist theories (Brown, 2022). Assessment for Learning (AfL): A formative assessment approach that uses continuous data collection to inform teaching and enhance student progress, grounded in Vygotsky's sociocultural theory (Black & Wiliam, 1998; Hattie & Timperley, 2007). Assessment of Learning (AoL): Typically associated with summative assessments at the end of an instructional period, AoL evaluates whether students have met intended learning outcomes and is essential for accountability (Bloom, 1969; Tyler, 1949). In distance education, AaL emphasizes four components crucial for enhancing student learning outcomes: Goal-Setting: Students set personal learning goals to enhance motivation and self-regulation, utilizing SMART criteria to guide their progress (Anderson, 2021; Locke & Latham, 2020). Self-Assessment: Involves students evaluating their work against established criteria, fostering autonomy and critical thinking skills (Boud, 1995; Khaemmanee, 2015). Metacognitive Strategies: Encourages students to plan, monitor, and evaluate their learning, enhancing their critical thinking and problem-solving abilities (Flavell, 1979; Zohar & Ben-David, 2009). Self-Reflection: A process where students critically analyze their learning experiences to gain insights and improve future performance (Dewey, 1933; Schön, 1983).

The context of Sukhothai Thammathirat Open University, which employs a distance learning system, that determined students engage in self-directed learning and self-assessment, closely aligning with the principles of Assessment as Learning (AaL). However, the diverse age range of students, many of whom have full-time jobs, often leads to insufficient time allocated for studying. This results in cramming before exams, focusing only on key concepts and exercises rather than achieving a deep understanding of the material. Consequently, this lack of preparation can negatively impact academic performance, leading to failures and increased dropout rates.

The research investigates AaL components' impact on learning success in distance education among undergraduate students in Thailand, identifying factors such as attitudes, subjective norms, self-control, and achievement motivation as vital for enhancing learning outcomes (Lee et al., 2020; Mendez et al., 2021). This research aims to develop the causal relationship model of Assessment as Learning Factors influencing the learning success of Undergraduate Students in distance education in Thailand and evaluate the model fit between the conceptual model and empirical data. It posits that if students establish clear goal-setting, utilise metacognitive strategies to support their learning, and consistently engage in self-assessment and reflection, they are more likely to succeed in distance education.

Literature Review

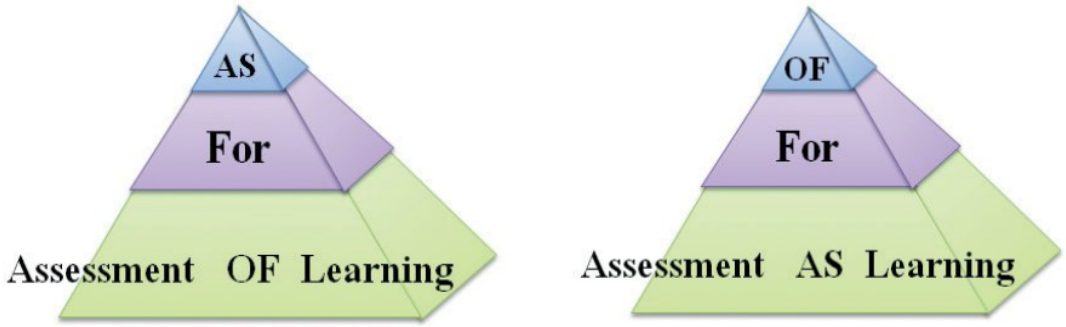
The 21st-Century Assessment and Assessment as Learning

The educational landscape of the 21st century demands a reevaluation of traditional assessment methods. The rapid technological advancements, globalization, and the shift towards skills such as critical thinking, creativity, collaboration, communication, digital literacy, and real-world problem-solving skills have necessitated the development of more dynamic and comprehensive assessment practices. 21st-century assessment emphasizes evaluating students in ways that reflect their ability to apply knowledge and skills in real-world contexts. This modern approach incorporates a variety of assessment methods that go beyond traditional tests to include authentic, formative, and digital assessments (Smith, 2021; Taylor, 2021a; Thompson, 2021). Within this framework, the concepts of 21st-Century Assessment, Assessment as Learning (AaL), Assessment for Learning (AfL), and Assessment of Learning (AoL) have become central to modern educational practices.

i. **Assessment as Learning (AaL)** emphasizes student-centered learning by engaging learners in goal-setting, self-assessment, and reflection, fostering responsibility for their own learning. This approach develops critical thinking and metacognitive skills, aligning with constructivist theories that view learners as active participants. AaL transforms assessment into a learning tool rather than a measurement method, supporting the development of self-regulated learners (Brown, 2022; Jones, 2021; Taylor, 2021a; Wilson, 2019).
ii. **Assessment for Learning (AfL)** is a formative approach that uses continuous assessment to guide teaching and enhance student progress. Based on Vygotsky's sociocultural theory, it highlights the importance of feedback and social interaction in learning (Hattie & Timperley, 2007; Vygotsky, 1978).
iii. **Assessment of Learning (AoL)** refers to summative assessment used to evaluate whether learning outcomes are achieved, often through standardized tests. While crucial for certification and accountability, AoL is complemented by AaL and AfL to form a comprehensive assessment system (Bloom, 1969; Popham, 2001; Tyler, 1949).

All three types of assessment play a crucial role in effective teaching and student learning. *Assessment for learning* enables instructors to design learning activities that are appropriately tailored to students' needs. *Assessment as learning* fosters learners' awareness of their own learning processes, helping them to recognize their strengths, weaknesses, and areas for improvement, which in turn allows them to take active steps toward achieving their learning goals. Meanwhile, *assessment of learning* provides evidence of whether students have met the established learning standards. Therefore, it is essential that educators incorporate all three forms of assessment to ensure a comprehensive evaluation of student learning. In this regard, a new conceptual framework has been proposed to rebalance the proportion of these three types of assessment in order to enhance the overall effectiveness and fairness of student evaluation (Earl, 2003). As shown in Figure 1.

Figure 1
Concept of Balance in the Three Types of Assessment



Traditional Assessment Pyramid **Reconfigured Assessment Pyramid**

Traditional assessment frameworks placed the greatest emphasis on **AoL**, with **AfL** and **AaL** receiving less focus. However, current perspectives have reversed this order, now prioritizing **AaL** as the most essential, supported by research indicating that students' awareness of their own learning progress through formative assessment is a more effective motivator than external achievement outcomes (Black & Wiliam, 1998).

In the 21st century, the demand for higher-order thinking and adaptability has reinforced the importance of *Assessment as Learning*. This approach shifts learning responsibility to students, encouraging self-assessment, reflection, and metacognitive strategies that develop lifelong learning skills, critical thinking, and autonomy. Through AaL, learners set personal goals, track progress, and reflect on outcomes—enhancing self-regulation, deeper understanding, and self-awareness (Earl, 2003).

Key components of ***Assessment as Learning*** in distance education, this study focuses on the theory and concept of the components of AaL in distance education as follows:

Goal-Setting

Goal-setting helps students take ownership of their learning by enhancing motivation, focus, and progress tracking. This aligns with Locke's Goal-Setting Theory (1990) and self-regulation frameworks (Zimmerman, 2002). **Sub-components include:** (1) *Understanding Learning Goals* – Clarifying objectives and their purpose. (2) *Studying Academic Plans* – Aligning goals with academic frameworks. (3) *Goal Specification* – Creating SMART goals. (4) *Setting Success Criteria* – Establishing benchmarks for progress. (5) *Executing the Plan* – Taking actions toward goal achievement. (6) *Techniques to Success* – Applying motivational and strategic methods. (7) *Adjustment of Goals* – Revising goals based on feedback and circumstances (Anderson, 2021; Bandura, 2018; Deci & Ryan, 2020; Gollwitzer & Sheeran, 2022; Locke & Latham, 2020; Miele et al., 2019; Oettingen, 2021; Schunk, 2021; Tormala & Petty, 2019).

Self-Assessment

Self-assessment promotes autonomy, self-awareness, and reflective thinking, enabling students to recognize their strengths and areas for improvement. Rooted in constructivist theory, it fosters lifelong learning (Boud, 1995; Earl, 2003; Zimmerman, 2002). **Sub-components include:** (1) *Establishing Learning Goals* – Defining clear, specific targets. (2)

Questioning and Answering in Learning – Using questions to deepen understanding. (3) *Self-Learning and Testing* – Engaging in self-directed practice. (4) *Self-Monitoring* – Tracking progress against goals. (5) *Self-Improve* – Implementing changes based on reflection. (6) *Adjustment of Plan* – Modifying strategies based on performance. (7) *Self-Regulated Learning* – Planning, monitoring, and evaluating one's learning (Boekaerts & Corno, 2021; Kluger & DeNisi, 2019; Pintrich, 2021; Schunk & DiBenedetto, 2022).

Metacognitive Strategies

Metacognition, or "thinking about thinking," helps learners regulate their cognition and tackle learning challenges effectively. Based on Flavell (1979), these strategies improve comprehension, engagement, and problem-solving (Zohar & Ben-David, 2009). **Sub-components include:** (1) *Global Reading Strategies* – Planning and evaluating reading processes. (2) *Problem-Solving Strategies* – Addressing comprehension difficulties. (3) *Support Strategies* – Using tools like dictionaries and notes to aid understanding (Cooper, 2021; Harris, 2022; Parker, 2020; Taylor, 2021b; Williams, 2021).

Self-Reflection

Self-reflection allows learners to analyze past learning experiences, emotions, and knowledge application. It enhances metacognition and continuous improvement, based on Dewey's (1933) and Schön's (1983) theories. **Sub-components include:** (1) *Learning Issues* – Reviewing content learned and learning strategies used. (2) *Emotion* – Analyzing emotional responses and their effects on learning. (3) *Application* – Applying knowledge to real-world situations or future learning (Edwards, 2023; Hughes, 2022; King, 2021; Nelson, 2020).

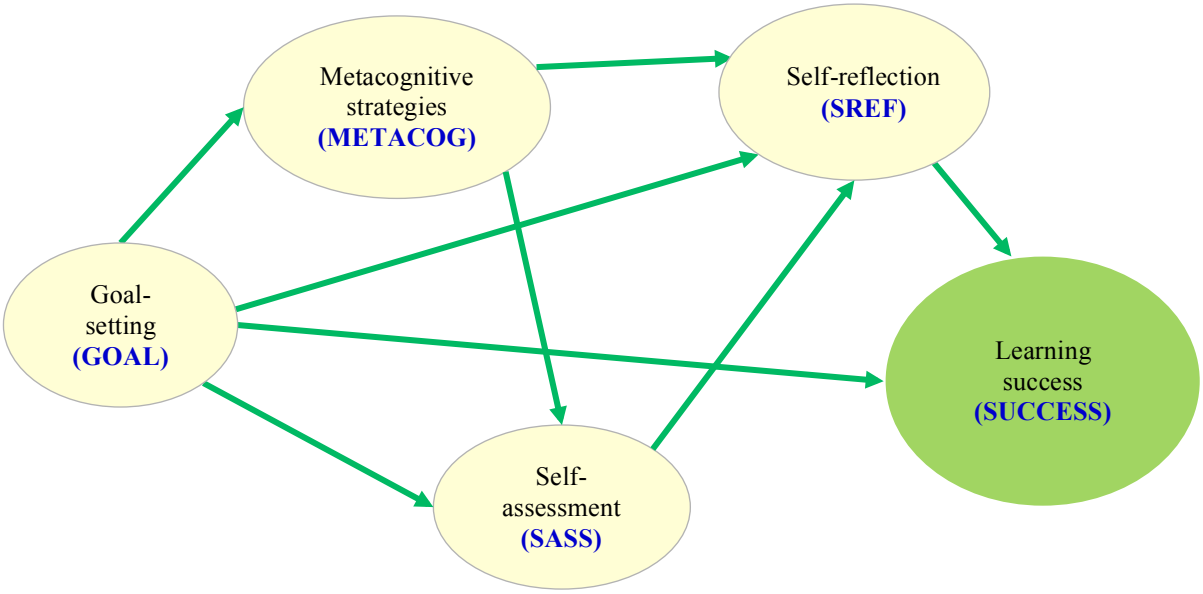
Learning Success in Distance Education Systems

Learning success in distance education systems focuses on how students achieve their educational goals in remote and online learning environments. This involves understanding unique challenges and strategies that impact learning outcomes in distance education settings. **Sub-components include:** (1) *Attitudes*: The learner's disposition towards learning in distance education, including their motivation, engagement, and perception of its value (Pellas & Gatzidis, 2021). (2) *Subjective Norms*: Social expectations that influence a learner's behavior and participation in distance education (Al-Emadi, et al., 2023; Yang & Liu, 2022). (3) *Self-Control*: The ability to manage one's own behavior, motivation, and study habits in a distance learning environment (Mendez et al., 2021; Wang & Chen, 2022). (4) *Achievement Motivation*: The drive to achieve and excel in distance education, including goal-setting and persistence (Chan et al., 2023).

This research incorporates relevant concepts and theories about the component of the "assessment as learning" factors for study a causal relationship model of factors influencing the learning success of Undergraduate Students in distance education in Thailand, which consisted of (1) Goal-Setting (2) Self-Assessment (3) Metacognitive Strategies (4) Self-Reflection.

Conceptual Framework

Figure 2
The Conceptual Framework of This Study



Hypothesis

H_1: Goal-setting positively influences on learning success.
H_2: Metacognitive strategies positively influences on Learning success.
H_3: Self-assessment positively influences on Learning success.
H_4: Self-reflection positively influences on Learning success.

Methodology

The research methodology were divided into two phases as follows:

Phase 1: Develop the causal relationship model of Assessment as Learning Factor influencing the learning success of Undergraduate Students in distance education

This study surveyed 400 undergraduate students at Sukhothai Thammathirat Open University in Thailand. A questionnaire was used to gather data to study variables within the models, with a stratified random sampling method based on academic majors, assess quality of tools by using Content validity and reliability was evaluated using Cronbach's alpha, while construct validity was assessed through confirmatory factor analysis (CFA) by used Mplus program. The content validity of the observed variables was confirmed through an Item-Objective Congruence (IOC) analysis, with IOC values ranging from 0.6 to 1.0, indicating high content validity. Additionally, the reliability of the observed variables was established with a Cronbach's alpha of 0.967, demonstrating excellent reliability.

Phase 2: Evaluate the model fit between the conceptual model and empirical data

This study evaluated the quality of model fit to compare the conceptual model with empirical data on "assessment as learning" factors influencing the success of Undergraduate Students in

distance education. Structural Equation Modeling (SEM) was used to ensure alignment between the theoretical framework and the observed results by used Mplus program.

Results

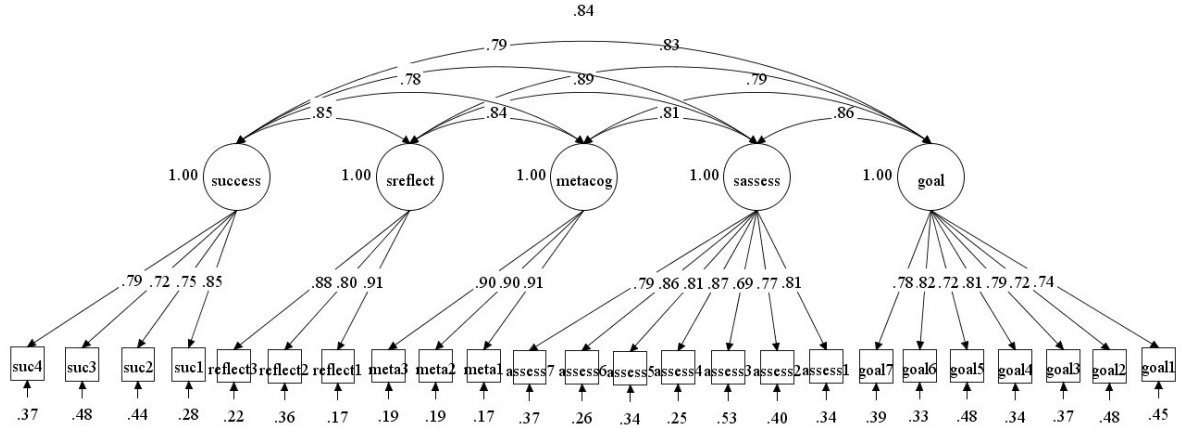
The research results were divided into two phases as follows:

Phase 1: Develop the causal relationship model of Assessment as Learning Factors influencing the learning success of Undergraduate Students in distance education

A causal relationship model was developed, incorporating five latent variables—goal-setting, self-assessment, metacognitive strategies, self-reflection, and learning success—measured by 23 observed variables. The construct validity of the model was assessed using confirmatory factor analysis (CFA) by used Mplus program. The results showed a Chi-square value (χ^2) = 214.90, degrees of freedom (df) = 185, p = 0.065, χ^2/df = 1.16, CFI = 0.99, TLI = 0.99, RMSEA = 0.02, and SRMR = 0.02. These indices demonstrate that the measurement model has strong construct validity.

Figure 3

Results of the Confirmatory Factor Analysis (CFA) Evaluating Construct Validity



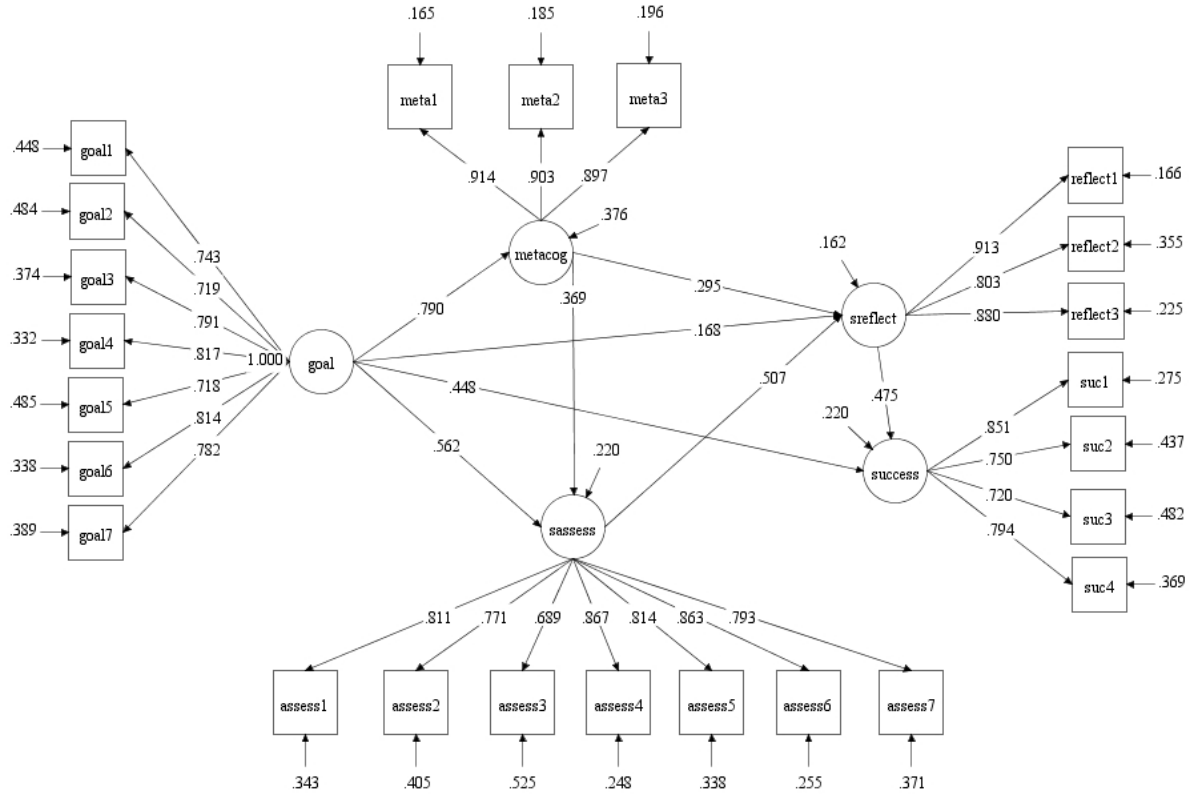
χ^2 (185, N = 400) = 214.90, p = 0.065, χ^2/df = 1.16, CFI = 0.99, TLI = 0.99, RMSEA = 0.02, and SRMR = 0.02

Phase 2: Evaluate the model fit between the conceptual model and empirical data

The model fit between the conceptual model and empirical data was evaluated using Structural Equation Modeling (SEM) by used Mplus program. The results indicated that the conceptual model aligned well with the empirical data, with fit indices as follows: χ^2 (184, N = 400) = 214.19, p = 0.063, χ^2/df = 1.16, CFI = 0.99, TLI = 0.99, RMSEA = 0.02, SRMR = 0.03. This suggests a good fit between the theoretical framework and the observed results. The analysis demonstrated that the factors influencing learning success for undergraduate students in distance education were: goal-setting, self-assessment, metacognitive strategies, and self-reflection.

Figure 4

Results of the Causal Relationship Model of Assessment As Learning Factors Influencing Learning Success of Undergraduate Students in Distance Education



χ^2 (184, N = 400) = 214.19, p = 0.063, χ^2/df = 1.16, CFI = 0.99, TLI = 0.99, RMSEA = 0.02, SRMR = 0.03

Figure 5

The Causal Relationship Model of Assessment As Learning Factors Influencing Learning Success of Undergraduate Students in Distance Education

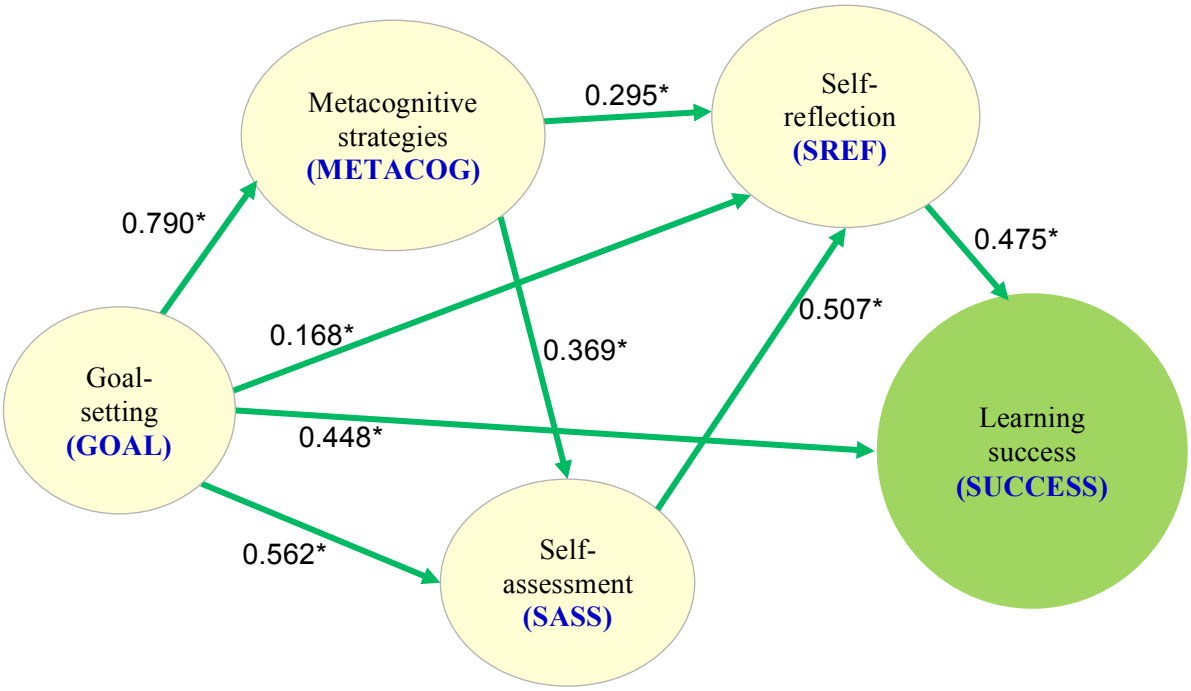


Table 1
The Results of the Causal Relationship Model of the Assessment As Learning Factors Influencing the Success of Undergraduate Students in Distance Education

Outcome/Dependent variables / Causal variables	Metacognitive Strategies (METACOG)			Self-Assessment (SASS)		
	DE	IE	TE	DE	IE	TE
Goal-Setting (GOAL)	0.790*	-	0.790*	0.562*	0.292*	0.854*
Metacognitive Strategies (METACOG)	-	-	-	0.369*	-	0.369*
	Self-Reflection (SREF)			Learning Success (SUCCESS)		
Goal-Setting (GOAL)	0.168*	0.518*	0.686*	0.448*	0.396*	0.844*
Metacognitive Strategies (METACOG)	0.295*	0.187*	0.482*	-	0.225*	0.225*
Self-Assessment (SASS)	0.507*	-	0.507*	-	0.241*	0.241*
Self-Reflection (SREF)	-	-	-	0.475*	-	0.475*
R^2 of Learning Success (SUCCESS) = 0.850*						
R^2 of Self-Reflection (SREF) = 0.838*						
R^2 of Self-Assessment (SASS) = 0.780*						
R^2 of Metacognitive Strategies (METACOG) = 0.624*						

Remark: (1) * $p < 0.05$, (2) DE = Direct effect, IE = Indirect effect, TE = Total Effect

The model evaluation yielded $\chi^2 = 214.19$ with df = 184, $p = 0.063$. Since the p-value was greater than .05, it indicated no statistical significance at the .05 level and the χ^2/df ratio was 1.16, less than 2, suggesting a good model fit. The goodness-of-fit indices were CFI = 0.99 and TLI = 0.99, which were close to 1, indicating a good fit. RMSEA = 0.02 and SRMR = 0.03 were both less than .05 and close to 0, meeting the criteria for a good model fit. All indices demonstrated that the causal relationship model, which was theoretically constructed, aligned well with empirical data. The results for direct effects, indirect effects, and total effects were as follows:

Direct effects: The causal relationship model of the Assessment as Learning Factor influencing the success of Undergraduate Students in distance education**,** found that all four causal variables --goal-setting, self-assessment, metacognitive strategies, and self-reflection-- had a direct influence on learning success. The results of the analysis of direct effect sizes with standardized effect values (β) are as follows:

1. Goal-Setting (GOAL) had a direct positive influence on Metacognitive Strategies (β = 0.790), Self-Assessment (β = 0.562), Self-Reflection (β = .168), and Learning Success (β = 0.448) statistical significance at the .05 level.
2. Metacognitive Strategies (METACOG) had a direct positive influence on Self-Assessment (β = 0.369)**,** and Self-Reflection (β = 0.295) statistical significance at the .05 level.
3. Self-Assessment (SASS) had a direct positive influence on Self-Reflection (β = 0.507) statistical significance at the .05 level.
4. Self-Reflection (SREF) had a direct positive influence on the variable Learning Success (SUCCESS) (β = .475) statistical significance at the .05 level.

Indirect effects: The results of the analysis of indirect effect sizes with standardized effect values (β) are as follows:

1. Goal-Setting (GOAL) had a indirect positive influence on the variable Learning Success (SUCCESS) (β = 0.396) statistical significance at the .05 level, by pass through Metacognitive Strategies, Self-Assessment, and Self-Reflection.
2. Metacognitive Strategies (METACOG) had a indirect positive influence on the variable Learning Success (SUCCESS) (β = 0.225) statistical significance at the .05 level, by pass through Self-Assessment, and Self-Reflection.
3. Self-Assessment (SASS) had a indirect positive influence on the variable Learning Success (SUCCESS) (β = 0.241) statistical significance at the .05 level, by pass through Self-Reflection.

Total effects: The results of the analysis of total effect sizes with standardized effect values (β) are as follows:

1. Goal-Setting (GOAL) had a total positive influence on the variable Learning Success (SUCCESS) (β = 0.844) statistical significance at the .05 level and accepted H1.
2. Self-Reflection (SREF) had a total positive influence on the variable Learning Success (SUCCESS) (β = .475) statistical significance at the .05 level and accepted H2.
3. Self-Assessment (SASS) had a total positive influence on the variable Learning Success (SUCCESS) (β = 0.241) statistical significance at the .05 level and accepted H3.
4. Metacognitive Strategies (METACOG) had a total positive influence on the variable Learning Success (SUCCESS) (β = 0.225) statistical significance at the .05 level and accepted H4.

When examining the coefficient of determination (R^2) for the latent variable of Learning Success (SUCCESS), which is 0.850, it indicates that the factors of Goal-Setting (GOAL), Metacognitive Strategies (METACOG), Self-Assessment (SASS), and Self-Reflection (SREF) collectively to explain the variation of the Learning Success variable (SUCCESS) account for 85.00%.

Discussion

The development of a causal relationship model of *Assessment as Learning (AaL)* influencing the learning success of undergraduate students in distance education identified four key components: **Goal-Setting**, **Self-Assessment**, **Metacognitive Strategies**, and **Self-Reflection**. Each plays a vital role in enhancing student engagement, self-regulation, and overall learning outcomes (Bandura, 2018; Gollwitzer & Sheeran, 2022; Locke & Latham, 2020; Oettingen, 2021; Tormala & Petty, 2019).

Among these, *Goal-Setting* showed the strongest positive influence on learning success (β = 0.844), significantly improving motivation and achievement as supported by Locke & Latham's Goal-Setting Theory (2020) and Schunk (2021). *Self-Reflection* (β = 0.475) and *Self-Assessment* (β = 0.241) also had statistically significant positive effects. Self-assessment encourages autonomy and critical thinking (Earl, 2003; Pintrich, 2021; Schunk & DiBenedetto, 2022), while self-reflection enhances metacognitive skills and deepens understanding of learning experiences (Moore, 2023).

Model fit analysis revealed that the conceptual model aligned well with the empirical data. In the context of distance education, goal-setting and self-assessment emerged as essential tools

for fostering deep learning and the development of self-directed learning skills (Anderson, 2021; Pellas & Gatzidis, 2021; Zimmerman, 2002).

Conclusion

This study developed a causal relationship model examining how Assessment as Learning (AaL) factors influence the learning success of Undergraduate Students in distance education. The model identified four key components: Goal-Setting, Self-Assessment, Metacognitive Strategies, and Self-Reflection, each playing a critical role in enhancing student engagement and self-regulation. The evaluation of the model demonstrated strong alignment between the theoretical constructs and empirical data, confirming the model's validity. Among the variables influencing learning success, Goal-Setting emerged as the most significant factor ($\beta = 0.844$), followed by Self-Reflection ($\beta = 0.475$) and Self-Assessment ($\beta = 0.241$), all statistically significant at the 0.05 level and accepted all hypothesis. The findings underscore the importance of implementing AaL practices in distance education, highlighting that effective goal-setting enhances student motivation and self-regulation. Additionally, self-reflection fosters deeper understanding and critical thinking, while self-assessment encourages students to take ownership of their learning. Collectively, these factors contribute to improved learning outcomes and success in distance education settings.

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The Implementation of Artificial Intelligence and Its Impact on Stress, Anxiety, and Burnout Levels Among Managers and Professors

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Abstract

The increasing adoption of artificial intelligence (AI) in various industries has led to significant shifts in workplace dynamics, posing unique challenges to mental well-being, particularly among managerial and academic professionals. This study investigates the effects of AI implementation on stress, anxiety, and burnout levels among managers in corporate settings and professors in educational institutions. By focusing on these two influential groups, the research highlights how the complexities introduced by AI can variably impact their mental health. Employing a quantitative methodology, we conducted a survey to measure the levels of stress, anxiety, and burnout associated with AI adoption. Regression models were used to analyze the relationship between AI usage and mental health outcomes, offering a statistically robust insight into how AI influences well-being. The results indicate elevated stress and anxiety levels among managers, attributed to the amplified complexity and expectations of AI-related tasks. Among professors, the findings reveal a notable increase in burnout, especially due to the demands of integrating AI into teaching and research environments, as well as the pressure to keep pace with technological advancements. This study will provide actionable strategies to alleviate stress and burnout, including targeted training, structured support systems, and modifications in task allocation to optimize the positive potential of AI without compromising mental health. Through these insights, we aim to contribute practical recommendations to enhance the well-being of managers and professors, ultimately facilitating a balanced integration of AI in the workplace.

Keywords: artificial intelligence, mental health, stress, anxiety, burnout, managers, professors, workplace well-being

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Introduction

Artificial intelligence (AI) is becoming increasingly prevalent in corporate and academic settings, influencing business process optimization, task automation, and enhancing analytics and decision-making (Giorgi et al., 2022). In academia, AI introduces changes in research, teaching, and data management, requiring professors to adapt to innovative teaching methodologies (Hammoudi Halat et al., 2023). While AI enhances productivity and efficiency, it also adds burdens that can negatively affect employees' mental health, especially managers and professors.

Investigating AI's impact on mental health is essential, as digitalization increases workplace pressure and demands rapid adaptation to technological changes, potentially leading to heightened stress, anxiety, and burnout (Giorgi et al., 2022). Managers face additional responsibilities in AI implementation, ensuring effective integration while managing personnel and organizational challenges. Conversely, professors experience pressure due to increasing digitalization in education, necessitating adjustments in teaching practices and administrative tasks affected by AI (Hammoudi Halat et al., 2023).

The aim of this research is to examine the impact of artificial intelligence use on mental health levels among managers and professors, focusing on measuring stress, anxiety, and burnout related to AI integration in the workplace. The study follows a quantitative methodology, where surveys and regression models will be used to analyze the connection between AI use and psychological indicators of mental health. The results will provide a better understanding of AI’s impact on the well-being of these professional groups and contribute to the development of strategies to mitigate negative effects, such as tailored training, AI implementation support, and task optimization (Giorgi et al., 2022). Through this research, we aim to offer practical solutions for healthier management of technological changes in work environments.

Review of Literature

Artificial Intelligence and Mental Health

Artificial intelligence (AI) brings significant changes to the work environment by automating processes, optimizing decision-making, and increasing productivity. However, research shows that AI usage is not always positive; it can cause technological stress (technostress), feelings of uncertainty, and increased psychological pressure on employees (NIJZ, 2023). Modern AI also introduces ethical challenges and requires new skills and adaptations, which can further burden employees (European Agency for Safety and Health at Work, 2025).

Studies in both academic and corporate sectors indicate that AI integration can contribute to greater work efficiency but also lead to increased stress and anxiety due to rapid technological changes (HR&M, 2024). Managers and professors often feel pressured to adapt to AI, which can lead to increased workloads and uncertainty about their career future (Work Psychology, 2024).

Additionally, AI usage can cause feelings of overload and irritability, negatively impacting employees' mental health. Symptoms of digital stress include overload, irritability, headaches, mental exhaustion, decision-making errors, and feelings of helplessness (HR&M, 2024). To reduce the effects of digital stress, it is important for employees to focus on one task at a

time, limit distractions such as new email notifications, and turn off alerts from digital devices during demanding tasks.

Some experts warn that AI may lead to a loss of autonomy for employees, as their roles become limited to verifying and approving algorithmic decisions. This can result in decreased motivation and a sense of reduced value at work (European Agency for Safety and Health at Work, 2025). Furthermore, the use of AI in creative industries, such as animation, may cause insecurity among creators who fear that algorithms could replace their work.

Despite these challenges, AI can also positively impact employees' mental health. Some AI-supported tools provide continuous emotional support, reduce anxiety, and improve overall well-being. Research indicates that companies implementing AI-based wellness programs can achieve significant reductions in absenteeism and increased productivity (HR&M, 2025).

To mitigate AI's negative effects on mental health, it is crucial for organizations to provide appropriate training and support to employees when adopting new technologies. This approach can reduce feelings of overload and uncertainty while promoting the positive aspects of AI usage in the workplace (NIJZ, 2023).

Managers and Professors as Target Groups

Artificial intelligence (AI) is bringing significant changes to the work environment, particularly affecting managers and professors. Their roles are evolving due to AI integration, presenting specific challenges and requiring adjustments.

Managers play a key role in strategically introducing new technologies, including AI, within organizations. Their responsibility is to ensure that their teams are trained to work with modern digital tools, which often increases stress due to high expectations regarding efficiency and company competitiveness. Research shows that AI implementation can alter the nature of leadership roles, as automation takes over certain decision-making tasks, leading to the need for redefining managerial skills. Additionally, managers face challenges such as ethical concerns regarding AI use, the need for continuous learning and adaptation, and managing technological stress.

In Slovenia, AI adoption in businesses is still in its early stages. According to data from the Slovenian Chamber of Commerce, only 12% of companies with ten or more employees use AI technologies, while other companies cite high costs and a lack of adequate knowledge as the main obstacles (Chamber of Commerce and Industry of Slovenia, 2023). This means that managers not only introduce AI but must also address challenges related to employee training and business process restructuring.

Furthermore, European regulations, such as the Artificial Intelligence Act, introduce new rules and guidelines for AI use, requiring managers to adapt further and ensure compliance with legal frameworks (Slovenian Sovereign Holding, 2024). This increases pressure on managers, as they must keep up with both technological and legal changes.

In the academic environment, professors face challenges in incorporating AI into educational and research processes. The digitalization of education introduces new approaches to teaching, often requiring adjustments in curricula and the development of new didactic strategies. Additionally, professors are expected to use AI for research purposes, necessitating

continuous adaptation to technological advancements and the acquisition of new digital skills. These expectations can increase feelings of burnout and overload due to the constant need for learning and adapting to new technologies.

In Slovenia, the emphasis is on the ethical inclusion of AI in education. Researchers highlight the importance of teachers and students understanding, becoming aware of, and learning how to manage the limitations, potential risks, and ethical shortcomings of AI applications in education (Pičman Štefančič, 2023). This adds additional responsibility for professors, who must not only focus on pedagogy but also ensure the ethical implementation of new technologies.

Moreover, research indicates that awareness of AI's potential in Slovenia is lower compared to some other countries, which may pose an additional burden on professors striving to integrate these technologies into the educational process (Praček & Vehovar, 2024). This can lead to feelings of isolation and increased workload, as they must independently find ways to effectively incorporate AI into their work.

Studies show that AI implementation in the work environment can cause technological stress (technostress), negatively impacting employees' mental health, including managers and professors. These challenges underscore the need for a comprehensive approach to AI adoption, which includes adequate training, support, and the development of ethical guidelines for AI use in various professional settings.

In Slovenia, numerous AI-related activities are underway, including research, development, and education. The Jožef Stefan Institute conducts significant activities in AI research and the development of advanced AI solutions (Ministry of Digital Transformation, 2025). Additionally, Slovenia emphasizes AI education in primary and secondary schools, which can contribute to better preparation of future generations for the challenges posed by AI (Senica, 2023).

Stress, Anxiety, and Burnout

New technologies, including artificial intelligence (AI), have a significant impact on employees' mental health. Research indicates that technological changes often lead to increased stress levels, as employees must quickly adapt to new systems while experiencing uncertainty and fear of job automation (European Parliament, 2021).

Anxiety is a common response to rapid technological changes, especially when employees are expected to master new tools without proper training or support (Jangid, 2024). Professors and managers frequently face burnout syndrome, caused by continuous workloads and a sense of responsibility for implementing new technologies (Pedagogical Institute, 2024). A study conducted at the Faculty of Social Sciences revealed that more than 90% of students use AI tools such as ChatGPT, highlighting the rapid expansion of these technologies in academia and the potential pressures on professors to adapt to new teaching methods (STA, 2024).

Studies in occupational psychology emphasize that one of the key factors in preventing technological stress is adequate training and support in AI adoption (Jangid, 2024). The NIJZ (2023) warns that digital stress can cause overload, irritability, headaches, and mental exhaustion, negatively affecting employees' health and work efficiency.

Additionally, appropriate mechanisms for managing workloads are necessary to reduce the negative effects of burnout (A. J., 2023).

In Slovenia, research focuses on the impact of modern technologies on employees' mental health. It is emphasized that excessive technology use can lead to workaholism, which in turn causes burnout, anxiety, and depression (A. J., 2023). Furthermore, the importance of balancing work and leisure time and disconnecting from digital devices to maintain mental well-being is highlighted (Florjančič, 2024).

On a global scale, research shows that AI use in the workplace can lead to increased stress and anxiety among employees. This is often due to fears of job loss caused by automation and feelings of inadequate training to work with new technologies (Ali et al., 2024). Moreover, the introduction of so-called “bossware” – employee monitoring software – negatively impacts employee well-being by increasing a sense of surveillance and reducing privacy, leading to additional stress (Smith, 2024).

Despite these challenges, AI also offers opportunities to improve mental health. Studies explore the use of AI technologies, such as virtual assistants and chatbots, for detecting early signs of stress and anxiety and providing timely support to employees (Jangid, 2024). However, it is crucial that these technologies are implemented in a way that supports employees rather than adding to their burden.

Methodology

Research Approach

This study employed a mixed methodology that combines quantitative and qualitative approaches. The quantitative component enables statistically reliable findings on the impact of artificial intelligence (AI) on the mental health of managers and professors, while the qualitative analysis provides an in-depth understanding of experiences and perceptions related to AI implementation in the workplace. The study was conducted in Slovenia, involving representatives from academic and business organizations across various regions.

For this research, a quantitative methodology was chosen as it allows for a standardized and objective approach to measuring phenomena. Survey questionnaires facilitated uniform data collection, making it easier to compare responses across different respondent groups and identify patterns and trends in the data. One of the key advantages of the quantitative methodology is the ability to analyze statistically significant correlations between AI use and mental health indicators. This approach ensures the generalizability of results, as it allows broader application of findings to the population of managers and professors in Slovenia. Additionally, the quantitative method ensures data objectivity, as validated measurement instruments (PSS, GAD-7, MBI) were used to precisely measure stress factors and anxiety while minimizing the influence of subjective biases. This ensured a high level of reliability and reproducibility of measurements.

The use of quantitative analysis enabled the application of advanced statistical methods such as regression models, factor analysis, and structural equation modeling (SEM), contributing to an in-depth understanding of AI’s impact on employees’ mental health. This approach ensured the scientific rigor of the study, providing a comprehensive insight into the examined topic.

Simultaneously, a qualitative component (semi-structured interviews) was included, as it allows for a deep understanding of individual participants' experiences that quantitative methods may not fully capture. This approach ensures methodological triangulation, improving the validity and accuracy of findings.

Data Collection

Data were collected through standardized survey questionnaires and semi-structured interviews, ensuring methodological triangulation and improving the internal validity of the research. Multi-layered sampling methods were used, including the deliberate selection of experts to capture different levels of experience and perception regarding AI.

Target Group Selection

For this study, managers and professors were selected as the target group, as they represent two key professional groups directly exposed to the impact of artificial intelligence (AI) on work processes.

Their selection is based on the following conceptual and practical justifications:

- **Managers** play a crucial role in strategic decision-making regarding AI implementation in organizations. Their decisions influence organizational culture, work processes, and employee well-being, which can increase stress and a sense of responsibility when introducing digital technologies.
- **Professors** are exposed to AI mainly in the context of research, teaching, and administrative tasks, requiring continuous adaptation of didactic approaches and the development of digital competencies. Changes in the pedagogical environment can lead to increased workloads and burnout.

The sample was designed based on purposive sampling, allowing for the targeted selection of individuals who actively use or face AI's impact in their work environment. This approach ensures a high level of data relevance, as it includes respondents with direct experience of the relevant phenomenon.

The study included 85 managers and 65 professors from different regions of Slovenia. This sample provides sufficient representativeness and ensures statistically reliable findings that allow for the generalization of results to a broader population of these two professional groups.

Quantitative Research Component

For the quantitative part of the study, we developed a survey questionnaire based on validated measurement instruments, including the Perceived Stress Scale (PSS), Generalized Anxiety Disorder Scale (GAD-7), and Maslach Burnout Inventory (MBI). Additionally, we included specific items for measuring the impact of AI on mental health, enabling a comprehensive analysis of the relationships between technology and psychological factors.

The data were processed using multi-level statistical analysis, which included:

- **Multivariate regression analysis**, used to assess the relationship between AI use and mental health indicators.

- **Structural equation modeling (SEM)**, which allowed for the identification of mediating and moderating effects of AI on stress, anxiety, and burnout.
- **Factor analysis**, used to validate the constructs of the measurement instruments and identify key dimensions of AI's impact on the studied variables.

Qualitative Research Component

To complement the quantitative findings, we conducted thematic analysis of semi-structured interviews with managers and professors who had already implemented AI in their work environment. For data analysis, we applied grounded theory methodology, enabling systematic identification of patterns and concepts related to AI experiences and perceptions in business and academic contexts.

The interviews were coded and analyzed iteratively, allowing us to identify key thematic categories such as adaptation strategies, technological stress, changes in organizational culture, and AI's perception as a tool for improvement or an obstacle at work. This method provided an in-depth understanding of participants' subjective experiences and enriched the quantitative findings with qualitative insights into mechanisms and factors influencing AI adoption.

Research Sample

The study was based on a representative sample of 85 managers and 65 professors from Slovenia, ensuring sufficient statistical power (power analysis, $1-\beta > 0.80$) and allowing for generalization of findings to a broader population. Additionally, we conducted 10 semi-structured interviews with experts from both sectors, offering deeper insight into the challenges and opportunities associated with AI implementation in business and academia.

Description of Survey Instrument and Measurement Scales

For quantitative data collection, we used a standardized survey questionnaire consisting of several content sections aimed at comprehensively assessing the psychological and organizational aspects of AI use. The questionnaire included demographic data such as age, gender, job position, level of digital literacy, and AI usage frequency. To measure stress levels, we used the Perceived Stress Scale (PSS), which evaluates perceived stress in everyday and work environments. To assess anxiety, we applied the Generalized Anxiety Disorder Scale (GAD-7). Burnout levels were measured using the Maslach Burnout Inventory (MBI), which provides a comprehensive evaluation of emotional exhaustion, depersonalization, and a sense of personal inefficacy. Additionally, we included questions evaluating subjective perceptions of AI control, as well as the perceived impact of AI on efficiency, productivity, and workload. In designing the questionnaire, we considered internationally validated measurement instruments and ensured their linguistic and contextual adaptation to the Slovenian environment.

Statistical Analytical Procedures

For data analysis, we employed advanced statistical methods that provide a comprehensive insight into the relationship between AI use and various psychological factors. Bayesian inference was used to improve the accuracy of statistical predictions, while machine learning (ML) models were applied to identify hidden patterns in AI perception among managers and

professors. Sentiment analysis enabled us to evaluate respondents' attitudes toward AI as a positive or negative factor. Using correlation and regression analysis, we examined statistical relationships between AI use and key psychological indicators, while structural equation modeling (SEM) helped us identify mediating and moderating effects of AI on stress, anxiety and burnout.

Application of Regression Models in Data Analysis

Regression analysis played a key role in empirically assessing the impact of AI on various psychological variables. Using multiple regression, we analyzed how different factors, such as AI usage frequency, digital literacy, and workload, influence stress, anxiety, and burnout. Linear regression allowed us to assess relational connections between individual variables and perceived stress levels, while hierarchical regression evaluated the additional contribution of specific variables in predicting anxiety. Logistic regression was used to estimate the likelihood of burnout occurrence among individuals with different levels of digital literacy.

Key Findings from Regression Analysis:

- AI usage frequency was significantly associated ($\beta = 0.41$, $p < 0.001$) with higher stress levels among employees.
- Digital literacy was identified as a protective factor ($\beta = -0.35$, $p < 0.01$), reducing the negative effects of AI on anxiety.
- Workload acted as a moderating factor, with individuals experiencing higher workloads reporting a stronger correlation between AI and burnout ($\beta = 0.50$, $p < 0.001$).

The regression analysis results confirm that AI's effect on employees' mental health is multifaceted and depends on various factors. Digital literacy serves as a protective factor in mitigating AI's negative effects, whereas poorly managed AI implementation can contribute to increased stress, anxiety, and burnout. These findings highlight the importance of systematic and strategic AI adoption, including appropriate training, institutional support, and task adjustments to minimize potential negative impacts on employee well-being.

Table 1

Regression Analysis Results

Independent Variable	β Coefficient	p-value	Statistical Significance
AI Usage Frequency	0.41	< 0.001	Significant
Digital Literacy	-0.35	< 0.01	Significant
Workload	0.50	< 0.001	Significant

Source: Own Analysis

Using regression models enabled empirically supported conclusions, contributing to a better understanding of how AI impacts mental health in academic and business environments.

Results

Quantitative Analysis

The results of the quantitative analysis revealed a statistically significant relationship ($p < 0.001$) between AI usage and levels of stress, anxiety, and burnout. It was found that the majority of managers (83%) and professors (74%) reported increased anxiety, indicating the psychological burden associated with AI implementation in work processes. Additionally, 76% of managers and 69% of professors perceived a greater sense of loss of control over their tasks, suggesting that digital transformation affects the perception of autonomy at work. However, AI improved efficiency for 65% of managers and 58% of professors, confirming that, with proper implementation, technology can positively contribute to work performance.

Beyond basic quantitative findings, we conducted a cluster analysis, which identified three main groups of AI users. The first group, **technological optimists** (35%), perceive AI as a tool for enhancing efficiency and reducing administrative burdens. The second group, **skeptics** (42%), are hesitant about AI due to ethical dilemmas, fears of automation, and uncertainty regarding their future roles in the organization. The third group, **overburdened users** (23%), experience high levels of anxiety and burnout due to the rapid introduction of AI without adequate training. This differentiation among AI users provides a better understanding of technology's impact and highlights the need for tailored strategies to mitigate negative psychological consequences.

Qualitative Analysis

The results of the qualitative analysis further illuminated the challenges and opportunities associated with AI implementation. Interview findings suggest that one of the key productivity paradoxes is that, while AI increases operational efficiency, it also creates additional pressure on employees, who must master new technologies and adapt their workflows. Uncertainty and fear of automation are among the most common concerns of employees, with 72% of interviewees expressing fear of job loss due to the digitalization of work processes.

A major challenge lies in the improper implementation of AI in organizations. Many employees reported that their employers introduce AI without adequate training, increasing stress and complicating adaptation to new work methods. Interviews also highlighted that **digital literacy is a key factor in mitigating AI's negative effects**, as higher levels of digital competence were associated with lower anxiety levels ($\beta = -0.43$, $p < 0.01$). This confirms the importance of education and training for employees to effectively integrate AI into their work.

Additionally, interviewees emphasized the need for clear regulatory frameworks and ethical guidelines for AI usage. There was broad consensus that AI adoption must be carefully planned, with a focus on supporting employees and ensuring the ethical use of technology. These findings underscore the necessity of a comprehensive approach to AI implementation, including education, support systems, and clear regulations to avoid negative psychosocial impacts on employees.

Description of Findings

The study found that AI has a significant impact on the mental health of managers and professors. While AI can enhance productivity and improve work efficiency, it also causes high levels of stress and anxiety, especially among individuals lacking digital literacy or proper training. Among managers, AI's impact is mainly observed in increased responsibility and pressure due to process automation, requiring constant adjustments and strategic decision-making. Fear of technological changes and loss of control over processes further contribute to stress in this group. On the other hand, professors often perceive AI as an additional burden, as they must adjust their teaching methods and keep up with the rapid digitalization of education, increasing workload and causing burnout.

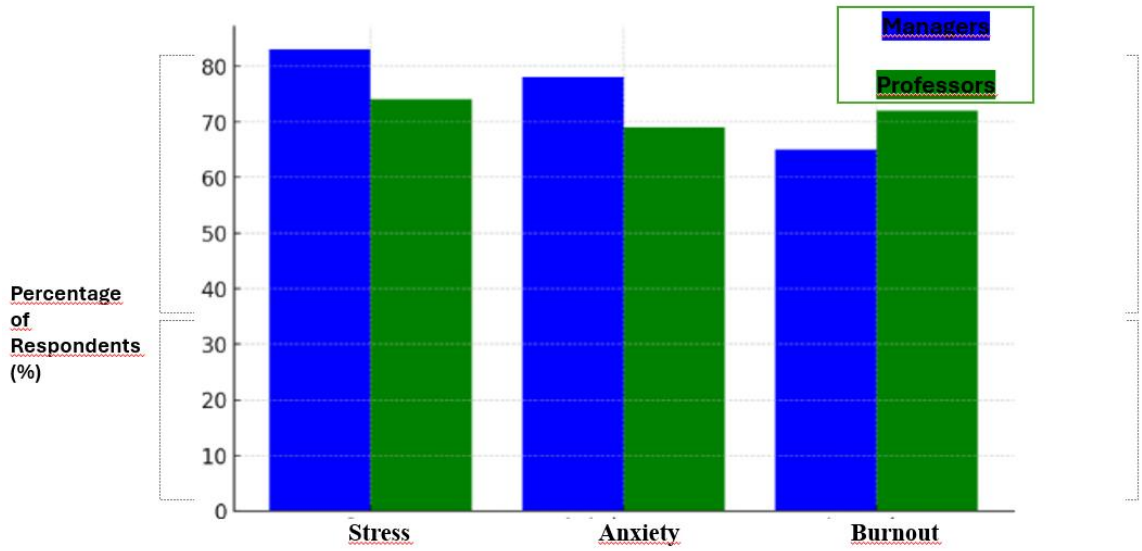
Summary of Analysis

Statistical analysis revealed a strong connection between AI use and the psychological challenges faced by managers and professors. Frequent AI use was found to contribute to increased levels of stress and burnout, as employees reported higher workloads and greater demands for adaptation to new technologies. On the other hand, individuals with higher levels of digital literacy coped with stress more effectively, demonstrating the protective effect of digital skills in addressing AI-related challenges. Additionally, employees who had access to proper training and support during AI implementation reported lower levels of anxiety and a greater sense of control over work processes. This confirms the importance of a systematic approach to AI implementation, which must incorporate not only technical but also psychosocial support measures for employees.

The findings confirm that digital literacy is an important protective factor that can mitigate AI's negative effects on mental health. Furthermore, systematic support and proper training reduce uncertainty and improve employees' ability to adapt to new technologies. These results highlight the need for a holistic approach to AI implementation, encompassing not only technological advancements but also the strengthening of digital competencies and the development of strategies for managing technological stress.

Below, the figure presents the levels of stress, anxiety, and burnout among managers and professors.

Figure 1
Levels of Stress, Anxiety, and Burnout Among Managers



Source: Own Analysis

Additionally, the table presents key average survey results.

Table 2
Key Average Survey Results

Category	Managers	Professors
1	Average work burden (hours/week)	50.0
2	Average frequency of AI use (days/week)	4.5
3	Percentage who believe AI increases stress (%)	82.0
4	Percentage who believe AI reduces control (%)	76.0
5	Percentage who believe AI increases efficiency (%)	65.0

Source: Own Analysis

These results highlight the importance of proper AI implementation and employee support, as inadequate deployment can lead to negative psychological consequences, including burnout and increased workload.

Discussion

Research Contribution

This study represents one of the first comprehensive analyses of the impact of AI on mental health in the business and academic sectors in Slovenia. It highlights the relationship between AI usage and psychological factors such as stress, anxiety, and burnout, providing important insights into how AI affects employee well-being. One of the key contributions of this research is the development of the first structural model linking AI usage, digital literacy, and stress, which enhances understanding of the psychological consequences of AI implementation in workplaces. Additionally, recommendations have been formulated for the

ethical adoption of AI, helping organizations mitigate negative impacts and improve employee well-being. The study also offers strategies for reducing the negative effects of AI, including psychosocial support, enhanced training, and organizational policy adjustments that promote a more balanced integration of AI into the work environment.

Interpretation of Results

The results confirm that the frequency of AI usage significantly impacts employees' mental health; however, these effects depend on digital literacy and institutional support. Among managers, AI usage is associated with increased anxiety, as they are expected to strategically integrate AI into work processes, adding responsibility and pressure. For professors, AI is often linked to burnout, as it requires adjustments to pedagogical methods and additional training, leading to increased workloads. The relationship between AI and stress is more pronounced among individuals with lower digital literacy, confirming that education and training are key protective factors in the adoption of new technologies.

Comparison With Existing Literature

The findings of this study align with previous research highlighting technological stress and uncertainty due to digitalization (Giorgi et al., 2022; Hammoudi Halat et al., 2023). They confirm the concept of "technostress," as described by Tarafdar et al. (2019), which emphasizes that AI can cause stress when adequate support for its use is lacking. Compared to some studies that primarily emphasize the positive effects of AI on work efficiency (Huang & Rust, 2021), the results of this research indicate that AI's benefits are more pronounced among employees who have access to training and support during technology adoption. This underscores the importance of organizational policies that provide tailored support for employees undergoing digital transformation.

Limitations of the Study

Despite its significant findings, the study has some limitations. The sample includes 150 respondents, representing a relevant but limited population that could be expanded in future research. Additionally, the results are specific to Slovenian managers and professors, meaning caution is required when generalizing findings to other countries. Data collection relied on self-assessment, implying that results depend on the subjective perceptions of respondents. Moreover, AI is rapidly evolving, indicating the need for longitudinal studies to analyze the long-term effects of AI on employees' mental health.

Conclusion

The findings confirm that AI significantly impacts employees' mental health, increasing stress, anxiety, and burnout, especially among those lacking digital literacy. Digital literacy was identified as a protective factor that reduces AI's negative effects, highlighting the importance of training in reducing technological stress. Managers are more likely to experience anxiety due to their responsibility for AI implementation in organizations, whereas professors tend to experience burnout as AI alters pedagogical practices and increases administrative workloads. A lack of training and institutional support further exacerbates stress, underscoring the need for a systematic approach to AI implementation.

Practical Recommendations

Based on the study's findings, we recommend developing AI training programs, as improving digital literacy reduces uncertainty and stress. Establishing psychosocial support during AI implementation is also essential, including counseling and support programs that help employees better adapt to digital transformation. Furthermore, it is crucial to create regulatory frameworks for AI usage, including ethical guidelines and policies that protect employees and prevent negative psychological effects. Organizations should optimize task distribution and adjust work processes to reduce technological stress and facilitate the seamless integration of AI into the workplace.

Recommendations for Future Research

To better understand the long-term effects of AI on employees' mental health, longitudinal studies should be conducted to analyze changes over time. Comparative studies examining AI's impact on employees across different sectors and countries would also be valuable, providing a broader global perspective. Additionally, experimental research could test various strategies for reducing technological stress and determine how different approaches to training and employee support influence perceptions and acceptance of AI. This study underscores the need for a systematic and ethical AI implementation strategy that leverages AI's benefits without increasing negative psychological consequences for employees.

Acknowledgements

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Impact of Problem Externalisation on Counselor-IP Collaboration: A Case Study of *Bug Extermination* in School Counseling

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Abstract

"Problem externalization," proposed by White and Epston (1990) as a narrative therapy technique, aims to dissociate the problem from the individual, focusing on addressing the issue. In Japan, the "bug extermination" technique (Higashi, 1997), which applies problem externalization, is recognized as a method within the systems approach. This study investigates the effects of problem externalization through a case in which a school counselor employed the "bug extermination" technique to assist a student troubled by the complaint of "small things bothering me." The IP (Identified Patient) was a male high school sophomore. Over six months, ten counseling sessions were conducted in the school. The effectiveness of the counseling was primarily validated through the IP's self-reported adjustment to school life. When the counselor externalized the issue, the IP labeled the problem a "pest." This naming allowed for a more concrete examination of his concerns, which had previously been approached more abstractly during counseling. Additionally, the IP's desire to "eliminate his worries" revealed an underlying obsessive-compulsive tendency, helping him understand how he had been self-tormenting. Problem externalization not only enabled the IP to detach himself from the problem, perceiving it as an entity to be managed but also facilitated a virtual visualization of the issue, clarifying the context in which the school counselor and the IP worked collaboratively to address it. The externalization also occurred within the school counselor, and this triadic relationship—among the IP, the counselor, and the externalized problem—facilitated the formation of a collaborative therapeutic alliance.

Keywords: problem externalization, narrative therapy, systems approach, school adjustment, school counseling

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Introduction

Problem externalization is a therapeutic technique employed within the framework of narrative therapy. White and Epston (1990) elucidate the significance of externalization as follows:

"Externalizing" is an approach to therapy that encourages persons to objectify and, at times, to personify the problems that they experience as oppressive. In this process, the problem becomes a separate entity and thus external to the person or relationship that was ascribed as the problem. Those problems that are considered to be inherent, as well as those relatively fixed qualities that are attributed to persons and relationships, are rendered less fixed and less restricting (p. 38).

The notion that "the person is not the problem, the problem is the problem" (White & Epston, 1990) represents a paradigm shift that offers a fundamentally different approach from traditional psychotherapy, which tends to locate the problem within the individual, often conflating the individual with the problem itself.

In Japan, the systems approach has evolved by adapting the narrowly defined marital and family therapy introduced from the West to Japanese familial and interpersonal relationships across various contexts (Yoshikawa, 2023). This approach has been significantly influenced by narrative therapy. One technique within the systems approach that integrates problem externalization is "Bug Extermination" ["Mushi Taiji" in Japanese] (Higashi, 1997), which reframes a "problem" as the "work of a bug."

Higashi (1997) originally conceived the bug metaphor in response to the cultural background of the identified patient's family, which relied on purification rituals at shrines ("Oharai") to resolve difficulties. However, metaphors related to "bugs" have long been embedded in Japanese culture. For instance, a bad mood is traditionally expressed as "the bug in one's body is in a bad place" (Mushi no i-dokoro ga warui), while a foreboding feeling is described as "a bad message from the bug inside me" (Mushi no shirase). In this sense, the externalization of problems through the concept of "bugs" aligns with preexisting Japanese cultural narratives, independent of psychotherapeutic influences. Bug Extermination exemplifies how the systems approach has been adapted to resonate with Japanese cultural frameworks.

Bug extermination has been applied across various clinical settings. Its implementation in school counseling has been examined by Sakamoto (2012) and others, with discussions on its effectiveness. Given the loosely structured nature of approaches such as narrative therapy, generalizable findings must be established through the accumulation of diverse case studies while preserving the unique characteristics of the approach. Accordingly, the present study investigates the effects of problem externalization through a case in which a school counselor employed the "bug extermination" technique.

In presenting this case study, the purpose of the research and the protection of privacy were explained to the identified patient in writing and orally, and his written consent was obtained. The contents of the report have been described with the parts related to personal information deleted.

Case Summary

IP (Identified Patient): A male sophomore in high school.
Family members: IP, Father (Office worker), Mother (Full-time housewife).
How he came to counseling: The IP unexpectedly began crying in school, prompting a concerned teacher to recommend counseling.
Main complaint: Small things bother him.
Counselor: The school counselor of high school.
Number of sessions: 10 times. (Over six months.)
Outcomes: the IP's self-reported adjustment to school life.

Counseling Process

Session 1

First, the school counselor (SC) identified the IP's difficulties.

SC: I have been waiting for you. Thank you for coming. Let me start right away. What do you hope to talk about today?

IP: The biggest problem right now is that I am not going to school. I have no complaints about school. When I go to school, I have normal classes, but in the morning, I hate it.

SC: In the morning, you hate going to school. What do you think about it?

IP: I get lost in thoughts about the day, including not going to school, and I lose my head.

The IP expressed distress over his inability to attend school in the morning. However, the school counselor deliberately refrained from focusing solely on this issue. This approach was based on the perspective that school attendance in the morning is merely an outcome; a deeper understanding of the underlying experiences and the individual's perception of the situation is essential for providing effective support. As the conversation progressed in this direction, The IP stated, “I have been hiding my true character and feelings. I don’t think others will understand me if I express them.” With this admission, the following exchange took place at the conclusion of the first session.

SC: You said that you don't talk about your true feelings or personality, but do you ever think to yourself about your true feelings or personality?

IP: I think about it every day. I worry about strange things. I try not to worry too much about it, but then I lose my mind, and it starts going around in circles in my head.

SC: It's like your thinking gets in the way of you.

IP: I don't have to worry about the little things, but they keep popping up one after the other.

SC: It must be difficult for thoughts to come to mind. But I also got the sense that you think a lot about what is going on inside yourself. If possible, I would like to work with you on some more specifics about these thoughts that come to mind.

IP: Yes, please.

Session 2 and 3

These sessions revolved around the question, “When are you able to concentrate without overthinking?” In response, the IP acknowledged, “I am in class, and in some cases, I can concentrate.” However, he repeatedly expressed frustration about his inability to stop overthinking minor details, causing the conversation to stagnate. The school counselor grew concerned about how to guide the session forward, as the discussion seemed likely to remain abstract and unstructured.

Session 4

As mentioned above, while two sessions appeared to lack progression, a pivotal moment in the counseling process emerged during the following conversation in the fourth session.

SC: You say you are concerned about a lot of things, but what kind of school life do you think you would have if that were completely gone?

IP: People will think I'm a serious person.

SC: Yeah, and then what happens next?

IP: When everyone's impression of me changes, I can come to school every day without being uncomfortable. Also, I can focus on what I enjoy doing.

SC: You want to enjoy what you should enjoy.

IP: I can't enjoy it because of “that”.

SC: “That” disturbs you.

IP: That’s right!

SC: At what point does “that thing” get in your way?

IP: It's the small things that bother me. When I'm having fun, I'm bothered when I think I forgot “that thing”. If I didn't have that problem, I could enjoy myself.

SC: Maybe you can reveal “that” and give it a name so that we can see what it looks like.

IP: It's a small thing, maybe we should call it a virus.

SC: It is characterized by being small. What virus is it?

IP: It fits better with “bug” than virus. A bug that gets in the way anyway.

SC: You feel that “bug” fits better. We can see the figure better when you describe it that way.

This approach exemplifies a typical pattern of problem externalization. The school counselor identified the IP's description of his distress as "that thing" and actively worked to assign it a name. This process personified the problem, rendering it more tangible and observable. By doing so, he was able to consider potential countermeasures from a more objective perspective.

Session 5 and 6

The appearance of the "bug" led to the following conversation. We discussed when and how the bug gets in the way, and how the IP is countering it. He said, "Although the bug bothers me, I try to think that it is not a problem that it is there." He reported that school life was better than before. He said he wanted to get rid of the bug perfectly. The school counselor responded by saying that the idea was also influenced by the bug. This conversation allowed us to examine his issues in detail. Furthermore, the metaphor of the bug clarified the compulsive attitude with which he was tormenting himself.

Session 7and 8

The counseling appeared to be progressing well; however, the IP committed violence against a classmate at school and was subsequently disciplined by the high school. Despite this, the school counselor was able to continue the sessions. The counseling then shifted toward the perspective that "the conflict with the classmate was caused by the bug, and the IP and the school counselor will find a way to manage it." Traditionally, support for students exhibiting problematic behavior in school might be framed as "the school counselor guiding the IP in addressing the problem." However, by consistently utilizing the "bug" metaphor, the counselor was able to sustain a collaborative relationship with him.

Session 10

This counseling was concluded in session 10.

SC: We've been talking about bugs for a long time in this counseling session. Has the bug been attacking you lately?

IP: It's less than before. I think it's okay to have things on my mind. There are times when I think, "That was not good," but it's not good to dwell on it. There's no point in worrying about it. Even if such thoughts pop into my head, I try to focus on what I see.

SC: You've changed a lot. What helped you with that?

IP: I realized that when I blame myself, I lose the energy to action. When I decide what to do next time, that's all I focus on. I found that there's nothing wrong with starting to think about it, because it's just a habit.

SC: No problem, you say?

IP: Nothing really seems to cause that problem.

SC: Ah, you can confirm that nothing happened that you were worried about.

Through conversations with the school counselor, the IP began to objectify and analyze his troubles. Consequently, he appeared to recognize that the actual impact of his problems on his daily life was less significant than he had initially anticipated.

Counseling Evaluations

The subjective adjustment status to school life, as reported by IP, improved. At the end of the school year, he reported that there were no longer any significant difficulties in his school life, and he was successfully promoted to the next grade.

Conclusion

The present study investigated the effects of problem externalization through a case in which a school counselor employed the "bug extermination" technique. The externalization of the problem has separated the problem from the client and has made it a curable object. Not only that, but the visualization of the client's problem as an image clarified the context in which the counselor and client cooperate in dealing with it. In other words, the externalization of the problem occurred not only in the client's perception but also in the counselor's perception, and a cooperative relationship between the IP and the school counselor was considered to have been established.

This collaborative relationship between the IP and the school counselor was particularly significant in this case. White and Epston (1990) emphasized that externalizing the problem: "(This practice) paves the way for persons to cooperate with each other, to unite in a struggle against the problem, and to escape its influence in their lives and relationships." "(It) presents options for dialogue, rather than monologue, about the problem" (pp. 39–40).

In this case study, the bug extermination technique had precisely this effect. The collaborative dynamic between the IP and the school counselor played a crucial role in various aspects of the counseling process. The IP's compulsive tendencies could have been framed as a personal shortcoming, potentially reinforcing feelings of self-blame. However, by employing the metaphor of "it's the bug's fault," the counselor facilitated the IP's awareness of his compulsive tendencies in a manner that was easier to accept. This approach also prevented the reinforcement of the IP's compulsive mindset of "trying not to worry." Moreover, even when the IP engaged in violent behavior, the school counselor maintained the perspective that "the bug (problem) is the problem," rather than attributing blame to the IP himself. This perspective allowed the counseling process to continue despite challenging circumstances, with the shared conceptualization of "the bug" as a common adversary proving highly effective.

In conclusion, the externalization of the problem through Bug Extermination facilitated the formation of a triadic relationship among the IP, the school counselor, and the externalized problem. This triadic dynamic contributed to the development of a collaborative therapeutic alliance and appeared to be instrumental in fostering a supportive and even lighthearted therapeutic relationship—an essential foundation for effective counseling.

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Generative AI in English Teaching and Learning: A Case Study From Vietnam Universities

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Abstract

The study examines the perspectives of lecturers and students on using Generative AI (GenAI) for teaching and learning English in Vietnam. GenAI tools such as Duolingo, ChatGPT, or Gemini have been proven to enhance personalized learning experience, provide instant feedback, or reduce teacher workload. However, they also pose challenges such as information reliability, over-reliance on using GenAI, or ethical issues. Despite widespread use in English education in Vietnam, more insight is needed into the perceptions of both students and teachers regarding GenAI's benefits and drawbacks, particularly at the tertiary level. The study triangulates data from questionnaires and interviews with students, lecturers and managers to deepen understanding. The paper reinforces the views of GenAI as supportive for students in enhancing engagement, autonomy, and access to learning resources, particularly in English writing and vocabulary development. It also highlights concerns related to information accuracy, critical thinking decline, academic integrity, and data privacy. The paper suggests that while GenAI could enrich the landscape of English education in Vietnam, its implementation should include clear ethical guidelines, teacher training, and digital literacy development.

Keywords: generative AI, perceptions, English education, higher education, Vietnam

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Introduction

The integration of Generative Artificial Intelligence (GenAI) into educational settings is transforming traditional teaching and learning practices. With its capability of providing personalized, interactive, and engaging experiences, GenAI has been considered a tool to enhance student outcomes and teacher efficiency. Some significant benefits of GenAI, such as tailoring instruction and feedback, lesson planning or fostering engaging learning environments, are well-documented in global educational contexts (Chan & Hu, 2023; Chiu et al., 2023; Zapata-Rivera et al., 2024). However, this innovative technology also raises concerns regarding information accuracy, ethical issues, and its impact on students' critical thinking and creativity (Kaplan-Rakowski et al., 2023; Pesovski et al., 2024).

In Vietnam, the gradual adoption of AI tools in English education among university students and teachers is widely recognized due to the rise of digital literacy. For instance, Chuyen et al. (2021), T. T. H. Tran (2023) and T. Duong and Suppasetseree (2024) show that tools like Grammarly, Duolingo, and ChatGPT can enhance various language skills, such as writing coherence, pronunciation, and speaking. However, challenges including over-reliance on AI, technology anxiety, and cultural misalignments in teaching practices do persist (Pham & Le, 2024). This prevalence of both opportunities and constraints requires localized research to explore the effective integration of GenAI into English language education within Vietnamese universities.

This study aims to investigate the application of GenAI in English teaching and learning in Vietnamese higher education by exploring the experiences and perspectives of both students and teachers. By doing this, it seeks to understand how language education is being reshaped by this innovation, and to identify best practices and potential pitfalls. The findings are believed to contribute to the ongoing discourse on leveraging AI for inclusivity, efficiency, and sustainability of language education in Vietnam. The research question is "How do teachers and students in Vietnamese universities perceive the integration of GenAI into their English teaching and learning practices?"

Literature Review

GenAI's Support in Enhancement of Teaching and Learning Experiences

GenAI is recognized as a powerful tool for creating personalized and interactive learning experiences for students (C. K. Y. Chan & Hu, 2023; Chiu et al., 2023; Zapata-Rivera et al., 2024). It facilitates tailored instruction and feedback based on individual language proficiency (Su & Yang, 2023) and tracking learning progress (Pesovski et al., 2024; Zapata-Rivera et al., 2024), making the learning experience more relevant and engaging (Mertala et al., 2022).

Additionally, acting as a virtual tutor, GenAI can provide learners with personalized support and immediate answers to questions (Pesovski et al., 2024). In some cases, AI-based chatbots can contribute to student success (Kaplan-Rakowski et al., 2023), assist students in brainstorming ideas and receiving feedback on their writing (Atlas, 2023; C. K. Y. Chan & Lee, 2023), which is especially helpful for non-native English-speaking students (C. K. Y. Chan & Lee, 2023). GenAI can also automate various tasks, such as generating worksheets, tutorials, evaluations, and providing feedback. This, according to Mittal et al. (2024), brings students better access to educational resources, and through simulations, virtual creating

reality scenarios, and gamified elements it can create engaging and immersive learning content.

Teachers' efficiency can also benefit from GenAI in time-consuming tasks, for example lesson planning or giving real-time feedback on writing assignments (Chiu et al., 2023). This can give teachers time to focus more on meaningful teacher-student interactions (Kaplan-Rakowski et al., 2023; Mittal et al., 2024; van den Berg & du Plessis, 2023). Moreover, GenAI can aid teachers in creating worksheets, articles, and essays, and producing assessment tasks and critical thinking exercises (van den Berg & du Plessis, 2023), or generating engaging lead-in questions and quizzes (Williyan et al., 2024), helping teachers to develop more effective teaching methods and personalized curricula that incorporate student feedback (Mittal et al., 2024). Prompts for formative assessments to inform teaching and learning can also be generated by using AI (Baidoo-Anu & Ansah, 2023).

Potential Concerns of Using GenAI in Education

One primary concern regarding the use of GenAI in education is the accuracy and reliability of information. Pesovski et al. (2024) and Baidoo-Anu and Ansah (2023) believe that despite being trained on large datasets, GenAI can contain biases or inaccuracies reflected in its output. Kaplan-Rakowski et al. (2023), Schardt (2023) and Yan et al. (2024) also support the idea that AI models can provide *hallucinations*, which present false information as if it were true, making it difficult for teachers to verify the AI-generated information. In addition, because AI models often have inefficient common-sense reasoning ability and limited real-time access to updated information (van den Berg & du Plessis, 2023), they are unlikely to provide the most accurate and up-to-date information.

Ethical implications have been widely recognized as a common concern in using GenAI in education, in particular, students using GenAI to complete assignments without doing the work (Chan & Hu, 2023; Cogo et al., 2024; Kaplan-Rakowski et al., 2023; Michel-Villarreal et al., 2023; Mittal et al., 2024; Zapata-Rivera et al., 2024). Teachers therefore may find it difficult to look for ways to evaluate authentic learning and ensure academic integrity. Another concern is the privacy and security of student data (Kaplan-Rakowski et al., 2023; Mittal et al., 2024; Yan et al., 2024). Moreover, AI models can perpetuate existing biases, which according to Mittal et al. (2024), Pesovski et al. (2024), Williyan et al. (2024) and Yan et al. (2024) can be challenging for teachers who wish to create inclusive and equitable learning environments. One recent concern, according to Cogo et al. (2024), Mittal et al. (2024) and Pesovski et al. (2024) is copyright infringement of the content generated by AI models. Teachers may encounter a legal and ethical challenge when using copyrighted materials in their teaching.

Over-reliance on GenAI can negatively impact students' critical thinking and problem-solving skills (Chan & Hu, 2023; Cogo et al., 2024; Michel-Villarreal et al., 2023; Yan et al., 2024). Overusing AI, according to Bisdas et al. (2021) and Essel et al. (2022), can also reduce valuable human interaction in the classroom and hinder learners' social-emotional development, which is important for language learners as they often benefit from interaction with others.

There are also constraints on teachers using GenAI in their teaching. Most importantly, many teachers lack the suitable training and resources necessary to effectively integrate GenAI into their teaching (Kaplan-Rakowski et al., 2023; Michel-Villarreal et al., 2023; Mittal et al.,

2024; Pesovski et al., 2024). Teachers should be provided with opportunities to experiment and reflect upon GenAI in their teaching practices. In addition, some teachers may resist integrating AI into their teaching practices due to fear or skepticism (Baskara, 2023; Michel-Villarreal et al., 2023; Pesovski et al., 2024).

Use of GenAI in English Education in Vietnam

Higher education in Vietnam has undergone significant changes in recent years. According to V. T. Duong et al. (2024), there has been a profound impact of the emergence of digital and online technologies on Vietnamese society and higher education institutions (HEIs). New technologies, according to UNESCO (2020, as cited in Duong et al., 2024, p.1), include "digital workplaces, the Internet of Things (IoT), artificial intelligence, virtual and augmented reality, block chain, 3D printing, robotics, and more."

L. A. T. Nguyen and Habók (2022) found that most EFL university students in Vietnam have access to digital technologies at home and at school, and they show sufficient digital literacy and technological skills. They also found that Vietnamese students today are immersed in the use of computers, mobile devices, and the installed applications (V. T. Duong et al., 2024).

There have been many studies exploring the use of AI in English language learning in Vietnam. In T. T. H. Tran (2023), Grammarly and Quillbot were used in academic writing classes in language centers to detect errors and suggest ways to improve sentence structure and word choice. Both teachers and students have positive attitudes toward AI's benefits at discourse, sentence, and word/phase levels, considerably contributing to students' improvement of *cohesion and coherence*, lexical resources, grammatical range, and accuracy. However, both groups of participants agreed that *task response* was not improved by AI tools, but mostly by teachers' contributions. In another research, Chuyen et al. (2021) investigated whether Duolingo could increase high school students' English pronunciation and found that it could improve pronunciation using speech recognition, offer opportunities to practice listening, and provide instant feedback. T. Duong and Suppasetseree (2024) also found that AI chatbots, with the ability to create a low-pressure environment for practicing speaking skills, were used as conversational partners to improve speaking skills and increase confidence of non-English majors in Vietnam.

Undergraduate participants in Pham and Le (2024) perceive AI tools as useful for facilitating language learning, enhancing knowledge, and supporting their learning process. However, the authors posed a potential for excessive reliance on AI, which could limit students' critical thinking and creativity. Le Phan (2023, p. 1) investigated students' perceptions of AI technology application in General English writing classes at Vietnam National University (VNU) and found that students generally have positive attitudes regarding AI writing tools, specifically due to their "accessibility, adaptability, and simplicity," and students' increased motivation in language learning.

Nguyen and Tran (2023) explored the efficacy of ChatGPT in evaluating writing essays from advanced English students, providing detailed feedback and assigning grades. However, standardized samples of writing, according to some students, may lead to copying and biased grading, while some others may experience technology anxiety when using AI tools. Some other papers were conducted to understand teachers' perspectives towards the use of AI in English education in Vietnam. Recently, Pham and Le (2024) explored the intersection of AI technology and creative language pedagogy in the Vietnamese educational setting. Although

some teachers view AI as a supportive tool that can enhance teaching efficiency and allow them to foster student creativity, the integration of AI into language learning is complex and its influence on both teaching practices and student creativity should be carefully considered.

Teachers' perspectives towards using AI tools in English education in tertiary level in Hieu and Le (2024) revealed challenges in integrating ChatGPT into language teaching, including cultural and contextual misalignments, over-reliance on AI, effect on creativity, digital literacy, and ethical considerations. However, the opportunities include enhanced student engagement, personalized learning, fostering critical thinking and creativity, encouragement of technological adoption, teachers' professional development and efficacy.

Methodology

The study took place at a public university in Vietnam, where English programs range from elementary to upper intermediate levels. The study includes 132 non-English major students from diverse backgrounds, regions, and genders, randomly selected from a public university. They have varying English proficiency levels: 38 at A2, 55 at B1, and 39 at B2 according to the CEFR framework. Additionally, 7 lecturers and 3 educational leaders, all with at least master's degrees in English education or related fields, were interviewed. A questionnaire is designed to gather responses from students. The questionnaire includes various sections such as students' backgrounds, their utilization of GenAI in learning English, overall perceptions of using GenAI for English learning, and self-perceived recommendations for effective support in using GenAI. Additionally, some open-ended questions are included to obtain more detailed and comprehensive responses. Another questionnaire was also designed to collect lecturers' perspectives towards their use of GenAI and the benefits and constraints of using those tools in teaching English. Interview questions were used to gather in-depth feedback from leaders and managers on the implementation of GenAI at the current context, and suggestions for enhancement of using GenAI in English education at the tertiary level in Vietnam.

The collected data from questionnaires is analyzed using the SPSS 26 software. Descriptive statistics Mean (M) are employed to indicate students' and lecturers' perceptions of using GenAI in learning English, ranging from *Strongly Disagree* to *Strongly Agree*. Additionally, recommendation for necessary support is also gathered and analyzed through both close-ended and open-ended questions. The data from questionnaires and interviews are triangulated to provide comprehensive understanding of the findings.

Results

Managers and Teachers' Perspectives

Background of Using GenAI in Teaching English

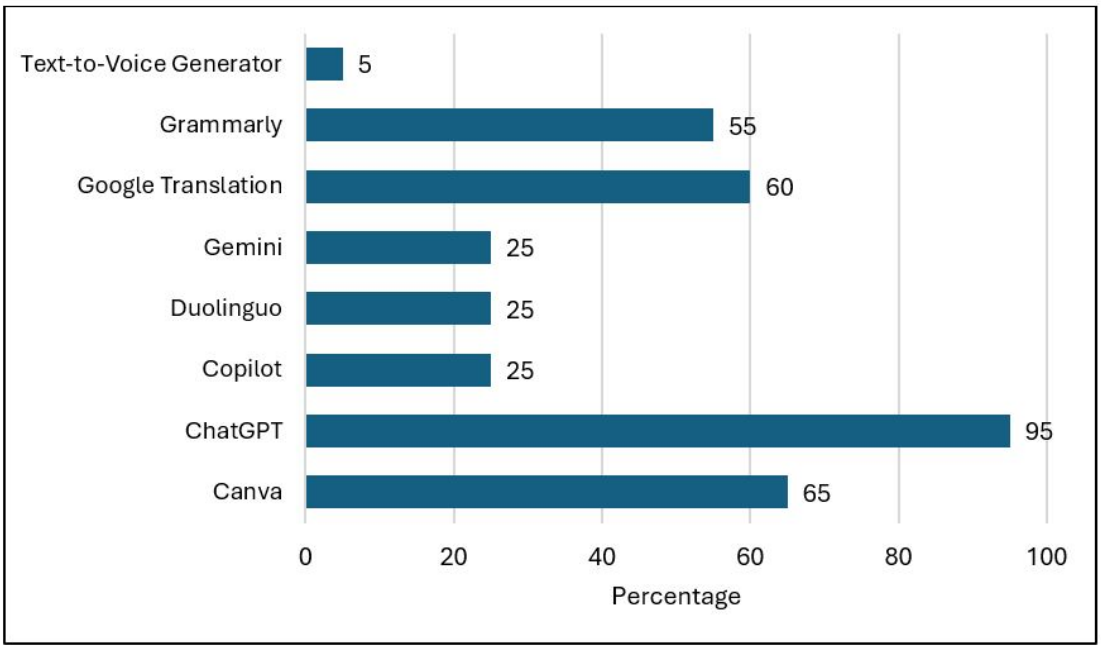
Most of the Vietnamese managers and teachers who participated in the survey and interview have over fifteen years of English-teaching experience and are employed full-time. Nearly all are already familiar with GenAI in the context of language instruction, making their insights particularly valuable. Half of the respondents report that they frequently use AI to develop teaching materials and design assignments. However, over seventy percent are either unaware of or uncertain about any university-level policy or guidelines governing AI use. This

suggests that institutions are not yet adequately prepared to offer systematic training or policy support for integrating AI tools into the classroom.

Despite the absence of formal professional guidance, teachers have rapidly embraced a range of AI-powered tools to enhance their instruction. As shown in the figure 4 below, 95 percent of respondents use ChatGPT; 65 percent rely on Canva for creating slides and visual materials; and 60 percent turn to Google Translate to support reading comprehension and vocabulary exercises.

Figure 1

AI Tools Used in English Language Teaching



Most respondents indicated that they employ AI tools across multiple pedagogical functions, including curriculum design, content creation, assessment development and grading, instructional delivery, and personalized learning. For instance, many teachers leverage Canva to design instructional posters and visual aids—citing significant time savings. ChatGPT is regularly used for brainstorming fresh ideas, crafting rubrics, and generating quiz questions. Some educators also consult AI tools for pedagogical guidance—soliciting recommendations on teaching methods and classroom activities. More specifically, ChatGPT assists in summarizing complex material and elucidating technical terminology in English instruction. Additionally, teachers utilize AI to verify the originality of student work by detecting AI□generated responses, and to compare machine translations with students' own translations to assess accuracy and deepen vocabulary comprehension. Overall, most participants agreed that AI tools enhance their lesson planning and provide a wider variety of instructional materials, enabling more engaging and effective classroom activities.

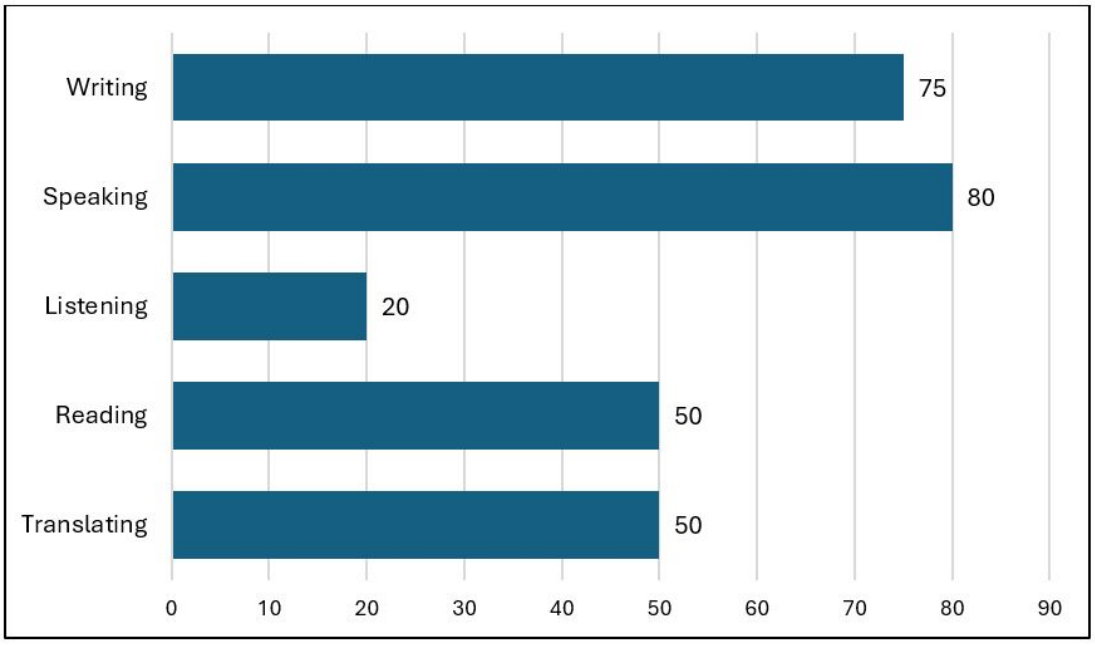
The Effectiveness of Using AI Tools in Teaching English Skills

According to the survey, 75 percent of teachers believe GenAI most benefits writing instruction, and 80 percent cite speaking as the skill most enhanced. Educators also rate GenAI as effective across other English-language domains—with the notable exception of

listening. Yet only 10 percent have received formal training in GenAI applications for English teaching, while 75 percent report having to acquire these skills independently.

Figure 2

The Effectiveness of Using AI Tools in Teaching English



In some teaching and learning cases, most teachers permit students to use AI tools such as brainstorming ideas, sourcing images for their stories, creating presentation slides, and checking spelling and grammar to refine their writing. For design majors, Canva proves especially valuable for generating virtual content—posters, illustrations, and the like. Moreover, some instructors encourage students to reflect on what they've learned through AI at the end of each session. This finding underscore teachers' openness to—and positive perception of—students' use of AI tools as a learning aid. When asked about students' ability with AI tools, 85 percent of teachers reported that they were unaware of how students are being instructed in AI use.

Aside from students' ability in effectively using AI tools, teachers reported receiving insufficient training on integrating GenAI into English teaching and learning. They emphasized that this training gap must be recognized and addressed by institutional managers and educational leaders. They responded "we should promote the use and focus on training" [Responder 1], highlighting the need for institutional support. They believe that "lecturers should apply more initiatives on teaching methods using GenAI" [Responder 2], and "students should integrate GenAI into learning and practicing speaking and pronunciation" [Responder 2]. These responses reflect a shared belief in the potential of GenAI and the importance of structured, pedagogically informed integration.

Comparison of GenAI–Based Learning and Traditional Teaching Methods

When asked to compare GenAI with traditional teaching methods, lecturers acknowledged that AI tools offer both advantages and challenges in enhancing student engagement, motivation, and overall learning outcomes. Their responses reflected a range of perspectives on the impact of AI in education. One lecturer commented, "AI enhances student learning by

providing data-driven insights into their performance, highlighting their strengths and areas for improvement, and offering guidance on how to progress—so these are really the advantages" [Responder 3]. Another lecturer highlighted both the strengths and limitations of AI compared to traditional methods, stating, "It's fast for searching information but I prefer traditional methods because students have connections each other and promote better learning" [Responder 4]. Some lecturers expressed more critical views, raising concerns about creativity and academic integrity. One remarked, "It poses a threat to our creativity. While it speeds up teaching, administrative tasks, or translation, students often use AI to complete writing assignments. It's not their original work—it's plagiarism. The learning outcomes are neither transparent nor reliable" [Responder 5]. Overall, while a few teachers expressed a preference for traditional approaches, they also recognized the value of AI tools in supporting their work.

Impact and Significance of GenAI on Teaching and Learning

Both teachers and managers agreed that AI tools have had a significant impact on their work. They noted that AI has made their teaching more structured and efficient by streamlining lesson planning, providing real-time insights into student performance, and enabling more targeted feedback. This, in turn, has helped them better address individual student needs and improve overall lesson organization. One interviewee shared, "The most significant improvement is my lesson preparation time, which used to be time-consuming, but since I applied AI tools, it became quicker" [Responder 3]. Another explained how AI supports her in teaching speaking skills: "I can show my students some AI-generated sample answers using a range of vocabulary suitable for their level" [Responder 2]. One teacher enthusiastically shared a positive classroom experience "One time, I asked my students to write a story and include photos or images to illustrate it. They were very good at it, and the results were great" [Responder 5].

Despite these benefits, some participants emphasized the importance of addressing ethical concerns. As one remarked, "Issues such as ethics and plagiarism should be addressed soon within the academic environment" [Responder 7]. Sometimes, AI tools fail to provide appropriate suggestions, even when the input prompt is clear, or the suggestions were not suitable for addressing the diverse learning styles and needs of the students.

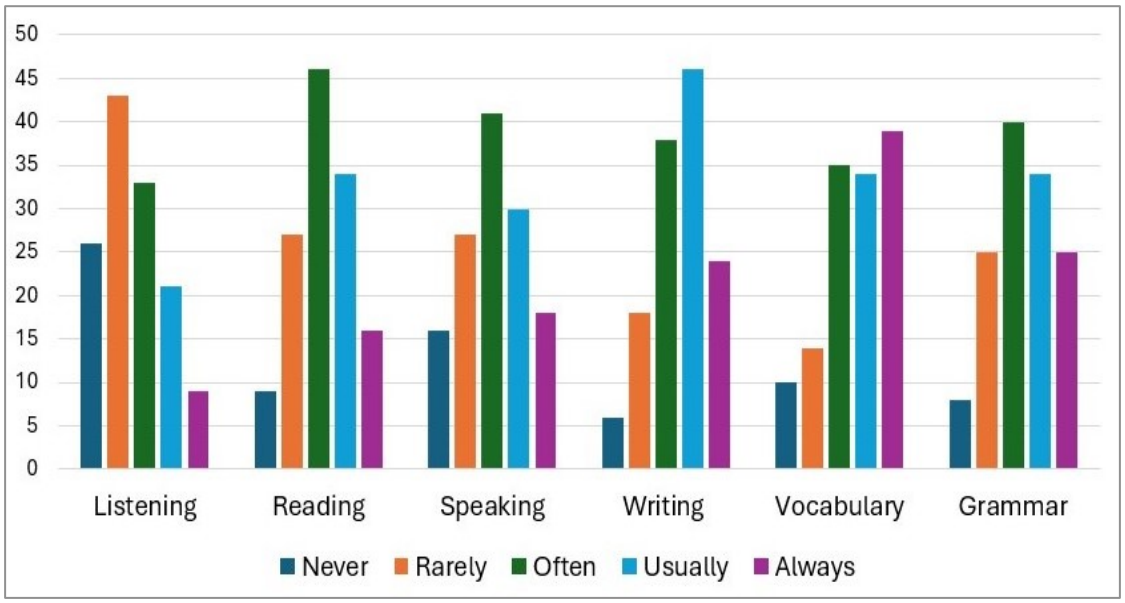
Results of Student Surveys on English Learning Skills

Students' Use and Perceptions of GenAI in Learning English

The results from the student survey show that students appreciated and became more familiar with GenAI tools and their functions. Figure 3 presents data on the frequency with which students use GenAI to learn English skills, specifically in the areas of vocabulary and grammar.

Figure 3

Students' Frequency of Using GenAI in Learning English



It is evident that Vietnamese university students use GenAI in learning Writing skills and Vocabulary more frequently, compared to other skills. Learning Listening skills is the least supported by GenAI. Similar extent of using GenAI usually while learning Reading skills and Grammar is also noticed. The results indicate an imbalance of using GenAI in learning different English skills, showing students' needs for support with Writing, Reading and Lexical Resources. However, Figures 4 and 5 below indicate that 72.7 percent of students do not know how to use GenAI effectively, and nearly two-thirds of them would like to receive suitable training on how to use those tools, highlighting the benefits and constraints when using them.

Usefulness and Limitations of Generative AI for Students Learning

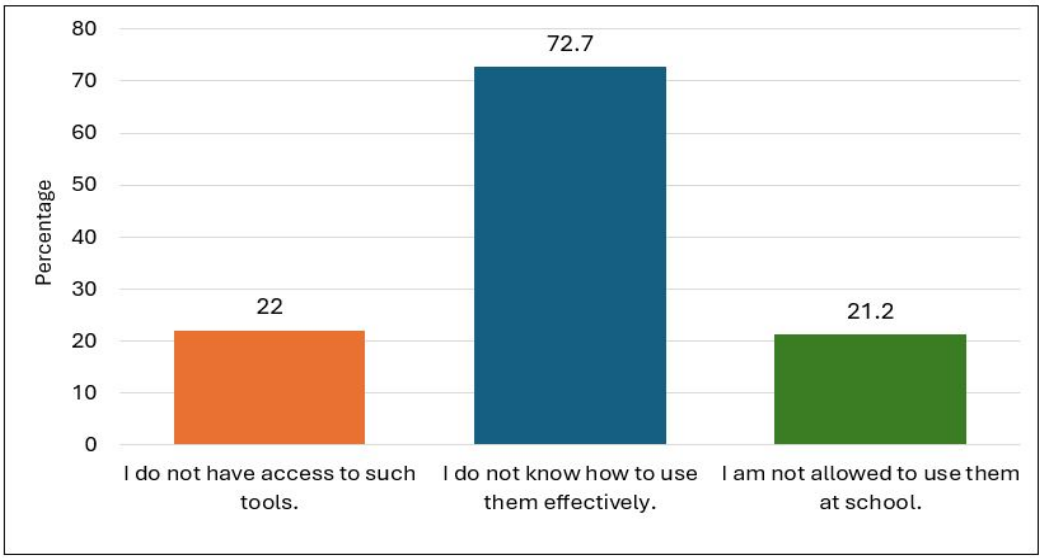
Relating to students' perception on GenAI providing personalized learning as the useful tools while learning English, it is apparent that students, regardless of English proficiency, agree that GenAI can provide them with personalized learning experience. For example, GenAI helps them identify strengths and weaknesses (Sig. = 0.279), or GenAI makes learning English more engaging and interactive for them (Sig. = 0.369). Also, GenAI can provide feedback on students' assignments, and help students to become independent learners, with Sig. = 0.629 and 0.668, respectively.

Table 1
Students' Perception on GenAI in Personalized Learning

Levels of proficiency		GenAI helps me identify my strengths and weaknesses in learning English.	Using GenAI has made learning English more engaging and interactive for me.	GenAI tools help me receive personalized feedback on my English assignments.	GenAI has improved my ability to learn English independently.
A2	Mean	3.4211	3.3947	3.5789	3.6842
	N	38	38	38	38
	Std. D	1.15388	1.24204	1.15388	1.14148
B1	Mean	3.7818	3.6727	3.7636	3.7273
	N	55	55	55	55
	Std. D	.91674	.98234	.99933	1.00838
B2	Mean	3.6410	3.6667	3.7949	3.8718
	N	39	39	39	39
	Std. D	.90284	.77233	.83286	.89382
Total	Mean	3.6364	3.5909	3.7197	3.7576
	N	132	132	132	132
	Std. D	.99059	1.01104	.99858	1.01230

Relating to the limitations of using GenAI at school, in our survey, 72.7 % of students admitted that they don't know how to use generative AI tools correctly—highlighting a need for guided training on effective prompting and tool features. Besides, more than one-fifth of students said they are not allowed to use AI tools in the classroom, preventing them from exploring and integrating AI's benefits into their regular learning activities. The detail information is indicated in the following figure:

Figure 4
Limitations of Generative AI for Students at School



Use of Generative AI as Learning Resources

To indicate how students think GenAI provides them with learning resources and tools, the below table shows a difference in perceptions on GenAI making it more flexible and accessible among students of different proficiencies, with Sig. = 0.045. All students agree on GenAI improving their answers to English assignments. Relating to how students think about over-reliance and skill development when using GenAI in learning English. Although students, regardless of their proficiencies, agree that they may be reliant to use GenAI to complete their assignments, and get reluctant to work in teams, there is a slight difference in their self-reported perception on GenAI reducing their critical thinking skills, with Sig. = 0.014, with B1-level students showing a higher level of agreement (M = 4.11). While students of B1 proficiency are generally concerned about the ethics and privacy of using GenAI in learning English, those of other proficiency lower and higher levels are unsure about their privacy and copyright issues.

Table 2
Students' Perception of GenAI in Learning Resources and Tools

Levels of proficiency		GenAI tools make learning English more accessible and flexible for me.	GenAI helps me brainstorm ideas in English for my assignments.	GenAI-generated suggestions for improving my answers are clear and actionable.
A2	Mean	3.5000	3.5789	3.6579
	N	38	38	38
	Std. D	1.08429	1.13021	1.12169
B1	Mean	4.0545	4.0727	4.0545
	N	55	55	55
	Std. D	.95099	.87886	.93131
B2	Mean	3.8462	3.6667	3.6667
	N	39	39	39
	Std. D	.81235	.73747	.80568
Total	Mean	3.8333	3.8106	3.8258
	N	132	132	132
	Std. D	.97422	.94208	.96895

Discussion, Conclusion, and Recommendation

Lecturers have a positive view of GenAI, especially for teaching English Writing and Speaking. However, the absence of formal training presents a notable challenge. This reinforces the conclusions by Kaplan-Rakowski et al. (2023) and Mittal et al. (2024) regarding the urgent need for focused professional development and systematic support in the integration of AI into teaching. This concern is also recognized by managers and educational leaders, as they acknowledge "the institutional responsibility to provide support" [Responder 8 and 9]. However, despite institutional awareness of the potential benefits of GenAI, there remains a gap between policy awareness and practical implementation. This highlights the necessity for coordinated efforts among stakeholders to ensure sustainable and pedagogically sound integration.

One of the key findings from this research is that students view GenAI as a tool for promoting personalized learning and independent learning. Students noted that GenAI identifies strengths and weaknesses, provides tailored feedback, and fosters engagement. These findings are in line with existing studies which emphasize GenAI's potential to personalize instruction and learning environment (Chan & Hu, 2023; Pesovski et al., 2024; Su & Yang, 2023; Zapata-Rivera et al., 2024). Additionally, tools such as ChatGPT were recognized by both teachers and students in this study as helpful for brainstorming and improving writing skills. This observation aligns with Atlas (2023) and C. K. Y. Chan and Lee (2023), who highlighted the role of AI in improving idea development and writing coherence. Notably, B1-level students showed the strongest agreement on GenAI enhancing learning flexibility and accessibility. This suggests intermediate learners are more confident in using these tools or more aware of their benefits compared to beginner learners. This is consistent with L. A. T. Nguyen and Habók (2022), who identified Vietnamese students' increasing digital literacy and adaptability with online platforms.

Another significant finding is that both managers, teachers and students are concerned about the accuracy and bias in AI-generated content. They expressed uncertainty about the reliability of information produced by GenAI. This supports prior concerns from Pesovski et al. (2024), Schardt (2023), and Yan et al. (2024) about AI's hallucinations. In addition, while most of them find AI content convenient, they also see risks such as reduced critical thinking and over-reliance, resembling concerns from Cogo et al. (2024), Michel-Villarreal et al. (2023), and Essel et al. (2022) about decreased learner autonomy and cognitive engagement. Ethical concerns were also notably significant, especially regarding academic integrity, data privacy, and copyright infringement (Kaplan-Rakowski et al., 2023; Michel-Villarreal et al., 2023; Mittal et al., 2024).

In short, the findings provide a variety of applications of how GenAI tools are currently used and perceived in teaching and learning English at some major universities in Vietnam. The study confirms that GenAI significantly benefits English education by promoting personalized learning, enhancing engagement, and supporting independent learning. It is also truly beneficial for teachers in lesson preparation and improving their teaching techniques. However, the study highlights critical concerns, including doubts about AI-generated information's accuracy and objectivity, risks of over-reliance, reduced critical thinking, and ineffective peer collaboration. Therefore, it is recommended that teachers' support with suitable formal training on using GenAI should be strongly concerned. For students, it is essential to train them to know how to craft appropriate prompts that guide the tool in generating relevant and useful information. More importantly, we need to guide them "to avoid situations where they become overly reliant on AI tools, as this may result in performance outcomes that do not accurately reflect their true abilities" [Responder 3].

The findings generally suggest that while GenAI has significant potential for enhancing English education in Vietnam, its implementation must be undertaken with caution and in a strategic way. To ensure GenAI's effectiveness and sustainability as an educational tool, there is a need for clear ethical guidelines, digital literacy training for both students and teachers, and more institutional support. Besides, it is important to be more mindful when using AI tools, as they are meant to assist—not fully replace—our work. So, using their outputs as suggestions, recommendations, or sources of feedback for students learning may be a more effective and responsible. Lastly, more in depth and comprehensive research on this area may further explore for its integration and improvement teaching and learning languages purposes.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

The authors used ChatGPT to improve the grammar and vocabulary in selected sections of the manuscript. It was also used to review and format citations and references in accordance with APA 7.0 style.

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Empowering Educators: Implementing Research-Based Learning for Inquiry-Driven Classrooms

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Abstract

Research-Based Learning (RBL) transforms traditional instructional methods by placing inquiry, discovery, and evidence at the heart of the learning process. Unlike conventional approaches that prioritize content delivery, RBL encourages students to actively engage in constructing knowledge through investigation and critical analysis. This paper explores the foundational principles of RBL, its key differences from traditional instruction, and practical strategies for its effective implementation in K–12 educational settings. Drawing on recent educational research, it illustrates how RBL fosters critical thinking, creativity, student autonomy, and deeper engagement with subject matter. The study also presents a variety of implementation models, supported by tables and figures that highlight comparative analyses, project frameworks, and observed learning outcomes. Challenges such as time constraints, resource limitations, and varying student readiness levels are discussed, along with recommendations for overcoming these barriers. Additionally, the paper addresses the role of teacher training, curriculum design, and assessment practices in creating successful RBL environments. By integrating theoretical insights with real-world examples, this study demonstrates the potential of RBL to enhance long-term knowledge retention and prepare students for complex, real-world problem-solving. The paper concludes by emphasizing the importance of empowering educators to foster inquiry-driven classrooms and offering recommendations for future research to expand and refine RBL practices across diverse educational contexts.

Keywords: research-based learning, inquiry-based learning, project-based learning, educational innovation, critical thinking

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Introduction

In an age where information is abundant, but critical thinking skills are scarce, Research-Based Learning (RBL) emerges as a transformative approach to education. Originating from psychological studies in the 1800s, RBL has evolved into a dynamic model that prioritizes inquiry, evidence analysis, and knowledge construction over passive information absorption (Healey & Jenkins, 2009). This paper examines how RBL can empower educators and revolutionize traditional classroom practices. We review historical contexts, theoretical foundations, and modern applications of RBL, supporting our discussion with figures and references from recent educational studies.

Conceptual Foundations of Research-Based Learning

Research-Based Learning intertwines multiple pedagogical strategies:

- Inquiry-Based Learning (IBL)
- Problem-Based Learning (PBL)
- Project-Based Learning (PrjBL)
- Evidence-Based Learning (EBL)

Each of these methods shifts the focus from "teaching" to "learning," encouraging students to actively participate in constructing their own knowledge (Barron & Darling-Hammond, 2008).

RBL Versus Traditional Teaching: A Comparative Overview

Table 1
Comparison Between Traditional Teaching and RBL

Aspect	Traditional Teaching	Research-Based Learning
Learning Approach	Passive Reception	Active Inquiry
Role of Teacher	Information Provider	Facilitator/Coach
Role of Student	Listener and Memorizer	Researcher and Investigator
Assessment Style	Standardized Testing	Authentic, Project-Based
Skill Development	Recall and Reproduction	Critical Thinking, Problem-Solving

*Table 1 compares traditional teaching with research-based learning. While traditional models often focus on content delivery and memorization, RBL engages students as active participants, encouraging skills such as analysis, problem-solving, and collaboration.

The RBL Teaching Cycle

The Research-Based Learning Cycle begins with posing real-world questions, exploration of resources, formulation of hypotheses, data collection and analysis, development of solutions, presentation of findings, and reflection (Mayolo-Deloisa et al., 2019).

Figure 1
Research-Based Learning Cycle

*This figure outlines the iterative process at the core of RBL, promoting deep engagement and continuous improvement.

Being a comprehensive, structured approach that guides students through a series of steps aimed at promoting deeper understanding and active engagement with content, it begins with posing real-world questions. This stage is essential because it sets the foundation for inquiry-based learning, where students identify problems or questions that are relevant to their lives or future careers. These questions are typically open-ended and require exploration, helping to connect classroom learning with practical, real-world situations. By encouraging students to think critically about real-world issues, this step motivates them to explore further and discover solutions through research.

Following the formulation of questions, the next stage involves exploration of resources. This is where students dive into available information—whether it be textbooks, academic articles, online resources, or interviews with experts. They critically analyze and sift through the materials, enhancing their research skills and gaining a broader perspective on the issue at hand. The exploration phase also encourages students to question the sources and validity of the information they encounter. Next comes the formulation of hypotheses, where students make educated guesses or predictions based on the information they have gathered. Hypotheses form the basis of their investigation, driving the data collection process that follows.

Once students have their hypotheses in place, the cycle progresses into data collection and analysis. Students actively gather data through experiments, surveys, or other investigative methods, allowing them to test their hypotheses in a structured manner. The process of analyzing the collected data helps students to draw conclusions, refine their understanding, and build evidence-based arguments. Following this, students develop solutions, which might involve creating models, proposing recommendations, or designing projects that address the initial question posed. The final stages of the cycle focus on presentation and reflection. Students present their findings through various formats, such as reports, presentations, or multimedia projects. The act of presenting helps them to hone their communication skills and articulate their thought processes. Reflection is the last and crucial stage, where students evaluate their learning journey, assess the process, and identify areas for improvement. This stage encourages self-assessment and encourages students to consider how they can apply what they've learned to future challenges.

The RBL Teaching Cycle, as described by Mayolo-Deloisa et al. (2019), emphasizes a holistic approach to learning that aligns closely with inquiry-based and experiential learning methodologies. By guiding students through these stages, RBL allows them to engage deeply with the content, develop critical skills, and make meaningful connections between theory and practice. This cycle not only fosters academic growth but also prepares students for real-world problem-solving by embedding skills like critical thinking, collaboration, and effective communication within the learning process. Through this inquiry-driven, cyclical process, RBL creates an environment where learning is active, relevant, and student-centered, ensuring that students are not just passive recipients of information but active participants in the construction of their knowledge.

Strategies for Implementing RBL in Classrooms

Inquiry-Based Learning

Inquiry-Based Learning (IBL) stimulates students' curiosity through open-ended real-world questions and exploration activities. Teachers act as facilitators, encouraging students to hypothesize, investigate, and draw conclusions independently. Recent research by Lazonder & Harmsen (2022) emphasizes that structured inquiry, combined with timely scaffolding, maximizes student engagement and deeper understanding. In practice, students might explore why pollinator populations are declining by formulating research questions, analyzing case studies, and proposing evidence-based solutions.[1]

Instruction-Based Learning (Scaffolded Approach)

Instruction-Based Learning provides the necessary foundational knowledge and context before students embark on independent inquiry. This scaffolded approach ensures learners possess the cognitive tools to navigate complex questions without feeling overwhelmed. Clark, Kirschner, & Sweller (2020) argue that direct instruction followed by guided exploration supports long-term knowledge retention. For example, teachers might first deliver a structured lesson on ecosystems before assigning students a project investigating environmental impacts on local biodiversity.

Evidence-Based Learning

Evidence-Based Learning (EBL) trains students to critically engage with empirical data, reports, and scientific literature. Students learn to assess the reliability, validity, and bias within different information sources. Open Science initiatives, as advocated by Fecher & Friesike (2021), encourage integrating primary research analysis into student tasks. This practice cultivates data literacy and ethical reasoning, crucial skills for navigating today's information-rich environment.

Problem-Based Learning

Problem-Based Learning (PBL) challenges students to solve authentic, often interdisciplinary, problems that lack clear-cut answers. By working collaboratively, students

[1] Inquiry-Based Learning and Problem-Based Learning share overlapping characteristics but differ mainly in the framing of problems.

develop problem-solving strategies, resilience, and adaptive thinking. Aalborg University exemplifies institutional PBL implementation, demonstrating improved graduate competencies in real-world application and teamwork. For instance, a class might address "How can urban communities reduce their carbon footprint?" through collaborative research and actionable proposals.

Project-Based Learning

Project-Based Learning involves students undertaking extended research projects that result in tangible outputs such as presentations, essays, prototypes, or multimedia campaigns. Projects allow learners to synthesize their knowledge creatively while honing project management, communication, and interdisciplinary thinking skills. According to Thomas (2000), well-designed projects increase student motivation, ownership, and academic achievement. Examples include producing a documentary on local sustainability efforts or designing a community health awareness campaign.

Sample Project Outcomes in RBL Settings

Table 2
Sample Project Outcomes From RBL Activities

Project Type	Example Project	Skills Developed
Research Presentation	Decline of Honeybees Study	Public Speaking, Analysis
Educational Poster	Kindness Campaign in Schools	Design Thinking, Communication
Proposal Writing	Biodiversity Conservation Proposal	Argumentation, Critical Thinking
Digital Media Project	Environmental Awareness Podcast	Technological Literacy, Teamwork

*Each project type reinforces subject-specific knowledge and cultivates creativity, collaboration, digital literacy, and communication skills.

After examining the table of sample project outcomes in Research-Based Learning (RBL) settings, it is important to delve into how these projects help students develop essential skills that go beyond academic content and prepare them for real-world challenges. In each project type, students not only apply their subject knowledge but also cultivate transferable skills that can be used in a variety of contexts.

The Research Presentation on the population- decline of honeybees, for example, is a project that encourages students to gather, analyze, and synthesize research findings on a relevant environmental issue. Through presenting their findings, students improve public speaking skills by articulating their ideas clearly and confidently to an audience. This project also enhances their analytical abilities, as they must critically evaluate data, draw conclusions, and present them in a logical, structured manner. The process of preparing for a presentation builds skills in organization and communication, which are valuable in many future careers.

In the case of an Educational Poster on a kindness campaign in schools, students engage in design thinking, which involves empathy and creativity as they work to communicate an

important social message in a visually compelling and effective way. The project encourages communication skills, as students must clearly convey the message of kindness in a format that is accessible and engaging. This type of project also fosters collaboration, as students often work in groups to create a cohesive design. The creative aspect of the poster encourages innovative thinking, while the need to communicate the core message effectively enhances both written and visual communication skills.

A Proposal Writing project, such as creating a biodiversity conservation proposal, requires students to engage in argumentation and critical thinking. In this project, students must analyze the state of biodiversity, identify issues, and craft well-supported arguments to advocate for conservation efforts. Writing a proposal challenges students to structure their thoughts, present evidence, and persuade an audience to act. The ability to logically present a case, backed by research, is crucial not only in academic settings but also in many professional fields such as business, policy, and law.

Lastly, the Digital Media Project like an environmental awareness podcast develops technological literacy and teamwork skills. This project requires students to use digital tools to produce audio or video content, honing their ability to use various software and platforms effectively. The process of creating a podcast involves research, scripting, recording, and editing, which boosts technical proficiency and problem-solving skills. Additionally, working on a podcast typically involves collaboration, where students must coordinate with others to ensure that the project aligns with their shared goals and deadlines. This collaborative aspect strengthens teamwork and interpersonal skills, which are crucial for success in any work environment.

In all these projects, RBL encourages students to take an active role in their learning while also developing a range of skills that are highly valued in both academic and professional contexts. The combination of subject knowledge and essential transferable skills such as critical thinking, creativity, and teamwork provides students with a more comprehensive education that prepares them for the complexities of the modern world. By engaging in hands-on projects that require real-world application, students not only deepen their understanding of content but also build the competencies needed for lifelong success.

Benefits of Research-Based Teaching & Learning

Research-based learning (RBL) offers several significant benefits in shaping student outcomes. One of its key advantages is that it fosters independent learners, as students are encouraged to explore, analyze, and solve problems on their own (Hmelo-Silver, 2004). By being given the tools and freedom to engage in self-directed learning, students develop a deeper understanding of the material and acquire essential lifelong learning skills. RBL also enhances critical thinking and analysis, as it challenges students to think critically, evaluate evidence, and apply concepts to real-world scenarios (Thomas, 2000). This process nurtures their ability to make informed decisions and approach problems from multiple perspectives.

Furthermore, RBL prepares students for real-world problem-solving by simulating authentic challenges they may face outside of the classroom. It teaches them to apply their knowledge and skills in practical contexts, bridging the gap between theory and practice. This approach not only prepares students for future careers but also boosts student engagement and motivation. When students can see the relevance of what they are learning and feel more

involved in their educational journey, they are more likely to stay motivated and engaged in their studies, leading to improved overall performance and academic success.

Challenges and Solutions

Table 3
Challenges and Solutions

Challenge	Solution
Limited access to resources	Use open-source databases, online journals, and virtual resources.
Lack of student motivation	Connect projects to real-world problems to increase relevance and engagement.
Time management difficulties	Break projects into smaller, manageable tasks and set clear deadlines.
Difficulty in group collaboration	Implement structured group roles and regular check-ins to ensure effective teamwork.
Inadequate technical skills	Provide training in digital tools and resources for students.
Limited teacher support or expertise	Offer professional development for teachers to enhance RBL facilitation skills.
Assessment challenges	Use a combination of formative and summative assessments to evaluate student progress.

After examining the challenges and solutions in Research-Based Learning (RBL) settings, it is important to understand how these factors shape the overall learning experience and how educators can effectively address them to create a more supportive, engaging, and productive environment for students.

One of the major challenges in RBL is limited access to resources, which can hinder students' ability to conduct thorough research. This can be particularly difficult in areas where access to academic journals, books, or specialized materials is limited. The solution lies in leveraging open-source databases and virtual resources. By utilizing freely available academic repositories, digital libraries, and online platforms, educators can provide students with the tools they need to access high-quality information without the constraint of physical resources. Additionally, guiding students on how to use credible, freely available sources helps them develop critical research skills and encourages resourcefulness.

Another common challenge in RBL is the lack of student motivation, especially when projects feel disconnected from their interests or real-world relevance. This can be addressed by connecting projects to real-world problems that matter to students. When students see the practical application of their research, they are more likely to stay engaged and motivated. Giving students some choice in selecting their research topics can also enhance ownership and enthusiasm. Time management difficulties often arise because students may find it overwhelming to manage long-term projects without clear guidelines. Educators can address this by breaking projects into smaller, manageable tasks with incremental deadlines. This step-by-step approach not only makes the workload feel more achievable but also teaches students valuable organizational and planning skills.

Difficulty in group collaboration is another frequent issue in RBL settings. Without clear roles and structure, group work can lead to conflicts or unequal participation. Assigning structured group roles and holding regular check-ins can help ensure effective teamwork and accountability. In addition, students often face challenges with inadequate technical skills needed for research, analysis, or presentations. Providing basic training in the use of digital tools, data analysis software, and online collaboration platforms can build students' confidence and competence. A lack of teacher support or expertise in guiding the RBL process can also be a barrier. This can be addressed through professional development programs that help teachers become more comfortable with inquiry-based methods and the RBL cycle. Finally, assessment challenges can occur because traditional grading methods may not fully capture the learning journey. A combination of formative assessments, such as ongoing feedback, and summative assessments, like final presentations or reports, ensures a balanced and comprehensive evaluation of student progress and outcomes.

By anticipating and addressing these challenges thoughtfully, educators can create RBL environments that are inclusive, motivating, and effective. Students not only gain deeper content knowledge but also develop critical thinking, problem-solving, and collaboration skills that prepare them for future academic and professional success.

Conclusion

Research-Based Learning offers a transformative pathway for educators seeking to cultivate inquiry-driven, critical thinkers equipped for the complexities of the modern world. While implementing RBL poses challenges such as time constraints and resource needs, the benefits in terms of skill development, engagement, and lifelong learning are profound. Educators who adopt RBL methodologies contribute to an educational culture where exploration, innovation, and critical inquiry are paramount.

By embedding research practices within the learning process, students are not only consumers of knowledge but also producers of new ideas and solutions. This shift from passive learning to active investigation fosters deeper understanding, independence, and resilience. As students move through the RBL cycle, they develop essential skills such as problem-solving, communication, teamwork, and technological literacy, which are critical for success in an increasingly complex and interconnected world. The adaptability of RBL across disciplines further enhances its value, making it a versatile approach suitable for diverse educational settings.

However, the successful integration of RBL requires systemic support, including professional development for educators, access to appropriate resources, and thoughtful curriculum design. Institutions that prioritize collaborative planning, provide ongoing teacher training, and encourage flexibility in project execution are more likely to witness the full potential of RBL. Additionally, a balanced approach to assessment that values both the process and the final product is crucial to truly capturing the breadth of student learning and growth within RBL environments. Reflection, a key component of the cycle, should be emphasized to help students internalize lessons learned and continuously refine their thinking strategies.

Recommendations for Future Research

Looking ahead, future research could explore several important areas to further strengthen RBL practices. Studies examining the long-term impact of RBL on students' career readiness

and innovation capacity would provide valuable insights into its broader societal contributions. Additionally, research into how RBL can be effectively adapted for younger learners, diverse cultural contexts, and online learning environments would help expand its reach and accessibility. Investigating the role of emerging technologies, such as artificial intelligence and virtual collaboration platforms, in enhancing RBL experiences could also open new avenues for more dynamic, personalized, and globally connected research-based learning opportunities.

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Appendices

Appendix A

Sample Lesson Plan for RBL – The RBL Teaching Cycle

Grade Level	6
Subject	Science: Environmental Studies
Lesson Title	Exploring Ecosystems: Research, Analyze, Present
Time Frame	5 sessions (60 minutes each)
Learning Objective	• Students will formulate research questions. • Students will gather and analyze information from multiple sources. • Students will collaborate and communicate findings. • Students will reflect on their learning process.
Assessment	Rubric-based self-evaluation and peer review (See Appendix B)
Curriculum Framework	Based on the California Next Generation Science Standards (NGSS) for Grade 6 – Ecosystems: Interactions, Energy, and Dynamics (MS-LS2-1 to MS-LS2-5).

Stage	Objective	Activity / Tools
Lead-in and Warm-up	Activate prior knowledge and spark curiosity about ecosystems.	**Activity:** Display a time-lapse video showing seasonal changes in a forest ecosystem. **Prompt Questions:** What changes do you observe? What might be causing these changes? What living and nonliving components do you notice?
Stage 1: Engagement (Tuning In)	Engage students with the concept of ecosystems and interdependence.	**Activity:** Watch a short nature documentary clip (e.g., “Planet Earth” segment on predator-prey relationships). **Prompt:** What do you notice about the relationships between organisms? What questions do you have about how ecosystems work?

Exploration (Finding Out)	Explore the roles and relationships in an ecosystem.	**Activity:** In small groups, students research components of an assigned ecosystem (desert, rainforest, tundra, etc.) and create food web models. **Resources:** Research materials, printed templates, access to library or internet, ecosystem fact sheets.
Explanation (Sorting Out)	Analyze the flow of energy and interactions in ecosystems.	**Activity:** Class discussion and group presentations of food web posters, focusing on producers, consumers, decomposers, and energy transfer. **Tools:** Poster paper, markers, peer review checklist.
Elaboration (Going Further)	Apply understanding to new environmental scenarios.	**Activity:** Students propose what might happen if a species in their ecosystem became endangered or extinct, using cause-effect reasoning in a short-written report.
Evaluation (Reflecting & Acting)	Reflect on ecosystem knowledge and collaborative learning.	**Activity:** Students complete a rubric-based self-evaluation and peer review. **Assessment: See Appendix B.**

Materials Needed:
- Laptops/tablets
- Internet access
- Chart paper and markers
- Rubrics and self-assessment forms

Differentiation Strategies:
- Provide scaffolded research guides.
- Offer technology support.
- Allow multiple formats for presentation (slides, video, posters).

Reflection:
Post-lesson discussion on what was learned, challenges faced, and improvements for future inquiry projects.

Appendix B

Assessment Rubric for RBL Projects – Character Development Analysis

Criteria	Excellent (4)	Good (3)	Satisfactory (2)	Needs Improvement (1)
Inquiry & Questioning	Poses insightful, open-ended questions	Asks relevant questions	Questions are basic and few	Questions lack relevance or depth
Textual Evidence	Strong, relevant evidence supports all points	Evidence mostly supports ideas	Some evidence; lacks depth	Minimal or no evidence provided
Analysis & Interpretation	Deep, original analysis of character development	Reasonable interpretation	General analysis; lacks depth	Little to no analysis or misinterpretation
Reflection	Thoughtful reflection; personal insight	Reflects on learning	Basic reflection	Reflection is missing or vague
Presentation	Clear, coherent, and well-organized writing	Mostly clear writing	Writing lacks clarity or structure	Writing is unclear or poorly organized

Scoring Guide:

- 20: Exemplary
- 15–19: Proficient
- 10–14: Developing
- Below 10: Beginning

The rubric table uses a 4-point scale per criterion, where:

- Excellent = 4 points
- Good = 3 points
- Satisfactory = 2 points
- Needs Improvement = 1 point

There are 5 criteria in the rubric, so the maximum total score is 20 (5 criteria × 4 points).

Scoring Guide Alignment:

Score Range	Interpretation	Explanation
20	Exemplary	The student scored a 4 (Excellent) on all 5 criteria.
15–19	Proficient	The student averaged mostly 3s or a mix of 3s and some 4s.
10–14	Developing	The student mostly scored 2s, possibly with a 3 or 1.
Below 10	Beginning	The student scored mostly 1s, indicating minimal understanding.

So, a “Proficient” score of 15–19 corresponds to a student whose performance mostly falls in the “Good” (3**)** or a mix of “Good” and “Excellent” (3s and 4s) categories. The rubric and the scoring guide are consistent — the table breaks it down by criteria, and the scoring guide interprets the total score.

Optimizing Chinese Writing Instruction: Integrating Chunks and Blended Learning

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Abstract

The Chunks approach is widely used in foreign language teaching, particularly in EFL, to enhance students' language intuition, processing speed, and accuracy. It also helps produce more natural and precise language output. However, there is limited empirical research on its effectiveness in Chinese writing instruction, especially among Chinese learners in Indonesia. This study integrates the chunks approach into a blended learning model, referred to as "3 Stages, 3 Methods, 4 Sessions," to examine its impact on overcoming students' difficulties in writing, such as incorrect vocabulary combinations, incoherence between phrases or sentences, and inappropriate used of fixed-phrases. A classroom action research design was adopted, using pre- and post-tests as research instruments. A total of 28 Indonesian students were divided into experimental and control groups. The results indicate that the experimental group demonstrated more significant academic improvement compared to the control group. Furthermore, their essays exhibited higher quality, particularly in terms of the accuracy and variety of collocations and framework structures used in their writing compositions. This study suggests that teachers can effectively integrate the chunks-based approach within a blended learning framework to enhance students' Chinese writing proficiency. However, to achieve more substantial and lasting impacts, it is recommended that this approach be implemented over a longer duration of study.

Keywords: chunks approach, blended learning, Chinese learning, writing skills

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Introduction

Chunks are multi-word sequences stored as fixed or semi-fixed patterns in the brain, helping second-language learners process information efficiently and accurately (Lu & Wang, 2024; Ma & Li, 2015). In language teaching with a chunk-based approach, students are encouraged not to memorize vocabulary word by word but rather to learn clusters of words or phrases, such as collocations, idioms, common expressions, polite phrases, sentence patterns, etc. The use of chunks has been shown to enhance the speed and accuracy of foreign language processing, particularly in listening (Zhang, 2010), improve language intuition and fluency (Ureña, 2018), increase reading speed (Zhou, 2013), and reduce misunderstandings caused by negative transfer from their native language(s) or cultural differences (Huang, 2019).

Research on using chunks in language teaching for non-native speakers has been mainly carried out in English language learning. Studies on chunks and their benefits in Chinese language instruction have only emerged since the early 21st century. However, the participants involved in the research predominantly consist of university students studying Chinese in China or students of Chinese descent (Huayi, 华裔) who have been exposed to learning Chinese within their family environments from an early age. Studies focusing on learners of Chinese outside of China or non-Huayi learners remain significantly limited.

As learners and teachers of Chinese, we have observed several errors faced by Indonesian students who study Chinese in some universities in Indonesia related to chunks also exist. The interference of native languages often makes their Chinese not meet the Chinese grammar standard or unsuitable for the language occasions. The errors, for example, in mismatches combining vocabulary, incoherence between phrases or sentences, and inappropriate use of fixed phrases in specific contexts, are often found in students' writing assignments.

In addition, the rapid development of digital technology and the trend of International Chinese Language Education after the pandemic, which emphasizes online and offline learning combination (Lu et al., 2020; Qadriani, 2022), encourage teachers to innovate in teaching. The literature study that we conducted on online and offline blended learning in CFL shows that no studies have been conducted to address the student challenges mentioned above, highlighting the significance of this research.

Therefore, this study adopts a chunks-based learning approach integrated with blended learning models, combining online and offline instruction within an action research framework. The learning design, referred to as the "3 Stages, 3 Methods, 4 Sessions" model, is systematically structured to address students' challenges in chunk usage and improving their writing proficiency.

The research questions (RQ) of this study encompass the following three aspects:

1. Does the "3 Stages, 3 Methods, 4 Sessions" learning design improve students' academic performance in writing courses?
2. Has students' ability to combine words improved regarding their writing compositions' accuracy and variety of chunks?
3. Has students' ability to connect phrases and sentences improved regarding their writing compositions' accuracy and variety of chunks?
4. Has students' ability to use fixed phrases improved regarding their writing compositions' accuracy and variety of chunks?

Theoretical Framework

Chunks Classifications in Chinese

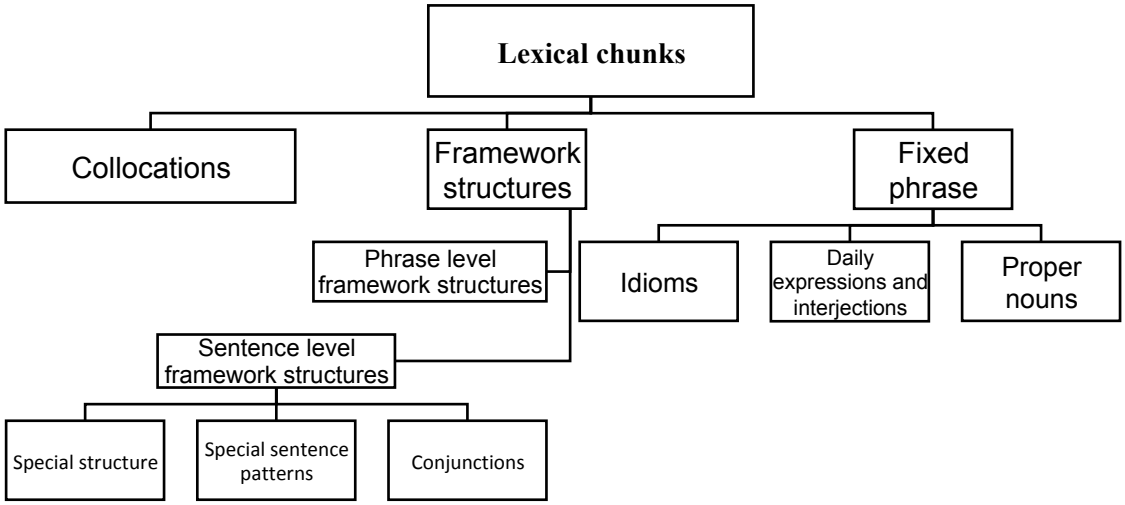
Several previous researchers have categorized chunks in Chinese into various types. For instance, Zhou, J (2007) classified chunks into three types: common word combinations, commonly used phrases, and sentence structures. Qian (2008) categorized chunks based on their hierarchical levels within language structures, including word, sentence, and paragraph-level chunks. Zhang (2010) divided chunks based on their usage, distinguishing between chunks used in oral language and writing.

However, the categorization of chunks in previous studies has primarily been examined from linguistic and pedagogical perspectives. Research incorporating it based on the usage conditions or the errors learners make when studying Chinese, especially for Indonesian students, is still lacking.

In this research, after analyzing the classification of chunks from previous studies, we sought to align it with the challenges and errors encountered by Indonesian students when learning chunks. These challenges include errors in word collocation (Xie, 2017), the use of conjunctions in sentences (Lestari & Pujiastuti, 2018), and the application of fixed phrases such as idioms (Luo, 2015), among others.

Furthermore, this study integrates the chunk classifications identified in previous research with Indonesian students' usage characteristics. As a result, we categorized chunks into three types, as illustrated in Figure 1.

Figure 1
Three Chunk Types in This Study



1) Collocations (词语搭配组合)
   Collocations consist of specific word combinations with various syllabic structures, including 1+2 syllables (e.g., 交+朋友, 提+意见), 2+1 syllables (e.g., 责任+心, 压力+大), and 2+n syllables (e.g., 造成+困难, 电子+邮件, 申请+奖学金).

2) Framework structure (框架式结构)
Framework structures are composed of fixed components combined with blank spaces and are further divided into phrase-level and sentence-level chunks. Phrase-level chunks (短语级语块) connect two or more words to form a phrase, such as 当……的时候, 往……走, 像……一样. Sentence-level chunks (句级语块） link two clauses and include conjunction/compound forms (e.g., 不但……而且……, 虽然……但是……), special sentence patterns (e.g., 被字句, 把字句), and special structures (e.g., 一是……二是……).

3) Fixed phrase (固定短语)
Fixed phrases encompass idioms (e.g. , 一见钟情, 日久见人心), daily expressions and interjections (e.g., 毫无疑问, 总的来说), and proper nouns, such as city names like 雅加达 (Jakarta) and 茂物 (Bogor).

Integration Between Chunks Approach and Blended Learning Models

Qi (2008) stated that using the chunk approach in second language learning requires repeated practice of learned chunks, integration of vocabulary and grammar teaching, and reinforcement of instructional intensity to enhance students' language proficiency. However, traditional classroom settings are constrained by time, teaching resources, and teachers' capacity for individualized guidance (Chang, 2020; Xiao & Zhao, 2021), making it difficult for students to receive sufficient input and output practice within the limited class time.

On the other hand, blended learning, as a teaching model that integrates the advantages of both online and offline instruction, provides a more optimal learning environment for chunk-based teaching (Graham, 2006). It allows students to engage in extensive chunk input before face-to-face classes (e.g., accumulating and memorizing chunks through online resources), participate in collaborative learning during class (e.g., exercise chunks utilization through discussion, group tasks, etc.), and accomplish personalized assignment after class (e.g., writing assignments using chunks). Consequently, blended learning effectively enhances students' long-term retention of chunks, thereby improving their writing proficiency.

Empirical research on blended learning in Chinese language teaching, particularly concerning the use of chunks, remains limited. Liao (2022) developed a blended learning design focused on teaching idioms to help students understand Chinese culture and address misunderstandings caused by cultural differences. The study found that students were more engaged with the implemented blended learning approach. However, some students still struggled to grasp the idioms' meanings. The short duration of the study and the implementation of blended learning limited the reliability of the results.

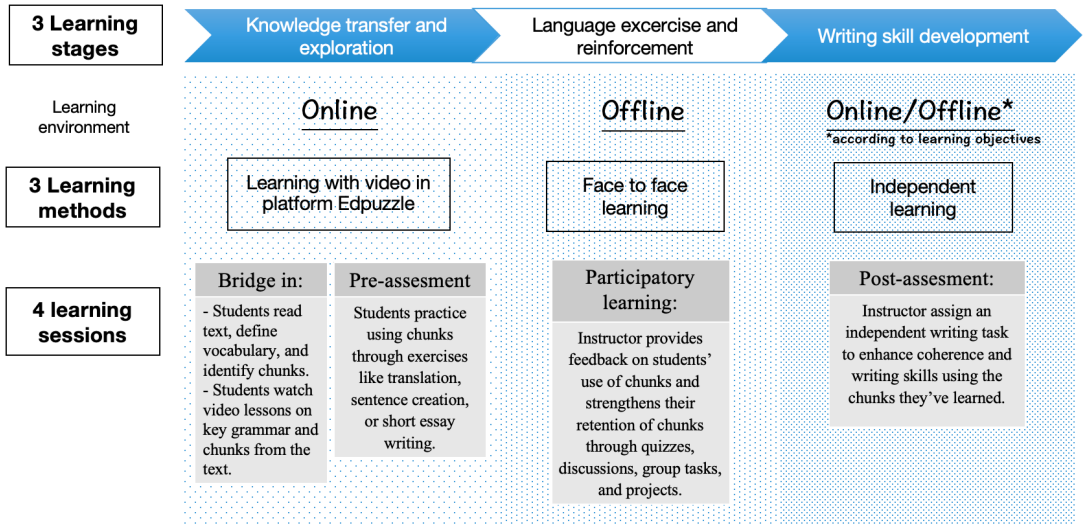
The limitations of Liao's study and the absence of research addressing the use of blended learning in teaching Chinese collocations and framework structures to address student challenges highlight the need for this research to be conducted.

In this research, blended learning is divided into learning using video lessons prepared by the instructor before face-to-face classes, in-class face-to-face learning, and completing assignments following the face-to-face sessions, aiming to enhance students' proficiency in mastering Chinese writing, particularly in the acquisition of Chinese chunks. We called this

combination of chunks-based learning approach and blended learning model the "3 Stages, 3 Methods, 4 Sessions" learning model.

Figure 2

"3 Stages, 3 Methods, 4 Sessions" Learning Model



"3 stages, 3 methods, 4 sessions" is a sequential instructional design, where each learning stage generally takes one class session to complete. This instructional design focuses on training students to identify and understand chunks within the learning text and to incorporate the mastered chunks into their writing, thereby ensuring that their writing aligns more closely with the linguistic habits of native Chinese speakers.

The "3 stages" refer to the stages of language skill learning, which include 1) knowledge transfer and exploration, 2) language exercise and reinforcement, and 3) writing skill development. These three stages aim to guide students in gradually deepening their understanding and application of chunks while promoting the enhancement and development of their writing skills.

The "3 learning methods" refer to the combination of the three main instructional approaches adopted in this teaching model: 1) learning with video in the online educational platform Edpuzzle; 2) offline face-to-face collaborative learning; 3) task-based independent learning.

The "4 learning sessions" refer to the four core instructional sessions selected from the BOPPPS teaching model: Bridge-in, Pre-assessment, Participatory Learning, and Post-assessment.

In the Bridge-In stages, students preview the learning text independently and watch the video lesson to learn language points, especially in grammar and chunks. The teacher guides students in identifying and extracting chunks from the text and gives them more sentence examples.

The pre-assessment stage is used to evaluate students' initial mastery of chunks. The Edpuzzle platform offers interactive features, requiring students to complete exercises during the micro-lesson, such as word collocations, chunk translations, and sentence construction with framework structure chunks.

In participatory learning, the instructor guides students in reviewing the online learning content to reinforce chunk retention. Through task-based collaborative learning (such as group discussions, data analysis, and report writing), students practice using chunks in authentic language contexts to enhance their writing skills. In the post-assessment stages, the instructor can flexibly choose online or offline methods to assign personalized writing tasks.

The post-assessment may include short post-summaries or long-form essays, requiring students to apply the learned chunks in their writing. This evaluates their learning outcomes and improves writing fluency and expression skills.

Research Method

This study employs a mixed-methods approach with a classroom action research design. The research was conducted in the Chinese Language and Culture Program at Universitas Padjadjaran, Indonesia. A total of 28 students participated in the study, with 93% being non-Huayi students with a Chinese proficiency level equivalent to HSK 3. The remaining 7% had a Huayi background but reported no prior formal learning experience in Chinese before entering university. As a result, their proficiency level was relatively similar to that of the other students.

To evaluate the effectiveness of the instructional design implemented in this study, we utilized pre-tests and post-tests as evaluation tools. The test consisted of five sections. The first section involved matching vocabulary, while the second required students to combine vocabulary items—both sections aimed at assessing students' mastery of collocations. The third section involved sentence construction to evaluate their ability to apply structural frameworks. The fourth section consisted of translation tasks to measure their grasp of fixed phrases. Finally, the fifth section required students to write a composition based on given topics, which was used to assess the quantity and variety of chunks they incorporated in their writing.

After completing the pre-test, students were evenly divided into two groups: an experimental class and a control class. The experimental class received instruction through a chunks-based blended learning approach, following the “3 stages, 3 methods, 4 sessions” framework. In contrast, the control class also engaged in blended learning; however, their instruction consisted solely of offline face-to-face sessions combined with independent online assignments, without an explicit focus on chunk-based teaching. After five weeks of instruction, students were required to take a post-test to assess learning outcomes.

Findings

The Impact of the “3 Stages, 3 Methods, 4 Sessions” Learning Model on Students Writing Performance

In this study, we compared students’ total scores on the pre-test and post-test to determine whether the implemented learning model impacted their writing performance. The students’ pre-test and post-test scores are presented in Table 1 below:

Table 1
Student's Writing Score in Pre-test and Post-test

	Pre-test Score		**Post-test score**	
	Experimental class	Control class	Experimental class	Control class
N	14	14	14	14
Range	64	62	81	82
Minimum score	14	13	16	15
Maximum score	78	75	97	97
Mean	51.86	51.29	70.07	60.71
Std. Deviation	19.845	18.036	23.949	22.829
Variance	393.824	325.297	573.571	521.143

Based on the data above, both classes showed an improvement in post-test scores. However, the average score of students in the experimental class was higher than that of the control class. The average score in the experimental class was 70.07, which was 10 points higher than the control class average of 60.71. It indicates that the "3 stages, 3 methods, 4 sessions" learning model effectively enhanced students' writing performance, particularly in mastering chunks.

Interestingly, despite the significant improvement between the pre-test and post-test scores, both classes' minimum and maximum post-test scores remained relatively similar. In the pre-test, the minimum scores for the experimental and control classes were 16 and 15, respectively. However, the maximum score in both classes was the same, at 97.

Students' self-discipline and intrinsic motivation are essential for knowledge acquisition and academic performance (Howard et al., 2021; Jung et al., 2017). In addition to appropriate teaching methods, tools, and learning environments, these internal factors significantly influence students' academic success. This study's experimental and control groups included students with low enthusiasm and weaker academic performance. Notably, the experimental group showed no significant improvement among these students.

In contrast, highly motivated students with strong independent learning abilities and clear goals often seek effective strategies independently. In the control group, one such student excelled in face-to-face classes, actively participated in discussions, and remained focused on improving her Chinese proficiency. Despite not receiving specialized instruction in lexical chunks and writing skills, she independently identified effective strategies and achieved strong academic results.

The Accuracy Level of Chunk Usage in Students' Written Compositions

Figure 3

The Accuracy Level Chunk Usage in Student's Writing Test Result

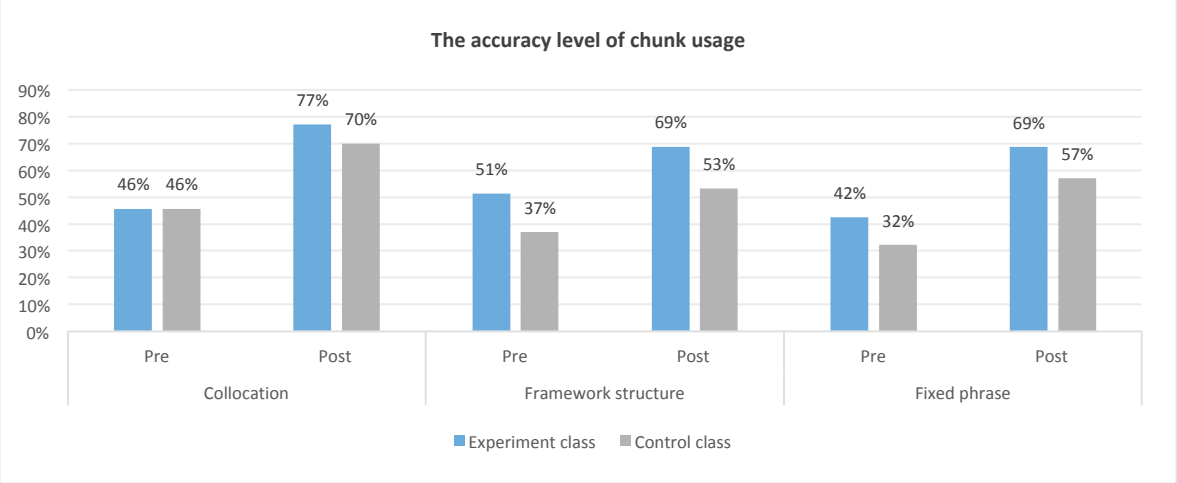


Figure 3 illustrates an improvement in students' chunk usage accuracy in both the experimental and control classes. The most notable enhancement is observed in the accuracy of collocation-type chunks, with the experimental class demonstrating a 31% increase, significantly higher than the 24% increase in the control class.

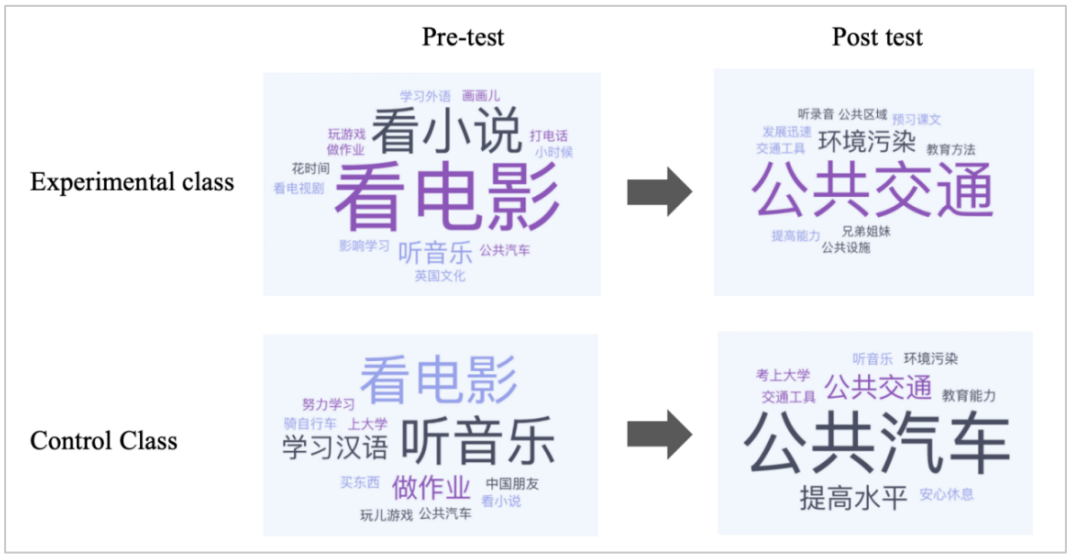
Moreover, the accuracy of framework-structure type chunks in the experimental class increased by 18%, compared to a 16% increase in the control class. Similarly, the accuracy of fixed phrase-type chunks in the experimental class rose by 27%, whereas the control class showed a 25% increase.

Based on the data presented, it can be inferred that students in the experimental class who underwent the "3 stages, 3 methods, 4 stages" exhibited superior chunk usage. This is substantiated by their relatively higher accuracy levels in chunk usage compared to their counterparts in the control class. The most significant increase is in the use of collocations.

The Variety of Chunk Usage in Students' Written Compositions

Figures 4 to 6 illustrate three types of chunks employed by students in their written compositions, with the font size representing the frequency of chunk usage.

Figure 4
Variety of Collocations in Student's Writing Composition



As shown in Figure 4, both the experimental and control classes exhibited a similar level of variation in the pre-test. The experimental class produced 14 variants of collocations, while the control class produced 12 variants. However, the vocabulary used in these collocations was relatively simple.

In contrast, the post-test results revealed a reduction in the variety of collocations, with the experimental class decreasing to 11 variants and the control class to 9. Despite this reduction, the complexity and sophistication of the vocabulary used in the collocations increased. This shift may be attributed to the topics selected by the students. In the pre-test, the majority of students chose the topic " 我的爱好 (My hobbies)" for their compositions. For the post-test, this topic was removed to encourage students to select more challenging topics and utilize the vocabulary they had acquired over the research, which focused on topics related to life and the environment. Consequently, collocations such as 环境污染 (environmental pollution), 交通工具 (means of transportation), and 公共设施 (public facilities) were more frequently employed.

Figure 5
Variety of Structure-Frameworks in Student's Writing Composition

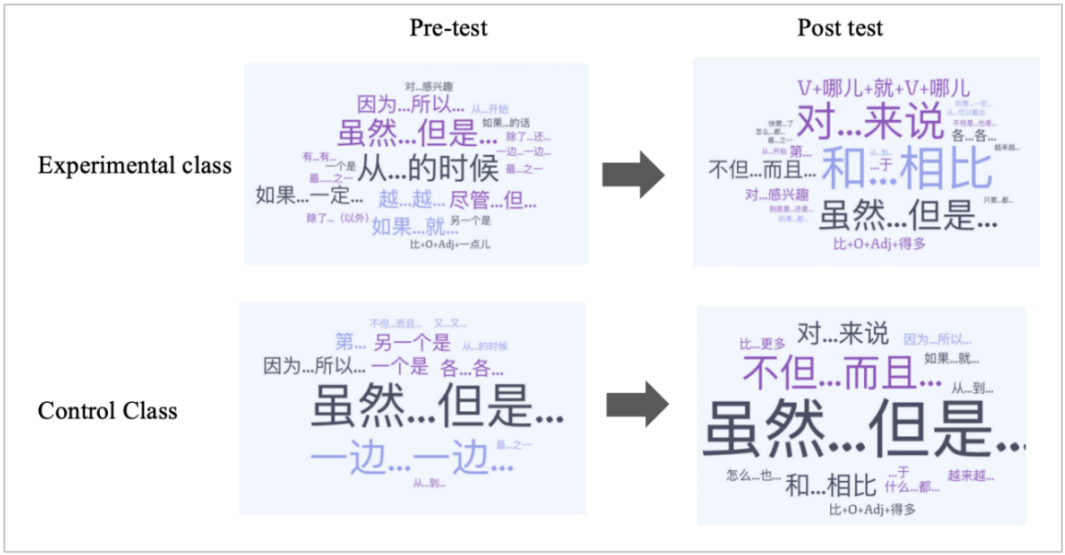


Figure 5 presents that both the pre-test and post-test results reveal a notable variance in the structure-framework chunks used by the experimental and control classes, with the experimental class exhibiting greater quantity and diversity. In the pre-test, students in the experimental class employed 19 variants of chunks (total quantity: 27), which increased to 22 variants (total quantity: 45) in the post-test. In contrast, students in the control class used 12 variants of chunks (total quantity: 21) in the pre-test, with only a marginal increase to 13 variants (total quantity remaining at 21) in the post-test.

Analysis of the pre-test writing compositions from both the experimental and control classes indicates that sentence-level chunks, such as 虽然…但是… (Although... [yet]...) and 因为…所以… (Because... [therefore]...) were the most frequently occurring structure-framework chunks. Additionally, in the post-test, students in the experimental class incorporated chunks studied during the course, such as 和…相比 (compared to…), 对…来说 (from the perspective of…), and 各…各… (each… has its own…), into their writing. While students in the control class also used these chunks, their usage was significantly less frequent compared to that of the experimental class.

Figure 6
Variety of Structure-Frameworks in Student's Writing Composition

Figure 6 presents contrasting results. The experimental class exhibited a reduction in the quantity and variety of chunks used between the pre-test and post-test. Specifically, students in the experimental class employed 7 variants of fixed phrases in the pre-test, but this number decreased to only 4 variants in the post-test. In contrast, students in the control class demonstrated an increase in the variety of fixed phrases used in the post-test compared to the pre-test.

Interjection-fixed phrases, such as 一般来说 (generally speaking) and 总之 (in conclusion), were the most frequently used in students' compositions. However, other fixed phrases, such as Chinese idioms, did not appear in their writing. This was observed despite the instructor's emphasis on the importance of incorporating idioms during the course. This suggests that Indonesian students may still lack the awareness or confidence to utilize idiomatic expressions effectively in their writing exercises.

Discussion

This learning model was designed to address the writing challenges faced by Indonesian students, particularly issues such as incorrect vocabulary combinations, lack of coherence between phrases or sentences, and inappropriate use of fixed phrases. The model aims to enhance students' writing skills by addressing these challenges.

Overall, the implementation of this learning model has achieved its objectives. This is evident from the significant improvement in the post-test scores of students in the experimental class compared to their pre-test scores. Additionally, the average score of the experimental class was higher than that of the control class. These results demonstrate that integrating chunk-based learning into a blended learning framework through the "3 stages, 3 methods, 4 stages" model positively impacts students' writing proficiency (RQ1). This finding aligns with and extends previous research, highlighting the effectiveness of a chunks-based approach in improving writing competence (Hou et al., 2018; Ma, 2014; Shen & Wang, 2014).

To address the issue of incorrect vocabulary combinations (RQ2), students in the experimental class demonstrated significant improvement in combining words effectively. This was evident from their higher accuracy in collocations compared to control class students. Additionally, the combinations of words in their post-test writing compositions were more complex than those in the pre-test. These findings indicate that the learning model effectively addressed the targeted issue.

These findings align with the research of Kennedy (2003) and Li and Lei (2024), which revealed that explicit collocation instruction is effective in second-language learning. Furthermore, collocation instruction supported by online tools, such as Edpuzzle, can enhance its effectiveness. This is consistent with the findings of Basal (2019), who demonstrated that collocation instruction becomes more effective when supported by appropriate online tools, including interactive platforms like Edpuzzle.

This learning model has provided an effective solution to address the issue of incoherence between phrases or sentences (RQ3) —a common challenge students face when using framework structures. Students in the experimental class showed significantly improved accuracy, quantity, and variety of structure-framework chunks compared to those in the control class. These chunks are closely tied to grammar instruction, as highlighted by Sun (2014), who emphasized that vocabulary and grammar teaching cannot be ignored in a chunks-based learning approach. Instead, the most effective method combines them, enabling students to master framework structure chunks while adhering to correct grammar rules.

It is important to note that, in this study, chunks were introduced after students had developed an understanding of vocabulary meanings and grammar usage. This approach not only aids students in memorizing language patterns but also makes it easier for them to recall and apply these chunks in their writing.

To address the issue of inappropriate fixed-phrase usage, this learning model has achieved the desired impact (RQ4). However, it has not yet succeeded in optimizing the use of fixed phrases in students' writing compositions. Although the teaching practice was conducted over five weeks and emphasized fixed-phrase instruction—resulting in improved accuracy in fixed-phrase recognition—students in the experimental class still did not optimally incorporate these phrases into their writing compositions. This finding contrasts with Liao's (2022) research, which found that students were more engaged in using idioms through blended learning. However, it aligns with Liao's perspective that longer teaching practices may be necessary to understand better this learning model's impact on student's ability to use fixed phrases effectively in their writing.

Conclusion

The "3 stages, 3 methods, 4 sessions" learning model integrates a chunks-based approach with blended learning to address challenges Indonesian students face in developing Chinese as a Foreign Language (CFL) writing competence. Specifically, it targets difficulties in combining words effectively, using framework structures to create coherent sentences and paragraphs, and incorporating fixed phrases such as idioms and daily expressions.

Throughout a five-week teaching application, this learning model effectively enhanced students' academic performance in writing. It also improved their ability to identify collocations, framework structures, and fixed phrases. The increased variety of collocations

and framework structures used in their writing compositions contributed to higher-quality and more coherent texts. However, the results revealed that fixed phrases, particularly idiomatic expressions, were not used optimally in students' writing.

The relatively short duration of the research may have been a key factor limiting the optimal use of fixed phrases. Therefore, we recommend extending the implementation of this learning model over a longer period to achieve more significant and comprehensive improvements in students' writing abilities.

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Foreign Loanwords in the Thai Language: A Case Study on the Use of Board Games to Enhance Undergraduate Learning Achievement

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Abstract

This study aims to develop the board game *"Foreign Loanwords in the Thai Language"* designed to enhance undergraduate learning achievement of foreign loanwords in the Thai language. The board game emphasizes interactive and engaging learning, integrating knowledge about the origins, meanings, concepts, and usage of loanwords from various languages such as English, Chinese, Khmer, and Pali-Sanskrit into a creative and challenging format. The researcher meticulously compiled the content of foreign loanwords in the Thai language to design various game activities. Results from using the board game with a sample group of Thai undergraduate students indicated that it effectively increased their learning achievements. The board game also contributed to enjoyable learning and interaction. Participants provided positive feedback on the board game's design and content, further guiding improvements to enhance learning achievement. This board game is one of the modern teaching tools, promoting active learning and effectively facilitating knowledge related to foreign loanwords in the Thai language.

Keywords: board game, foreign loanwords, Thai language, learning achievement

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Introduction

The dynamic nature of the Thai language reflects continuous linguistic evolution, much of which is influenced by foreign loanwords from languages such as English, Chinese, Khmer, and Pali-Sanskrit. These loanwords play a significant role in shaping communication across domains including education, technology, media, and culture. Despite their prevalence, the pedagogical treatment of foreign loanwords at the undergraduate level in Thai language curricula remains limited, often relying on traditional didactic methods that emphasize rote memorization rather than conceptual understanding or linguistic awareness. Consequently, students frequently exhibit low engagement and limited retention of knowledge related to the etymology, semantic transformation, and contextual application of such words (Saengboon, 2021; Wongsuwon, 2019).

In response to the shifting landscape of language education, recent pedagogical approaches advocate for the integration of interactive and student-centered learning tools. Game-based learning (GBL) has emerged as a promising strategy to enhance learner motivation and academic performance, particularly among digital-native undergraduate students (Gee, 2007; Prensky, 2001). Games, by their nature, promote engagement, collaboration, and experiential learning, which are all conducive to deeper cognitive processing. Studies have demonstrated that GBL can foster critical thinking, improve knowledge retention, and increase students' affective involvement in learning (Plass et al., 2015). However, there exists a research gap in the application of such pedagogical innovations to the specific domain of loanwords in Thai, where most instructional methods remain static and teacher-centered.

The lack of innovative instructional materials targeting the understanding of foreign loanwords constitutes a notable void in language education research and practice. While several studies have focused on the sociolinguistic impact and structural integration of loanwords in Thai (Thammasathien, 2020), few have explored how modern instructional media can support students' comprehension of their linguistic origins and functions. Moreover, the conventional perception of loanwords as a dry and technical topic has led to diminished student enthusiasm and engagement. There is a critical need for a didactic tool that is not only content-rich but also motivationally effective and pedagogically sound—addressing both linguistic knowledge and learner-centered engagement.

This study is underpinned by several theoretical frameworks, including constructivist learning theory, which posits that learners construct knowledge through active involvement in meaningful tasks (Piaget, 1970; Vygotsky, 1978). Additionally, the principles of active learning and game-based learning provide a robust foundation for the design of educational interventions that are participatory, problem-based, and cognitively stimulating. According to Bloom's revised taxonomy, engaging learners at higher-order cognitive levels such as analysis, evaluation, and creation is essential for developing transferable knowledge (Anderson & Krathwohl, 2001). These frameworks collectively inform the development of a board game designed to facilitate the understanding of foreign loanwords through play, inquiry, and reflection.

The impetus for this research arose from the researcher's sustained academic interest in foreign loanwords and observed challenges faced by undergraduate students in mastering this content. Students often exhibit difficulties in grasping the linguistic and cultural nuances of loanwords, leading to surface-level understanding and underdeveloped critical perspectives. Drawing from both pedagogical theory and classroom experience, the researcher identified

the potential of educational board games to transform passive learning into active exploration. The current study, therefore, seeks to bridge the gap between theory and practice by designing and evaluating a board game as an instructional innovation. Through this game, it is anticipated that students will not only acquire linguistic knowledge but also develop a more appreciative and analytical view of language change and contact in the Thai context.

Objectives

1. To develop an educational board game *"Foreign Loanwords in the Thai Language"* to enhance undergraduate learning achievement.
2. To examine the effectiveness of the board game in enhancing undergraduate students' learning achievement in the study of foreign loanwords in the Thai language.
3. To analyze the students' satisfaction provided by the *"Foreign Loanwords in the Thai Language"* board game.

Research Hypotheses

1. The board game *"Foreign Loanwords in the Thai Language"* significantly improves undergraduate students' learning achievement regarding foreign loanwords in the Thai language.
2. Undergraduate students have a high level of satisfaction with the design, content, and learning experience provided by the board game.

Methodology

This study employed a Research and Development (R&D) methodology with the objective of developing and evaluating an educational board game titled *"Foreign Loanwords in the Thai Language."* The development of the board game was based on the ADDIE Model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation**.** The methodology was divided into two main phases as follows:

Phase 1: **Development of the Board Game Using the ADDIE Model**

Analysis

In the first stage, a needs analysis was conducted to identify problems and challenges in learning foreign loanwords among undergraduate students. The analysis was carried out through document reviews, curriculum analysis, and in-depth interviews. The target group consisted of 29 undergraduate students from the Faculty of Education, Srinakharinwirot University. The researcher also reviewed academic sources related to loanwords in Thai from English, Chinese, Khmer, and Pali-Sanskrit origins to determine appropriate content for game development.

Design

Based on the analysis, the game structure and learning activities were designed in alignment with the research objectives. The board game included components such as a game board, question cards, challenge cards, player tokens, and a scoring system. Game activities were designed to promote interactive learning, critical thinking, and contextual usage of

loanwords. Storyboarding and content mapping were conducted to ensure coherence between gameplay and learning objectives.

Development

A prototype of the board game was developed and tested. The prototype included both visual and educational components. Experts in Thai language, instructional design, and game-based learning were consulted to validate the content and design of the game. Feedback was used to revise and improve the prototype. A small-scale pilot test was conducted with a few students to evaluate the usability and functionality of the game.

Implementation

The final version of the board game was implemented with a sample of 29 undergraduate students over four weeks. The board game was integrated into regular classroom activities. The researcher acted as a facilitator during gameplay and observed students' engagement, collaboration, and learning behavior.

Evaluation

The evaluation phase included both formative evaluation**,** which was conducted during the development and pilot stages, and summative evaluation, which was conducted after the full implementation. The evaluation tools included:

- A learning achievement test (pre-test and post-test)
- A student satisfaction questionnaire (using a 5-point Likert scale)
- An observation checklist and group interview protocol

Quantitative data were analyzed using descriptive statistics (mean, standard deviation) and inferential statistics (paired sample t-test) to assess the effectiveness of the board game.

Phase 2: Assessment of Learning Achievement and Student Satisfaction

Sample Group

The sample consisted of 29 undergraduate students from the Faculty of Education, Srinakharinwirot University. Purposive sampling was used to select participants who had prior exposure to the concept of foreign loanwords in the Thai language.

Research Instruments

1. The educational board game: *"Foreign Loanwords in the Thai Language"*
2. A 30-item multiple-choice learning achievement test
3. A satisfaction questionnaire based on a 5-point Likert scale
4. Observation checklist and semi-structured interview guide

Data Collection and Analysis

A pre-test was administered before the game-based intervention, and a post-test was conducted after four weeks of game use. After the sessions, students completed the satisfaction questionnaire and participated in group interviews. Quantitative data were

analyzed using SPSS for descriptive and inferential statistics, while qualitative data were analyzed through content analysis to provide deeper insights into students' learning experiences and feedback.

Results

Learning Achievement Results

The comparison between the pre-test and post-test scores of the students is summarized in the following table

Table 1
Comparison of Pre-test and Post-test Scores

Test	N	Mean	S.D.	t	Sig
Pre-Test	29	17.52	2.81	13.62	.000**
Post-Test	29	24.48	2.36		

*Note:*** indicates significance at the .05 level

The results indicate a statistically significant improvement in learning achievement after using the board game. The mean score increased from 17.52 (pre-test) to 24.48 (post-test), and the paired sample t-test showed a significant difference **(**$t(28) = 13.62$**,** $p < .005$), suggesting that the use of the board game had a positive impact on students' knowledge and understanding of foreign loanwords in Thai.

Student Satisfaction Results

The satisfaction questionnaire revealed a high level of student satisfaction with the game. The results are summarized in the table below

Table 2
The Satisfaction of Students

Aspect	Mean	S.D.	Interpretation
Design and attractiveness	4.63	0.49	Very satisfied
Content and relevance	4.51	0.54	Very satisfied
Interactivity and enjoyment	4.68	0.45	Very satisfied
Overall learning experience	4.57	0.48	Very satisfied
Total Satisfaction	4.60	0.49	Very satisfied

The overall mean satisfaction score was 4.60, indicating that students were highly satisfied with the game. The highest satisfaction ratings were for interactivity and enjoyment (mean = 4.68) and design and attractiveness (mean = 4.63). This suggests that the game successfully engaged students and made learning more enjoyable.

Discussion

The results of this study provide strong evidence that the *"Foreign Loanwords in the Thai Language"* board game was effective in improving students' learning achievement and increasing their satisfaction. The significant improvement in post-test scores ($t(28) = 13.62$, p

< .001) indicates that the game successfully enhanced students' understanding of foreign loanwords in Thai, supporting the findings of previous studies that emphasize the effectiveness of game-based learning in promoting cognitive achievement (Anderson & Dill, 2000; Gee, 2003).

The high levels of student satisfaction reported in the questionnaire (mean = 4.60) align with the literature on the benefits of interactive and engaging learning tools. Games, particularly those that encourage active participation and competition, have been found to improve motivation and learning outcomes (Prensky, 2001). In this study, students appreciated the game's design, which made the learning process both enjoyable and educational. These results support the argument that educational games can reduce anxiety and create a positive learning environment (Vogel et al., 2006).

Moreover, the content of the game, which integrated loanwords from multiple languages, helped students gain a more comprehensive understanding of the origins and usages of foreign loanwords. This reflects the findings of Dewaele and Li Wei (2012), who note that understanding the origins of loanwords contributes to deeper language learning and retention.

Conclusion

This research demonstrates that the *"Foreign Loanwords in the Thai Language"* board game is an effective tool for enhancing undergraduate students' learning achievement in the Thai language, particularly in understanding foreign loanwords. The significant improvement in learning outcomes, as indicated by the pre-test and post-test comparison, suggests that game-based learning can play an important role in facilitating knowledge acquisition.

Furthermore, the high levels of satisfaction expressed by the students reflect the game's ability to engage and motivate learners. These findings contribute to the growing body of research on the benefits of using game-based learning in higher education (Gee, 2003; Prensky, 2001). Future research could explore the long-term effects of game-based learning on language retention and investigate other aspects of student engagement, such as collaboration and critical thinking.

Ultimately, the *"Foreign Loanwords in the Thai Language"* board game is a promising educational tool that not only enhances learning but also makes the process more enjoyable, fostering an interactive and student-centered learning environment.

Recommendations for Future Research

Based on the findings of this study, several recommendations for future research are proposed to further explore the potential of game-based learning in the context of language education:

1. **Long-term Impact of Game-Based Learning**
   This study focused on short-term improvements in learning achievement and student satisfaction. Future research could investigate the long-term effects of using board games in language learning, particularly whether the knowledge gained from such interactive methods is retained over time. Longitudinal studies could be conducted to assess the sustained impact of game-based learning on language proficiency and retention of foreign loanwords.

2. **Comparative Studies with Other Learning Tools**
   Further research could compare the effectiveness of board games with other traditional or modern learning tools, such as digital games, mobile apps, or traditional textbook-based learning, in promoting the understanding of foreign loanwords. A comparative analysis could provide deeper insights into the advantages and limitations of each learning tool and guide educators in selecting the most effective method for different learning contexts.
3. **Exploring Collaborative Learning in Game-Based Environments**
   This study primarily focused on individual learning outcomes. Future studies could explore the role of collaboration and peer interaction in game-based learning environments. Research could examine how cooperative game mechanics, where students work together to solve problems, affect both the learning achievement and the social dynamics of the classroom. Collaborative game-based learning might enhance students' communication skills and foster a more engaging learning environment.
4. **Incorporating Different Language Groups**
   While this study focused on foreign loanwords from English, Chinese, Khmer, and Pali-Sanskrit, future research could expand the scope to include loanwords from other languages that have influenced Thai. Researchers could examine how the inclusion of a wider range of languages affects students' understanding of the complexities of loanwords and their use in modern Thai. This could also allow for comparative studies between loanwords from various linguistic backgrounds.
5. **Exploring the Role of Gamification in Motivation and Engagement**
   Future research could explore the specific elements of gamification (such as rewards, levels, and challenges) that contribute to students' motivation and engagement in learning. By conducting experimental studies with different gamification strategies, researchers could identify which aspects most effectively encourage students to engage with the learning material and improve their performance in language acquisition.
6. **Cultural Contexts and Adaptation**
   The current study focused on Thai undergraduate students. Future studies could explore how game-based learning is received and adapted in different cultural contexts. Research could examine how educational games, particularly those involving loanwords, are perceived by students from different countries and languages, and how cultural factors influence their learning outcomes.

By addressing these areas, future research could contribute to a deeper understanding of how game-based learning can be optimized and applied across various educational settings, providing valuable insights for educators and instructional designers in the field of language education.

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Strategies for Improving Quality of Life and Promoting Peace in Papua Through Literacy, Education, and Peacebuilding

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Abstract

Eliminating illiteracy and the lack of numerate literacy among children and students is critical to improving quality of life and promoting social stability. In this regard, Indonesian authorities have prioritized the goal of achieving a literate and numerate population by 2030. This paper examines strategies to improve quality of life and promote peace through literacy and education initiatives in Papua. Using a qualitative research approach, this study involved students, teachers and the coordinator of the Pre-service Teacher Education program in Papua as key participants. The research findings revealed that literacy and education barriers in Papua are derived from the limited human resources, geographical barriers, cultural diversity and inadequate adaptation strategies. To address these issues, the paper argues a structured framework with short-term, medium-term and long-term strategies to improve literacy and education outcomes. The sustainable progress of literacy and peace requires active collaboration among various stakeholders, including Government institutions, NGOs, religion institutions such as Churches and Papuan communities. Efforts undertaken in a well-coordinated among all these groups are essential to address the disparities in education and foster literate and peaceful societies in Papua. This paper underscores the importance of a comprehensive and multi-dimensional approach to education reform and social harmony in the region.

Keywords: education, literacy development, peace, quality of life

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Introduction

Reading and writing are skill-based approaches to increasing access to information. With these abilities, someone could gain knowledge and skills in various fields, thereby improving the quality of life, family, and even country. The Literacy Rate Letters (AMH), or the number of illiterates in Indonesia, is the indicator used to measure the population's reading and writing abilities. AMH was used to size its efficient basic education system for ten years. Indicators were used frequently as a proxy for measuring social and economic progress (BAPPENAS, 2020). The use of AMH can be increased to meet current needs. AMH should be able to expand reading, writing, and arithmetic for elementary schools. However, the use of AMH has affected life expectancy while also significantly impacting the number of poor people. The lower the number of poor people, the higher the literacy rate and life expectancy.

Literacy is a critical component of the fundamental right to education and a necessary foundation for independent learning. It is also essential to achieving the Sustainable Development Goals because it is a major driver of socioeconomic transformation (SDGs). Literacy and numeracy must play a critical role in fostering peaceful, just, inclusive, and sustainable societies and addressing global challenges (Hanemann, 2022). Literacy is often associated with reading and writing. However, literacy is more than that. Literacy includes reading, writing, listening, and speaking. However, because the object under consideration has many limitations, this analysis will focus on writing and reading. Literacy is the ability to obtain information, and it refers to a specific activity that involves gathering, processing, and communicating information. These three activities are linked inextricably to reading and writing abilities. As a side effect, literacy is one of the basic human needs that must be met, including improving one's quality of life. Increasing the literacy ability of the population will have a strong multiplier effect on development because of the impact on empowerment and the improvement of quality of life in society, which will affect the population's participation in employment, the reduction of poverty, and other factors. As a result, there is no doubt that AMH is one of the target indicators of the social pillars of the Sustainable development goals (SDG), namely target 4.6. Implications of specifying AMH as an SDGs indicator in 2030 and the public having good literacy and numeracy ability.

Literacy extends far beyond linguistic skills; it is a fundamental force that shapes all aspects of life and spans multiple fields of knowledge. More than just reading and writing, literacy serves as a catalyst for development, peace, education, and overall quality of life. It fosters understanding, tolerance, and effective communication, which are crucial in diverse societies like Indonesia. By equipping individuals with the ability to analyze complex issues, literacy plays a key role in conflict resolution through meaningful dialogue and negotiation. Moreover, as the cornerstone of education, literacy enables individuals to acquire, process, and apply knowledge across disciplines, fueling scientific discovery, artistic creativity, technological advancements, and expertise in various domains. Beyond academics, it enhances quality of life by expanding access to information, opportunities, and resources while driving socioeconomic progress by empowering individuals to make informed decisions about health, careers, and overall well-being. Ultimately, recognizing literacy as a universal asset highlights its transformative power in building harmonious societies, ensuring accessible education, and elevating human potential.

However, the increase in literacy education in Indonesia has not been evenly distributed, particularly in Papua. This educational disparity is reflected in the number of university students who struggle with reading and writing. Even some have difficulty spelling a word in

a sentence and comprehending the meaning and context of a text. This literacy difficulty impacts adapting, stereotypes, low student self-confidence, receiving unsatisfactory grades, and frequently falling behind in lessons, so it is not uncommon to graduate late. Students who continue their education are expected to improve the quality of life for people in their communities.

Papua Island is an island east of Indonesia that is the world's second-largest island (after Greenland) and is located north of Australia (Gischa, 2022). The island was initially divided into two regions, Papua Province and West Papua Province. The House of Representatives then approved three areas due to the expansion of the Papua Province on June 30, 2022, namely the Provinces of Papua Mountains, South Papua Province, and South Papua Province, bringing the total provinces on the island of Papua to five. Papua's geographical location, which is quite far from the state government's center, causes Papua to fall behind frequently in areas such as education, economy, and health. In terms of education, Papua still has a long way to go before it can compete with the central and western regions of Indonesia. According to the Central Bureau of Statistics, the illiteracy rate in Papua reached 22% in 2020 and decreased slightly to 21.11% in 2021. Education and literacy levels have a profound impact on the economy, health, and overall quality of life. Therefore, enhancing literacy is a crucial step toward improving education and elevating the quality of life in Papua.

The urgency of addressing literacy challenges in Papua, particularly in reading and writing, stems from the profound impact on education, economy, and health. The disparity in literacy education in Papua, highlighted by the struggle of university students with essential reading and writing skills, not only hampers personal development but also perpetuates stereotypes, low self-confidence, and academic underperformance. This urgent issue not only affects individual students but also has broader implications for the overall development of Papua. The looming threat of a 22% illiteracy rate in 2020 and 21.11% in 2021 underscores the pressing need to swiftly bridge the educational gap and enhance literacy skills in the region. Failing to address this urgency risks perpetuating socioeconomic disparities and hindering progress towards the Sustainable Development Goals (SDGs), mainly target 4.6.

The gap in literacy education in Papua, as revealed by the struggle of university students with essential reading and writing, points to a significant educational disparity that needs immediate attention. This gap is reflected in academic performance and extends to broader societal challenges such as adapting to new environments, reinforcing stereotypes, and impeding personal and communal progress. The geographical remoteness of Papua from the central government exacerbates this gap, contributing to disparities in education, economy, and health. While literacy is recognized as a fundamental human need and a key driver for socio-economic development, the gap in literacy education persists, hindering the realization of the full potential of individuals and communities in Papua.

The novelty of the situation lies in the unique geographical and socioeconomic context of Papua, where the struggle for literacy is intricately linked to the island's remoteness and historical divisions. The expansion of Papua into six provinces in 2024 such as the provinces of Papua, West Papua, South Papua, Central Papua, Highlands Papua, and Southwest Papua, coupled with the staggering illiteracy rates, presents a fresh and urgent challenge that demands innovative solutions. Focusing on reading and writing skills, particularly in university education, unveils a distinct aspect of the literacy issue. By emphasizing the need for literacy improvements in the context of sustainable development and the SDGs, this article contributes a fresh perspective to the discourse on literacy education. The call for

action in enhancing literacy to uplift the quality of life in Papua brings forth a novel approach to address the unique challenges faced by this region in Indonesia.

Method

In this study, the method used is qualitative with a phenomenological approach. Phenomenological research seeks to explore, understand and interpret the meaning of phenomena, events, and their relationship with ordinary people in certain situations. The informants who were researched and used as data sources were students from Papua, teachers in Papua, and Coordinators of the Teacher Professional Education Program. Informant selection techniques in research using the Snowball Sampling model. Snowball sampling describes informants, starting from a small number and gradually becoming large until the results of something are known and saturated. This technique is also used to determine the number of informants because when the data and results are saturated in qualitative research, the taking of informants can be stopped.

Data collection techniques were carried out through interviews and observation, and a literature study where the types of interviews were conducted using planned and unstructured interviews that had been made interview guidelines but did not use a standard format or order. It is hoped that the informant will provide explanations or opinions that are just scrolling following the situation and experiences that the informant has experienced. The researcher also used non-participant observation to obtain documentation and behavior around the informants to strengthen the data. Source and method triangulation were carried out to ensure the credibility of the data obtained from informants.

The data analysis technique uses Miles and Huberman's Flow model (Miles et al., 2014), which has three activities: data reduction, data presentation, and conclusion. Data reduction is a selection process that simplifies, abstracts and transforms initial data from written records in the field. This data reduction takes place continuously during qualitative research. Presenting the data at this stage, the researcher develops a structured description of the information to conclude. The researcher concludes to draw conclusions and verify by looking for the meaning of each symptom he gets from the field, noting the regularities and configurations that may exist, the causal flow of phenomena, and proportions.

Findings and Discussion

Analysis of the Issue

The fundamental idea of improving human relations in society through education is contained in the universal education program of Comenius, a Czech philosopher of education and theologian who can be considered the founder of modern educational science, who said that if all human beings were taught about the cosmos from the beginning, they would be truly wise. The world would be entirely of order, light and peace (Seitz, 2004). This point is also supported by the UNESCO Commission on Education for the 21st Century, which should give credence to education's fundamentally positive and civilizing power. The UNESCO Commission revealed that education is one of the most important means of furthering the development of humanity in a better way and with greater harmony. With its help, poverty, exclusion, ignorance, oppression, conflict and war can be reduced (Seitz, 2004). Education promotes social peace, contributes to overcoming social inequalities and is the key to equal

social participation. This is still relevant and one of the basic legitimizing formulas for all education policies, including national and international policies.

However, in reality, many regions in the world ignore how education promotes social equality, which has the potential to create conflict in society. Many of them forget that education is an essential element of peace. This is the case in Papua, where decades of conflict and violence remain undeniable to this day. Unfortunately, various studies have shown that the strategies implemented by the government in the form of Special Autonomy, infrastructure development, and regional expansion have not been able to overcome the complexity of welfare problems. The strategy has also not overcome the stigma that is often directed at indigenous Papuans, which is "poor, sick, and uneducated"(Elisabeth, 2021), obviously in overcoming this stigmatization and improving the quality of people in Papua, namely education.

Several interconnected factors cause literacy problems among Papuan students. Students in Indonesia are required to complete eight years of early education, consisting of six years in elementary school and two years in kindergarten. In contrast, most Papuan students receive only 2–4 years of elementary education, contributing to low literacy rates. Literacy encompasses not just reading and writing but also the reasons people engage with texts in daily life. According to Barton and Hamilton (Perry, 2012), literacy practices involve more than interacting with text; they are shaped by values, attitudes, emotions, and social relationships. Since literacy is inherently social, it should be understood as a communal practice rather than an individual skill.

Elementary schools in Papua classify students based on age and alphabet recognition. Some students begin elementary school at age ten or older and are often placed directly in higher grades, such as grade 5, to match their age group. Additionally, teachers sometimes advance students by three to four grade levels if they can recognize and pronounce the alphabet, even if they cannot read or comprehend text. However, Law No. 20 of 2003 on the National Education System mandates six years of elementary education and three years of junior high school. The purpose of elementary education is to develop critical thinking, introduce basic science, technology, and communication skills, and ensure students acquire fundamental literacy and numeracy. Therefore, completing only 2–4 years of elementary school is insufficient and ineffective in achieving these educational goals.

Students starting school at ten are influenced by the school's distance and geographic location. Students who begin primary school at ten do so due to the distance between residential areas and the school. As a result, some students must live away from home as early as elementary school, either staying with relatives or being entrusted to acquaintances near their school. This situation often causes concern among parents, as their children enter boarding schools or live under the care of others at a young age. Several research findings (Badan Pusat Statistik Provinsi Papua, 2021; Nisa & Samputra, 2020; Sandila, 2020) support this condition, indicating that factors affecting educational inequality between regions in Indonesia, particularly in Papua, include the low average length of schooling for residents in several areas, which is closely related to the still low level of student continuity to a higher level of education. Other factors driving educational inequality in West Papua Province include limited school availability, the high cost of higher education enrollment, and parental expectations for children to work before completing primary education.

In addition to geographical challenges, Papua faces a severe shortage of qualified teachers. Although the government claims to have addressed this issue, the distribution remains uneven, with most teachers concentrated in urban areas like Jayapura, leaving rural regions understaffed. Consequently, teachers in remote areas bear a heavier workload. Many of these educators lack formal training, as some are only elementary or junior high school graduates who volunteer to teach in their communities. Moreover, underqualified teachers are often hired, and the primary language of instruction in schools is the local language. As a result, many students struggle to understand Indonesian, making it difficult for them to grasp the meaning of words and sentences at the elementary level.

Plan to Change the Issue

As a solution offered to solve the problems described, several things must be fixed in the short, medium, and long term.

Short-Term

We can provide special treatment for Papua students in the short term. This particular treatment can be given to introduce and teach literacy, beginning with the basics. Basic literacy can be accomplished by developing metacognitive abilities such as monitoring the process of understanding text at three stages of learning: before, when, and after reading, and using multimodal text during education. Use tools such as graphic organizers and pictures for visualization; develop responses to different questions; make inquiries; and perform analysis, synthesis, evaluation, and reflection on the text. Where possible, use flexible grouping to promote learning. Some appropriate methods with Papuan students are flexible grouping, which aims to determine the meaning of words and phrases used in a text, and analyzing how a text uses structure to emphasize key points or advance an explanation or analysis. This Flexible Grouping is designed to assist all students in learning how to carry out their learning objectives. Students are given a list of standards they are expected to meet at the start of the semester and the freedom to choose based on their interests. However, learning objectives address thinking skills such as historians and reading and writing skills. Students are asked to look at grassroots lessons that will improve problem-solving and other skills they face during each meeting. After that, students conduct independent research and use in-class resources to direct their study of concepts, terms, and skills.

In unanimous reading groups, students read aloud the text they chose the previous week. The students dissect the text into four domains: decoding, social processes, comprehension, and genre. When anyone in the group has a new question, clarification, or understanding, they "break" or pause as they read. Students in study groups choose to concentrate on vocabulary. They choose vocabulary that they believe is important to know and define it using resources and prior knowledge. Other study groups use the resources in class to pursue individual questions about the topic. Students work on personal goals during independent work time. Students have the same options in this lesson as in their courses. The university places a high value on providing resources that allow students to think for themselves and develop solutions. Thus, students can choose their focus within the curriculum and standards framework. They can choose what they will work on and when they will work on it to ensure that it is most beneficial to their own needs.

Reading aloud is one method teachers who have taught in Papua can use to increase student literacy. Prior vocabulary-focused research in reading aloud practice, typically conducted in

preschool or early elementary school. This finding demonstrates that explicitly teaching vocabulary as part of reading-aloud activities benefits students' vocabulary development (Baker et al., 2013; Fien et al., 2011). Reading aloud can be practised in schools by providing exciting books, particularly picture books and genres of interest to students. Reading aloud can result in interactions such as discussions with fellow students, writing, and painting. Even if the language of instruction is regional or local, students' imagination, curiosity, and reasoning power will be awakened in addition to their vocabulary.

Furthermore, Papuan students who migrate to other areas are granted matriculation or pre-university programs. A matriculation or pre-university program is a program that provides basic language learning materials and adaptability to classroom lessons. Matriculation accommodates efforts to equalize the abilities of new students with varying basic skills in a class. According to several studies (Afaria, 2020; Sahetapy, 2018), matriculation influences new students' adaptation. Students learn about the environment, language, habits, norms, and rules and how to interact in the intended area during enrollment.

Medium-Term

They are increasing the number of teachers who genuinely want to serve and improve education in Papua. The government has established a volunteer teaching program for people outside Papua. However, these volunteers stay in Papua for 2-5 years. The same happened when the application period was opened for civil servants and teachers in Papua. Many teachers see Papua as a staging post, and once accepted, they will apply to move to another island considered more advanced after 2-5 years. As a result, the government should strengthen indigenous Papuans' commitment and determination. Aside from that, teachers should be paid more for volunteers from outside Papua and Papuan teachers. The government cannot compare teacher salaries across the country to those in Papua because the cost of living and the resources required are both very high in Papua.

Furthermore, if native Papuans work as teachers there, they will have cultural ties, be more readily accepted by society, and be able to recognize children's situations. Teachers who want to dedicate their lives to Papua frequently only have elementary, junior high, and high school certificates. As a result, regardless of age, they must be given the opportunity and facilities to continue their studies because we must recognize dedicated teachers.

Teachers' competence and professionalism must be enhanced for those who have served and are following educational qualifications. To improve a teacher's creativity and professionalism, the Ministry of Education, through the Directorate General of Teachers and Education Personnel, has developed a program in PPG. Teachers have had opportunities for PPG, but in reality, many Papua teachers have registered, perhaps 50-100 teachers, and only 3-5 people pass to enter PPG positions. PPG's following failure is because many teachers did not pass the substantive test. Previously, it was stated that it was impossible to generalize all teachers' knowledge, but the government had forgotten that Papua still needed to be considered. As a result, before taking PPG, teachers in Papua should be given preparation training. Special programs can be developed if necessary to equalize other teachers in Indonesia. This program must be implemented consistently and continuously to provide a meeting place for all competent Indonesian teachers.

To support local teacher competency in Papua, the government must improve its ability to identify, recruit, and place skilled teachers within and outside Papua. The recruitment of these

professional teachers should ideally include a knowledge transfer process so that they can share learning methods or other best practices with local teachers. Experienced teachers should also be hired on a contract basis, but with incentives commensurate with their performance and considering the risks they take. Several similar programs have been running successfully in various districts and cities throughout Papua and can serve as models. These include the Gadjah Mada University Papua Task Force's Remote Area Mobilization Teachers initiative, the Indonesia Teaching Movement, and, most recently, the Ministry of Education's Mobilizing Teachers initiative.

Long-Term

Teachers who have completed teacher professional education are expected to be able to improve learning structures, change approaches, and identify which characteristics and models to implement. Teachers in Papua should also be trained to stimulate teacher creativity and work together to solve problems in schools that are specific to the culture and environment. It must be instilled that the curriculum does not know the students but that the teacher is aware of and understands their circumstances and needs.

To improve long-term human resource competence, the government should encourage the younger generation to pursue bachelor's, master's, and doctoral degrees through effective scholarships. Scholarships have been provided to improve the quality of teachers and prospective teachers. However, the implementation of these various scholarship programs is not well monitored. The local government is only involved in the budgeting and disbursing of scholarship funds but does not monitor or evaluate scholarship recipients. The provincial government does not yet have a clear picture of Papua's strategic human resource mapping. As a result, scholarship recipients are given no direction and can do whatever they want while receiving scholarships. It is not uncommon for slogans to appear claiming that only 10 of 100 scholarship recipients return home with diplomas and only five return to serve in developing their region. As a result, reviewing the scholarship awarding process and implementation is necessary. Other approaches that encourage and motivate scholarship recipients to complete their studies well, on time, and return home to help build their hometown must be used in addition to sanctions.

Furthermore, when imposing sanctions, the government may impose a penalty if students fail to complete their studies by the deadline, such as a refund of more than what was received or other measures. This has some advantages and disadvantages because some Papuan students want something special for themselves. This specialization can be offered in addition to the one year of pre-university or matriculation described in the short-term strategy above.

In Papua, infrastructure equity must be implemented immediately because the excellent infrastructure will make access to education, health care, and the economy much easier. Furthermore, as infrastructure becomes available, school facilities and infrastructure will increase. Full facilities and infrastructure, a comfortable environment, and easy access to education will undoubtedly eliminate illiteracy and improve the quality of life for the Papuans.

Other factors that contribute to an unfavourable educational climate, such as threats to the safety and security of Papua's teachers and students, must not be overlooked by the government. Acts of violence and conflict in various regions of Papua have never stopped but have increased and spread evenly - from Maybrat in West Papua to Intan Jaya in Papua.

Several studies have found that many basic service facilities, including education, have become inactive and non-functional due to social conflict. The state can be present in the imagination and reality of the Papuan people's lives through the steps and considerations outlined above to strengthen education services in Papua.

Conclusion

Literacy is not only limited to the linguistic field, but covers all aspects of human life including peace and improving the quality of human life. Therefore, the eradication of illiteracy and low literacy skills among children and students from Papua Island must be resolved immediately in line with Indonesia's efforts to meet the target of a society that has good literacy and numeracy skills by 2030. As solutions are offered to overcome the problems discussed, there are several points that should be addressed either in short, medium or long-term. The measures proposed require the involvement of various parties, including the government, non-governmental organizations (NGOs), and the Church, as most of Indonesia's population is Protestant Christian and Catholic. In addition, the Papuan people must have a strong desire and determination to change the quality of education which has an impact on the quality of life of the community. No matter how hard the government tries, if the Papuan people have no desire, all efforts will be useless and the people of Papua will remain behind in all fields.

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An AI-Driven Framework for Teaching Industrial Design Students Using a Generate-and-Evaluate Approach Within the Double Diamond Model

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Abstract

As AI technologies increasingly influence the design industry, there is a growing need to equip design students with skills in generative AI (GenAI) and machine learning (ML) to stay competitive. This paper presents an AI-driven framework for teaching industrial design students using a generate-and-evaluate approach within the double diamond model. This framework integrates GenAI and ML to enhance creativity, analytical skills, and brand-focused thinking. Students first use Stable Diffusion, a GenAI model, to explore diverse car design concepts inspired by Porsche's aesthetics, engaging in a divergent phase that expands creative possibilities. To manage the large volume of designs, students then apply classification models with Weka, an ML tools, in the convergent phase to filter and select options aligned with Porsche's brand identity. This evaluation step teaches students to critically assess the relevance and consistency of AI-generated results, reinforcing the double diamond model's balance between exploration and refinement. The framework offers key insights into design education. First, it bridges AI—including generative and ML classification—with traditional design processes, making AI more accessible to students. Second, the structured generate-and-evaluate approach aligns with students' natural design inclinations, fostering higher engagement and acceptance of AI as a valuable tool. Finally, the framework provides a scalable model for broader design education, adaptable across various design disciplines, supporting a technology-rich curriculum. By blending innovative technology with established design methods, this study highlights an effective approach to preparing students for industry demands through experiential learning with AI tools.

Keywords: generative artificial intelligence, machine learning, double diamond model, AI-driven design process, industrial design education

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Introduction

Artificial intelligence (AI) has emerged as a transformative force in industrial design, influencing concept generation, evaluation, and product development. However, many industrial design curricula lack a structured framework for integrating AI into the traditional design process. The Double Diamond Model, widely used in design thinking, provides a structured approach, but its application of AI remains fragmented. Existing AI-driven studies focus on the later stages of design, Develop and Deliver, while AI's role in Discover and Define is underutilized. Addressing this gap is crucial for enhancing industrial design education.

Furthermore, while designers are beginning to adopt AI tools, many students and educators struggle to integrate these technologies effectively. The lack of a systematic, pedagogically sound approach leads to inconsistent learning outcomes. This paper aims to resolve this by presenting a cohesive framework that not only enhances creativity but also cultivates critical evaluation and decision-making skills, crucial for future industrial designers.

Studies on AI-assisted design often emphasize the role of generative artificial intelligence (GenAI) in concept ideation while neglecting systematic evaluation methods. As a result, students and educators may struggle to assess the quality and relevance of AI-generated outputs, leading to inconsistent design outcomes. Additionally, existing adaptations of the Double Diamond Model incorporate AI unevenly, with most applications focusing on later-stage refinement rather than early-stage research and problem framing. Consequently, the lack of structured AI training in design programs exacerbates student uncertainty, leaving them unsure of how to use AI effectively throughout the entire design workflow.

The Generate-and-Evaluate Approach directly addresses this gap by providing a structured methodology that balances AI-driven creativity with systematic evaluation. By integrating creative generation and analytical refinement into an iterative cycle, this approach ensures that AI-generated solutions are not only diverse but also strategically validated before selection. In AI-driven design processes, GenAI rapidly produces multiple alternatives, expanding the design space. However, without an evaluation mechanism, this flood of options can lead to decision paralysis and inconsistency. To counter this, machine learning (ML) models and rule-based evaluation techniques help assess the quality, relevance, and feasibility of AI-generated concepts. By embedding both exploration and validation into the design process, the Generate-and-Evaluate Approach enhances AI's role from merely producing ideas to actively shaping high-quality, industry-relevant design outcomes.

The paper proposes a new AI-enhanced framework that addresses the gap by integrating the Generate-and-Evaluate Approach into the Double Diamond Model for industrial design students by synthesizing insights from prior research on AI applications within the Double Diamond Model to develop a structured Generate-and-Evaluate AI-enhanced framework for design education.

AI Integration in Design: Double Diamond Model and Generate-and-Evaluate Approach

Double Diamond Design Process

The Double Diamond Model, developed by the UK Design Council, is a widely adopted framework for structured design processes, consisting of four phases: Discover, Define, Develop, and Deliver. It facilitates a balance between divergent exploration and convergent refinement, ensuring that design solutions are rooted in deep user insights and iterative prototyping. However, traditional applications of the model have largely relied on human-centered methodologies, with limited integration of AI.

Recent research has highlighted the uneven distribution of adoption of AI during the double diamond phase. Although AI is increasingly being used at the development and delivery stages for concept improvement, prototype and production (Lee et al., 2025), its role in exploration and definition is still not widely known. This limitation prevented AI from fully supporting early research, problem definition, and creative direction, where it could improve trend analysis, synthesis of user insight, and synthesis of ideas.

To address this limitation, several adaptations of the Double Diamond Model have incorporated AI or interdisciplinary strategies to varying degrees. Viviani et al. (2024) developed the Interdisciplinary Double Diamond, integrating design research and engineering methodologies to drive urban transport product innovation, though its primary focus is not on AI applications. While these adaptations contribute to refining design thinking methodologies, few fully integrate both generative and evaluative AI tools across all four phases of the Double Diamond Model.

Generate-and-Evaluate Design Approach

To address the gaps in AI integration, researchers have explored the Generate-and-Evaluate Approach, which combines AI-driven ideation with structured evaluation mechanisms. This approach is particularly relevant in industrial design education, where students benefit from both expansive creativity and critical assessment skills to refine their work. In the field of industrial design, GenAI tools such as ChatGPT, DALL·E, Midjourney, and Vizcom can effectively generate multiple design solutions in a short time. Tang et al. (2024) identify the distinction between Pre-AI (divergent) and Post-AI (convergent) design phases, and how AI tools assist in ideation, visualization, and iterative refinement. These tools expand the divergent exploration phase by allowing designers to quickly visualize multiple aesthetic, functional, and material variations. However, without systematic evaluation methods, AI-generated outputs risk being unfiltered, misaligned with brand identity, or impractical for manufacturing.

In contrast, ML classification, such as Weka and Orange, has potential to accurately classify AI-generated concepts based on predefined criteria to facilitate the convergent selection process. The first author has co-authored several related papers that demonstrate how GenAI can be systematically integrated with ML classification to refine design outcomes. For example, Wang and Chen (2025) employ Stable Diffusion to generate BMW electric vehicle designs, allowing AI to explore multiple styling variations within the brand's identity. To assess these designs, they use Weka classification with PHOG feature extraction, ensuring that AI-generated outputs maintain a balance between brand typicality and novelty. Another

example is that Wang and Lu (2025) apply the Generate-and-Evaluate Approach to classify AI-generated SUV designs into four semantic categories: aggressive, sporty, clean, and off-road. AI tools are first used to create diverse SUV designs, which are then evaluated using Random Forest models in Weka to determine their alignment with predefined styling semantics. These studies highlight how GenAI can expand creative possibilities, while ML provides a quantifiable evaluation method to guide designers in selecting the most relevant concepts.

Building on this foundation, the integration of AI-generated exploration and ML-driven assessment ensures that students not only engage in freethinking but also develop structured decision-making capabilities when evaluating AI output. Despite these benefits, the implementation of the Generate-and-Evaluate Approach within the Double Diamond Model remains underdeveloped. Recognizing this gap, several studies emphasize the need for structured AI integration in design workflows. Lai et al. (2023) explored how GenAI impacts design workflows, highlighting the necessity of structured AI integration to prevent AI from being used in an ad-hoc manner. Similarly, Lyu et al. (2023) examined the speculative potential of AI-driven co-design processes, reinforcing the importance of a systematic framework that embeds AI tools across all design phases.

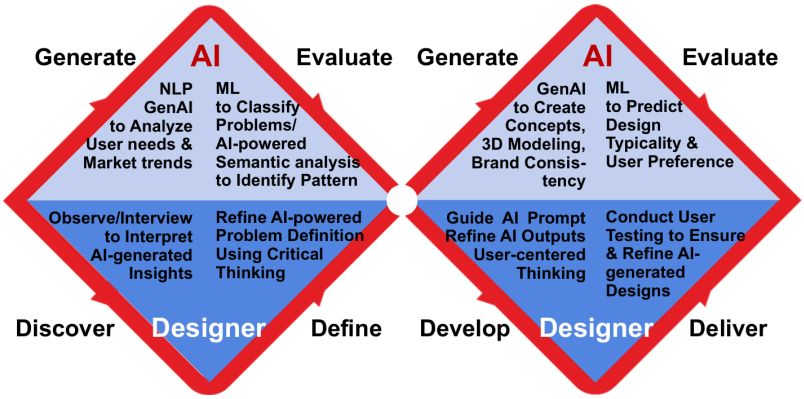
For AI-driven industrial design education, we argue that a well-structured framework is needed that:

- Integrates AI tools across all Double Diamond phases, from research & ideation (Discover, Define) to refinement & implementation (Develop, Deliver), and
- Combines GenAI (Stable Diffusion, Midjourney) with evaluative AI (ML classifiers, feature extraction tools like Weka) for structured decision-making.

Proposed AI-Driven Design Framework

This study proposes an AI-driven framework for teaching industrial design students using the Generate-and-Evaluate Approach with the Double Diamond Model, as shown in Figure 1. In the framework, the Discover and Develop phases align with Generate, where human designers leverage GenAI to explore possibilities. The Define and Deliver phases correspond to Evaluate, where Machine Learning (ML) techniques assist designers in refining, filtering, and validating design solutions. This framework establishes a co-creative partnership between AI and design students, enhancing both divergent ideation and convergent decision-making.

Figure 1
Framework for Teaching AI-Driven Design



As shown in Table 1, the framework integrates GenAI and ML into the Double Diamond Model, thereby structuring AI-assisted ideas and assessments in design education. Following a Generate-and-Evaluate approach, GenAI promotes creative exploration in the phases of discovery and development, while ML enables structured refinement in the phases of definition and delivery. By detailing the use of AI and ML tools at each stage, the framework explains how technology improves the design process and preserves the essential role of human designers in the refinement, validation and contextualization of AI-generated outputs.

As AI evolves, the framework is adaptable, enabling the design process to be reconfigured to reflect emerging technological advances. As part of the evolving Double Diamond model, it shows how AI contributes to problem discovery, designing challenges, exploring solutions, and evaluating concepts, and strengthens the balance between AI-driven efficiency and human creativity in design education.

To effectively implement this framework, the teaching guidelines emphasize the integration of AI at all stages rather than limiting its use to prototypes. Students are encouraged to use AI in problem construction and refinement to ensure a holistic design process based on AI. Furthermore, instructors should guide students to critically assess AI outputs in order to maintain a balance between creativity generated by AI and human judgement. Finally, AI feedback loops should be incorporated through iterative development and evaluation cycles, so that students can continuously refine ideas based on structured feedback and evaluation.

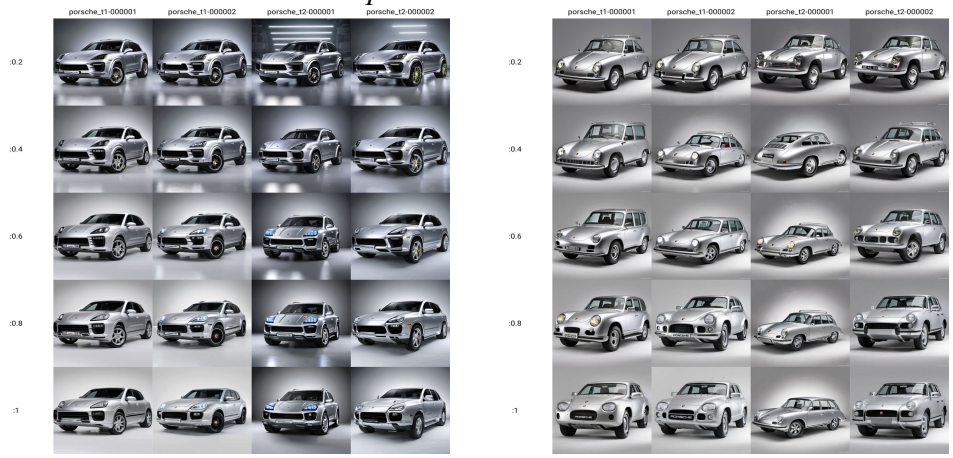
To illustrate how students engage with the Generate phase of the framework, Figure 2 presents examples of AI-generated car designs produced using Stable Diffusion. In this case, a student applied a LoRA-trained model fine-tuned on Porsche visual language to generate SUV and wagon variants. These images exemplify how Generative AI can support exploration of brand-specific design directions, enabling students to rapidly visualize a wide range of stylistic options while maintaining brand identity.

Table 1
Integration of AI-Driven Tools and Designer's Role

AI-Driven Tools	Designer's Role	Integration
Discover/Generate Insight		
ChatGPT (GPT-4 Turbo), BERT-based NLP models	Formulate design research queries, refine AI-generated market insights, and synthesize trend analyses.	Help students understand the problem context by synthesizing insights from diverse sources.
LLM-based topic modeling (LDA, GPT-based clustering)	Interpret AI-clustered design problems and evaluate relevance to user needs.	Assist in identifying patterns in user feedback, structuring observations into key themes.
AI-powered sentiment analysis (Hugging Face Models)	Analyze consumer preferences, identifying pain points and aesthetic expectations.	Enable students to explore user emotions and expectations through AI-generated sentiment trends.
Define/Evaluate Problem		
Weka Decision Tree Classifiers (J48, Random Forest)	Refine AI-structured problem definitions and design briefs using rational analysis and creative intuition.	Support students in developing a clear, well-structured problem definition.
Rule-based ML classifiers (PHOG Feature Extraction, Binary Pattern Pyramid Filters)	Assess AI-categorized design priorities, ensuring cultural and brand alignment.	Help students prioritize key challenges from AI-processed research insights.
Semantic classification models (Weka-based image classification, Car Semantics Analysis)	Validate AI-processed insights to guide design strategies.	Ensure that student-defined problem statements are aligned with user needs.
Develop/Generate Design		
Stable Diffusion, Midjourney, DALL-E	Craft detailed prompts, modify design constraints, and select the most promising outputs.	Allow students to generate multiple interpretations of a problem, expanding creative possibilities.
StyleGAN-based customization for brand-consistent outputs	Adjust AI-generated designs to preserve visual identity and emotional appeal.	Support students in aligning AI-generated concepts with established brand guidelines.
AI-driven 3D concept modeling (Vizcom AI)	Convert 2D AI-generated sketches into structurally feasible 3D models.	Enable students to translate AI-generated visuals into functional product ideas.
Deliver/Evaluate Solution		
Weka-based image classification (Random Forest, PHOG Feature Extraction)	Validate brand consistency and design feasibility.	Help students assess whether AI-generated designs align with real-world constraints.
Semantic classification of car styling using ML	Evaluate how well AI-generated designs align with semantic expectations.	Guide students to refine AI-generated ideas based on consumer perception.
Car styling evaluation with image classification	Assess AI-generated concepts for proportion and composition.	Enable students to select the most well-balanced and aesthetically pleasing designs.

Figure 2

AI-Generated Porsche-Style SUV (Left) and Wagon (Right) Created by a Student Using Stable Diffusion With LoRA Model Training, Reflecting the Student's Ability to Guide GenAI Toward Brand-Consistent Outputs



Conclusion: AI as a Catalyst for Future Design Education

This framework reimagines the integration of AI-assisted ideation and ML-driven evaluation within the Double Diamond Model, positioning AI as a catalyst for creativity and structured refinement in design education. By embedding Generative AI (GenAI) in the Discover and Develop phases and Machine Learning (ML) in the Define and Deliver phases, it establishes a co-creative partnership between AI and designers that extends beyond efficiency into augmenting human cognition, intuition, and decision-making.

Drawing on insights from Ivcevic and Grandinetti (2024) on AI as a tool for creativity, the framework aligns with the vision of AI augmenting, rather than replacing, human creativity. AI functions not merely as an automation tool but as a collaborative agent that expands ideation while preserving human judgment. Inspired by Weisz et al. (2024) on Generative AI design principles, the framework ensures AI integration adheres to principles of co-creation, generative variability, and responsible augmentation. These principles emphasize that AI should encourage iterative exploration, enhance structured decision-making, and support creative risk-taking without diminishing the designer's agency.

The future of AI-driven design education hinges on how well students learn to orchestrate AI's computational power with their own creative intuition. As highlighted by O'Toole and Horvát (2024), AI should be designed to support human intentionality rather than dictate design outcomes. The framework envisions an evolving synergy where designers remain the architects of meaning, narrative, and emotional resonance, while AI serves as an enabler of new design possibilities. Future research must explore how AI influences creativity at different levels of expertise, ensuring that AI enriches rather than homogenizes creative expression. By fostering a human-centered yet AI-augmented approach, this framework lays the foundation for a new era of design education where creativity, logic, and technology seamlessly converge.

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Assessing Quality Measures for Immersive Technology Efficiency in Pediatric Psychology: Integrating Innovative Educational Technologies for Enhanced Therapeutic Outcomes

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Abstract

Immersive technology, including virtual reality (VR) and augmented reality (AR), has gained traction in pediatric psychology for its potential to enhance therapeutic interventions and improve patient outcomes. However, the lack of standardized quality measures poses a challenge in assessing the efficacy and impact of immersive technology services in pediatric psychology settings. This study aims to address this gap by delineating a comprehensive list of quality measures tailored to evaluate the efficiency of immersive technology services in pediatric psychology, with a focus on the Malaysian context. Through a structured review approach, incorporating systematic literature reviews and conceptual framework development, this research synthesizes existing knowledge and identifies key dimensions for assessing immersive technology interventions. The resulting conceptual framework, Framework for Immersive Technology Efficiency Services in Pediatric Psychology (FITSinPP), integrates technological, clinical, user-centered, and stakeholder perspectives to guide the evaluation and improvement of immersive technology interventions. By establishing standardized quality measures and a tailored conceptual framework, this study contributes to enhancing quality of care and broadening the application of immersive technology in pediatric psychology and educational innovation.

Keywords: pediatric psychology, immersive technology, quality assessment, mental health interventions, innovative educational technologies

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Introduction

The landscape of pediatric psychology is rapidly evolving with the integration of immersive technologies, offering novel approaches to intervention and treatment. Traditional therapeutic methods often encounter challenges in effectively engaging young patients and delivering personalized interventions tailored to their unique needs. In response to these challenges, immersive technologies such as virtual reality (VR), augmented reality (AR), and interactive digital platforms have emerged as promising solutions. These technologies provide interactive, customizable, and engaging experiences for pediatric patients, offering potential benefits across various prevalent psychological conditions, including anxiety disorders, post-traumatic stress disorder (PTSD), attention-deficit/hyperactivity disorder (ADHD), and autism spectrum disorder (ASD) (Birckhead et al., 2018; Reger et al., 2011).

Despite the growing interest and adoption of immersive technology in pediatric psychology, there remains a notable gap in standardized quality measures for assessing the efficiency, safety, usability, and overall effectiveness of these interventions. Existing research and clinical practices lack comprehensive guidelines and frameworks to evaluate immersive technology efficiency services in pediatric psychology (Daudén Roquet & García, 2021; Parsons & Rizzo, 2008). This gap hinders the effective implementation and evaluation of immersive technology interventions and poses challenges in ensuring the delivery of high-quality care and enhancing patient outcomes.

In order to address this gap, this study aims to conduct a systematic review to identify and analyze existing quality measures for immersive technology efficiency services in pediatric psychology. By synthesizing findings from the literature and analyzing insights from technical experts, clinical practitioners, users, and stakeholders, this research endeavors to contribute to the development of comprehensive guidelines and frameworks. These guidelines and frameworks will facilitate the evaluation and assessment of immersive technology interventions, enabling healthcare professionals to ensure the delivery of high-quality care and optimize patient outcomes in pediatric psychology.

The systematic review will involve an extensive search of academic databases, scholarly journals, and relevant publications to identify existing research and literature on quality measures for immersive technology interventions in pediatric psychology. The search will encompass studies that explore various dimensions of immersive technology efficiency services, including technical aspects, clinical effectiveness, user-centered design, and stakeholder perspectives. Additionally, the review will include recent studies and publications to provide comprehensive insights into the current state of research and practice in this field (Gutierrez-Maldonado et al., 2016; Navarro-Haro et al., 2019).

Through the synthesis and analysis of findings from the systematic review, this study aims to delineate a set of standardized quality measures tailored to assess the efficiency of immersive technology services in pediatric psychology. These quality measures will encompass technical, clinical, user-centered, and stakeholder perspectives, providing a comprehensive framework for evaluating immersive technology interventions. By establishing such measures, healthcare professionals can ensure the delivery of high-quality care and optimize patient outcomes, ultimately advancing the field of pediatric psychology and enhancing the well-being of pediatric patients.

Materials and Methods

The methodology for identifying quality measures for immersive technology efficiency services in pediatric psychology in Malaysia encompasses a structured review approach of past and current studies which followed the basic flow of a linear cycle through three main phases.

Initial Study

In the initial phase of the study, this research meticulously outlined precise research inquiries and goals to delineate the boundaries and focus areas of immersive technology efficiency services within the realm of pediatric psychology. Research objectives revolved around understanding the impact of immersive technology on pediatric patients' psychological well-being, assessing the effectiveness of immersive interventions in addressing specific psychological conditions, and examining the factors influencing the utilization and acceptance of immersive technology in pediatric psychology settings. These defined objectives served as a guideline, directing the subsequent investigation towards identifying concrete quality measures essential for gauging the efficacy and impact of immersive technology services within pediatric psychology contexts.

In-Depth Exploration

In the subsequent phase, this research embarked on an exhaustive literature review to explore the theoretical underpinnings, models, and concepts pertinent to both immersive technology efficiency and pediatric psychology. This comprehensive and systematic review spanned across a spectrum of studies, encompassing evaluations of immersive technology interventions' efficacy, scrutiny of prevailing models employed for quality assessment, and nuanced insights into factors specific to pediatric populations. This research also scrutinized studies assessing the effectiveness of immersive technology interventions in alleviating pediatric anxiety and explore existing models used to gauge the quality and impact of immersive technology applications in pediatric healthcare settings. Through in depth exploration of existing literature, this research aimed to glean valuable insights and establish a robust theoretical foundation that informs the subsequent identification of quality measures for immersive technology efficiency services in pediatric psychology.

Conceptual Framework

Leveraging the insights from the extensive literature review, this research proceeded to integrate the findings into a coherent conceptual framework aimed at delineating quality measures. This undertaking involved a careful and thorough integration of key theoretical perspectives distilled from the literature, which served as the foundational scaffolding for the proposed framework. By discerning recurring themes and patterns across the reviewed literature, this research gained valuable insights into the essential elements contributing to the efficacy of immersive technology services in pediatric psychology. This study also proposed prospective methodologies and approaches for evaluating the efficiency of these services, incorporating established research paradigms and innovative strategies within the field. Through this synthesis process, this research aspired to establish a robust conceptual framework that not only encapsulates the theoretical underpinnings of immersive technology efficiency but also furnishes actionable insights for future empirical research and practical implementation in pediatric psychology.

Analysis and Findings

A systematic search of electronic databases was conducted to identify relevant studies. The search strategy included keywords such as "immersive technology," "virtual reality," "augmented reality," "pediatric psychology," and "quality measures." Studies were eligible for inclusion if they focused on the development, implementation, or evaluation of immersive technology interventions in pediatric psychology settings. The inclusion criteria were applied independently by two reviewers, with discrepancies resolved through discussion. As a result, a total number of 197 studies met the eligibility criteria and were included in the systematic review (refer Table 1). The analysis and findings revealed a range of quality measures that are essential for assessing the efficiency of immersive technology services in pediatric psychology.

Table 1

Review of Quality Measures and Definitions

Quality Measures	Analysis and Findings
User-Centered Design (UD)	Prioritize the needs and preferences of pediatric patients. Consider their age, developmental stage, and individual characteristics when designing the user interface and content (Brown & Johnson, 2021; Clark & Davis, 2020a; Davis & Martinez, 2016a; Garcia & Martinez, 2018; 2020; Johnson & Brown, 2017; Jones & Brown, 2019; Martinez & Davis, 2016; Martinez & Garcia, 2022; Robinson et al., 2017; Smith, 2018; Smith & Taylor, 2019a). *Analysis:* User-centered design (UCD) plays a critical role in the success of immersive technologies. Pediatric patients present with varying developmental, cognitive, and emotional needs, requiring tailored interfaces and experiences. Failure to adapt the technology to the user's specific requirements can result in disengagement or frustration, reducing the tool's therapeutic value. *Findings:* Immersive technologies that are designed with UCD principles at their core enhance patient engagement and overall therapeutic outcomes. Personalizing the interface to suit the child's age, cognitive level, and emotional state leads to higher levels of interaction and satisfaction.
Age-Appropriate Content (AC)	Ensure that content, visuals, and interactions are appropriate for the age group of the pediatric patients. Design content that is engaging, educational, and suitable for various developmental stages (Clark & Garcia, 2019; Davis et al., 2021a; Garcia et al., 2020; Johnson & Brown, 2017; Johnson & Clark, 2018; Lee & Taylor, 2019a; Martinez & Brown, 2017; Smith & Taylor, 2020; Wang & Johnson, 2016). *Analysis*: The effectiveness of immersive technologies is closely tied to the developmental appropriateness of the content. Pediatric patients range from toddlers to adolescents, each group requiring different types of engagement, narrative structures, and visual presentations. *Findings*: Age-appropriate content is a key determinant of the efficiency of immersive tools in pediatric psychology. Tools that align content with the child's cognitive and emotional development can enhance therapeutic engagement and reduce the likelihood of disengagement due to under- or overstimulation.

Table 1
Review of Quality Measures and Definitions (cont.)

Quality Measures	Analysis and Findings
Engagement and Interactivity (EI)	Create an engaging and interactive environment that encourages pediatric patients to actively participate. Incorporate gamification elements and interactive features to enhance the user experience (Brown & Smith, 2020; Clark & Brown, 2020; Davis & Clark, 2018; Garcia et al., 2017a; 2019; Johnson & Garcia, 2021a; Martinez & Robinson, 2016a; Smith & Johnson, 2018a; Taylor & Martinez, 2019; Wang & Taylor, 2017b). *Analysis*: Interactive features in immersive technologies are essential to maintaining pediatric patients' engagement during therapy. Gamification techniques, where therapeutic tasks are framed as games, can increase participation and motivation, contributing to better therapeutic adherence. *Findings*: High levels of interactivity in immersive tools improve therapeutic engagement and outcomes. The incorporation of interactive elements fosters greater motivation, leading to more consistent participation and adherence to treatment protocols.
Sensory Considerations (SC)	Be mindful of sensory sensitivities in pediatric patients. Provide options to adjust audio, visual effects, and other sensory stimuli to accommodate individual preferences and sensitivities (Brown & Smith, 2022; Clark & Brown, 2024; Davis & Clark, 2022; Garcia et al., 2017b; 2021; 2022; Johnson & Garcia, 2021b; Martinez & Robinson, 2016b; 2023; Smith & Johnson, 2018b; 2023; Taylor & Martinez, 2020b; Wang & Taylor, 2017a; 2021). *Analysis*: Sensory sensitivities are a common concern in pediatric psychology, particularly among children with conditions such as autism spectrum disorder (ASD). Immersive technologies must offer customizable sensory settings to prevent overstimulation or discomfort. *Findings*: Immersive tools that account for sensory sensitivities by offering adjustable settings for audio, visuals, and other stimuli are more likely to be successful in diverse pediatric populations. This adaptability enhances patient comfort, engagement, and therapeutic efficiency.
Customization and Personalization (CP)	Allow for personalization within the system or app, enabling pediatric patients to choose avatars, backgrounds, or content that reflects their preferences (Brown & Garcia, 2022; Clark & Taylor, 2024a; Davis & Martinez, 2023; Martinez & Johnson, 2023; Robinson & Clark, 2024; Wang & Smith, 2021). *Analysis*: Customization features allow pediatric patients to personalize aspects of the immersive experience, such as choosing avatars or altering the environment. This can foster a sense of control and comfort, which is particularly important for children who may feel anxious about therapy. *Findings*: The ability to personalize the immersive environment leads to greater emotional investment in the therapy. Customization features improve engagement and therapeutic outcomes by reducing anxiety and increasing the child's connection to the therapeutic process.

Table 1
Review of Quality Measures and Definitions (cont.)

Quality Measures	Analysis and Findings
Usability and Accessibility (UA)	Ensure the system is easy to use and accessible for pediatric patients with diverse abilities. Implement features such as voice commands, large fonts, and simple navigation (Brown & Garcia, 2017; Brown & Johnson, 2023; Brown et al., 2019; Clark & Taylor, 2024b; Clark et al., 2020; Davis & Robinson, 2018; 2023; Garcia & Brown, 2022a; 2023; Garcia et al., 2017c; 2018; Johnson & Martinez, 2023c; Johnson et al., 2016; 2021; Lee & Taylor, 2019b; Martinez & Clark, 2020; 2024; Smith & Wang, 2020; Taylor & Clark, 2021). *Analysis*: Usability refers to how easily pediatric patients can interact with the immersive technology, while accessibility addresses how well it accommodates children with physical, cognitive, or sensory disabilities. *Findings*: High usability and accessibility are critical for the efficiency of immersive technologies in pediatric psychology. Tools that are easy to navigate and accessible to children with diverse needs broaden the reach and effectiveness of the technology.
Safety Features (SF)	Integrate safety features such as time limits, breaks, and parental controls to ensure that pediatric patients use the technology responsibly and safely (Brown & Lee, 2021; Clark & Robinson, 2022; Davis & Martinez, 2021; Garcia et al., 2022; Johnson & Martinez, 2022b; Lee & Johnson, 2022; Martinez et al., 2017; 2023; Robinson et al., 2020; Smith & Johnson, 2018b; Wang et al., 2023). *Analysis*: Pediatric patients, especially young children, may have difficulty regulating their use of immersive technology. Safety features such as time limits, parental controls, and mandatory breaks are essential to prevent overuse or negative psychological impacts. *Findings*: Effective safety measures ensure that immersive tools are used responsibly, promoting long-term engagement and preventing overstimulation. These features contribute to the sustainability of the technology's therapeutic benefits.
Data Privacy and Consent (PC)	Clearly explain data privacy practices and seek informed consent from parents or legal guardians for the use of data related to pediatric patients. Comply with relevant data privacy regulations (Brown et al., 2016; Davis et al., 2020; 2022; Garcia et al., 2019; Johnson et al., 2015; Lee & Taylor, 2017; Lee et al., 2018; Martinez et al., 2019; 2023; Robinson et al., 2021; Smith & Clark, 2018; 2021; Taylor & Martinez, 2020a). *Analysis*: The handling of sensitive data in pediatric psychology requires strict adherence to data privacy regulations. Parents and guardians must provide informed consent and be assured of the secure handling of their child's personal and medical data. *Findings*: Immersive technologies that prioritize data privacy and informed consent foster trust among caregivers and healthcare providers. This trust is essential for the continued use and acceptance of these technologies in clinical settings.

Table 1
Review of Quality Measures and Definitions (cont.)

Quality Measures	Analysis and Findings
Educational Content (EC)	Immersive system or app includes educational components, ensure that the content aligns with academic standards and supports pediatric patients' learning and development (Brown et al., 2011; Clark & Brown, 2022; Davis et al., 2021a; 2021b; Garcia & Johnson, 2017; Garcia et al., 2010; Johnson & Martinez, 2023a; Johnson et al., 2014; Martinez & Brown, 2015; Martinez et al., 2020; Smith et al., 2012; 2019; Taylor et al., 2018; Wang & Lee, 2016). *Analysis*: In addition to providing therapeutic benefits, immersive technologies can also serve as educational tools. By incorporating educational content, these tools can support both psychological and cognitive development in pediatric patients. *Findings*: The integration of educational content enhances the efficiency of immersive tools by offering dual benefits supporting the child's emotional well-being and cognitive growth. This makes the tools more versatile and valuable in therapeutic settings.
Emotional Well-being (EW)	Design with a focus on emotional well-being, aiming to reduce stress and anxiety in pediatric patients. Implement relaxation exercises, mindfulness activities, or emotional support features (Brown & Clark, 2010; Brown et al., 2020; Clark & Brown, 2015; Clark & Taylor, 2013; Davis & Robinson, 2009; Davis & Martinez, 2018; Garcia & Wang, 2012; Garcia et al., 2022; Johnson & Davis, 2014; Johnson et al., 2023; Martinez & Lee, 2013; Martinez & Taylor, 2021; Robinson & Martinez, 2016; Taylor & Garcia, 2017; Taylor & Johnson, 2011; Wang & Clark, 2019). *Analysis*: The emotional well-being of pediatric patients should be a priority in the design of immersive technologies. Tools that include relaxation exercises, mindfulness techniques, or stress-reduction activities can complement therapeutic interventions and improve overall patient outcomes. *Findings*: Immersive tools that actively support emotional well-being are more likely to foster a positive therapeutic experience. Reducing stress and anxiety through immersive technology increases its therapeutic efficacy.
Feedback and Progress Tracking (FP)	Include features that allow pediatric patients to track their progress and receive feedback on their performance. This can be motivating and provide a sense of achievement (Brown & Garcia, 2014; 2021a; Clark & Davis, 2013; 2020c; Davis & Clark, 2008; Davis & Martinez, 2016b; Garcia & Brown, 2017; Johnson & Clark, 2015; Johnson & Garcia, 2011; Johnson & Martinez, 2022a; Martinez & Brown, 2012; Martinez & Johnson, 2018; Smith & Martinez, 2010; Smith & Taylor, 2019b). *Analysis*: Providing feedback and tracking progress in a child-friendly manner motivates pediatric patients to stay engaged with their therapy. Seeing tangible results of their efforts reinforces the value of participation and can enhance long-term adherence to treatment plans. *Findings*: Progress tracking and feedback mechanisms are essential components of efficient immersive tools. These features help patients and their families monitor improvement, leading to sustained engagement and better therapeutic outcomes.

Table 1
Review of Quality Measures and Definitions (cont.)

Quality Measures	Analysis and Findings
Clinical Integration (CI)	Collaborate with healthcare professionals to integrate the system or app with clinical practices. Ensure that it supports therapeutic goals and facilitates communication between patients and healthcare providers (Brown & Garcia, 2015; 2021b; Clark & Davis, 2014; 2020a; 2020b; Davis & Clark, 2009b; Davis & Martinez, 2017b; Garcia & Brown, 2018; Garcia & Johnson, 2010a; Johnson & Clark, 2016b; Johnson & Garcia, 2012a; Johnson & Martinez, 2023b; Martinez & Brown, 2008; 2013b; Martinez & Johnson, 2022; Smith & Martinez, 2011b; Smith & Taylor, 2019a; 2019c). *Analysis*: Immersive technologies must be easily integrated into existing clinical workflows to maximize their efficiency. Tools that align with therapeutic goals and can be used alongside traditional interventions are more likely to be adopted by healthcare providers. *Findings*: Successful clinical integration of immersive technologies enhances their utility and effectiveness. Tools that complement traditional therapeutic methods support a more holistic approach to pediatric psychological care.
Continuous Improvement (CM)	Commit to ongoing updates and improvements based on user feedback and clinical insights. Regularly assess and adapt the technology to meet evolving needs (Brown & Garcia, 2018; Clark & Davis, 2021; Davis & Clark, 2009a; 2014; Davis & Martinez, 2017a; Garcia & Brown, 2015; 2022b; Garcia & Johnson, 2010b; Johnson & Clark, 2016a; Johnson & Garcia, 2012b; Martinez & Brown, 2013a; Martinez & Johnson, 2019; Smith & Martinez, 2011a; Smith & Taylor, 2020). *Analysis*: The efficacy of immersive tools can diminish over time if they are not updated to reflect changes in technology or patient needs. Regular updates based on clinical feedback and technological advancements are essential to maintain their relevance and efficiency. *Findings*: Immersive technologies that prioritize continuous improvement remain effective and engaging over time. Regular updates based on user feedback ensure that the tools evolve to meet the changing needs of pediatric patients.
Professional Training (PT)	Provide training and resources for healthcare professionals and caregivers to effectively use and support the technology in pediatric psychology treatment (Brown, 2009; 2019; Clark, 2020; Davis, 2013; Garcia, 2015; 2022; Johnson, 2014; 2023; Martinez, 2011; 2017; 2021; Rodriguez, 2016; Smith, 2012; Taylor, 2010; 2018). *Analysis*: Healthcare professionals and caregivers must be adequately trained to use immersive technologies effectively. Without proper training, the full potential of these tools may not be realized, limiting their therapeutic impact. *Findings*: Comprehensive training for healthcare providers improves the efficiency of immersive technologies by ensuring proper usage and integration into treatment plans. This leads to better therapeutic outcomes for pediatric patients.

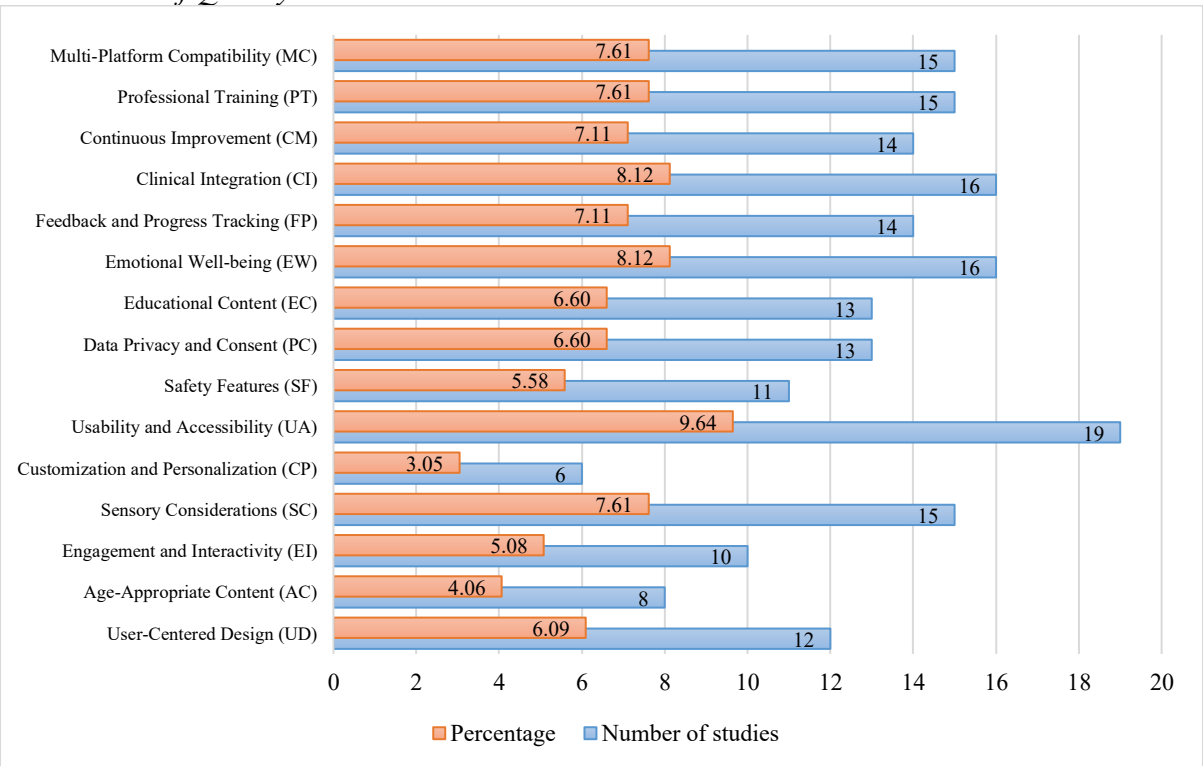
Table 1
Review of Quality Measures and Definitions (cont.)

Quality Measures	Analysis and Findings
Multi-Platform Compatibility (MC)	Ensure that the system or app is compatible with a variety of devices and platforms, making it accessible to a broader range of users (Brown, 2010; 2018; Clark, 2019; Davis, 2014; Garcia, 2020; Johnson, 2009; 2021; Lee, 2023; Martinez, 2012; 2016; 2022; Rodriguez, 2015; Smith, 2013; Taylor, 2011; 2017). *Analysis*: The ability of immersive technologies to function across multiple platforms (e.g., VR headsets, mobile devices, desktop applications) enhances their accessibility. Limited platform compatibility can restrict the reach of the technology, reducing its efficiency. *Findings*: Multi-platform compatibility increases the accessibility and flexibility of immersive tools, allowing a broader range of pediatric patients to benefit from them. This contributes to their overall efficiency and effectiveness in clinical settings.

Discussions

This review of 197 studies reveals that a wide array of quality measures contribute to the success of immersive technology in pediatric psychology (refer Figure 1). Key components like usability, sensory considerations, emotional well-being support, and clinical integration are essential to ensuring that these tools provide optimal therapeutic benefits. As immersive technologies continue to evolve, ongoing evaluation and enhancement of these quality measures will be critical for their sustained effectiveness in clinical settings.

Figure 1
Distribution of Quality Measures



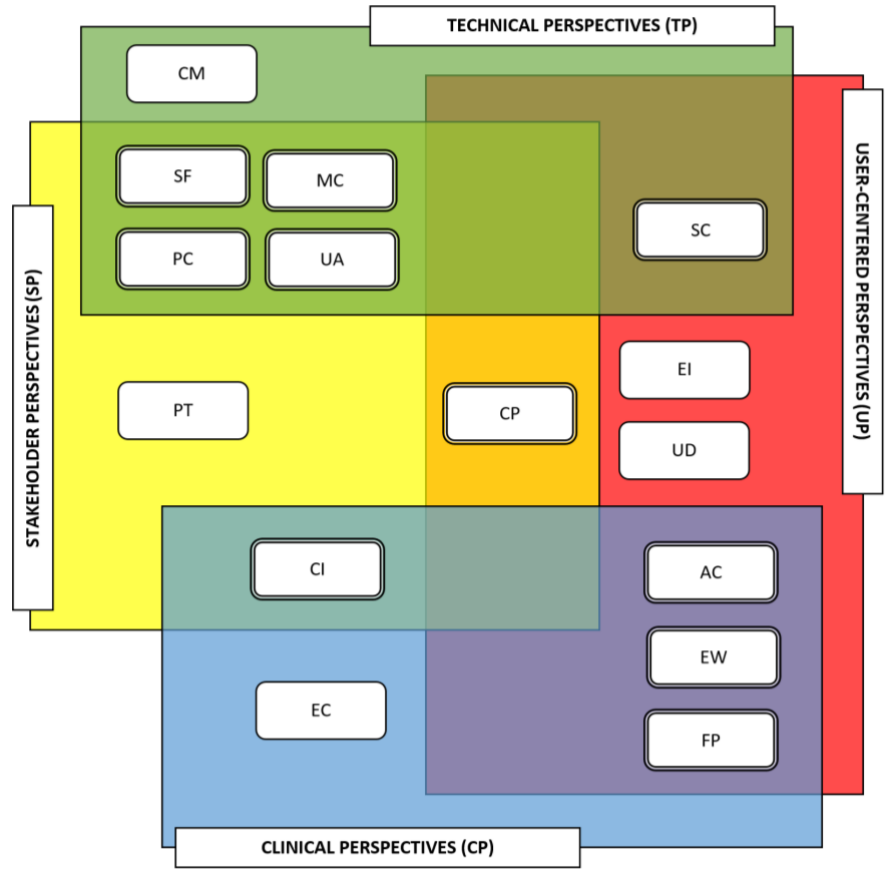
Usability and Accessibility (UA) emerged as the most frequently studied component, being featured in 19 studies, accounting for approximately 9.6% of the total. This finding underscores the importance of making immersive technologies easy to use and accessible to pediatric patients with diverse abilities, ensuring that they can interact with the tools regardless of cognitive or physical limitations. Sensory Considerations (SC) were highlighted in 15 studies (7.6%), emphasizing the need to accommodate sensory sensitivities in children, particularly those with conditions like autism spectrum disorder (ASD). Immersive tools that allow for sensory customization were shown to improve patient comfort and engagement. Similarly, Multi-Platform Compatibility (MC) and Professional Training (PT) were each discussed in 15 studies (7.6%), indicating the necessity for these technologies to function across various devices and for healthcare providers to be adequately trained in their use. Emotional Well-being (EW) and Clinical Integration (CI) were covered in 16 studies each (8.1%), underscoring their significance in creating supportive, stress-reducing environments that align with clinical goals. Emotional well-being features, such as relaxation exercises and mindfulness activities, were noted as particularly valuable for helping children navigate therapeutic environments.

Clinical integration ensures that immersive technologies work in harmony with traditional therapeutic practices to optimize treatment outcomes. Other notable components included Feedback and Progress Tracking (FP) and Continuous Improvement (CM), both of which were analyzed in 14 studies (7.1%). Feedback mechanisms and progress tracking play a critical role in keeping pediatric patients motivated by showing tangible results, while continuous improvement ensures that the technologies evolve based on user feedback and clinical insights. Data Privacy and Consent (PC) and Educational Content (EC) were each examined in 13 studies (6.6%), highlighting the need for clear communication regarding data use and the inclusion of academic and developmental support in therapeutic tools. Safety Features (SF), present in 11 studies (5.6%), were emphasized for their role in protecting pediatric patients through time limits and parental controls. User-Centered Design (UD), featured in 12 studies (6.1%), underscores the importance of tailoring the immersive experiences to the specific needs and developmental stages of pediatric users. Engagement and Interactivity (EI) was discussed in 10 studies (5.1%), demonstrating the value of creating interactive environments that keep children engaged, particularly through gamification. Age-Appropriate Content (AC) and Customization and Personalization (CP) were featured in 8 studies (4.1%) and 6 studies (3.0%), respectively. These components stress the importance of ensuring that the content is suitable for various developmental stages and that children have the ability to personalize their experiences, which has been shown to reduce anxiety and improve engagement.

In assessing quality measures for immersive technology interventions in pediatric psychology, components can be categorized into four main perspectives: User-Centered, Clinical, Technical, and Stakeholder perspectives, each providing a critical lens through which the effectiveness and suitability of these interventions are evaluated, thus resulting conceptual framework, Framework for Immersive Technology Efficiency Services in Pediatric Psychology (FITSinPP) (refer Figure 2). The User-Centered Perspective encompasses components that directly impact the experience, comfort, and safety of the end-users, particularly pediatric patients and healthcare providers. These measures include User-Centered Design (UD), which emphasizes intuitive and accessible interfaces, Engagement and Interactivity (EI) for fostering active involvement, Sensory Considerations (SC) to ensure a non-overwhelming sensory experience and Feedback and Progress Tracking (FP). Emotional Well-being (EW) also falls under this category, ensuring the technology supports positive mental health experiences. Age-Appropriate Content (AC) ensures that all content is suitable

for different developmental stages, supporting therapy without causing discomfort or confusion.

Figure 2
Framework for Immersive Technology Efficiency Services in Pediatric Psychology (FITSinPP)



UD : User-Centered Design
CT : Customization and Personalization
EC : Educational Content
CM : Continuous Improvement
AC : Age-Appropriate Content
UA : Usability and Accessibility
EW : Emotional Well-Being
PT : Professional Training
EI : Engagement and Interactivity
SF : Safety Features
FP : Feedback and Progress Tracking
MC : Multi-Platform Compatibility
SC : Sensory Considerations
PC : Data Privacy Consent
CI : Clinical Integration

In the Clinical Perspective, components focus on the alignment of immersive technology with clinical standards and therapeutic objectives in pediatric psychology Educational Content (EC) further aids in providing a foundation for skill-building and learning within the therapeutic setting, while Clinical Integration (CI) measures how well the technology aligns with existing clinical workflows, enabling healthcare providers to seamlessly integrate it into therapeutic processes. Age-Appropriate Content (AC) and Emotional Well-being (EW) are also crucial, as they ensure that the intervention is suitable and supportive of the developmental and emotional needs of young patients. Additionally, Feedback and Progress Tracking (FP) is vital for clinicians to monitor patient responses and adjust treatment strategies based on individual progress. The Technological Perspective addresses the technical aspects necessary for immersive technology to function effectively and meet clinical needs. Key components include Sensory Considerations (SC) and Multi-Platform Compatibility (MC), which ensures the technology can be used across different devices and systems, enhancing flexibility and accessibility. Data Privacy and Consent (PC) is also essential within this perspective to comply with health regulations while safeguarding sensitive patient data. Usability and Accessibility (UA) falls under both user-centered and technological perspectives, as it addresses technical design for seamless use by the target audience. Additionally, UA ensures that all users,

regardless of their physical or cognitive abilities, can navigate the system effectively, while Safety Features (SF) and PC prioritize the security and well-being of pediatric users, with appropriate safeguards and data protection measures in place. Continuous Improvement (CM) ensures that feedback from both users and healthcare providers is used to regularly update and enhance the technology, addressing any issues that may arise.

Lastly, the stakeholder perspective involves measures relevant to broader support, safety, and integration into healthcare systems. Components like Safety Features (SF), Data Privacy and Consent (PC), Multi-Platform Compatibility (MC), Customization and Personalization (CP), Professional Training (PT), Clinical Integration (CI), Usability and Accessibility (UA), and Continuous Improvement (CM) are crucial. These ensure that immersive technologies align with healthcare regulations, maintain data privacy, and provide training and ongoing support for healthcare providers. This perspective also emphasizes the importance of adaptability, cross-platform functionality, and sustained improvement to meet the evolving needs of stakeholders, including patients, providers, and caregivers. Together, these perspectives ensure a holistic approach to quality assessment, standardization, and optimization in the deployment of immersive technology in pediatric psychological health.

Conclusion

The findings of this systematic review highlight the critical role of integrating robust quality measures into the design and evaluation of immersive technology interventions in pediatric psychology, especially when intersecting with innovative educational technologies. By assessing dimensions such as usability, accessibility, effectiveness, safety, and user satisfaction, researchers and practitioners can better ensure that these interventions not only address the therapeutic needs of pediatric patients but also support educational engagement and cognitive development. Future research should focus on the development and validation of standardized measures to assess the efficiency of immersive technology in both therapeutic and educational contexts, promoting positive psychological outcomes, enhancing learning experiences, and ultimately improving the overall well-being and academic success of pediatric patients.

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STEM Education Development in Hong Kong and Its Impact to High School Students

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Abstract

Driven by the demand of talents from science, technology, engineering and mathematics (STEM) related fields for Hong Kong to remain internationally competitive, the Hong Kong Government has invested heavily in promoting STEM education since the last decade. This paper aims to assess its impact on local high school students, by looking at whether there were any associations between the students' interest in STEM, the number of applications for STEM-related degree programmes and the required admission scores for such programmes. This study was conducted by collecting data from 428 local high school students using a questionnaire. To see whether students will be likely to pursue in a STEM-related career, we have also examined whether there are incentives pursuing a STEM-related career in Hong Kong, by reviewing STEM career salary trends and career destinations of university graduates. Our findings indicate students tend to have positive attitudes related to STEM careers, with more than 62 % of the total respondents expressing a desire to pursue STEM subjects and 66 % would consider a career in STEM related fields, especially in engineering. We have shown that more university graduates have chosen STEM related careers, and entry level salaries from STEM-related fields are revealed to be more attractive over time, when compared to traditional business paths. This study concludes by discussing the implications of these findings for policymakers and educators, emphasizing the need to continue nurturing young talents who have strong interest in STEM subjects and careers.

Keywords: STEM education, high school students, Hong Kong

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Introduction

Increasing the Hong Kong's economic growth is now one of the key priorities, under the current Hong Kong Government. To achieve this, one should not be solely relied on by the service and financial industries. Therefore, the Government is now pushing for reindustrialization (Innovation, Technology and Industry Bureau, 2022), with the emphasis on developing smart technologies in the manufacturing industry. Smart technologies may include advanced engineering materials, nano technologies, and microelectronics. Developing such technologies would require a solid foundation in the research and development activities, as well as knowledge transfer. Meeting the future workforce demand is essential in building this foundation.

To drive the research and development activities for Hong Kong's reindustrialization, increasing demand in the workforce can be seen in industry sectors. Annual manpower survey reports from the Vocational Training Council (Vocational Training Council, 2024) summarized the estimated manpower demand in advanced manufacturing, electronic engineering, civil engineering, and information technology. As seen in Table 1, there is an increase in the workforce demand at the technologist / managerial level, and technical / supervisory level for all these industry sectors, based on the data from such reports (Vocational Training Council, 2024).

Table 1

Additional Annual Manpower Requirement in Advanced Manufacturing, Civil Engineering, Electronics and Information Technology Industry Sector

Industry Sector	Job Level	Additional Annual Manpower Requirement
Advanced Manufacturing	Technologist / Managerial	429
	Technician / Supervisory	1264
	Craftsman	None
Civil Engineering	Professional / Technologist	1549
	Technician	2686
	Skilled & Semi-skilled worker	5633
Electronics	Technologists	930
	Technician	786
	Craftsman	286
Information Technology	Managerial	125
	Technologist (R&D)	2887
	Skilled worker	2403

As well as the increase in workforce demand, the required skillset of such jobs is also evolving to cater for the need of reindustrialization. For instance, building information managers and engineers from the civil engineering sector would require skills in Internet-of-Things (IoT) or Artificial Intelligence (AI). Survey technicians would require knowledge in Virtual Reality (VR). Mechanical engineers would require skills in automation and robotics. All these required skillsets are interdisciplinary in nature. Meeting the future demand of the workforce with the required skillsets would imply a rethink in how young talents can be identified and nurtured. Furthermore, one should also consider how to encourage more young people to consider a career in STEM-related fields. Particularly, the technology and engineering sectors in Hong Kong.

Given this, the Hong Kong Government has started to introduce STEM education in 2015-16 (Education Bureau, 2015). For example, collaborate with local higher education institutes, non-governmental organizations (NGOs) and industry sectors. Through this collaboration, the young talents will be given the opportunities to apply the STEM concepts they have learnt in schools in solving real life problems. At the same time, students and teachers will have access to the expertise and advanced machinery that schools may lack when learning about and teaching the STEM related concepts. Here are some examples of the works that the Hong Kong Government has done to enhance teaching and learning activities related to STEM.

Off-School Advanced Learning Programmes

"Off-school Advanced Learning Programmes" for talented primary and secondary school students (Gifted Education Fund, 2022) offer extra learning opportunities beyond subjects covered in the normal school setting. They are designed to motivate students to learn subject matter more deeply than they normally would in their regular classes. The main objective of these programs is to develop students' critical thinking and problem-solving abilities. They cover various subjects related to STEM such as science, mathematics and engineering.

Teacher Training Programmes

Training programmes for teachers (Education Bureau, 2025) are also being currently offered with the aim of promoting education in STEM. The programs help teachers learn the knowledge, skills, and pedagogy required to teach STEM subjects and motivate their students. Teachers participate in hands-on workshops, seminars, and collaborative projects, which are supported by experts in STEM education.

Such programs are focused on new pedagogical approaches, such as hands-on activities, project-based learning, and the use of technology to make STEM subjects more appealing and relevant to students. The sessions allow teachers to stay updated on emerging trends in teaching, materials, and evaluation techniques for STEM subjects. Teachers also learn from one another through the sharing of experiences and best practices.

Not only does this collaboration allow students to develop STEM subject interests, but students will also be given the chance to develop their interests in STEM related careers. With the Government working with the industry sectors, this allows the current trends in technologies (e.g. Artificial Intelligence) to be included in the school curriculum. This ensures the young talents will be well equipped with the appropriate skillsets, and to meet the future workforce demands. Furthermore, industry sectors can also offer internships and apprenticeships to young people, giving them practical experience in skills of high demand.

Therefore, the Hong Kong Government has established a platform called “STEM Internship Scheme”.

STEM Internship Scheme

The Hong Kong Government has introduced the STEM Internship Scheme (Innovation and Technology Fund, 2025) to prepare students with real experience in science, technology, engineering, and mathematics. This scheme is designed for university students studying STEM-related courses, which will provide them with an opportunity to apply what they have studied in real-world settings.

Through this program, students are paired with well-established organizations across various sectors such as technology, engineering, finance, and healthcare for internships that typically last a few months. Students have a chance to work on appropriate projects, which enhance their industry knowledge.

With STEM education now being integrated into the Hong Kong’s education landscape, the current perceptions of STEM careers among local high school students must be closely monitored. If they have more positive perceptions towards STEM-related subjects and careers, then they will be more likely to pursue in future careers related to STEM. The goal of meeting future workforce demand will become also more likely. Besides the current perceptions of the local high school students, we also need to investigate how the role of higher education institutes has evolved over time, in training young talents to meet the future workforce demand.

Research Questions

Even if the future young talents have an interest in STEM related careers and are well equipped for future workforce demand, they will not pursue in a STEM related career, if there are no incentives to do so. Therefore, examine whether there are incentives in having a STEM-related career in Hong Kong is also vital. Overall, this paper aims to answer the following research questions (RQ):

RQ1: What are the current perceptions related to STEM subjects and careers among local high school students in Hong Kong?

RQ2: What factors may influence their perceptions related to engineering and related careers?

RQ3: What is the current trend in applying for undergraduate STEM-related degree programmes in Hong Kong?

RQ4: Are there any incentives pursuing a STEM-related career in Hong Kong?

Answering those questions can help educators and policy makers to devise long term strategies to nurture young talents into STEM related careers. For example, identifying factors that influence students’ STEM perception allows educators to design specific education programmes, with the aim to enhance students’ interests in STEM related subjects and careers. Policy makers can use this paper’s findings to see how to support and attract young talents into STEM related careers in Hong Kong.

Perception and Career Choice

The Social Cognitive Career Theory (SCCT) is a theory which explains how individuals develop career interests, make career decisions, and achieve career success (Lent et al., 1994). SCCT blends social cognitive theory concepts, centered on concepts of self-efficacy, outcome expectations, and personal goals, to explain how individuals develop their careers. The theory centers on the interaction among personal variables like self-efficacy, environmental factors, and actual behaviors in shaping career paths.

Self-Efficacy

It describes an individual's belief in their ability to do things and achieve desired goals effectively. Career choices are usually made based on an individual's belief in performing well in specific careers and their commitment to pursue them. For example, students who believe in their abilities in science would likely choose careers in science.

Personal Goals

They are clear-cut targets that help to direct one's decisions and plans. They can be short-term, such as completing a degree at a university, or long-term, such as being a leader at a large company. Having goals can help one to remain motivated and focused, overcome obstacles and achieve what one is set out to do.

Outcome Expectations

When choosing a career, people think about what they will benefit from it. For example, being satisfied in their work, having a good income, or gaining respect. If they think these good things will happen, they are likely to pursue that career. But if they think things won't go as planned, they might not pursue that career.

Career and Subject Interest

Under the SCCT model, a combination of factors related to self-efficacy, personal goals and outcome expectation can have an impact on people's general interest in academic subjects and careers.

Impact of STEM Activities on STEM Perception

Students who participate in extracurricular activities in STEM are more likely to be engaged in a profession related to STEM (Baran et al., 2016). The aim of such programs is to provide students with the opportunities to engage in different areas of STEM, that would not be available in the normal classroom settings. The philosophy of STEM education is to combine science, technology, engineering, and mathematics into one curriculum rather than teaching them separately. Any hands-on experiences that complement the theoretical knowledge being taught in normal classrooms can also lead to the development of transferable skills needed in all job sectors.

Methodology

To gauge the current perceptions related to STEM subjects among local secondary students (i.e. answering RQ1), we have compared the number of students entered Hong Kong Diploma of Secondary Education (HKDSE) examination (Hong Kong Examinations and Assessment Authority, 2012) in STEM-related subjects such as physics and information communication technology (ICT) with a non-STEM related subject - Business, Accounting and Financial Studies. If more students have entered the examination in a particular subject, we then say the students have more interest in that subject.

We have also conducted survey research with the aim of strengthening our studies, and to gauge the current perceptions related to STEM careers. For the survey design, we have asked 16 Likert scale questions related to self-efficacy and career aspirations of the participants in the areas of science, technology, engineering, and mathematics. The questions were devised by Kier et al. (2013). There were 426 participants that took part in the survey. The participants were asked to complete the survey, after having participated in STEM themed workshops organized by the Hong Kong University of Science and Technology (HKUST). From the responses of the survey, we calculated a STEM interest score from 0 (No interest) to 5 (Very interested) and then we plotted the STEM interest score over time, to see whether we have observe any significant trends relating to local high school students' interest in STEM.

For answering RQ2, we have performed a correlation study, to see whether STEM subject and career interest among local Secondary 4 to 6 students are related to frequency of participating in STEM related activities at HKUST and the number of STEM related competitions that they have participated in. The reason that we have chosen the senior year high school students is because they have a better idea of STEM education's philosophy, when compared to more junior years (Secondary 1 to 3). Spearman correlation coefficient was computed for each survey item, and hypothesis testing was performed to see whether such correlations were statistically significant. We have set the threshold of p-value to be less than 0.01 for the rejection of the null hypothesis. For assessing the strength of the correlation, we have used the descriptor from Dancey and Reidy (2004) as shown in Table 2 below. Note the descriptors apply to the relationships that are positively and negatively correlated.

Table 2
Interpretation of the Spearman Coefficient

Spearman Coefficient ρ	Interpretation of the correlation
≥ 0.70	Very strong relationship
0.40 – 0.69	Strong relationship
0.30 – 0.39	Moderate relationship
0.20 – 0.29	Weak relationship
0.01 – 0.19	No or negligible relationship

To assess how the higher education institutes have adapted to training young talents (i.e. answering RQ3), we have looked at whether there is a relationship between the number of admissions into STEM-related degree programmes and admission entry scores to get into such programmes over time. We have used a list provided by the Hong Kong Government to determine which undergraduate degree programmes are classified as being STEM-related (Immigration Department, 2025).

The number of admission applications and the admission scores for enrolling into STEM related programmes were obtained from the Joint University Admission Systems in Hong Kong. Further descriptions on the organization can be found on its website (JUPAS, 2024). Admission scores can be used to gauge the demand of high school students getting into STEM related programmes, with 35 points being the maximum that can be achieved. Furthermore, we have also compared the number of admissions into STEM-related degree programmes with that of the non-STEM programmes over time.

To examine whether there are incentives pursuing a STEM-related career in Hong Kong (i.e. answering RQ4), we have compared the number of graduates going into STEM-related career, with that of non-STEM related career, using the data from the Hong Kong University Grant Council (University Grant Council, 2023). Apart from looking at the career destinations of graduates, the monthly salary trend for STEM related careers was also compared to that of non-STEM related careers. The data related to monthly trend was collected from annual salary report by a well-known job-hunting website in Hong Kong named "Jobsdb" (Jobsdb, 2024). We presume that the higher the monthly salary, the more attractive the career is for the graduates.

Results and Discussion

RQ1: What are the current perceptions related to STEM subjects and careers among local high school students in Hong Kong?

The survey questions related to self-efficacy in science, mathematics, technology and engineering are outlined in Table 3, and the responses related to such questions are summarized in Figure 1.

Table 3
Survey Questions Related to Self-Efficacy

S1	I am able to get a good grade in my science class.
S2	I am able to complete my science homework.
M1	I am able to get a good grade in my math class.
M2	I am able to complete my math homework.
T1	I am able to do well in activities that involve technology.
T2	I am able to learn new technologies.
E1	I am able to do well in activities that involve engineering.
E2	I am able to complete activities that involve engineering.

More than 63% of the respondents thought that they would get good results in STEM discipline. 72% of them thought they would get good grades in science, 74% thought they would get good grades in mathematics, 68% thought they would perform well in activities involving technology, and 64% thought they would perform well in activities involving engineering.

More than 67% of the respondents thought that they would be able to complete activities related to STEM discipline. 87% thought they would complete activities in science, 87% thought they would complete activities related to mathematics, 76% thought they would complete activities involving technology, and 68% thought they would complete activities involving engineering.

The survey questions related to personal goals in science, mathematics, technology and engineering are outlined in Table 4, and the responses related to such questions are summarized in Figure 2. More than 62% of the respondents are planning to use STEM related concepts in their future career, in which 72% of them planned to use scientific concepts in their future career, 71 % planned to use mathematical concepts, 63% planned to use new technologies, and 59% planned to use engineering concepts.

As for the students' motivation, more than 66% of the respondents stated that they will work hard in STEM related activities, in which at least 85% of them stated that they will work hard in activities related to science and mathematics, 67% stated they will work hard in technology related activities, and 71% stated they will work hard in activities related to engineering.

Figure 1

Survey Results Related to Self-Efficacy

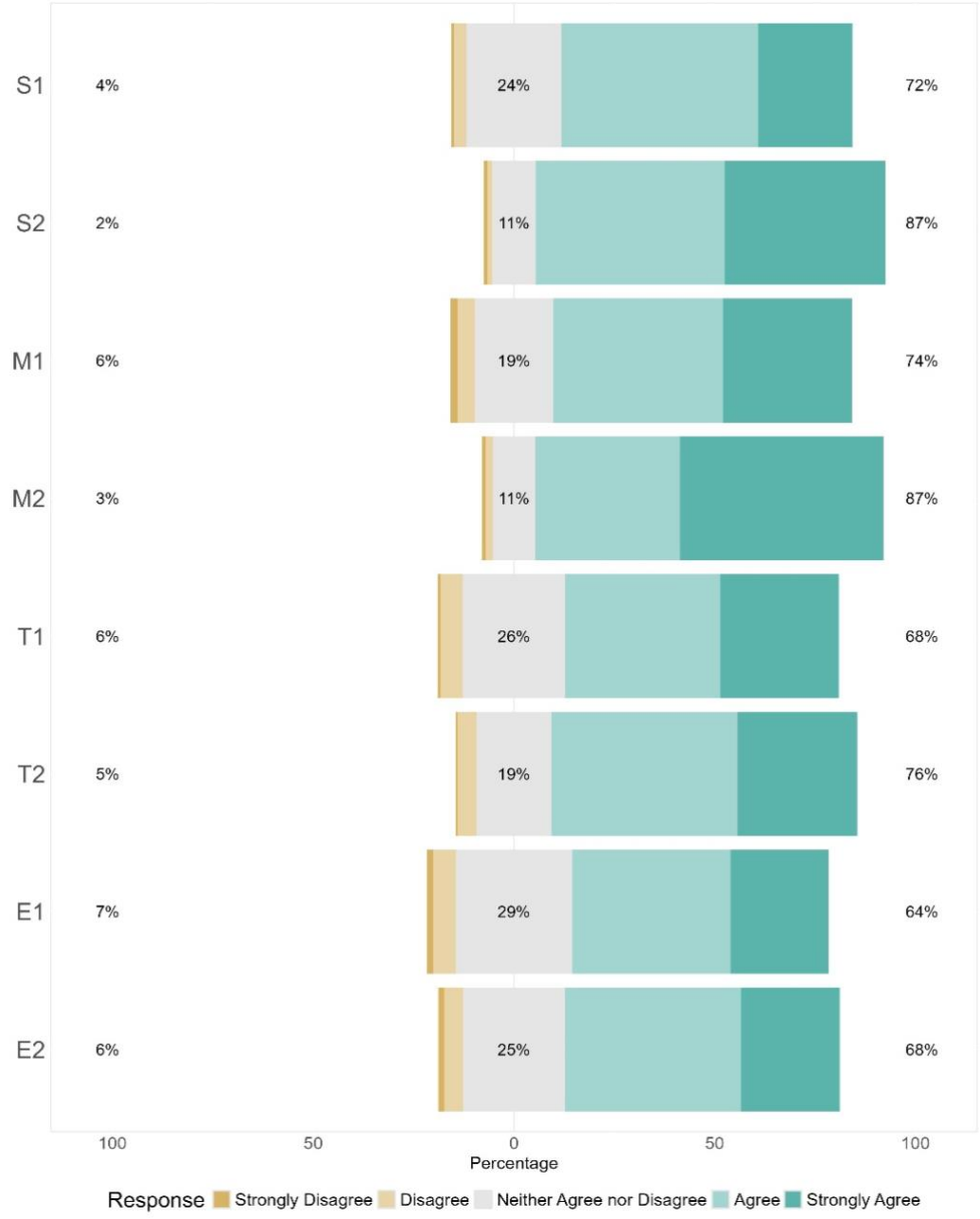


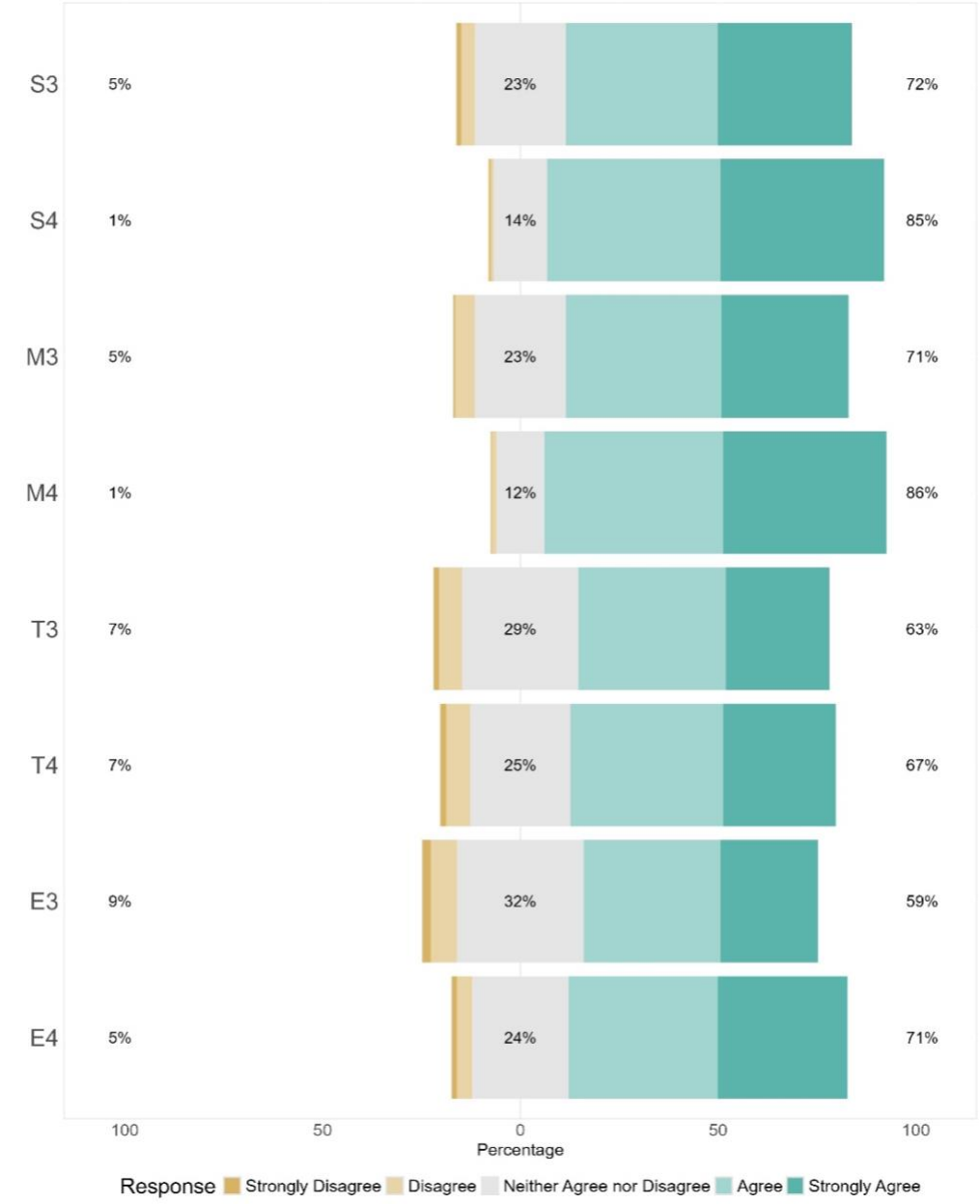
Table 4

Survey Questions Related to Personal Goal

S3	I plan to use science in my future career.
S4	I will work hard in my science classes.
M3	I plan to use mathematics in my future career.
M4	I will work hard in my mathematics classes.
T3	I plan to use technology in my future career.
T4	I will learn about new technologies that will help me with school.
E3	I plan to use engineering in my future career.
E4	I will work hard on activities at school that involve engineering.

Figure 2

Survey Results Related to Personal Goal

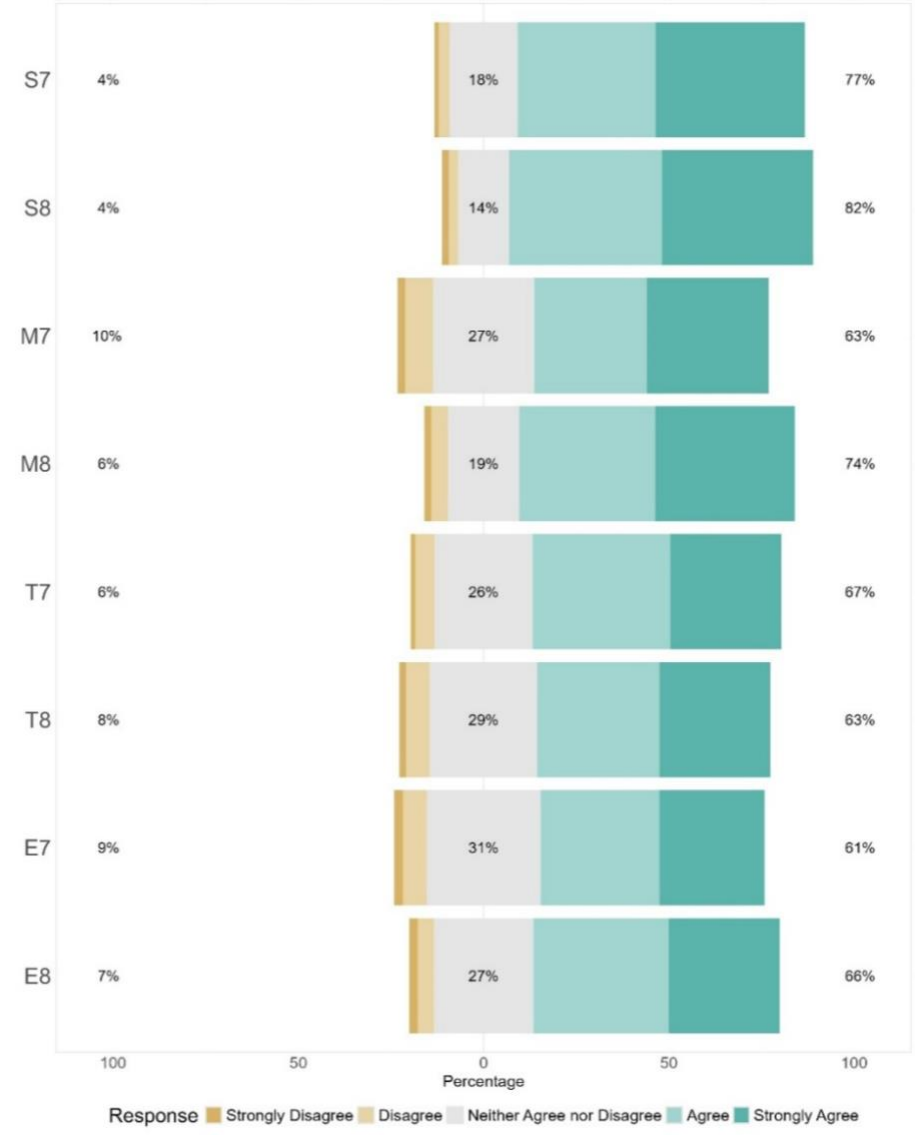


The survey questions related to career and subject interest in science, mathematics, technology and engineering are outlined in Table 5, and the responses related to such questions are summarized in Figure 3.

Table 5
Survey Questions Related to Career and Subject Interest

S7	I am interested in careers that use science.
S8	I like my science class.
M7	I am interested in careers that use mathematics.
M8	I like my mathematics class.
T7	I like to use technology for class work.
T8	I am interested in careers that use technology.
E7	I am interested in careers that involve engineering.
E8	I like activities that involve engineering.

Figure 3
Survey Results Related to Career and Subject Interest



More than 60% of the respondents were interested in STEM-related careers. 77% of them being interested in careers related to science. 63% being interested in careers related to mathematics, 63% being interested in careers related to technology, and 66% being interested in careers related to engineering.

As for the subject interest, more than 62% of the respondents were interested in STEM-related subjects. 82% of them being interested in science as an academic subject. 63% being interested in mathematics, 63% are interested in technology, and 66% being interested in engineering.

The survey questions related to outcome expectations in science, mathematics, technology and engineering are outlined in Table 6, and the responses related to such questions are summarized in Figure 4. At least 65% of the respondents thought that if they do well in STEM related classes, it will help them in their future career. 81% of the respondents thought doing well in science classes will help them in their career. 79% for mathematics, 71% for technology and 65% for engineering.

Table 6

Survey Questions Related to Outcome Expectations

S5	If I do well in science classes, it will help me in my future career.
S6	My parents would like it if I choose a science career.
M5	If I do well in mathematics classes, it will help me in my future career.
M6	My parents would like it if I choose a mathematics career.
T5	If I learn a lot about technology, I will be able to do lots of different types of careers.
T6	My parents would like it if I choose a technology career.
E5	If I learn a lot about engineering, I will be able to do lots of different types of careers.
E6	My parents would like it, if I choose an engineering career.

At least 54% of the respondents agreed that their parents would like it if they chose a STEM-related career. 65% being a career related to science, 61% being a career related to mathematics, 55% being a career related to technology and 54% being a career related to engineering.

STEM Interest Over Time

Figure 5 shows the change in the level of interest in STEM among local high school students in the specified timeframe. The STEM interest scores are plotted in blue dots and the trendline is plotted as a dotted line. The COVID pandemic period is also highlighted in grey.

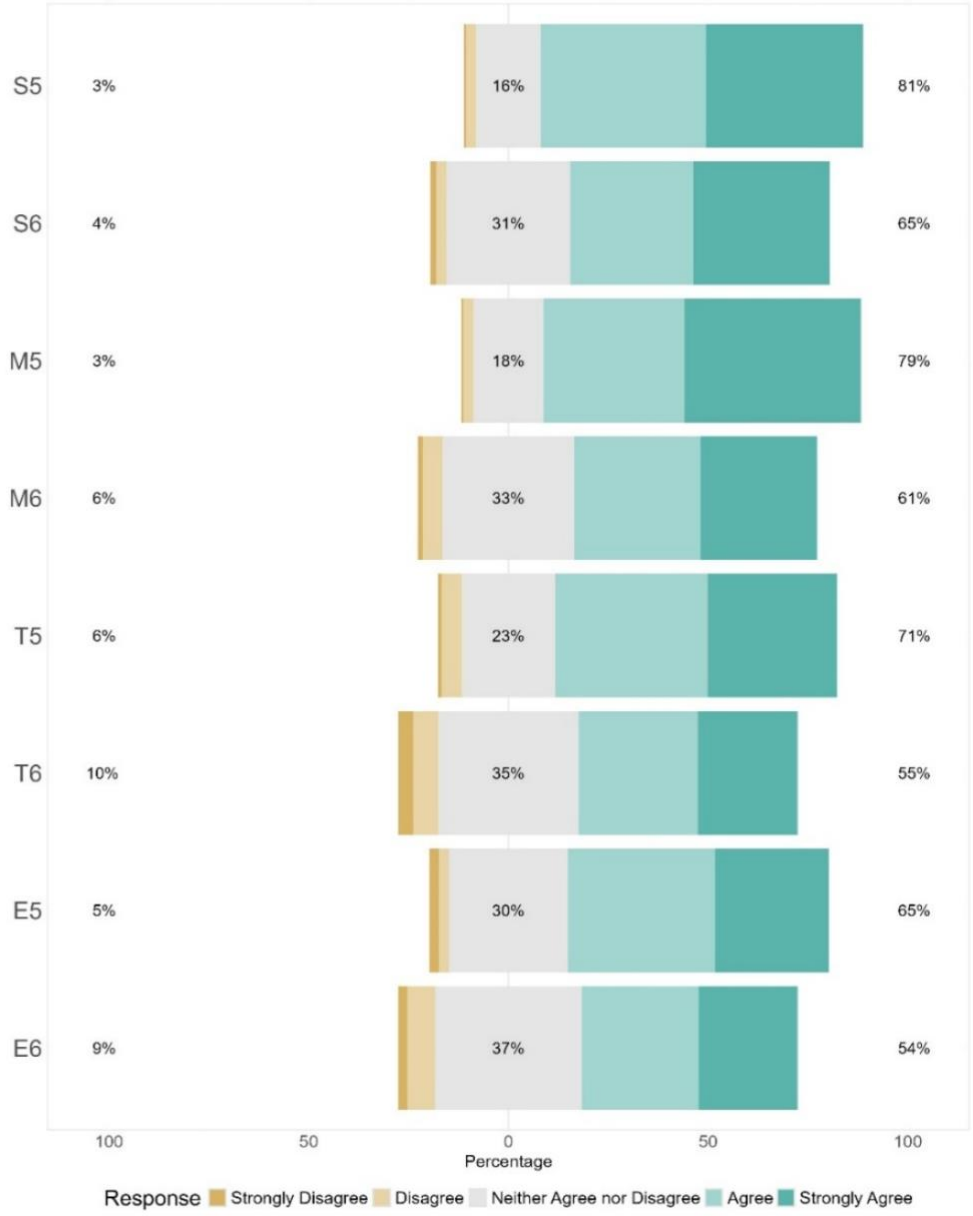
The STEM interest amongst the local high school students was at the lowest during the COVID pandemic period, but the level of interest has changed to an upward trend after such a period has ended. The low interest in STEM education during the COVID pandemic may be due to the two main reasons: the shift in the students' mindsets and access to resources during such period.

The pandemic can cause stress and anxiety amongst students, in which these can affect students' motivation and focus related to STEM learning tasks. Change in the daily routine and the reduction in support from teachers and peers can make one maintain interest in

STEM difficult. Students may also place the future career prospects in STEM at a lower priority, as they have more immediate concerns to deal with. Restrictions in accessing STEM learning resources may lead to insufficient practical learning experiences. This in turn can cause a decrease in motivation among students.

Figure 4

Survey Results Related to Outcome Expectations



Overall, we can see that most respondents (i.e. local high school students in Hong Kong) to our survey are generally have a positive perception towards STEM subject and careers. They are willing to study hard towards STEM-related subjects and have a positive attitude towards having a career related to STEM discipline. They generally believe that learning about STEM in their classes to achieve their career goals in STEM. From the survey, we can also see that parents' perception of STEM education.

Figure 5
STEM Interest Trend of Local High School Students

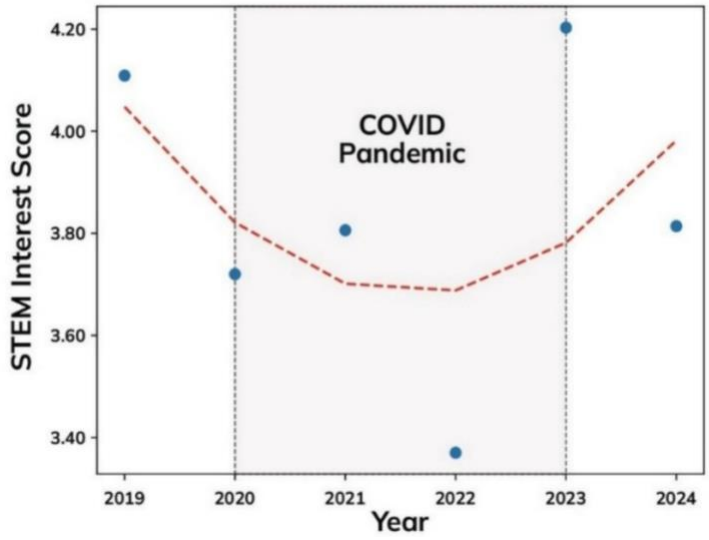
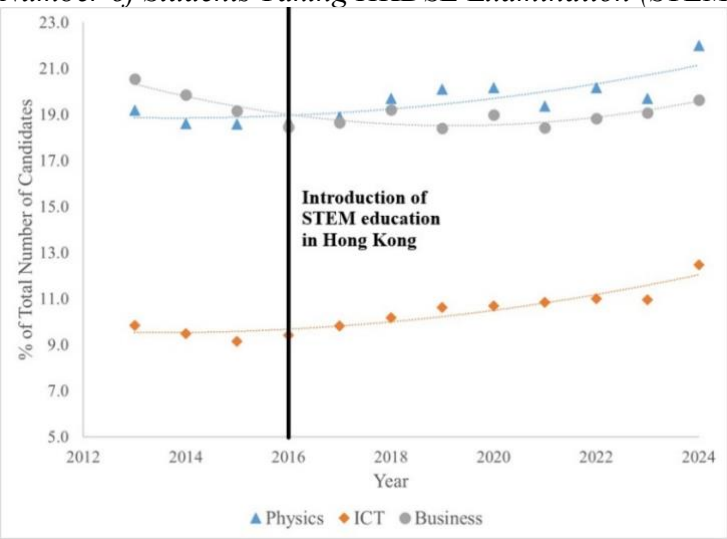


Figure 6 shows the percentage of the total number of candidates taking physics, information technology and business management as part of their Hong Kong Diploma of Secondary Education (HKDSE) examination.

Figure 6
Number of Students Taking HKDSE Examination (STEM Subjects vs Business)



Before the introduction of STEM education, the number of students taking STEM related subjects such as physics and information and communications technology (ICT) has been in decline (An average of 2% decrease in both subjects). Only after the introduction of STEM education, an upward trend is observed for both physics and ICT. The percentage of the total number of candidates taking physics has increased from 18% to 22% in the overall timeframe under study. Meanwhile, a downward trend is observed for business management. This is where the percentage of the total number of candidates decreased from 21% to 19%.

By comparing the trend for STEM-related subjects with that of business management, we can see that the interest in STEM-related subjects has increased since the introduction of STEM education by the Government, whereas interest in business subjects has decreased. This

demonstrates that the Government's initiative in promoting STEM education has played a role in pushing for this trend.

RQ2: What factors may influence their perceptions related to engineering and related careers?

We have investigated the possible correlation between the number of STEM-related activities that students have participated in and the level of interest in engineering. The results of the correlation study are shown in Table 7. This is where n is the number of respondents, M is the mean Likert score, SD is the standard deviation and the last column shows the Spearman correlation coefficient for each survey item.

Table 7

Correlation Between the Number of STEM-Related Activities and the Survey Items E1, E2, E3, E4, E5, E6, E7, E8

Variable	*n*	*M*	*SD*	Number of STEM related activities participated at HKUST
E1: I am able to do well in activities that involve engineering.	95	3.52	1.03	.373**
E2: I am able to complete activities that involve engineering.	94	3.50	.981	.305**
E3: I plan to use engineering in my future career.	95	3.51	1.10	.308**
E4: I will work hard on activities at school that involve engineering.	94	3.81	1.05	.320**
E5: If I learn a lot about engineering, I will be able to do lots of different types of careers.	96	3.66	1.07	.306**
E6: My parents would like it, if I choose an engineering career.	96	3.51	1.04	.204*
E7: I am interested in careers that involve engineering.	95	3.56	1.12	.282**
E8: I like activities that involve engineering.	95	3.59	1.13	.259*

*$p < .05$. **$p < .01$.

The results suggest that the number of STEM-related activities that students have participated at the Hong Kong University of Science and Technology (HKUST) is moderately associated with the level of self-efficacy (i.e. E1 and E2) and the level of interest in engineering careers (i.e. E3 and E5). This implies either STEM-related activities organized by HKUST have managed to attract students with an interest in engineering careers, or such activities have managed to change students' perception in engineering.

In addition to the number of STEM-related activities, we also have looked at a possible correlation between the number of STEM-related competitions that students have participated in and the level of interest in engineering. The results of the correlation study are shown in Table 8. This is where n is the number of respondents, M is the mean Likert score, SD is the

standard deviation and the last column shows the Spearman correlation coefficient for each survey item.

Table 8
Correlation Between the Number of STEM-Related Competitions and the Survey Items E1, E2, E3, E4, E5, E6, E7, E8

Variable	*n*	*M*	*SD*	Number of STEM related competitions participated
E1: I am able to do well in activities that involve engineering.	95	3.52	1.03	.366**
E2: I am able to complete activities that involve engineering.	94	3.50	.981	.354**
E3: I plan to use engineering in my future career.	95	3.51	1.10	.283**
E4: I will work hard on activities at school that involve engineering.	94	3.81	1.05	.279**
E5: If I learn a lot about engineering, I will be able to do lots of different types of careers.	96	3.66	1.07	.261*
E6: My parents would like it, if I choose an engineering career.	96	3.51	1.04	.272**
E7: I am interested in careers that involve engineering.	95	3.56	1.12	.320**
E8: I like activities that involve engineering.	95	3.59	1.13	.269**

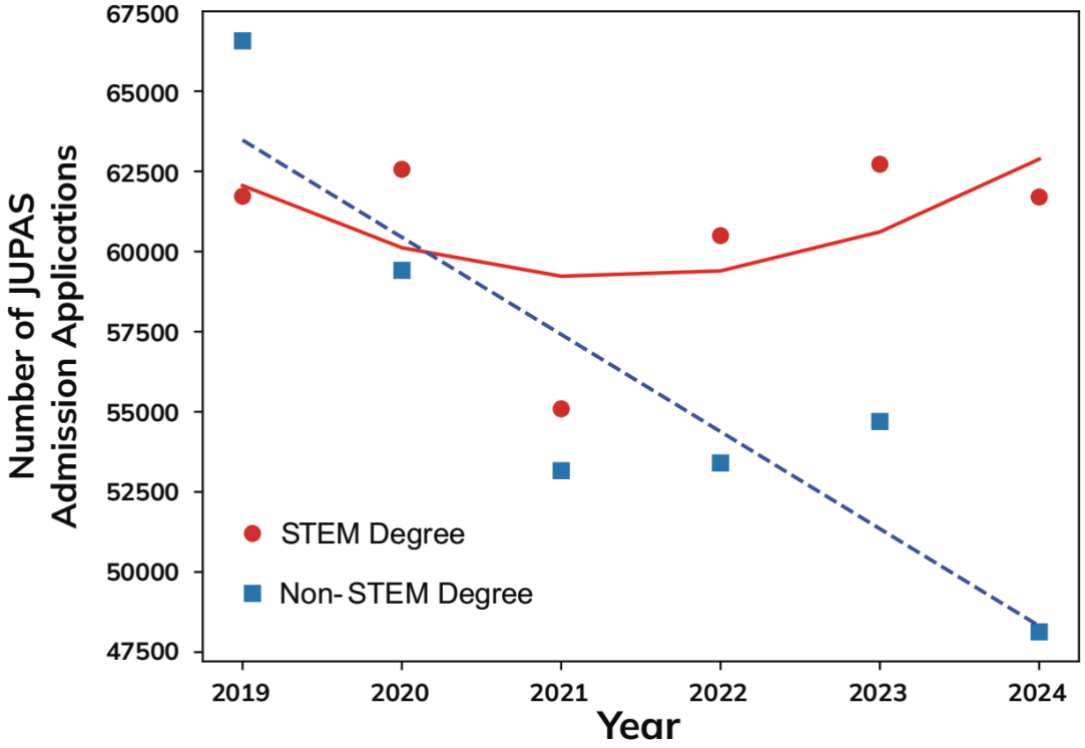
*$p < .05$. **$p < .01$.

The results suggest that the number of STEM-related competitions that students have participated in is moderately associated with self-efficacy in engineering (i.e. E1 and E2), also interest in engineering careers (i.e. E7). This may mean that students with high self-efficacy are the ones willing to participate in multiple STEM-related competitions, alternatively this may also mean participating in more competitions will mean an increase of students' self-efficacy.

RQ3: What is the current trend in applying for undergraduate STEM-related degree programmes in Hong Kong?

Figure 7 shows the number of JUPAS admission applications over a period as specified in such figure. The red circled markers are for the STEM degree admission applications, and the blue square markers are for non-STEM degree admission applications.

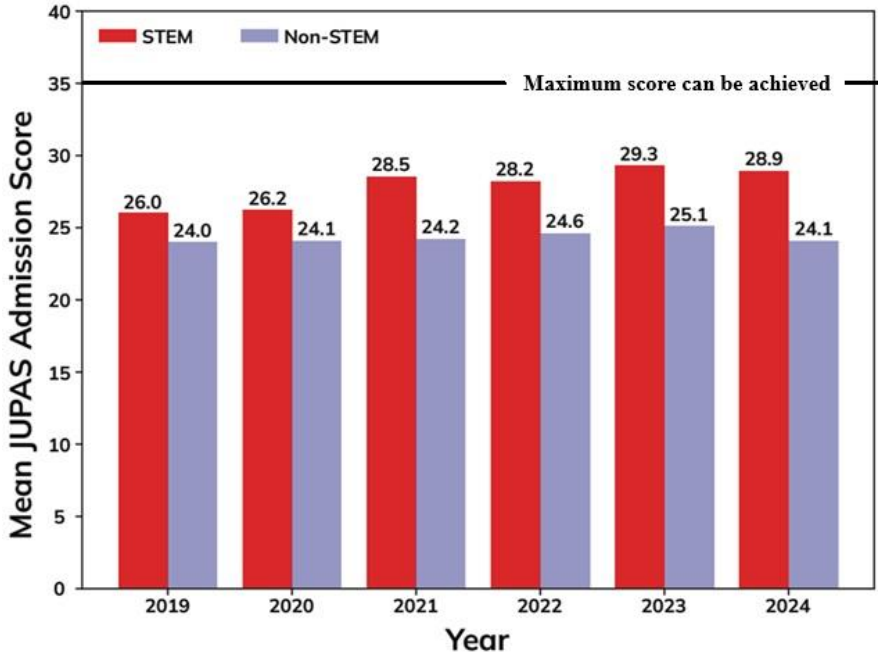
Figure 7
Comparison of the Number of JUPAS Admissions Applications (STEM vs Non-STEM)



In the beginning, 7% more JUPAS admission applications were received for non-STEM degree programmes, when compared to STEM-related degree programmes. However, the number of applications received for STEM degree programmes overtook that of non-STEM degree programmes in the next year. The difference in the number of applications for STEM degree programmes and non-STEM degree programmes has gradually increased since then. At the end of the specified period in the figure, 27% more applications were received for STEM degree programmes, when compared to that of non-STEM degree programmes. Furthermore, number of students applying for non-STEM related degree programmes has been in decline by 30% in the overall timeframe as specified in the figure. This implies that local high school students did see the appeal in pursuing further studies related to STEM related subjects.

Apart from looking at the number of JUPAS admission applications received for STEM related degree and non-STEM related degree over time, the change in JUPAS admission score over time was also studied for STEM related degree and non-STEM related degree. The results are shown in Figure 8.

Figure 8
Comparison of JUPAS Admission Score (STEM vs Non-STEM)



One can see the average JUPAS admission score has increased from 26.0 points in the year to 28.9 points for the entire period under study, for STEM related degree programmes. In contrast, the average JUPAS admission score remains the same for the same period, in the case for non-STEM-related degree programmes. The difference in the admission score between STEM and non-STEM degree programmes is getting larger over time during the entire period under study. Higher education institutes want to attract brighter students into STEM-related degree programmes, compared to non-STEM counterpart.

RQ4: Are there any incentives pursuing a STEM-related career in Hong Kong?

To assess whether there are incentives pursuing a STEM-related career in Hong Kong, we have compared monthly salary for an assistant engineer and that of an entry position for non-STEM job sector. Although the monthly salary is shown to be increasing for the two entry level positions, the monthly salary for an assistant engineer has risen more rapidly for the entire period under study. Its monthly salary has increased from HKD 19398 to HKD 26271 over those four years, as shown in Figure 9.

In addition to comparing monthly salaries, we have looked at the change in the number of university graduates going into the STEM job sector, as shown in Figure 10. The percentage of respondents going into the STEM job sector has increased from 34% to 40% during the entire period under study. Meanwhile, the percentage of respondents going into the business sector has decreased from 45% to 36% in the same period. We have also observed that more university graduates have gone into the business sector compared to that of the STEM job sector, before STEM education was introduced. Only two years after STEM education was introduced by the Government, we saw the number of university graduates going into the STEM job sector overtook that of the business sector. By looking at the monthly salary trends and career destination of university graduates over time, having a STEM related career in Hong Kong is getting more attractive.

Figure 9

Comparison of Monthly Salary for Entry Level Positions in STEM (Assistant Engineer) and Non-STEM Job Sector

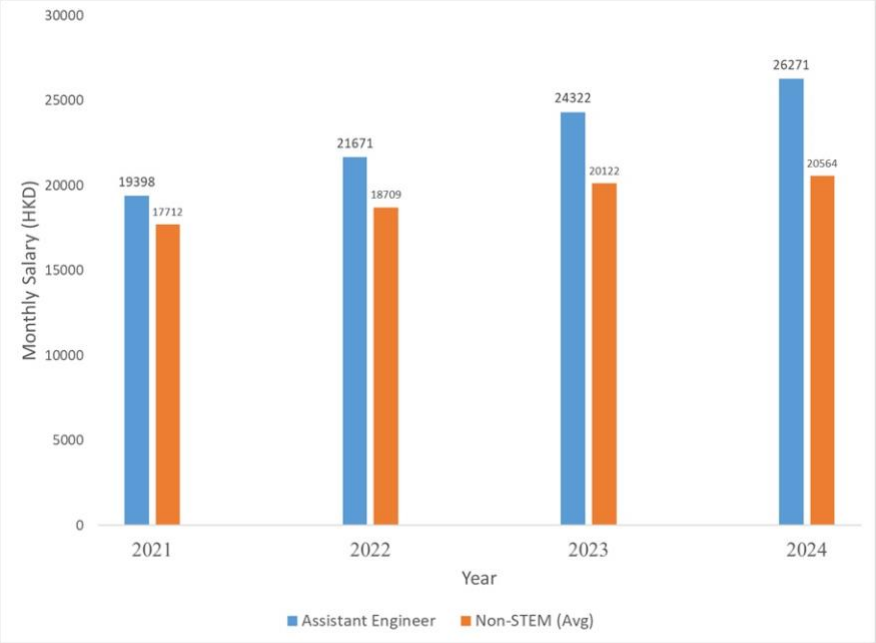
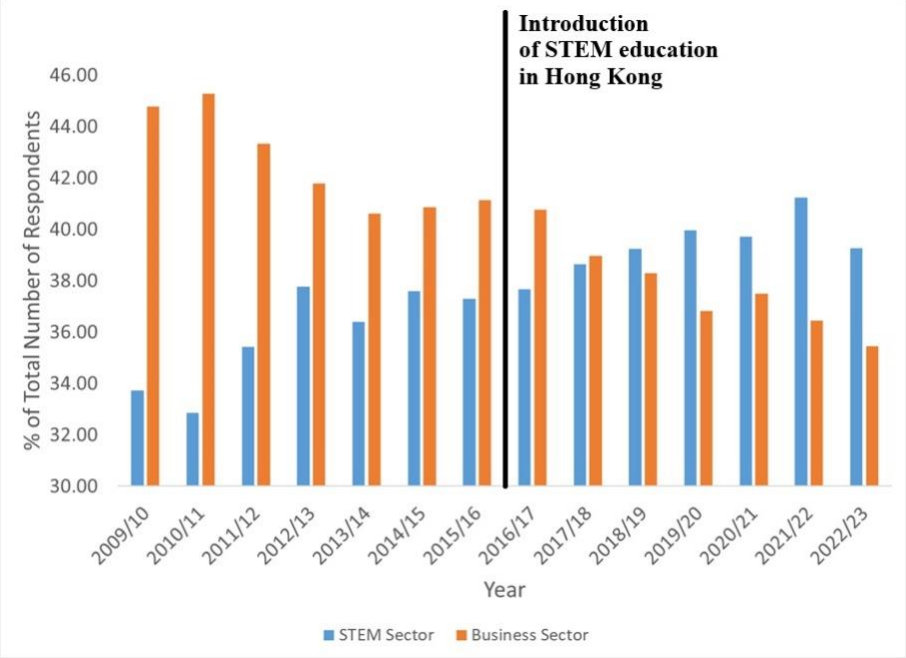


Figure 10

Comparison of Career Destination of University Graduates in Hong Kong (STEM vs Business)



Conclusion

Assessing the current landscape of STEM education amongst local high school students in Hong Kong is vital to meet the future manpower demands for Hong Kong's reindustrialization. To gain insight into students' attitudes towards STEM and their future career prospects in this job sector, we examined their perceptions of STEM subjects and career interests, identified factors that may influence with such interests, reviewed admission

requirements for STEM-related programs at higher education institutions, and evaluated the incentives of pursuing a STEM career in Hong Kong.

Our study revealed that local secondary school students generally have a positive attitude towards STEM-related careers and subjects. Over 62% of survey respondents expressed a desire to pursue further studies in STEM fields, while 66% indicated interest in a STEM-related career, particularly in engineering. The level of interest in STEM subjects and careers is positively correlated with the frequency of participation in STEM-related activities organized by HKUST.

The number of JUPAS admission applications for STEM degree programs appears to reflect local high school students' growing interest in STEM over time. An increasing number of students are opting to specialize in STEM subjects, and the gap in admission scores between STEM and non-STEM degree programs has widened over the same period. Higher education institutions are actively seeking to attract top students to STEM programs compared to their non-STEM counterparts.

In Hong Kong, there are more incentives to pursue careers in STEM fields than in business. Particularly, a growing number of university graduates are choosing STEM-related careers, as well as the entry-level salaries in these fields have become increasingly attractive over time.

Overall, this study supports the Government’s initiatives in continuing to nurture local high school students who have strong interest in STEM-related careers and subjects.

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Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

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Exploring Senior High School English Teachers' Perspectives in Maintaining Their English Language Proficiency in Taiwan: A Grounded Theory Study

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Abstract

Mastering a foreign language is a continuous journey, and English as a Foreign Language (EFL) teachers are often viewed as models of successful long-term learners. This study explores how Taiwanese high school English teachers maintain and enhance their language proficiency over the course of their careers. It examines the strategies they employ, the challenges they face, and the contextual factors influencing their professional growth. Adopting a grounded theory approach, data were collected through in-depth, semi-structured interviews. The iterative nature of grounded theory allowed for ongoing refinement of questions and deeper engagement with participants' evolving responses. The findings show that all participating teachers reported improvements in their English proficiency since entering the profession. While they began teaching with a strong foundation, many identified the need to deepen their understanding of grammar, pragmatics, and semantics. Their continued development was driven by both teaching demands and the desire to effectively convey complex ideas. Beyond linguistic skills, teachers emphasized the importance of adapting to institutional contexts and student needs. They relied on varied sources of authentic English input, such as media, travel, academic resources, and collaboration to sustain fluency and cultural awareness. This study underscores the dynamic interplay between individual initiative and institutional conditions in supporting ongoing language development. It highlights the need for professional development programs that not only provide sustained language input but also respond to the evolving realities of EFL teaching. Such programs are essential to ensuring that teachers remain linguistically competent and pedagogically effective.

Keywords: high school teachers, EFL, grounded theory, maintaining proficiency, semi-structured interviews

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Introduction

Language proficiency development is important for building English as a foreign language (EFL) teachers' identity because "their experiences as teachers are often situated on the same trajectory as their linguistic development" (Miller & Kubota, 2013, p. 246). The growing literature on language teacher education (e.g., Alagözlü, 2016; Choi & Lee, 2016; Ghasemboland & Hashim, 2013; Şahan et al., 2014; Sato, 2023; Wulyani et al., 2019; Yusuf & Novita, 2020) has also shown that EFL proficiency is interrelated with many other factors, such as previous experiences, pre-service programs, teachers' beliefs, and teachers' reflection and collaboration, which together contribute to language teachers' EFL development. In her historical overview of EFL teacher development, Schulz (2000) highlighted that "[t]he preparation of …EFL teachers has been a frequently discussed topic during the past century" (p. 495). However, to better understand how EFL teachers manage their dual role as both life-long EFL learners and EFL teachers as well as grapple with what motivates them to continue their development, empirical research should also address the more neglected area of in-service English teachers' development.

The recent growth in the number of studies that have used Dörnyei's (2005) L2 Motivational Self System to investigate language teachers' engagement (or lack thereof) in professional development (e.g., Dörnyei, 2019; Hiver, 2013; Kumazava, 2013) shows the increasing interest in bridging the gap in research between language teacher education and teachers' motivation. The present study seeks to contribute to the field by delving into the practices that EFL teachers use and the obstacles they encounter in maintaining their proficiency.

Literature Review

EFL Teachers' Language Proficiency

The concept of EFL teacher proficiency is multifaceted and cannot be reduced to a single skill set. Alzeebaree and Zebari (2021) argue that core elements of a proficient language teacher include strong oral skills, a standard accent, clear pronunciation, and sound grammatical knowledge. However, such a perspective, while valuable, does not fully capture the complexity of language proficiency within diverse teaching contexts. It is essential to consider proficiency in relation to teaching experience, pedagogical approaches, and the specific demands of the classroom.

Definitions of foreign language proficiency vary widely. At one end of the spectrum, Abrahamsson and Hyltenstam (2008) equate proficiency with near-native or native-like performance, although they argue that "native-like ultimate attainment in adult learners is, in principle, nonexistent" (p. 499), due to persistent subtle differences in L2 usage. In contrast, Piller (2002) advocates a more attainable, use-oriented definition that views language proficiency as context-dependent, shaped by the communicative purpose, audience, and medium. For EFL teachers, this suggests that mastery of English should not be seen as an abstract ideal, but as a functional skill tailored to classroom needs.

In Taiwan, the minimum required proficiency level for secondary school English teachers is typically set at CEFR C1 (The Language Training & Testing Center, 2014). According to the Council of Europe (2001), C1 users are expected to express themselves fluently and spontaneously, and to use language effectively in academic, social, and professional contexts. This level of command is considered essential, as teacher proficiency has a direct impact on

classroom instruction. Chambless (2012) emphasizes that EFL teachers must provide abundant, varied language input and facilitate meaningful interaction, interpretation, and negotiation of meaning. Consequently, the depth and flexibility of a teacher's language proficiency significantly influence the quality of language teaching and the effectiveness of student learning.

EFL Teachers' Motivation

According to Ushioda and Dörnyei (2012), they indicate that "language learning is a sustained and often tedious process," and attribute the success of long-term learners to their ability to maintain "a superordinate vision that kept them on track" (p. 25). For EFL teachers, sustaining and developing language proficiency across a career depends heavily on intrinsic motivation. Dörnyei (2001) defines intrinsic motivation as "the inherent joy of pursuing a meaningful activity related to one's subject area of interest, in an autonomous manner, within a vivacious collegial community, with self-efficacy" (p. 159). However, this motivation can be influenced and at times undermined by external factors such as institutional pressure, limited autonomy, low self-efficacy, and insufficient career support.

Over the past two decades, Dörnyei's work on second language (L2) motivation has evolved into the L2 Motivational Self System, which moves beyond linear models to account for the dynamic interplay of personal and contextual influences. Building on Markus and Nurius's (1986) concept of possible selves, Dörnyei (2009) identified two core components: the *ideal L2 self*, representing one's hopes and aspirations, and the *ought-to L2 self*, reflecting perceived duties and expectations. Motivation arises from the internal tension between one's current and future self-images, a concept further elaborated in Higgins's (1998) Self-Discrepancy Theory. Emotional investment such as fear, hope, and obligation is key to activating the motivational force of these self-guides. While the L2 Motivational Self System has become a foundational framework for understanding learner motivation (e.g., Li, 2023; Wang & Fisher, 2023; Yu & Jiang, 2023), its application to EFL teachers remains relatively underexplored, presenting an important area for further investigation.

Building on Dörnyei's (2005) L2 Motivational Self-System and Higgins's (1998) Self-Discrepancy Theory, Kubanyiova (2009) developed a theoretical model of Language Teacher Conceptual Change to explain why some teachers engage in specific classroom practices while others remain resistant to change. The model is grounded in the concept of a *Possible Language Teacher Self*, which incorporates three key dimensions: the *ideal self*, representing teachers' aspirations; the *ought-to self*, which reflects external expectations and obligations; and the *feared self*, highlighting the potential negative consequences of failing to meet those obligations.

In her study of in-service EFL teachers in Slovakia, Kubanyiova found that the perceived gap between teachers' actual selves and their ideal, ought-to, or feared selves did not always drive engagement in professional development activities. In cases where these activities conflicted with the teachers' sense of duty (the ought-to self) or were not viewed as a means to achieve their desired state, they failed to motivate participation. This emotional dissonance between teachers' self-concept and the demands of reform efforts appeared to undermine their willingness to adopt new practices.

In a similar vein to Kubanyiova, Hiver (2013) employed the concept of a *Possible Language Teacher Self* to examine language teacher development. His study of Korean in-service EFL

teachers revealed that continuing professional development is deeply emotional. Teachers motivated by their *ideal teacher selves* viewed development as a positive enhancement, while those driven by their *feared teacher selves* perceived it as a corrective necessity, accompanied by negative emotions. Hiver argued that emotions play a pivotal role in all aspects of teaching, serving as "significant catalysts driving decisions to engage in continuing teacher development" (p. 213). He emphasized that emotions not only influence teachers' initial decision to pursue professional development but also affect their ability to sustain it. The perceived discrepancy between present and future selves is inherently linked to affective states, making emotional engagement critical to long-term professional growth.

Given that teaching is an emotionally charged profession intertwined with both personal and professional identity, teachers' motivation and commitment significantly impact their students. Csikszentmihalyi (1997) underscored the importance of the teacher-student relationship, noting that "the best way to get students to believe that it makes sense to pursue knowledge is to believe in it oneself" (p. 72). In essence, the positive influence of effective teachers often stems from their deep commitment to the subject matter, which in turn fosters a similar willingness in students to engage with and pursue knowledge. Teachers who embody this commitment act as role models, inspiring students to value and believe in the learning process.

Given the significant impact of EFL teachers' proficiency and motivation on the quality of language education, Chambless (2012) emphasized the need for empirical studies on the trajectory of teachers' language proficiency after graduation. Specifically, she called for research into whether in-service teachers maintain their oral proficiency over time (p. 157). Such research is crucial to bridging the gap between pre-service language teacher education and the realities EFL teachers face throughout their careers. When professional development is not mandatory and is instead expected to be initiated by teachers themselves, it becomes essential to understand the mechanisms that drive such initiatives and how they can be effectively triggered.

Investigating EFL teachers' engagement in professional development offers valuable insights into two key areas: (a) the evolving needs of teachers at various stages of their careers and within different teaching contexts, and (b) how to foster bottom-up professional development that supports ongoing language proficiency maintenance and enhancement. Understanding these factors can inform the design of professional development programs that are responsive to teachers' specific needs, ultimately contributing to sustained improvement in language teaching.

Lack of Research on the Exploratory Qualitative Study

Past quantitative studies (e.g., Eslami & Fatahi, 2008; Fraga-Cañadas, 2010; Nayernia & Babaya, 2019; Yilmaz, 2011) have shown that teachers' perceptions of inadequate proficiency often result in more cautious teaching approaches, diminished self-efficacy, and reduced use of the target language in the classroom. Moreover, such self-perceptions may send a negative message to students regarding their own language learning potential, potentially serving as a detrimental role model. For example, Fraga-Cañadas (2010) found that Spanish non-native speaker teachers in American high schools reported experiences of fossilization, frustration, and a decline in proficiency. These challenges were attributed to prolonged teaching of low-level students, limited interaction with native speakers, and insufficient opportunities for language practice outside of the classroom. Similarly, Nayernia and Babaya (2019) found a

significant negative relationship between Iranian EFL teachers' language proficiency and two dimensions of teacher burnout: emotional exhaustion and depersonalization. This suggests that inadequate proficiency not only affects teachers' pedagogical performance but may also contribute to negative emotional and psychological outcomes.

Contrasting with the findings of Fraga-Cañadas (2010) and Nayernia and Babaya (2019), studies on high school teachers (e.g., Eslami & Fatahi, 2008; Yilmaz, 2011) have highlighted notable improvements in language proficiency such as speaking, pronunciation, listening, and reading over the course of their careers. These teachers were also proactive in engaging with activities like speaking the target language and consuming media in that language, both of which contributed to maintaining their proficiency. Furthermore, the analysis revealed that teachers who recognized improvements in their language skills were more inclined to adopt a communicative teaching approach compared to those who felt their proficiency had not progressed. Lastly, regarding the link between proficiency and motivation, teachers across various school types exhibited similar levels of motivation when they perceived their language proficiency had enhanced over time.

While previous research has explored teachers' self-perceived proficiency and motivation, Ushioda and Dörnyei (2012) emphasized the need for more qualitative research to complement the quantitative approach, in order to capture the dynamic and context-dependent nature of L2 motivation (p. 402). Existing quantitative studies have left several questions unanswered, particularly regarding the underlying reasons for, and nature of, teachers' engagement (or lack of engagement) in maintaining their language proficiency. This exploratory qualitative study seeks to address these gaps by using in-depth semi-structured interviews to examine EFL teachers' perceptions of their language proficiency progress, how this affects their in-class practices, and the nature of their commitment to maintaining proficiency. The interview data are analyzed through a grounded theory approach, ensuring a bottom-up perspective that prioritizes the teachers' experiences and insights.

Building on the points discussed above, this study aims to explore how senior high school English (EFL) teachers in Taiwan experience and respond to changes in their English language proficiency. The following research questions guide this interview-based study:

1. How do Taiwanese English teachers view changes in their English language proficiency during their teaching careers?
2. How do English teachers maintain their proficiency?

Research Method

This study was conducted in senior high schools in Taiwan, where students have the opportunity to study a variety of foreign languages, including English. In Taiwan, many senior high school students are motivated to continue their education after graduation, and proficiency in one or more foreign languages, particularly English, is seen as an essential component of a well-rounded education. It is generally expected that high school graduates in Taiwan achieve a B1 level of English proficiency on the CEFR (The Language Training & Testing Center, 2014). Consequently, it is crucial for teachers to maintain a strong command of English and continue developing their language proficiency to meet both professional and educational expectations.

The participants in this study were twelve senior high school English teachers. Sampling was both purposeful, targeting English teachers with varying lengths of teaching experience at

senior high schools, and convenient, relying on volunteer participants. Prior to data collection, the teachers were formally invited to participate in the study and provided with detailed written information about the research. Recruitment occurred through the researcher's personal networks, including social media and email contacts within the university.

Teachers were initially asked for their consent to participate, followed by scheduling of follow-up interviews. Throughout the research process, confidentiality and anonymity were strictly maintained. All recorded data were stored on password-protected computers, and audio files were deleted once transcriptions were completed. Transcriptions were anonymized, and any identifying information was removed during this process. Participation in the study was entirely voluntary, and participants were informed that they could withdraw at any time without penalty if they felt uncomfortable. To further protect confidentiality, pseudonyms were used for all participants.

Data Collection

This study involved detailed, individual semi-structured interviews with thirty English teachers from senior high schools in Taiwan. The semi-structured format was chosen to facilitate a conversational interview style, while ensuring that comparable data could still be collected (Dörnyei, 2007; O'Leary, 2017).

The study followed Charmaz's (2006) approach for crafting interview questions in grounded theory research. It emphasized equality between the researcher and participants (Scott, 2011), where participants were given full control over selecting the time and place for their interviews (Birks & Mills, 2012) and were encouraged to steer the conversation. The researcher asked open-ended questions, avoiding any preconceptions, and focused on active listening, allowing the dialogue to unfold naturally and empowering participants to share their personal experiences and insights (Scott, 2011). Participants were prompted to reflect on their experiences, stories, and emotions, illustrating their points with examples of specific events, language, and behaviors. The researcher repeated participants' responses to ensure clarity and accuracy in interpretation. Further discussion topics were shaped by earlier responses, while memos were written to capture context and emerging insights (Birks & Mills, 2012). In some cases, participants were contacted for follow-up through email or additional interviews, to verify whether emerging themes, codes, and theoretical ideas aligned with their perspectives as part of the member-checking process (Charmaz, 2006).

The interview questions focused on teachers' learning and teaching experiences, as well as their professional development. To begin, participants were asked for brief bio-data to provide context for their experiences and offer insights into their demographics, such as educational backgrounds and teaching histories. Following this, the questions delved into their journeys to becoming English language teachers, their experiences both as learners and educators, and their views on their teaching careers. Specifically, the questions aimed to understand how participants maintained their English language proficiency. The interview questions were primarily based on three core research questions derived from a literature review, but they were also shaped by the researcher's responsiveness to the participants' answers. The iterative process of grounded theory led the researcher to continuously adapt the questions in response to emerging data and developing theoretical categories. As a result, interview questions were modified based on participants' responses, with follow-up questions used to clarify any ambiguities.

Each interview lasted approximately one hour and was conducted either in person or online. All interviews were audio-recorded. Throughout the process, the researcher adhered to the ethics of care outlined by Kubanyiova (2008) in the context of situated research. For instance, recognizing that discussing issues related to English language proficiency, particularly when tied to one's professional identity, could be emotionally challenging and potentially threaten a teacher's self-esteem or sense of self-efficacy, the researcher made sure to approach sensitive topics with care. If participants appeared uncomfortable or hesitant to discuss certain matters, no further questions were asked. In such cases, participants were invited to follow up via email or a second interview to clarify or expand on their thoughts if necessary. All interview data were transcribed verbatim to ensure accuracy.

Data Analysis

Considering the critical role of English language proficiency for both English teachers and their students, along with the existing gap in the literature discussed earlier, grounded theory was selected as the most suitable methodology. Grounded theory, as defined by Glaser and Strauss (1967), is "the discovery of theory from data systematically obtained from social research" (p. 2), making it particularly well-suited to capture the dynamic nature of psychosocial processes. Employing grounded theory allowed the study to explore how EFL teachers maintain their English language proficiency, providing valuable insights into this important aspect of their professional development.

The data were analyzed using a grounded theory approach, beginning with open coding followed by axial coding. Through repeated readings of the data, the researcher identified recurring topics by circling and highlighting relevant words and phrases used by participants. From there, the central phenomenon (or axis) was identified, along with its various properties and dimensions, by linking the codes and organizing them into potential main themes.

The research process was iterative. As Urquhart (2013) notes, the process continued until data saturation was achieved, meaning no new concepts were emerging. According to Charmaz (2008), "Data collection, analysis and resultant theory generation has a reciprocal relationship ... it requires a constant interplay between the researcher and the data" (p. 47). The researcher aimed to identify groups that reflected a wide range of diversity, ensuring that categories were fully saturated (Glaser & Strauss, 1967). Through a continuous cycle of data analysis using constant comparative analysis, the researcher examined the data until no new codes or categories emerged, and all new data could be integrated within existing categories, marking the point of saturation (Birks & Mills, 2012).

To enhance the credibility and rigor of the study, two key techniques were employed: participant review and a coding consistency check. First, participant review was conducted by sharing the teachers' perspectives and providing a detailed description of each case. Participants were asked to review their transcribed interviews, with the option to add, delete, or revise any statements. The transcriptions were emailed to the teachers, who were asked to respond with any changes or comments directly in the document. To ensure validity and reliability (Merriam, 2002), member checks were also performed by sending the researcher's interpretations back to the teachers via email for verification. In this follow-up, teachers were asked to confirm that the transcribed interview accurately reflected their views and opinions and to provide consent for the accuracy of the content included.

Results

Q1: How do Taiwanese English teachers view changes in their English language proficiency during their teaching careers?

Most teachers set high standards for their own English proficiency, aiming for a level of fluency comparable to that of native speakers. This aspiration to achieve native-likeness (Dörnyei, 2005; Kubanyiova, 2009) reflects their commitment to continuous learning and a strong desire to maintain their language skills. While all teachers recognized that their proficiency was solid when they graduated, they found that teaching required a deeper understanding of the language's mechanics, pragmatics, and semantics, along with specific strategies tailored to their school settings and student needs. For example, Jenny acknowledged that, although her grammar was accurate, she struggled to explain the rules clearly and had to study the grammar she taught. Similarly, Lucy highlighted the importance of word associations, synonyms, and antonyms—analyzing language in ways she had not considered before but now recognized as crucial for helping students structure and process information.

While their strong English language backgrounds provided them with a rich vocabulary, the teachers often lacked the specialized terminology needed for teaching English for specific purposes, particularly in certain textbook units. For instance, Steven recalled learning business-related terms like "franchising" and "promissory note" as part of his teaching to students.

Additionally, all the teachers recognized that changes in their proficiency were both necessary and inevitable. As the language they teach evolves, they must also adapt. Lucy illustrated this point by saying, "If I spoke the way I did when I graduated 20 years ago, I'd sound like a book from the 18th century." Tania echoed this sentiment, explaining that she keeps current by watching modern movies. Lucy further stressed the continuous nature of learning: "There is always something new to learn. Teaching supports learning. As I grow, I keep changing." This view reflects sociolinguistic insights on linguistic variation and change (Mesthrie et al., 2009).

Q2: How do English teachers maintain their proficiency?

The teachers expressed a shared concern about maintaining and improving their English language proficiency, recognizing it as essential to their effectiveness in the classroom. Tania captured this sentiment, stating, "If I don't do anything, I will lose it. If the teacher's proficiency is high, the school will produce better students, and everyone benefits." This belief was echoed by Tom, who said, "If I do not know the language, what am I doing there? I mean, it is obvious." For Jenny, proficiency was not only professional but personal. She described it as "a matter of personal pride," something that "gives [her] confidence and authority," and "serves as a guarantee for the students."

To sustain and enhance their skills, teachers engaged in various activities such as using the Internet, watching English-language films, reading for enjoyment, and participating in an English teachers' study group at their school. All aimed at fostering ongoing professional growth.

Using the Internet

The teachers reported feeling inspired and motivated to improve their English proficiency, largely due to the accessibility of the Internet and the increasing availability of online English courses. They also highlighted interactive features such as chat rooms, forums, and social media platforms, which allow users to engage in conversations on a wide range of topics, ask questions, and receive feedback in real time. One participant emphasized the value of the Internet for language development:

> The Internet is my main source of self-directed professional growth. Participating in online discussions and chat rooms has helped me maintain my language proficiency. The need to communicate pushed me to focus on improving my grammar and vocabulary. What I find most impressive, though, is that it is the most cost-effective way to connect with others.

Watching Target Language Movies

The teachers reported that watching movies in the target language was a valuable way to observe how vocabulary and grammatical structures function in real-life communication. This exposure helped them understand how language is used to construct meaning in authentic contexts. One participant reflected on this experience:

> Watching movies allows me to discover how words and grammatical structures can be used not just to convey information, but to build entire worlds, expressing emotions, relationships, and cultural nuances. Using language flexibly and imaginatively is far more valuable than merely memorizing isolated words or set phrases without context. Through movies, I appreciate the richness and subtleties of communication in ways that textbooks alone could never offer.

In addition, to enhance their listening comprehension, the teachers used subtitles strategically. Some opted for subtitles in the target language to reinforce vocabulary recognition and syntactic awareness, while others preferred subtitles in their native language to aid overall understanding. These different approaches reflected individual learning preferences and goals.

Reading for Enjoyment

Several teachers emphasized the benefits of reading for enjoyment, describing it as a valuable way to engage with language on their own terms. They appreciated the freedom to explore texts in their native language, which allowed for deeper personal connection and alignment with individual interests. This type of reading created a relaxed, self-directed environment, free from the pressures of academic expectations or linguistic limitations. One participant articulated this clearly:

> Here, I decide what to read and what not to read. I also read at my own pace. When I have free time, I choose a story from a list of readers and enjoy it stress-free. I actively construct meaning by interpreting words and phrases through the lens of my own knowledge, experiences, and cultural background. As a result, reading becomes not just a source of pleasure, but also a meaningful way to strengthen both language skills and personal identity.

Joining School's English Teachers' Study Group

Joining the school's English teachers' study group was seen as a valuable way to foster interpersonal communication among colleagues with similar language proficiency and interests. In EFL contexts where English is rarely used for everyday social interaction, these groups offered a rare and meaningful opportunity for consistent language use and professional exchange. Teachers described the discussions as motivating, allowing them to share ideas, stay informed, and support each other's language development. One participant reflected on the experience:

> I attend the school's English teachers' study group. The group is strong and cohesive, and I really enjoy our regular meetings. We exchange a wealth of information to stay current with the language and culture. There is a genuine spirit of collaboration.

Another teacher echoed this sentiment, adding, "I joined the school's English teachers' study group. It was very useful. We shared our experiences and spoke in English, even though there were only a few of us."

Discussion and Conclusion

The findings of this study reveal that teachers' efforts to improve their English proficiency were driven by two primary motivations: personal development and a sense of responsibility toward their students. This dual focus reflects the interplay between their *ideal selves*, the teachers they aspire to become, and their *ought-to selves*, the professionals they feel obligated to be. The emotional tension between these self-concepts and their current proficiency levels acted as a catalyst for self-initiated learning and growth. Consequently, changes in their language proficiency followed varied trajectories, including lexical enrichment, simplification, and specialization, shaped by the demands of their specific teaching contexts. These shifts impacted not only their vocabulary and grammar usage but also their instructional practices.

Notably, teachers overwhelmingly perceived these changes as markers of growth, contributing to an enhanced sense of self-efficacy. This perception aligns with prior research (Bandura, 1997; Yilmaz, 2011), which emphasizes the critical role of language proficiency in shaping teachers' beliefs about their own capabilities. While a range of strategies was employed to sustain and develop their skills, these were predominantly driven by intrinsic motivation. This supports the findings of Yashiro (1992) and McEown et al. (2014), which suggest that motivation and attitude are more decisive factors in maintaining language proficiency than age or prior skill level. The study also identifies two crucial factors influencing teachers' engagement in professional development: the influence of their teaching environment and the presence of a collaborative, supportive community. Although all participants expressed a strong commitment to maintaining and enhancing their language proficiency, their engagement was closely aligned with the practical needs and constraints of their classrooms.

These findings underscore the importance of addressing both personal and contextual factors in supporting EFL teachers' ongoing development. Professional development initiatives should be responsive to the evolving challenges faced by teachers and tailored to their specific instructional settings. As Jiang and Dewaele (2019) point out, teachers play a pivotal role in sparking learners' interest in foreign languages. For motivation to lead to sustained

action, personal drive and contextual support must operate in tandem. It is therefore essential to recognize the dynamic interaction between internal motivations and external conditions that shape professional engagement. Given the central role of teachers in advancing students' language proficiency, schools should prioritize the creation of environments that nurture and sustain teachers' own language growth.

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Development of Thai Reading Skills of Primary Level Students by Using the Concept of School as Learning Community

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Abstract

This research aimed to develop an instructional package of Thai reading skills by using the concept of school as a learning community and efficiency of 80/80 and compare the Thai reading skills of students before and after using an instructional package of Thai reading skills by using the concept of school as a learning community. This research is experimental. The sample group was 30 students in grades 1 - 6, who had problems reading Thai, which was obtained from purposive sampling. The research tools consisted of activities learning to read Thai using the concept of school as an effective learning community according to the 80/80 criteria and a Thai reading skills test for primary school students. The experiment took 4 weeks, totaling 20 periods. Statistics used in data analysis were percentage, mean, standard deviation, and t-test for dependent samples. The research results found that; 1) The effectiveness of the Thai reading learning activity set by using the concept of school as a community Learning efficiency equals 80.06/81.72, higher than the standard criteria of 80/80, and 2) Comparison results of Thai reading skills of students before and after learning with an instructional package of Thai reading skills by using the concept of school as a learning community. The reading skills test results after studying were higher than before studying. Statistically significant at the .05.

Keywords: Thai reading skill, the concept of school as a learning community, instructional package

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Introduction

The Thai language is a national identity and a cultural heritage that fosters unity and strengthens the personality of Thai people, giving them a sense of "Thainess." It serves as a tool for communication to build understanding and good relationships, enabling people to carry out activities, work, and live together peacefully in a democratic society. Moreover, it is a means for seeking knowledge and experience from various information sources, helping to develop analytical thinking, critical thinking, and creativity to keep pace with social changes and scientific and technological advancements, as well as to apply in career development for economic stability. Additionally, Thai is a medium that conveys the ancestors' wisdom in culture, traditions, and aesthetics, making it a valuable heritage worthy of learning, preserving, and passing on to remain with the Thai nation forever (Ministry of Education, 2008: Online). The nature of the Thai language is skill-based; thus, the content of each skill cannot be separated by grade level, and it is necessary to have continuous skill-training processes. However, in terms of reading, it is necessary to teach language skills at every grade level, with each level having progressively more complex and difficult content, such as an increasing number of words, longer and more complex sentences, and longer reading passages (Ministry of Education, 2001).

Reading is an essential language skill in life and a cognitive process that enables individuals to interpret, comprehend, and construct accurate understanding of content. It also helps individuals grasp the main ideas and details based on their knowledge and personal experiences (Kaemkate, 2012). This skill affects many aspects of life, particularly in learning, where reading serves as a vital medium for accessing information and knowledge across all disciplines. In terms of language development, reading enhances vocabulary, sentence construction, and effective communication. Furthermore, reading contributes to the development of thinking skills by promoting analytical thinking, creative thinking, and interpretation. Reading is not merely a tool for learning but also helps individuals develop higher-order thinking skills and supports lifelong learning. Therefore, the development of reading skills should begin at the primary education level to establish a strong foundation for advanced learning in the future. Reading enables individuals to care for themselves, apply knowledge in their careers, and increase their capacity for self-development. Without good reading skills, readers will require more time to understand content and may fail to grasp the main ideas fully, which negatively impacts learning efficiency and daily life. Addressing this issue requires regular practice through daily reading activities. Promoting students' reading ability is thus essential, as this skill supports comprehension, decision-making, problem-solving, and interpretation. Therefore, reading is a crucial skill that should be continuously supported and developed to build a strong foundation for learning and living in the future, both at the individual and societal levels.

The development of reading skills must be accompanied by books or stories related to children's interests, as this supports reading ability and creates meaningful experiences. Engaging reading materials can stimulate students' interest in reading at all ages. This approach can be integrated with the concept of the school as a learning community, which fosters the participation of teachers, students, parents, and community stakeholders. Learning activities that promote exchange within the organization provide students with new ways to support their learning, particularly in the context of developing reading skills. Teachers play a key role in creating opportunities for others, including fellow teachers, parents, community members, and other stakeholders, to participate as observers, which positively impacts students' educational development. Education that emphasizes learning based on the concept

of the school as a learning community is grounded in a deep understanding of the importance of creating creative learning spaces and fostering enthusiasm for learning, beginning with assessing students' needs and interests. Additionally, implementing the idea of the school as a learning community is considered an important educational approach for creating diverse and engaging learning spaces. The learning context must therefore take into account activities that allow students to participate, focusing on collaborative learning environments in small groups to enable students to reach their full learning potential and extend it into diverse community-based learning spaces. Collaboration among teachers and parents, with the community as a key factor, helps create a learning environment that stimulates creativity and enhances students' reading skill development.

The Educational Research Division, Department of Curriculum and Instruction Development, Ministry of Education, evaluated the state of Thai language instruction in primary schools and found that students' Thai language achievement scores were at a relatively low level. The main problematic competencies included reading and writing skills, pronunciation of consonants and vowels, unclear consonant clusters, syllable segmentation, and incorrect use of Thai grammar. Syllable segmentation is particularly essential for beginning learners. If teachers do not teach syllable segmentation at the early stages, students will lack a foundation for word formation, which leads to confusion and difficulty in reading as they encounter more complex texts (Ministry of Education, 2003). This issue is reflected in the results of PISA assessments from 2012 to 2022, where Thai students' reading literacy scores steadily declined—441 points, 409 points, 393 points, and 379 points, respectively. This trend indicates a clear decrease in students' reading skills, partly due to the challenges in organizing learning during the COVID-19 pandemic. Moreover, the Thai education system shows a wide achievement gap between high-performing and low-performing students. This highlights that reading is crucial at all levels of education and across all sectors of society, especially reading comprehension, which should be explicitly developed among primary school students.

For these reasons, it highlights the importance and necessity of developing Thai reading skills among students in schools under the Bangkok Metropolitan Administration. This can be achieved through the use of learning activity packages that apply the concept of the school as a learning community. Such an approach can foster collaboration from all sectors and help expand and build upon knowledge, while employing strategies to develop schools into true learning communities aligned with their specific contexts. Ultimately, this can bring about improvements in the quality of education management in Thailand, enhance efforts to address educational quality issues, and strengthen school administration both in terms of management and academic development.

Research Objectives

1. To develop an instructional package of Thai reading skills by using the concept of school as a learning community to achieve an efficiency criterion of 80/80.
2. To compare the Thai reading skills of students before and after using an instructional package of Thai reading skills by using the concept of school as a learning community.

Research Methodology

Research Design

The experimental implementation of an instructional package of Thai reading skills which incorporates the Schools as Learning Communities concept, aims to develop Thai reading skills among primary school students in Bangkok Metropolitan schools. The study employs a one-group pretest-posttest Design, conducted over 4 weeks totaling 20 periods (5 periods per week).

Table 1
Research Design

Dependent Variables	Pre-test Assessment	Experimental Implementation	Post-test Assessment
Thai Language Reading Skills	T_1E	X	T_2E

E represents students participating in an instructional package of Thai reading skills by using the concept of school as a learning community.
T represents pre-test and post-test assessments
X represents the implementation of an instructional package of Thai reading skills by using the concept of school as a learning community.

Population and Sample

The population consists of 175,170 students in grades 1-6 from Bangkok Metropolitan Administration schools during the 2023 academic year, according to educational statistics reports.

The sample comprises 30 students from grades 1-6 in the 2024 academic year who demonstrate Thai reading difficulties, selected through purposive sampling.

Research Hypothesis

Primary school students who practice Thai reading skills using an instructional package of Thai reading skills by using the concept of school as a learning community will achieve higher post-test scores compared to pre-test scores, as analyzed using t-test for dependent samples.

Research Instruments

1. Instructional package of Thai reading skills by using the concept of school as a learning community, designed to meet an 80/80 efficiency criterion
2. Lesson plans for Thai reading instruction based on the Schools as Learning Communities concept
3. Thai reading skills assessment for primary school students

Instrument Development Process

The research instruments were developed through the following steps:

1. ***Literature Review:*** Review relevant research literature to define content conceptual framework and evaluation methodologies.
2. ***Lesson Plan Development:***
   • Analyzed the Basic Education Core Curriculum 2008 (revised 2017)
   • Studied Thai language teacher manuals focusing on reading skills
   • Reviewed literature on the concept of Schools as Learning Communities
   • Created 18 lesson plans
   • Obtained advisor feedback and made necessary revisions
   • Submitted materials to three experts for evaluation
   The lesson plans received an average expert evaluation score of 4.72 (SD = 0.30), Indicating the highest level of appropriateness.
3. ***Instructional Package of Thai Reading Skills Development:***
   • Studied appropriate activity formats for primary-level students
   • Incorporated participation from teachers, students, parents, and community members
   • Obtained expert validation and feedback
   • Achieved an average expert evaluation score of 4.53 (SD = 0.27)

Data Collection

The implementation spanned 4 weeks (20 periods, 5 periods per week), following these steps:

1. Administered pre-test to 73 students at Wat Intharawihan School
2. Selected 30 lowest-scoring students for the experiment
3. Implemented the learning package over 20 periods
4. Administered post-test for comparative analysis

Data Analysis

Analysis procedures included:

1. Quality analysis of lesson plans and learning activities using mean and standard deviation
2. Efficiency evaluation of the learning package using E1/E2 criteria
3. Comparison of pre-test and post-test achievement scores using dependent samples t-test

Research Results

The research on developing Thai reading skills among primary school students in Bangkok Metropolitan schools using the School as Learning Community concept yielded the following results:

1. The efficiency of the instructional package of Thai reading skills by using the concept of school as a learning community achieved an efficiency ratio of 80.06/81.72, exceeding the standard criterion of 80/80.

Table 2
Efficiency Analysis of an Instructional Package of Thai Reading Skills by Using the Concept of School as a Learning Community According to the 80/80 Criterion

Statistics	Scores from the instructional package (During Study)				Post-test Score (30)
	Set 1 (10)	Set 2 (10)	Set 3 (10)	Total (30)	
$\sum x$	218	243.5	259	720.5	735.5
$\bar{X}$	7.27	8.12	8.63	24.02	24.52
E_1/E_2	72.67	81.17	8.633	80.06	81.72
Efficiency	$E_1/E_2 = 80.06/81.72$				

2. The comparison of students' Thai reading skills before and after using an instructional package of Thai reading skills by using the concept of school as learning community, showed significantly higher post-test scores at the .05 level of statistical significance.

Table 3
Comparison of Thai Reading Achievement Scores of Primary School Students in Bangkok Metropolitan Schools Using the School As Learning Community Concept Before and After Instruction (t-Test for Dependent Samples)

Test	N	$\bar{X}$	S.D.	t	Sig.
Pre-test	30	16.52	2.32	11.11*	0.00
Post-test	30	24.52	2.98		

**Statistically significant at .05 level*

Discussion

The results from the study on the effectiveness of the instructional package of Thai reading skills which incorporates the Schools as Learning Communities concept revealed an efficiency of 80.06/81.72, which exceeded the set standard of 80/80. This outcome was due to the research team's development of the instructional package of Thai reading skills which incorporates the Schools as Learning Communities concept to promote student learning in accordance with the research objectives. Furthermore, the skill development package created by the researchers followed appropriate procedures and methods, offering a variety of activities suitable for the learners' age and interests. The package included a teacher's manual, lesson plans, learning activities, instructional materials, and assessment tools. Teachers acted as advisors providing guidance to help students follow the steps, achieve the learning objectives, and track their progress immediately upon completing the instructional package (Burasit, 2005; Good, 1973; Lertvattrakan, 2013; Moolkum & Moolkum, 2008; Pormwong, 2008; Thaipanich, 2008; Wongyai, 2002).

The acceptance of the efficiency assessment of the instructional package is defined as E1, which refers to the efficiency of the process, and E2, which refers to the efficiency of the outcome. The criterion for setting the E1/E2 value should consider the content type; for knowledge and memory-based content, the standard is typically set at 80/80. In this study, the researchers set the criterion at 80/80, following the efficiency assurance criteria proposed by Pengsawat (2003) and consistent with the study conducted by Paethong (2018), who investigated the development of Thai reading and writing skills using the instructional package entitled "Fun Reading, Joyful Writing" for Grade 1 students. The objective of that study was to improve students' reading and word writing skills in Thai to meet the 80/80 efficiency standard, examine learning achievement before and after instruction, and assess students' satisfaction after using the package. The study was conducted with 64 Grade 1 students at the Demonstration School of Chiang Mai Rajabhat University. The research tools included 12 lesson plans, 10 instructional package booklets of "Fun Reading, Joyful Writing," an achievement test, and a student satisfaction questionnaire. Data were collected and analyzed using mean, standard deviation, and percentage. The pretest, which consisted of 30 multiple-choice and subjective questions, showed an average score of 16.30, accounting for 54.33% of the total score. Subsequently, the instructional package was implemented following all learning steps. After completing the activities, the students took a posttest to assess progress and learning outcomes, yielding an average score of 25.75 or 85.83% of the total score. Comparing the pretest and posttest scores, the average learning progress was 9.45 points, representing 31.50% improvement (Paethong, 2018; Pengsawat, 2003).

The results of the study comparing Thai reading skills of students before and after using the instructional package, which incorporates the Schools as Learning Communities concept, revealed that the posttest scores were significantly higher than the pretest scores at the .05 level. Specifically, the average pretest score was 16.52, while the posttest score was 24.52. This indicates positive outcomes from activities developed through the observation of problems, analysis, and improvement of teaching processes, such as adjusting the group size to enhance student participation. These processes help create sustainable learning and increase understanding, resulting in higher student achievement. These findings are consistent with the research conducted by Saijeen (2018), which found that an instructional package based on the Professional Learning Community concept for Grade 6 students was highly effective (82.50/81.33). The average pretest score in that study was 38.20, which increased to 81.33 after the intervention, showing a statistically significant difference at the .05 level. Furthermore, students reported the highest level of satisfaction with the instructional package, with an average score of 4.80. These research results confirm that instructional designs focused on addressing problems in the students' context can effectively develop reading skills and enhance academic achievement (Saijeen, 2018).

Conclusion

The research demonstrates that the developed learning activity sets exceeded standard efficiency criteria, effectively promoting student learning through age-appropriate design, comprehensive teacher resources, and systematic evaluation methods. The implementation resulted in statistically significant improvement in Thai reading skills, with mean scores increasing from 16.52 to 24.52.

Policy Recommendations

1. Teachers should thoroughly study the learning activity sets and materials to adapt them systematically according to student context and objectives.
2. School administrators should increase support for learning resources and teaching materials to enhance classroom diversity and learning atmosphere.

Future Research Recommendations

1. Develop grade-specific reading skill enhancement activity sets that can be integrated into regular classroom instruction.
2. Expand the School as Learning Community concept to other subjects to improve school-wide collaboration effectiveness.

The new knowledge generated from this research provides a learning management approach that can be adapted across subjects and age groups, promoting learning through school collaboration, classroom management, positive relationships, and teaching methodologies suitable for the Thai education system.

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The Development of Lifelong Learning Innovation for Enhancing the Sustainable Development Goals Literacy of Thai Youth

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Abstract

The purposes of this study were to develop lifelong learning innovation for enhancing the SDGs literacy of Thai youth and study the satisfaction of Thai youth towards lifelong learning innovation for enhancing the SDGs literacy. The sample consisted of 30 Thai youth volunteers who tried the lifelong learning innovation. The instruments were the lifelong learning innovation and the satisfaction questionnaire of lifelong learning innovation for enhancing the SDGs literacy of Thai youth. The results of the development of lifelong learning innovation were an SDGs literacy cartoon book and boardgame that were complete, clear, academically correct, and agreeable with the purposes of innovation. The result of satisfaction was that prior to using innovation, SDGs literacy was totally in the highest level. When considering each issue, lifelong learning innovation promoted or stimulated new knowledge at the highest level, the innovation was consistent with SDGs, was up-to-date content consistent with the current situation, and will recommend this innovation to others at the same level the SDGs literacy of Thai youth and study the satisfaction of Thai youth towards lifelong learning innovation for enhancing the SDGs literacy. The sample consisted of 30 Thai youth volunteers who tried the lifelong learning innovation. The instruments were the lifelong learning innovation and the satisfaction questionnaire of lifelong learning innovation for enhancing the SDGs literacy of Thai youth. The results of the development of lifelong learning innovation were an SDGs literacy cartoon book and boardgame that were complete, clear, academically correct, and agreeable with the purposes of innovation. The result of satisfaction was that prior to using innovation, SDGs literacy was totally in the highest level. When considering each issue, lifelong learning innovation promoted or stimulated new knowledge at the highest level, the innovation was consistent with SDGs, was up-to-date content consistent with the current situation, and will recommend this innovation to others at the same level.

Keywords: lifelong learning innovations, literacy, sustainable development goals, Thai youth

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Introduction

In a society undergoing rapid changes in areas such as the economy, environment, living conditions, governance, science, and technology, as is the case today, education and learning have become increasingly essential for the public. The education individuals receive during their school years, or formal education, is merely one component that can be applied. However, individuals must continue to receive additional education or knowledge throughout their lives to appropriately cope with these changes at every stage of life. The provision of quality education is a critical goal for global sustainable development. The educational model in this new century focuses on delivering quality education and promoting lifelong learning.

UNESCO (2023) has emphasized literacy since 1946, viewing the acquisition and lifelong development of literacy as an essential part of the right to education. This is to empower people, enable them to participate fully in society, and contribute to improving their livelihoods. Literacy is a key driver of sustainable development, helping individuals engage more in the labor market, improve the health and nutrition of children and families, reduce poverty, and increase life opportunities. Literacy is considered part of lifelong learning and is included in the 2030 Agenda for Sustainable Development. UNESCO uses this approach to promote literacy worldwide, focusing on both youth and adults. In the context of the Sustainable Development Goals (SDGs), literacy is viewed as a lifelong learning process that everyone needs to continuously develop. This includes acquiring diverse knowledge, skills, and abilities, further advancing skills and competencies in various knowledge areas that are found in different environments (life-wide process). It also supports the creation of an environment conducive to knowledge and ability development (literate environment) through economic, social, and cultural activities in daily life, including support for life skills such as well-being in the community, health, human rights, citizenship, gender equality, etc. The goal is to ensure that the knowledge and abilities accumulated through literacy remain sustainable and do not fade away.

Literacy is therefore a key factor in achieving a sustainable and peaceful world. Studies have shown that when children receive quality education, they are more likely to have better life opportunities, such as improved health, increased employment prospects, and greater participation in political processes (Global Partnership for Education, 2019). Furthermore, literacy in the Sustainable Development Goals (SDGs) serves as a vital tool for youth empowerment. It equips them with three key instruments:1) A tool for assessing the inclusiveness of youth-related initiatives. 2) A tool for protecting and advocating for rights against unjust governmental actions. 3) A tool for fostering collaboration with other societal sectors driving the SDGs agenda (Centre for SDG Research and Support Faculty of Economics Thammasat University, 2020). Therefore, SDG literacy is a fundamental concept in promoting and developing Thai youth.

From the study and review of literature and research related to the Sustainable Development Goals (SDGs), it was found that most of the existing research is exploratory or descriptive in nature, focusing mainly on surveying the status of the SDGs. However, there has been no research found that develops learning innovations to promote learning among Thai children and youth, which would be beneficial in concretely enhancing their literacy regarding the SDGs. Therefore, it is essential to conduct research titled “The Development of Lifelong Learning Innovations to Enhance the Sustainable Development Goals Literacy of Thai Youth.” This research aims to study the level of SDG literacy among Thai youth, use the survey results to design and develop lifelong learning innovations to enhance their SDG

literacy, implement these innovations with a sample group of Thai youth, evaluate the effectiveness of the lifelong learning innovations, and study the satisfaction of Thai youth toward these innovations.

Research Objectives

1. To assess the level of literacy on the Sustainable Development Goals (SDGs) among Thai youth.
2. To develop lifelong learning innovations to enhance literacy on the Sustainable Development Goals (SDGs) among Thai youth.
3. To evaluate the effectiveness of lifelong learning innovations in enhancing literacy on the Sustainable Development Goals (SDGs) among Thai youth.
4. To examine the satisfaction of Thai youth with lifelong learning innovations aimed at enhancing literacy on the Sustainable Development Goals (SDGs).

Research Procedures

This study employs a Mixed Methods Research approach, structured into three phases as follows.

Phase 1: Assessing Thai Youth's Literacy on Sustainable Development Goals (SDGs)

Population and Sample

The population in this study consists of Thai youth aged 15–24 years, totaling 8,485,690 individuals. The sample comprises 400 Thai youths aged 15–24 years, selected using simple random sampling. The sample size was determined based on Yamane's formula with a 95% confidence level and a margin of error of ±5%, resulting in a total of 400 participants. However, after allowing youth to participate in the assessment of their knowledge regarding the Sustainable Development Goals (SDGs), the final sample size increased to 515 participants.

Research Instrument

The research instrument used in this study was an assessment tool designed to measure the level of Thai youth's literacy regarding the Sustainable Development Goals (SDGs). It consisted of 56 items, including 4 general questions and 52 questions assessing SDG literacy. Three experts evaluated the content validity (IOC), and only the items with IOC values ranging from 0.67 to 1.00 were selected. The questionnaire was then administered to a sample of 30 Thai youth to assess its reliability using Cronbach's Alpha, yielding a reliability coefficient of 0.855.

Data Analysis

Descriptive statistical analysis, including frequency and percentage, was used. The researchers identified the SDG with the lowest percentage score and selected it as the focus for developing a lifelong learning innovation aimed at enhancing Thai youth's literacy regarding the Sustainable Development Goals.

• ***Data Analysis:*** Descriptive statistics (frequency and percentage) were applied to identify SDGs with the lowest literacy scores, which were then selected for developing an innovative learning intervention.

Phase 2: Development of Lifelong Learning Innovations

• ***Key Informants:*** Five experts, selected through purposive sampling.
• ***Research Instruments:*** Two learning innovations were developed:
    1. Educational comic book
    2. Board game
• ***Data Analysis:*** Content analysis of focus group discussions was used to refine and finalize the learning innovations.

Phase 3: Evaluation of the Innovation Implementation and Satisfaction Study

• ***Population and Sample:*** A group of 30 Thai youth volunteers participated in testing the innovations.
• ***Research Instruments:***
    1. Literacy assessment test (15 items)
    2. Satisfaction survey (8 items) Both instruments were validated (IOC = 1.00) and demonstrated high reliability (Cronbach's Alpha = 0.806).
• ***Data Analysis:***
  Descriptive statistics: Mean and standard deviation.
  Inferential statistics: t-test was conducted to compare pre- and post-intervention literacy levels.

Research Findings

Research Objective 1

The research findings indicate that Thai youth demonstrated the highest level of literacy in SDG 17: Partnerships for the Goals, which emphasizes strengthening global partnerships for sustainable development. Conversely, the lowest level of literacy was observed in SDG 7: Affordable and Clean Energy, which focuses on ensuring universal access to reliable, sustainable, and modern energy. Details of these findings are presented in Table 1 below.

Table 1
Literacy Levels of Thai Youth on Sustainable Development Goals (SDGs)

Sustainable Development Goals (SDGs)	***Percentage***
No Poverty	76.51
Zero Hunger	63.56
Good Health and Well-being	38.51
Quality Education	58.06
Gender Equality	86.60
Clean Water and Sanitation	66.80
Affordable and Clean Energy	33.66
Decent Work and Economic Growth	71.00
Industry, Innovation, and Infrastructure	36.31
Reduced Inequality	80.98

Sustainable Cities and Communities	45.63
Responsible Consumption and Production	58.45
Climate Action	66.02
Life Below Water	67.05
Life on Land	62.20
Peace, Justice, and Strong Institutions	59.48
Partnerships for the Goals	88.45

Research Objective 2

The research team identified that Thai youth had the lowest literacy level in SDG 7: Affordable and Clean Energy. This goal was therefore chosen as the foundation for developing a lifelong learning innovation, which consists of a knowledge-based comic book and a board game aimed at improving youth awareness and understanding of sustainable energy.

Regarding the knowledge-based comic book, the findings revealed that while the content was comprehensive and clear, some improvements were necessary. These included reducing redundant wording to enhance readability, ensuring complete and accurate page numbering and citations, and separating the comic book from the board game manual for greater convenience. Additionally, it was recommended that the book size be adjusted to improve reading comfort.

For the board game, the evaluation found that the instruction manual provided sufficient information; however, some refinements were suggested. These included reducing unnecessary wording, adjusting the manual size to fit the game box, and specifying that the recommended age for players should be 18 years and older since macro-level energy concepts might be too complex for younger audiences. Certain game terminologies were also modified to improve clarity, such as changing “Go to Jail” to “Power Plant Maintenance Shutdown” and “Attack Card” to “Strategy Card”. Furthermore, the game board was expanded from 36 to 40 spaces, with additional elements such as numbered spaces for easier navigation, new spaces for drawing strategy cards, and a designated area to represent an increase in electricity consumption.

In terms of game mechanics, adjustments were made to align with real-world economic concepts and improve player engagement. The in-game currency was changed from paper money to coins, making it more intuitive. Additionally, the electricity cost reduction values on energy-related cards were modified from a fixed 100 coins to a more varied structure of 50, 100, 150, and 200 coins. To ensure better gameplay understanding, the game-ending conditions were also clarified, allowing players to follow the rules and objectives more effectively.

Research Objective 3

The study found that the 30 participants who engaged with the lifelong learning innovation demonstrated higher post-test scores compared to their pre-test scores. A hypothesis test using the t-test revealed a statistically significant difference at the .05 level, indicating that the lifelong learning innovation effectively enhanced Thai youth’s literacy on Sustainable Development Goals (SDGs). The results are presented in Table 2.

Table 2
Detailed Assessment of the Impact of the Lifelong Learning Innovation in Improving Youth Awareness and Understanding of SDGs

Score	x̄	S.D.	t	Sig.
Before learning	7.37	1.97	12.427*	0.000
After learning	11.97	0.99		

* Statistical significance at the 0.05 level

Research Objective 4

The study found that the participants expressed the highest level of satisfaction with the lifelong learning innovation designed to enhance literacy on Sustainable Development Goals (SDGs). The research findings are presented in Table 3

Table 3
Detailed Analysis of Thai Youth's Satisfaction With the Lifelong Learning Innovation in Promoting SDG Literacy

Evaluation Issues	***x̄***	***S.D.***	***Translation of Meaning***
1. The innovation promotes/stimulates interest in studying the Sustainable Development Goals (SDGs) more.	4.73	0.45	Maximum
2. The innovation promotes/stimulates the acquisition of new knowledge.	4.87	0.35	Maximum
3. The knowledge about the Sustainable Development Goals (SDGs) gained from the innovation can be practically applied.	4.73	0.45	Maximum
4. The content of the innovation aligns with the Sustainable Development Goals (SDGs).	4.83	0.38	Maximum
5. The content of the innovation is academically accurate.	4.77	0.50	Maximum
6. The content of the innovation is up-to-date and relevant to the current situation.	4.83	0.46	Maximum
7. The innovation is easy to learn and follows a straightforward process.	4.63	0.56	Maximum

8. if given the opportunity, I would recommend this innovation to others.	4.83	0.46	Maximum
Total	4.78	0.45	Maximum

New Knowledge

The lifelong learning innovation for enhancing the SDGs literacy of Thai youth is an educational innovation developed in the form of a **knowledge-based cartoon book** and a **board game**. This innovation effectively enhances Thai youth's understanding of the Sustainable Development Goals (SDGs). Additionally, educational institutions, relevant organizations, and individuals interested in SDGs can integrate this innovation into teaching and learning activities both inside and outside the classroom.

Figure 1

QR Code (Educational Comics)

Figure 2

Examples of Educational Comics

Figure 3

Cover of the Game Manual and Board Game Equipment

Discussion of Research Findings

The findings related to Objective 1 revealed that the level of sustainable development goal (SDG) literacy among Thai youth, as found in this study, was lowest for Goal 7: Ensure access to affordable, reliable, sustainable, and modern energy for all (Affordable and Clean Energy). This goal emphasizes guaranteeing that everyone has access to modern energy services that are affordable, reliable, and sustainable. According to the research team's perspective, the reason why Thai youth showed the lowest level of literacy on Goal 7 is likely due to the fact that Thailand's energy sector is facing various challenges. Which is also reflected in the study by Phdungsilp et al. (2017), which suggested that Thailand continues to face challenges in the energy sector, such as efforts to reduce dependence on imported energy sources, improve energy efficiency, increase the share of renewable energy, maintain energy security, and reduce carbon dioxide emissions from energy use. In addition, this is consistent with the suggestion of Bunnag et al. (2018), who proposed that Goal 7 requires developing Thai children and youth in terms of access to modern and affordable energy (Centre for SDG Research and Support, Faculty of Economics, Thammasat University, 2017: Online). This is also in line with the Policy Briefs in Support of the High-level Political Forum 2022, which highlights the connection between Goal 7 and Goal 4 (Quality Education), emphasizing that energy is a key factor in enhancing children's access to educational services. Examples include the availability of information and communication technologies (ICTs), digital connectivity, suitable thermal learning environments, adequate lighting, and access to clean drinking water. In addition, school curricula that emphasize sustainable energy can help children gain a clearer understanding of renewable and clean energy (United Nations, 2022).

The findings related to Objective 2 revealed that the lifelong learning innovations developed to enhance Thai youths' literacy on the Sustainable Development Goals (SDGs) included an educational comic book and a board game. From the research team's perspective, the educational comic book serves as a lifelong learning innovation that can be integrated into teaching and learning activities to increase students' interest in the lesson content and improve their academic performance. This was the main reason why the researchers chose to develop the educational comic book as a learning innovation. This research article is consistent with the study by Chukam (2007), which found that students' mathematics achievement after using the mathematics comic e-book lessons was significantly higher than the criterion level (60%) at the .01 level of statistical significance, and students showed a statistically significant level of satisfaction with the mathematics comic e-book lessons at the .01 level. It is also consistent with the study by Sripakho et al. (2013) which found that the experimental group's mean life skills scores after receiving the life skills development program using comic books were significantly higher than before receiving the program at the .05 level of statistical significance. Furthermore, the experimental group's mean life skills scores after the program were significantly higher than those of the control group at the .05 level of statistical significance. In addition, the research team also developed a board game learning innovation, as they agreed with the suggestion of Sukkumnoed (2018), who noted that board game learning innovations serve as lifelong learning tools that help develop problem-solving skills and promote interaction among players, as well as enhance K-A-P (knowledge, attitude, and practice) among participants. This research article is similar to the study by Bunnag et al. (2018), which emphasized the importance of disseminating knowledge about the SDGs and sustainable development to the general public. They developed a board game to provide knowledge about disasters (flooding) in high-risk urban areas, targeting groups such as secondary school students, youth council members, and various community leaders. They also developed board game and card game content and activities for use in the

course TU103 Life and Sustainability, a general education course at Thammasat University. This is also consistent with the study by Limpremwattana and Thamwattann (2017), which found that playing board games has positive effects on adolescents in educational and intellectual areas by stimulating the brain, increasing creativity, improving problem-solving and decision-making skills, and enhancing concentration in learning. In terms of emotional and psychological effects, playing board games helps relieve stress, brings enjoyment and relaxation, improves emotional regulation, and increases opportunities to make new friends.

The results for research objective 3 showed that the post-test scores of the sample group ($\overline{x}$ = 11.97, S.D. = 0.99) were higher than the pre-test scores before using the learning innovations ($\overline{x}$ = 7.37, S.D. = 1.97), with a statistically significant difference at the .05 level. This indicates that the lifelong learning innovations, including the educational comic book and the board game, were effective in enhancing Thai youth's literacy regarding the Sustainable Development Goals (SDGs). This research article is consistent with the findings of Areekul (2020), who found that the overall level of strong citizenship among undergraduate students before and after using board game-based learning innovations showed a statistically significant difference at the .05 level. It is also in line with the findings of Eiamwilai (2020), who found that Grade 7 students had a significantly higher average score in digital citizenship after learning through board games using critical thinking approaches, at the .05 level. Moreover, it is consistent with the findings of Keawsri (2019), who reported that the learning achievement of Grade 10 students after participating in a board game-based learning program on the immune system was significantly higher than before the program, with a confidence level of .05. Additionally, it aligns with the findings of Sittiwong (2021), who found that undergraduate students from the Faculty of Education at Naresuan University who used board games to promote learning had significantly higher learning achievement after the intervention compared to before, at the .05 level. Therefore, the use of board games can be considered a learning tool that effectively promotes and enhances learners' learning abilities. In the case of children with attention deficit hyperactivity disorder (ADHD), board games can improve attention and reduce inattentive, restless, and impulsive behaviors among children aged 9 - 11 when their families are involved in facilitating the board game activities. The research by Reamkidkarn and Chumchua (2019) found that the attention sustained scores of children with ADHD significantly increased after playing board games, reflecting that board games may improve attention and reduce inattentiveness, restlessness, and impulsivity in participants.

The findings from research objective 4 revealed that the participants expressed the highest level of satisfaction with the lifelong learning innovations designed to enhance literacy on the Sustainable Development Goals (SDGs), with an average score of 4.78 (S.D. = 0.45). This indicates that the innovations effectively promoted or stimulated the acquisition of new knowledge ($\overline{x}$ = 4.87, S.D. = 0.35). In addition, the content was found to align with the SDGs ($\overline{x}$ = 4.83, S.D. = 0.38) and was considered modern and relevant to current situations ($\overline{x}$ = 4.83, S.D. = 0.46). These evaluation results reflect that the lifelong learning innovations were effective in enhancing Thai youth's literacy regarding the Sustainable Development Goals. This research article is consistent with the findings of Preedakorn (2014), who found that the experimental group of students reported the highest level of satisfaction in all aspects. It also aligns with the findings of Areekul (2020), which revealed that, overall, undergraduate students were highly satisfied with the board game learning innovation designed to enhance strong citizenship, and were most satisfied with the appropriateness of the time allocated for playing the board game ($\overline{x}$ = 4.70, S.D. = 0.47). Furthermore, it is consistent with the results of Keawsri (2019), which showed that students expressed the highest level of satisfaction

with learning using the board game on the immune system topic ($\overline{x}$ = 4.60, S.D. = 0.21). However, when considering the evaluation aspect with the lowest average score, it was found that the participants perceived the innovation as easy to learn and having uncomplicated steps ($\overline{x}$ = 4.63, S.D. = 0.56). The research team speculates that the reason this aspect received the lowest average score may be because certain parts of the board game still involve complex steps, particularly regarding energy management - a topic on which Thai youth still have low literacy. Therefore, in future development of lifelong learning innovations, it is recommended to carefully consider the gameplay process to ensure the highest quality of lifelong learning innovations.

Conclusion

This lifelong learning innovation is designed to enhance literacy on the Sustainable Development Goals (SDGs), with a particular focus on SDG 7: Affordable and Clean Energy, which aims to ensure universal access to reliable, sustainable, and modern energy.

To address this goal, the research team developed two educational tools: a knowledge-based comic book and a board game. These innovations can be utilized by educational institutions, relevant organizations, and individuals interested in sustainability education. They serve as effective resources for integrating SDG-related learning into both formal and informal educational settings, fostering greater awareness and understanding of sustainable energy concepts.

Recommendations

1. Recommendations From the Research

Relevant educational organizations and institutions, such as the Office of the Basic Education Commission, the Office of the Vocational Education Commission, the Office for the Promotion of Learning, as well as educational institutions at various levels and interested individuals, can utilize this lifelong learning innovation comprising a knowledge-based comic book and a board game to organize activities that enhance literacy on SDG 7: Affordable and Clean Energy. This initiative aims to cultivate competent 21st-century citizens grounded in the principles of sustainable development.

2. Recommendations for Future Research

2.1 Expanding the Target Population This study focused on developing a lifelong learning innovation for Thai youth aged 15 - 24 years. As a result, the assessment revealed that SDG 7 had the lowest literacy level among this age group. Future research could explore different age groups, such as adults or the elderly, which may lead to the development of lifelong learning innovations targeting other SDGs beyond SDG 7.

2.2 Further Research and Development Relevant organizations, institutions, and individuals interested in sustainable development can further study and expand upon this lifelong learning innovation - the comic book and board game - to develop additional educational tools for other SDGs, thereby broadening the impact of sustainability education.

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Demographic Profiling, Socio-Economic Analysis, and Training Needs of Purok 1-4, Barangay Mabini, Aborlan, Palawan

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Abstract

This study was conducted from March to August 2024 to determine the demographic profiling, socio-economic analysis, and training needs of Purok 1-4 of barangay Mabini, Aborlan, Palawan. The descriptive research design specifically the survey method was used in this study. Data were gathered through survey questionnaires. A total of 185 households were randomly selected as the respondents of the study. The most significant findings show that the majority of the group are young adults – from 18 to 31 years old, mostly female and about 30% of them earn less than ₱10,000.00 ($172.11) a month. The study emphasizes the lack of knowledge about local customs and the people rely on few basic foods, without much variety, with rice as the main part of their diet. Economic analysis, on the other hand, shows that almost all families spend less than ₱5,000.00 ($86.05) a month for education, food, and other living expenses, thus signifying the difficulties they face. The assessment of the training needs identifies the biggest need for workshops on topics such as Biowaste Processing, Agricultural Machinery Maintenance, and Electrical Wiring among many other skills while Basic Surveying and AutoCAD skills are found to be less demanding. The study concludes that focused training programs are enormously needed to boost locals' expertise and economic capability. Proposed courses involve local instructors and community participation that promise to solve present-day problems. This study is a platform that will influence other interventions and by so doing lead the way for the betterment of the Mabini.

Keywords: Barangay Mabini, training needs, residents, development, farmer

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Introduction

Background of the Study

As part of Western Philippine University's (WPU) mission to provide quality instruction, research, and extension programs, researchers carried out a baseline survey in Purok 1-4, Barangay Mabini, Aborlan, Palawan. The purpose of the survey is to collect data on the current conditions, attitudes, and behaviors of the target population. This data will serve as a benchmark for measuring and evaluating progress throughout the project cycle. The project aims to implement training programs for various engineering disciplines at WPU.

Griffith et al. (2016) emphasized that demography can connect diverse research areas in ecology and evolution, offering promising avenues for innovation and bridging the gap between population dynamics and other disciplines. The study aims to assess the demographic and socio-economic conditions of residents in Barangay Mabini. The findings would inform targeted interventions by the local government. Additionally, the study would contribute to the academic repository of WPU and serve as a reference for any relevant training initiatives in the area.

Significance of the Study

The study would benefit the following:

- Barangay Mabini Officials: This study would provide demographic and socio-economic information about the residents of Barangay Mabini. It would aid in the development of appropriate interventions that the Barangay government can implement.
- The University: This study would enhance the academic repository of the University and serve as a reference for relevant training programs conducted in Barangay Mabini.
- Future Researchers: The study would serve as a valuable reference for future research conducted in the same locale.

Objectives of the Study

The study that would be conducted in Barangay Mabini has the following objectives:

1. To determine the demographic characteristics of its residents.
2. To assess its socio-economic status
3. To evaluate its economic condition
4. To analyze its organizational and political partnerships.
5. To examine its housing characteristics and community infrastructures.
6. To assess its health, sanitation, and environmental practices.
7. To identify its priority needs and problems.
8. To conduct the training needs assessment of the said Barangay.

Scope and Limitations of the Study

This study focused on the 185 randomly selected households of Barangay Mabini. The collected data would be limited to the demographic profile, socio-economic status, and training needs assessment. It would be collected through survey questionnaires. The

respondents would be only those 18 years old and above, and only one (1) respondent would be chosen per household.

Operational Definition of Terms

- Demographic Profile – refers to the demographic characteristics of the respondents, such as gender, civil status, and educational attainment.
- Household – a social unit composed of those living together in the same dwelling.
- Organizational and Political Partnerships – refers to the organizational and political involvement of the respondents.
- Training – refers to the skills training in fields such as Agricultural Biosystems Engineering, Civil Engineering, Electrical Engineering, and Mechanical Engineering.

Methodology

Locale of the Study

The study be conducted at Purok 1-4 of Barangay Mabini from March to August 2024.

Research Design

The research design used in this study was the descriptive research method, specifically, the survey method.

Sampling Procedure

The sample size would be computed using Slovin's formula ($\frac{1}{}$) with a margin of error, e = 0.05.

The respondents would be selected using random sampling.

Respondents of the Study

The respondents of the study would be 18 years old and above residents of Barangay Mabini. One respondent would represent each household.

Instrumentation

The survey questionnaire would be composed of eight parts namely: Personal Information; Socio-Cultural Profile; Economic Profile; Political and Organizational Partnerships; Housing Characteristics and Community Infrastructure; Health, Sanitation, and Environmental Practices; Priority Needs and Problems; and Training Needs Assessment.

Data Collection Procedure

The researchers would be conducting an on-site interview using the survey questionnaire as a guide. It would be done after obtaining permission from the Barangay Captain of Barangay Mabini, Aborlan, Palawan.

Treatment of Data

The data collected be analyzed using descriptive statistics. It would include methods such as, but not limited to, frequency counts, mean, and percentages that would represent the population.

Results and Discussion

This chapter presents the data and table form, statistically analyzed and interpreted. These were arranged according to the logical order of the problem.

Demographic Characteristics of the Respondents

Table 1 presents the demographic profile of selected residents from Barangay Mabini, Aborlan, Palawan, detailing their age, gender, civil status, educational attainment, and monthly income, with a total of 185 respondents participating in the study.

Table 1
Distribution of the Respondents as to their Demographic Characteristics

Characteristics	Frequency (n = 185)	Percentage
Age		
18-31	52	28.11
32-45	46	24.86
46-59	49	26.49
60-73	31	16.76
74-87	7	3.78
Gender		
Male	69	37.30
Female	116	62.70
Civil Status		
Single	37	20.00
Married	125	67.57
Separated	11	5.95
Single Parent	12	6.49
Highest Educational Attainment		
College Graduate		
TechVoc Course Graduate	41	22.16
College Level		
High School Graduate	10	5.41
High School Level	42	22.70
Elementary Graduate	36	19.46
Elementary Level	28	15.14
	16	8.65
	12	6.49
Monthly Income		
<10000	129	69.73
10001 – 20000	36	19.46
20001 – 30000	10	5.41
30001 – 40000	2	1.08
40001 – 50000	2	1.08
>50000	6	3.24

The survey data shows a notable middle-aged demographic, with individuals aged 18-31 making up 28.11% of the sample. The 46-59 age group follows closely, representing 26.49%. A significant portion of the respondents is young, with 62.70% identifying as female and 37.30% as male. Most respondents are married, accounting for 67.57%, while singles make up 20.00%. A large number of participants have completed higher education, although a considerable percentage have not. Additionally, many respondents report an income below ₱10,000 monthly, indicating low income levels and limited access to resources and opportunities. The survey underscores the need to understand community living conditions to assess needs and guide the development of effective corporate social responsibility (CSR) initiatives. Community surveys offer valuable insights into the socioeconomic landscape, which is essential for crafting relevant and impactful CSR strategies. Research highlights the link between community conditions and the success of CSR initiatives aimed at enhancing them.

Socio-Cultural Characteristics of the Respondents

The socio-cultural characteristics of the respondents from Barangay Mabini, Aborlan, Palawan, as presented in Tables 2 to 3, reflect the educational, dietary, and cultural participation patterns within the community.

The first part contains 6 different statements regarding the number of schooling household members which the respondents have answered. 0, 1, 2, 3, 4, 5, or 6 are the choices given.

Table 2.1
Distribution of the Number of Students per Household

Characteristics	Frequency (n = 185)	Percentage
No. of household members in school age		
0	82	44.32
1	44	23.78
2	29	15.68
3	22	11.89
4	5	2.70
5	2	1.08
6	1	0.54
No. of household members in school		
0	93	50.27
1	39	21.08
2	27	14.59
3	19	10.27
4	5	2.70
5	1	0.54
6	1	0.54
No. of Pre-school ones		
0	168	90.81
1	17	9.19
2	0	0
3	0	0
4	0	0
5	0	0

No. of Elementary ones		
0	131	70.81
1	42	22.70
2	12	6.49
3	0	0
4	0	0
5	0	0
No. of High School ones		
0	126	68.11
1	41	22.16
2	13	7.03
3	4	2.16
4	0	0
5	1	0.54
No. of College ones		
0	141	76.22
1	36	19.46
2	8	4.32
3	0	0
4	0	0

The study indicates that a notable number of respondents in Barangay Mabini lack formal education, with 44.32% of the sample reporting that they do not have children of school age. This could be attributed to a demographic trend favoring older individuals or families without children. Additionally, a considerable portion of households (50.27%) is not engaged in schooling, implying that larger families with multiple students are less prevalent than those with fewer children. A striking 90.81% of households do not have preschool students, and 70.81% do not have elementary students. Furthermore, 68.11% of families do not have high school students, with more families having one or two children compared to those with elementary schoolers. Lastly, 76.22% of households lack college students, with many having only one or two. Factors contributing to this pattern include economic conditions, attitudes towards education, early marriage and family formation, the average number of children, and cultural traditions.

The second part contains statements regarding the types of foods the respondents consume, which the respondents have answered. Foods are categorized in terms of carbohydrates, proteins, vegetables, fruits, and beverages.

Table 2.2
Carbohydrates Consumed by the Respondents Daily

Meal	Frequency (n = 185)	Percentage
Breakfast		
rice	163	88.11
bread	2	1.08
rice and banana	5	2.70
rice and bread	1	0.54
rice and sweet potato	4	2.16
rice, bread, and noodles	1	0.54
rice, banana, and sweet potato	1	0.54
none	8	4.32
Lunch		
rice	179	96.76
bread	0	0
rice and banana	2	1.08
rice and bread	0	0
rice and sweet potato	0	0
rice, bread, and noodles	0	0
rice, banana, and sweet potato	0	0
none	4	2.16
Dinner		
rice	180	97.30
bread	0	0
rice and banana	0	0
rice and bread	0	0
rice and sweet potato	1	0.54
rice, bread, and noodles	0	0
rice, banana, and sweet potato	0	0
none	4	2.16

The survey indicates that rice is the main carbohydrate for breakfast, enjoyed by 88.11% of participants, highlighting regional dietary preferences. Bread comes next, followed by fruits and other starches. For lunch, a significant 96.76% of respondents choose rice as their carbohydrate source, underscoring its role as a staple food. Dinner habits mirror those of earlier meals, with 97.30% of respondents still opting for rice. The minimal presence of alternative carbohydrate sources, such as sweet potatoes, further underscores the dominance of rice in these meals.

Table 2.3
Protein Consumed by the Respondents Daily

Meal	Frequency (n = 185)	Percentage
Breakfast		
meat	10	5.41
fish	63	34.05
eggs	43	23.24
eggs and fish	9	4.86
eggs and meat	1	0.54
meat and fish	6	3.24
eggs, meat, and fish	31	16.76
none	22	11.89
Lunch		
meat	27	14.59
fish	103	55.68
eggs	11	5.95
eggs and fish	2	1.08
eggs and meat	0	0
meat and fish	28	3.24
eggs, meat, and fish	1	0.54
none	13	7.03
Dinner		
meat	54	29.19
fish	79	42.70
eggs	5	2.70
eggs and fish	3	1.62
eggs and meat	0	0
meat and fish	32	17.30
eggs, meat, and fish	0	0
none	4	2.16

Table 2.3 indicates that fish is the top protein choice for breakfast, with eggs coming in at 23.24%. However, a notable portion of respondents do not eat any protein in the morning, which suggests they might be skipping breakfast or choosing carbohydrate-heavy options instead. For lunch, fish remains the favorite protein, with 55.68% of people selecting it. In contrast, meat consumption during lunch is relatively low, with just 14.59% including it. At dinner, both meat and fish are consumed, but egg consumption remains minimal.

Table 2.4
Vegetables Consumed by the Respondents Daily

Meal	Frequency (n = 185)	Percentage
Breakfast		
assorted (pinakbet)	65	35.14
okra	1	0.54
bitter gourd	9	4.86
string beans	2	1.08
eggplant	23	12.43
jackfruit	3	1.62
sweet potato tops	8	4.32
bottle gourd	2	1.08
mung beans	1	0.54
squash	5	2.70
bamboo shoots	1	0.54
green peas	3	1.62
banana bud	1	0.54
none	62	33.51
Lunch		
assorted (pinakbet)	67	36.22
okra	5	2.70
papaya	5	2.70
malabar spinach	1	0.54
bitter gourd	4	2.16
string beans	5	2.70
eggplant	8	4.32
malunggay	4	2.16
jackfruit	8	4.32
kamote tops	4	2.16
bottle gourd	1	0.54
sponge gourd	2	1.08
pechay	5	2.70
sweet potato	3	1.62
mung beans	2	1.08
jute leaves	1	0.54
cabbage	2	1.08
squash	6	3.24
none	52	28.11
Dinner		
assorted (pinakbet)	68	36.76
okra	5	2.70
papaya	2	1.08
malabar spinach	1	0.54
bitter gourd	4	2.16
string beans	4	2.16
eggplant	3	1.62
malunggay	3	1.62
jackfruit	8	4.32
kamote tops	4	2.16
bottle gourd	1	0.54
sponge gourd	3	1.62
pechay	4	2.16

mung beans	3	1.62
jute leaves	1	0.54
amaranth	1	0.54
squash	6	3.24
green peas	1	0.54
none	63	34.05

Table 2.4 indicates that pakbet, a traditional Filipino dish, is the most favored vegetable for breakfast, with 35.14% of respondents enjoying it. Lunch choices are more diverse, featuring okra, papaya, and string beans, which are consumed in smaller quantities. Pakbet also plays a significant role in dinner, as 36.76% of people include it in their evening meals. However, 34.05% of respondents skip vegetables at dinner, showing a preference for dishes that are rich in vegetables.

Table 2.5
Fruits Consumed by the Respondents Daily

Meal	Frequency (n = 185)	Percentage
Breakfast		
soursop	3	1.62
jackfruit	2	1.08
young coconut fruit	1	0.54
papaya	3	1.62
apple	5	2.70
banana	103	55.68
guava	1	0.54
calamansi	2	1.08
star apple	4	2.16
watermelon	2	1.08
citrus	1	0.54
tomato	2	1.08
pomelo	1	0.54
pineapple	1	0.54
mango	2	1.08
orange	0	0
none	52	28.11
Lunch		
soursop	1	0.54
jackfruit	8	4.32
young coconut fruit	0	0
papaya	5	2.70
apple	6	3.24
banana	46	24.86
guava	0	0
calamansi	0	0
star apple	3	1.62
watermelon	5	2.70
citrus	1	0.54
tomato	0	0
pomelo	0	0
pineapple	2	1.08
mango	6	3.24

orange	4	2.16
none	98	52.97
Dinner		
soursop	2	1.08
jackfruit	1	0.54
young coconut fruit	1	0.54
papaya	6	3.24
apple	4	2.16
banana	40	21.62
guava	1	0.54
calamansi	2	1.08
star apple	2	1.08
watermelon	3	1.62
citrus	0	0
tomato	0	0
pomelo	0	0
pineapple	0	0
mango	8	4.32
orange	3	1.62
none	112	60.54

The study shows that bananas are the top choice for breakfast, with 55.68% of respondents enjoying them. However, 28.11% skip fruit altogether in the morning, indicating that some people might prefer different food options. For lunch, 24.86% opt for bananas, while 52.97% do not. At dinner, 21.62% include bananas, but 60.54% choose not to, suggesting that fruit consumption is more common earlier in the day and decreases as it goes on.

Table 2.6

Beverage Consumed by the Respondents Daily

Meal	Frequency (n = 185)	Percentage
Breakfast		
coffee	98	52.97
milk	21	11.35
water	1	0.54
juice	0	0
soft drinks	1	0.54
shake	0	0
coffee and milk	46	24.86
none	18	9.73
Lunch		
coffee	19	10.27
milk	7	3.78
water	34	18.38
juice	3	1.62
soft drinks	4	2.16
shake	1	0.54
coffee and milk	0	0
none	117	63.24

Dinner		
coffee	25	13.51
milk	7	3.78
water	46	24.86
juice	0	0
soft drinks	0	0
shake	0	0
coffee and milk	4	2.16
none	103	55.68

Table 2.6 indicates that coffee is the most popular breakfast beverage, favored by 52.97% of those surveyed. Among them, 24.86% prefer their coffee with milk. During lunch, water takes the lead as the most consumed drink, although 63.24% of respondents reported not drinking anything at that time. For dinner, water remains the top choice, with 24.86% opting for it. A significant 55.68% of people also choose not to drink anything at dinner, pointing to a decrease in caffeine consumption.

The third part contains 2 questions regarding the respondents' cultural participation in Barangay Mabini which the respondents have answered. Yes or No is the choice given.

Table 2.7
Cultural Participation of the Respondents

	Frequency (n = 185)	Percentage
Are there any cultural activities conducted in the community?		
Yes	42	22.70
No	143	77.30
If Yes, have you participated in any of these cultural activities		
Yes	34	80.95
No	8	19.05

A significant 77.30% of respondents feel that their community is lacking in cultural activities, which may be attributed to factors such as limited resources, lack of awareness, or poor organization. In contrast, only 22.70% acknowledge the presence of cultural activities, highlighting a disconnect in community involvement. Nevertheless, among those who did recognize cultural activities, 80.95% took part, suggesting a level of positive engagement. The low overall participation rate, however, raises important questions about inclusivity and accessibility.

The data shows a notable middle-aged population, accompanied by a considerable gender imbalance. The majority of respondents are married, and most have either bachelor's or college degrees. However, 69.73% report having low income. Additionally, most households do not have school-age children, suggesting an older demographic trend. Rice serves as the primary carbohydrate, while fish and eggs are the main sources of protein. Cultural engagement appears to be low, with 77.30% of individuals feeling that there are no cultural activities available in their community.

Economic Profile

Table 3.1 below illustrates the business involvement of the respondents. It includes two questions. The first is a close-ended question: "Are you or your family engaged in any business?" The second question, "If yes, what is the nature of your business?" serves as a follow-up for those who answered Yes to the first question.

Table 3.1
Business Involvement of the Respondents

	Frequency	Percentage
Are you or your family engaged in any business?		
Yes	46	24.86
No	139	75.14
If yes, what is the nature of your business?		
Online Selling	1	2.17
Sari-Sari Store	11	23.91
Food Vendor	15	32.61
Grocery Store	3	6.52
Poultry Supplier	1	2.17
Fried Chicken Store	1	2.17
Hollow Blocks Making	2	4.35
Money Lending	2	4.35
Piggery	1	2.17
Buy and Sell	2	4.35
Retailer	2	4.35
Eatery	1	2.17
Bamboo Crafting	1	2.17
Boarding House	1	2.17
Wholesale Reseller	1	2.17

A significant 75.14% of respondents are not engaged in any business activities, highlighting a low level of entrepreneurial involvement. The most common type of business is food vending, with sari-sari stores and grocery stores following closely behind. While the range of business types indicates limited overall participation, those who are involved are active across different sectors.

Table 3.2 below shows the monthly expenditures of the households in terms of children's education, medical expenses, food, clothing, recreation, utilities, and others.

Table 3.2
Monthly Expenditures of the Households

	Frequency (n = 185)	Percentage
Education of Children		
<5001	164	88.65
5001 – 10000	14	7.57
10001 – 15000	4	2.16

15001 – 20000	2	1.08
>20000	1	0.54
Medical Expenses		
<5001	175	94.59
5001 – 10000	6	3.24
10001 – 15000	3	1.62
15001 – 20000	1	0.54
>20000	0	0
Food		
<5001	120	64.86
5001 – 10000	43	23.24
10001 – 15000	12	6.49
15001 – 20000	5	2.70
>20000	5	2.70
Clothing		
<5001	181	97.84
5001 – 10000	3	1.62
10001 – 15000	1	0.54
15001 – 20000	0	0
>20000	0	0
Recreation		
<5001	183	98.92
5001 – 10000	1	0.54
10001 – 15000	1	0.54
15001 – 20000	0	0
>20000	0	0
Utilities		
<5001	171	92.43
5001 – 10000	10	5.41
10001 – 15000	2	1.08
15001 – 20000	1	0.54
>20000	1	0.54
Others		
<5001	183	98.92
5001 – 10000	1	0.54
10001 – 15000	0	0
15001 – 20000	0	0
>20000	1	0.54
TOTAL		
<10001	96	51.89
10001 – 20000	54	29.19
20001 – 30000	16	8.65
30001 – 40000	8	4.32
40001 – 50000	5	2.70
>50000	6	3.24

The data indicates that 88.65% of households spend less than ₱5,001.00 ($85.18) on children's education, while 94.59% allocate under ₱5,001.00 for medical expenses. Food expenditures are also modest, with 64.86% of households spending below ₱5,001.00. Clothing costs are particularly low, as 97.84% spend less than ₱5,001.00. Additionally, recreational spending is minimal, with 98.92% of households keeping their expenses under ₱5,001.00. Utility costs are low as well, which may be attributed to energy-saving practices or limited access to expensive utility services.

Most households maintain low monthly spending, indicating a frugal lifestyle. 88.65% spend less than ₱5,001.00 on children's education and 94.59% on medical expenses. This suggests limited access to expensive services and a preference for affordable alternatives.

Table 3.3 below shows the engagement of the respondents in terms of farming and fishing.

Table 3.3
Engagement of the Respondents in Farming and Fishing

	Frequency (n = 185)	Percentage
Are you or any member of your household into farming?		
Yes	40	21.62
No	145	78.38
Are you or any member of your household into fishing?		
Yes	1	0.54
No	184	99.46

The survey found that 21.62% of participants are involved in farming, while a significant 78.38% are not. Fishing participation is also minimal, with just 0.54% of respondents taking part. Most respondents (99.46%) indicated they do not engage in fishing activities, which may point to limited access to resources or a preference for other forms of livelihood. These low engagement levels could be attributed to socio-economic factors, such as the availability of resources or cultural preferences.

Organizational and Political Involvement

Table 4.1 below shows the results of the 185 respondents' answers from the organizational involvement survey questionnaire distributed to each of them in terms of frequency and percentage.

Table 4.1
Organizational Involvement of the Respondents

	Frequency	Percentage
Are there any organizations in your community?		
Yes	133	71.89
No	52	28.11
Are you or any member of your household a member of any of these organizations?		
Yes	57	30.81
No	128	69.19
If yes, what is your/their membership status?		
Active	55	96.49
Inactive	2	3.51

A significant portion of respondents (71.89%) recognize the existence of community organizations, highlighting a robust framework for social cohesion and support networks. However, only 30.81% are actual members, pointing to possible obstacles to participation. The majority (69.19%) are not involved, indicating that these organizations may not be successfully engaging the community. Among active members, 96.49% are engaged, while a small fraction (3.51%) are inactive. Identifying the barriers to membership is essential for organizations aiming to enhance community involvement and support.

Table 4.2
Political Involvement of the Respondents

	Frequency	Percentage
Have you voted in the last election?		
Yes	178	96.22
No	7	3.78
Have you been a candidate for any elective position?		
Yes	23	12.43
No	162	87.57
If yes, what level?		
Barangay	22	95.65
Municipal	1	4.35
Provincial	0	0

A significant number of respondents took part in the last election, showing a strong dedication to the electoral process. However, only 12.43% have ever pursued an elective position, which points to possible barriers to candidacy. The vast majority (87.57%) have not tried to run, revealing a potential shortfall in political representation. Most individuals aimed for positions at the barangay level, indicating a focus on local involvement rather than higher

government roles. Grasping these dynamics could foster increased political engagement and representation within the community.

Table 4.3
Knowledge of the Respondents on Barangay Regular Assembly Meetings

	Frequency	Percentage
Is there any regular assembly meeting in the barangay?		
Yes	174	94.05
No	11	5.95
If yes, how often is the Barangay assembly meeting conducted?		
Monthly	49	28.16
Quarterly	91	52.30
Twice a year	24	13.79
Once a year	10	5.75

Most respondents in their barangay are aware of regular assembly meetings, which play an important role in community governance. The frequency of these meetings differs, with 52.30% occurring quarterly, 28.16% monthly, and a smaller portion happening twice a year or once a year. This indicates that the current frequency might not be sufficient for all members to participate regularly. Exploring the reasons for this frequency could lead to a more engaged community.

The study underscores the crucial role of Barangays in fostering community engagement and advancing the Sustainable Development Goals (SDGs) in the Philippines. It stresses the value of lifelong learning, self-determination, inclusion, and collaboration within community organizations and political processes (Ancho et al., 2022).

Housing Characteristics and Community Infrastructures

Table 5.1 below shows the results of the 185 respondents' answers from the housing characteristic survey questionnaire distributed to each of them in terms of frequency and percentage.

Table 5.1
Housing Characteristics

	Frequency	Percentage
Source/means of lighting		
PALECO	155	83.78
solar power	5	2.70
candle	1	0.54
PALECO, solar power	24	12.97
Fuel used for cooking		
LPG	29	15.68
charcoal	100	54.05
firewood	12	6.49
electricity	1	0.54
LPG and charcoal	19	10.27
LPG and firewood	1	0.54
charcoal and firewood	21	11.35
charcoal and electricity	2	1.08

A significant majority of respondents (83.78%) depend on PALECO for lighting and charcoal for cooking, while only 2.70% utilize solar power. The use of candles is minimal, and 12.97% combine PALECO with solar energy. Charcoal remains the predominant cooking fuel, with LPG being used by 15.68%. Other fuel sources, such as firewood and electricity, are less commonly used. The trend of mixed fuel usage indicates a growing preference for combining various energy sources for cooking. Gaining insights into these housing characteristics can inform local energy policies and initiatives.

Table 5.2
Community Infrastructures

	Frequency	Percentage
Is there a functional road in the Barangay?		
Yes	185	100.00
No	0	0
If yes, what is it made of?		
concrete	185	100.00
Does the Barangay have a functional drainage facility?		
Yes	47	25.41
No	138	74.59
If yes, what type of drainage system?		
Open drainage	43	
Closed drainage	4	
Is there a school in the Barangay?		
Yes	185	100.00
No	0	0

If yes, what type of school/s is/are present?		
Elementary School	185	100.00
High School	0	0
Is there a functional health center in the Barangay?		
Yes	185	100.00
No	0	0
If yes, how often it is open to serve the community?		
Weekdays	185	100.00
Are there recreational facilities in the Barangay?		
Yes	185	100.00
No	0	0
If yes, what are these recreational facilities?		
Basketball court	185	100.00

The barangay boasts a well-kept road network, yet only 25.41% of respondents report having access to a functional drainage facility, which points to possible issues in water management and sanitation. It features an elementary school, a health center, and recreational amenities like a basketball court. However, the absence of adequate drainage facilities highlights areas that need improvement in sanitation and water management. While the community's infrastructure is strong, there are clear opportunities for enhancement, especially regarding drainage systems.

Health, Sanitation, and Environmental Practices

Table 6 below shows the health, sanitation, and environmental practices in Barangay Mabini. Categories included are source of water for drinking/cooking, kind of toilet used, wastewater disposal, and solid waste disposal.

Table 6
Health, Sanitation, and Environmental Practices

	Frequency	Percentage
Source of water for drinking/cooking		
refilling station	39	21.08
BAWASA	10	5.41
faucet	27	14.59
poso	13	7.03
well water	7	3.78
poso and faucet	4	2.16
BAWASA and faucet	14	7.57
Refilling station and faucet	60	24.86
Faucet, BAWASA, and refilling station	8	4.32
Refilling station and mineral water	1	0.54
Faucet, BAWASA, and poso	1	0.54

Refilling station and poso	3	1.62
BAWASA and poso	1	0.54
BAWASA, refilling station, and poso	2	1.08
Refilling station, faucet, and HOSEMO	1	0.54
BAWASA and refilling station	2	1.08
HOSEMO and poso	1	0.54
HOSEMO and distilled water	1	0.54
HOSEMO	2	1.08
Faucet and mineral water	1	0.54
Well water and faucet	1	0.54
Kind of toilet used		
Ceramic type (Pour Flush)	185	100.00
Wastewater disposal		
Pit	17	9.19
Canals	13	7.03
Safety Tank	4	2.16
Wetting soil	64	34.59
Watering plants	35	18.92
Washing animals	7	3.78
Washing vehicles	13	7.03
Cleaning	3	1.62
Watering plants and washing vehicles	6	3.24
Watering plants and wetting soil	10	5.41
Watering plants and canals	6	3.24
Wetting soil and washing vehicle	1	0.54
Watering plants and pits	1	0.54
Watering plants and cleaning	1	0.54
Watering plants, wetting soil, cleaning pigpens	1	0.54
Watering plants, wetting soil, washing vehicles	3	1.62
Solid waste disposal		
Pit	38	20.54
Burning	59	31.89
Garbage collection	41	22.16
MRF	20	10.81
Pit, garbage collection	2	1.08
Burning, garbage collection	6	3.24
Burning, pit	5	2.70
Composting, garbage collection	9	4.86
MRF, burning	3	1.62
Burning, pit, garbage collection	2	1.08

The community depends on several water sources, such as refilling stations and BAWASA, for their drinking and cooking needs. All respondents use ceramic-type toilets, which help maintain hygiene and reduce health risks. Wastewater disposal methods differ, with 34.59% of individuals using it for watering plants and 18.92% relying on canals and safety tanks. Solid waste is mainly disposed of by burning, with garbage collection and a Materials Recovery Facility as secondary options. However, the practice of burning raises concerns regarding air quality and environmental health. The community's proactive approach to

resource management indicates there is room for improvement in waste management and sanitation practices, which could enhance long-term sustainability and health outcomes.

Priority Needs and Problems

Table 7.1 below shows the results of the 555 respondents' answers from the survey questionnaire on the three most serious problems, presented in terms of frequency and percentage.

Table 7.1
Three Most Serious Problems

Entity	Frequency (n = 555)	Percentage
Your Household		
Financial	117	21.08
Health problems	16	2.88
Land dispute	1	0.18
Lack of livelihood programs	30	5.41
Lack of food	38	6.85
Diseases	8	1.44
Debts	2	0.36
Unemployment	1	0.18
Accidents	1	0.18
Electricity	4	0.72
Water	2	0.36
Cleanliness problem	1	0.18
Noise	3	0.54
Conflicts within the family	1	0.18
Vices	1	0.18
Smell of the neighboring slaughterhouse	1	0.18
Transportation	1	0.18
Slow internet connection	1	0.18
None	326	58.74
Your Barangay		
Poor waste management	9	1.62
Poor maintenance of street lights	6	1.08
Lack of financial assistance	2	0.36
Lack of livelihood programs	5	0.90
Lack of security equipment	1	0.18
Cleanliness problem	3	0.54
Communication problem	1	0.18
Unemployment	2	0.36
Bias	1	0.18
Electricity	1	0.18
Lack of funds	11	1.98
Noise	3	0.54
Laziness	1	0.18
Gambling	1	0.18
Vices	1	0.18
Troublemakers	3	0.54
Unpaved roads	1	0.18
Land disputes	1	0.18
Corruption	1	0.18

Burglary	2	0.36
Poor governance	2	0.36
Children's health problem	4	0.72
Gossip	1	0.18
Alcoholism	1	0.18
Problems in project implementation	1	0.18
Local conflicts	2	0.36
None	488	87.93
Men in your Barangay		
Alcoholism	11	1.98
Burglary	1	0.18
Attitude	1	0.18
Financial	6	1.08
Gambling	1	0.18
Nicotine addiction	1	0.18
Noise	1	0.18
Teenage fatherhood	1	0.18
Troublemakers	4	0.72
Unemployment	21	3.78
Vices	3	0.54
None	504	90.81
Women in your Barangay		
Alcoholism	1	0.18
Attitude	1	0.18
Gossip	4	0.72
Laziness	4	0.72
Local conflicts	1	0.18
Noise	2	0.36
Poor parenting	4	0.72
Teenage pregnancy	2	0.36
Unemployment	16	2.88
None	520	93.69
Youth in your Barangay		
Alcoholism	3	0.54
Attitude	1	0.18
Burglary	1	0.18
Lack of assistance from the government	9	1.62
Lack of education	1	0.18
Lack of knowledge about rights	1	0.18
Lack of school facilities	1	0.18
Malnutrition	7	1.26
Mental health problem	1	0.18
Gambling	1	0.18
Nicotine addiction	1	0.18
Noise	5	0.90
Phone addiction	6	1.08
Social media addiction	1	0.18
Teenage pregnancy	2	0.36
Troublemakers	2	0.36
Vices	3	0.54
Unemployment	11	1.98
None	498	89.73

Children in your Barangay		
Lack of food	2	0.36
Health problems	6	1.08
Lack of attention	1	0.18
Lack of playgrounds	1	0.18
Malnutrition	5	0.90
Phone addiction	6	1.08
Scattered on the road	1	0.18
None	533	96.04

The community is grappling with several challenges, including financial struggles, food shortages, and inadequate livelihood programs. Major concerns include poor waste management, insufficient street lighting, and a lack of financial support. Men primarily worry about alcoholism and unemployment, while women express concerns about alcoholism and gossip. Young people are facing a lack of government support and educational opportunities, and children are dealing with food scarcity and health issues. Most respondents do not perceive these problems as significant, indicating a possible lack of awareness or understanding. By addressing these challenges, enhancing waste management, and providing better resources for youth and families, the overall well-being of the community could see substantial improvement.

Table 7.2

Three Most Urgent Needs

Entity	Frequency (n = 555)	Percentage
Your Household		
Educational assistance	1	0.18
Clothes	5	0.90
Dwelling	1	0.18
Appliances	1	0.18
Electricity	1	0.18
Financial help	109	19.64
Financial management	1	0.18
Foods	68	12.25
Basic commodities	1	0.18
Healthcare	4	0.72
House renovation	5	0.90
Feeds for animals	1	0.18
Job	11	1.98
Internet connection	1	0.18
Livelihood programs	12	2.1
Close market proximity	1	0.18
Medicine	5	0.90
Proper waste disposal	1	0.18
Teaching of values and right	1	0.18
conduct	1	0.18
Transportation	1	0.18
Vehicular maintenance	4	0.72
Water	319	57.48
None		

Your Barangay		
Area for facilities	1	0.18
Assistance from government	1	0.18
Clothes	2	0.36
Curfew	2	0.36
Clearing and cleaning pathways	1	0.18
Electricity	1	0.18
Ensured the safety of pedestrian	1	0.18
kids	4	0.72
Food	16	2.88
Funds	1	0.18
Healthcare services	1	0.18
Healthcare facilities	1	0.18
Healthcare personnel	1	0.18
Honest officials	4	0.72
Improvement of governance	7	1.26
Jobs	1	0.18
Medicine	3	0.54
Proper waste management	2	0.36
Security equipment	1	0.18
Sports equipment/facilities	2	0.36
Street lights	1	0.18
Paved roads	3	0.54
Transportation	3	0.54
Support services for those in	1	0.18
need	3	0.54
Water	491	88.47
Unity		
None		
Men in your Barangay		
Discipline	1	0.18
Education	3	0.54
Financial help	13	2.34
Foods	3	0.54
Livelihood programs	22	3.96
Jobs	14	2.52
Proper awareness	1	0.18
Sports equipment/facilities	1	0.18
None	497	89.55
Women in your Barangay		
Education	2	0.36
Clothes	1	0.18
Financial help	10	1.80
Foods	3	0.54
Jobs	12	2.16
Internet connection	1	0.18
Parenting seminars	3	0.54
Livelihood programs	18	3.24
Proper awareness	1	0.18
None	504	90.81

Youth in your Barangay		
Discipline	1	0.18
Education	17	3.06
Financial help	8	1.44
Food	2	0.36
Livelihood programs	7	1.26
Scholarships	1	0.18
Seminars	1	0.18
Sports equipment/facilities	1	0.18
Jobs	3	0.54
None	514	92.61
Children in your Barangay		
Education	10	1.80
Feeding program	3	0.54
Healthcare	16	2.88
Parental guidance	1	0.18
School supplies	2	0.36
Security equipment	1	0.18
None	522	94.05

The community is grappling with several urgent needs, such as financial support, healthcare services, and better governance. For households, the most critical needs are financial assistance, followed closely by food and educational support. At the barangay level, the main priorities are healthcare services and improvements in governance. Men primarily seek financial assistance, along with job opportunities and livelihood programs. Women focus on education and financial aid, while the youth prioritize education, financial support, and livelihood initiatives. Children's needs revolve around healthcare and feeding programs. These urgent needs within the community underscore the potential impact of targeted assistance and intervention, particularly in alleviating financial struggles, improving healthcare services, and broadening educational access.

Training Needs Assessment

Tables 8.1 to 8.4 below show the frequency, percentage, mean score, and the corresponding description of each skill training that can be conducted by Western Philippines University. Trainings that are included are under Agricultural & Biosystems Engineering, Civil Engineering, Electrical Engineering, and Mechanical Engineering.

The survey questionnaire contains 24 different statements which the respondents have answered. Have Attended, Not Needed, Needed, or Very Much Needed are the choices given.

Table 8.1 assesses the training needs in the Agricultural Biosystems Engineering field, drawing on the experiences and perceptions of respondents. Biowaste Processing Machineries received an average score of 1.67, with 90% of participants indicating its necessity. Coconut Husk Processing Machineries had an average score of 1.59, with 92 respondents affirming its importance. Watershed Management also scored 1.59, with 87 respondents expressing a need for additional education. Agricultural Machinery, Maintenance, and Operation received a mean score of 1.62, underscoring the vital role of machinery upkeep in enhancing agricultural productivity. Pressurized Irrigation Systems scored 1.55, with 82 respondents deeming it necessary. Structural design was recognized as essential, with 90% of respondents highlighting its importance for improving agricultural

operations. Farmstead Planning received a mean score of 1.60, indicating a demand for further training. This evaluation serves as a valuable resource for pinpointing key areas for training programs and addressing the evolving needs of the agricultural sector.

Table 8.1
Training Needs Assessment of the Respondents (Agricultural Biosystems Engineering)

Training	Have Attended		Not Needed		Needed		Very Much Needed		Mean Score	Description
	f	%	f	%	f	%	f	%		
Biowaste Processing Machineries	8	4.32	66	35.68	90	48.65	21	11.35	1.67	Needed
Coconut Husk Processing Machineries	3	1.62	80	43.24	92	49.73	10	5.41	1.59	Needed
Watershed Management	1	0.54	85	45.95	87	47.03	12	6.49	1.59	Needed
Agricultural Machinery, Maintenance, and Operation	9	4.86	66	35.68	97	52.43	13	7.03	1.62	Needed
Pressurized Irrigation System Design	3	1.62	89	48.11	82	44.32	11	5.95	1.55	Needed
Design of Agricultural Structure	2	1.08	83	44.86	90	48.65	10	5.41	1.58	Needed
Farmstead Planning	6	3.24	75	40.54	88	47.57	16	8.65	1.60	Needed

Legend:
0.00 – 0.49 = Have Attended
0.50 – 1.49 = Not Needed
1.50 – 2.49 = Needed
2.50 – 3.00 = Very Much Needed

In Table 8.2, a training needs assessment was carried out among Civil Engineering respondents, highlighting a significant demand for further education and training in practical skills like carpentry, surveying, and hollow block making. The survey indicated a strong interest in these skills, with 12 respondents having participated in training, 95 identifying them as necessary, and 9 rating them as very much needed. Most respondents felt that masonry skills were sufficiently covered in current training programs, suggesting no immediate need for additional training. Hollow block production was also recognized as necessary, with 7 respondents having attended training and 93 considering it essential. Tile setting was viewed as valuable, with 9 respondents stating it was necessary, 91 affirming its importance, and 84 also deeming it necessary. AutoCAD was seen as unnecessary, with only 3 respondents having received training, indicating a lack of perceived need for this software.

Microsoft Project Management Software was not regarded as essential, suggesting it may be obtained through other means or not prioritized. Addressing these training needs could greatly enhance the skills of Civil Engineering professionals, leading to better project outcomes and opportunities for professional development.

Table 8.2

Training Needs Assessment of the Respondents (Civil Engineering)

Training	Have Attended		Not Needed		Needed		Very Much Needed		Mean Score	Description
	f	%	f	%	f	%	f	%		
Carpentry	12	6.49	69	37.30	95	51.35	9	4.86	1.55	Needed
Basic Surveying	2	1.08	93	50.27	82	44.32	8	4.32	1.52	Needed
Masonry	9	4.86	82	44.32	88	47.57	6	3.24	1.49	Not Needed
Hollow Blocks Making	7	3.78	79	42.70	93	50.27	6	3.24	1.53	Needed
Tile Setting	9	4.86	78	42.16	91	49.19	7	3.78	1.52	Needed
Plumbing	7	3.78	86	46.49	84	45.41	8	4.32	1.50	Needed
AutoCAD	3	1.62	102	55.14	75	40.54	5	2.70	1.44	Not Needed
Google Sketchup	2	1.08	102	55.14	76	41.08	5	2.70	1.45	Not Needed
Microsoft Project Management Software	3	1.62	107	57.84	70	37.84	5	2.70	1.42	Not Needed

Legend:

0.00 – 0.49 = Have Attended
0.50 – 1.49 = Not Needed
1.50 – 2.49 = Needed
2.50 – 3.00 = Very Much Needed

In Table 8.3, a training needs assessment in the Electrical Engineering sector shows a significant demand for training in areas such as Electrical Wiring Installation and Troubleshooting, Electronics Repair and Troubleshooting, and Computer Literacy. The survey indicated that 11 respondents had participated in training, reflecting a strong interest in these skills. The mean score for Electronics Repair and Troubleshooting was 1.71, suggesting a need for skilled technicians to effectively maintain and repair electronic devices. Additionally, the assessment emphasized the critical role of computer literacy in the field, as technology is essential for design, analysis, and troubleshooting. This assessment highlights the necessity for further education and training in key areas of Electrical Engineering to enhance professional skills and drive industry progress.

Table 8.3
Training Needs Assessment of the Respondents (Electrical Engineering)

Training	Have Attended		Not Needed		Needed		Very Much Needed		Mean Score	Description
	f	%	f	%	f	%	f	%		
Electrical Wiring Installation and Trouble-shooting	11	5.95	59	31.89	98	52.97	17	9.19	1.65	Needed
Electronics Repair and Trouble-shooting	2	1.08	63	34.05	107	57.84	13	7.03	1.71	Needed
Computer Literacy	2	1.08	72	38.92	97	52.43	14	7.57	1.66	Needed

Legend:
0.00 – 0.49 = Have Attended
0.50 – 1.49 = Not Needed
1.50 – 2.49 = Needed
2.50 – 3.00 = Very Much Needed

In Table 8.4, the training needs assessment for individuals in Mechanical Engineering is divided into four categories: “Have Attended,” “Not Needed,” “Needed,” and “Very Much Needed.” The areas of Small Engine Troubleshooting, welding, and air conditioning maintenance stand out as the most critical, reflecting a strong demand for these skills. Additionally, the assessment indicates a growing need for training in 3D printing, which is becoming increasingly relevant in the industry. However, the lower interest in 3D printing suggests it may not be a top priority for many respondents. This assessment serves as a valuable resource for pinpointing key training areas and ensuring that educational programs align with the evolving needs of the mechanical engineering workforce. Addressing these training requirements, can enhance project outcomes and foster professional development, ultimately benefiting the Mechanical Engineering field.

Table 8.4
Training Needs Assessment of the Respondents (Mechanical Engineering)

Training	Have Attended		Not Needed		Needed		Very Much Needed		Mean Score	Description
	f	%	f	%	f	%	f	%		
Small Engine Troubleshooting	9	4.86	62	33.51	102	55.14	12	6.49	1.63	Needed
Welding	5	2.70	68	36.76	98	52.97	14	7.57	1.65	Needed
Aircon and Refrigeration Maintenance	2	1.08	79	42.70	89	48.11	15	8.11	1.63	Needed
3D Printing	6	3.24	103	55.68	68	36.76	8	4.32	1.42	Not Needed
Machining	3	1.62	91	49.19	85	45.95	6	3.24	1.51	Needed

Legend:
0.00 – 0.49 = Have Attended
0.50 – 1.49 = Not Needed
1.50 – 2.49 = Needed
2.50 – 3.00 = Very Much Needed

Conclusions

The study examined the demographic and socio-economic conditions, as well as the training needs, of Purok 1-4 in Barangay Mabini, Aborlan, Palawan. It revealed that a majority of respondents are young adults, predominantly females, with many earning less than ₱10,000 per month. This suggests economic challenges, as evidenced by their reliance on rice and minimal spending on essential needs. The assessment of training needs pointed out the importance of workshops in areas like Biowaste Processing, Agricultural Machinery Maintenance, and Electrical Wiring to enhance local skills and improve economic conditions.

The significance of this study lies in its ability to inform local officials and educational institutions about implementing targeted interventions to meet these needs. Future research should focus on obtaining a larger, more diverse sample and investigating barriers to education and employment.

The study highlights the critical need for specialized training programs and community involvement to empower the residents of Barangay Mabini, ultimately promoting community development and improving their quality of life.

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Personality in Performance: Grade 3 Students' Personality Type in Relation With Academic Performance in Science

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Abstract

As different innovations about teaching continuously emerge, the study aims to approach science teaching based on the development and personalities of students ranging from 8 to 9 years of age. A correlational study on how personality types relate to academic performance in Science was conducted in a private school in Quezon City, Metro Manila, Philippines among 201 third grade students at the end of the school year. Data from the reports of the Murphy-Meisgeier Type Indicator for Children (MMTIC), Achievement Posttest in Science, and their final average in the subject were analyzed using descriptive statistics, Spearman's rank correlation and one-way analysis of variance. The results indicate that (a) most personality types of the students in this developmental age fall under the Feeling (focused on emotions) and Judging (prefer structure and organization) types, (b) about 95% revealed satisfactory to above average performance in Science as measured by their grades and achievement test scores, and (c) the variables show positive relationships with certain personality types exhibiting differences in their final average. Establishing class routines guided by the personality and behavioral profiles helps students to excel academically. Moreover, provision for hands-on experiences that cater to students of different personality types hone their creative and communication skills. With these, recommendations for varied instructional methods and classroom management techniques to tailor to the developmental needs and personality traits of the students were presented.

Keywords: personality, academic performance, achievement posttest, childhood education, MMTIC

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Introduction

In third grade, students are introduced to more academic rigors. They experience more socialization activities and developmentally appropriate practices that help them grow more holistically and develop their personalities. Since habits, preferences, and the unique characters of students become more prominent at this level, it became a natural interest of the researchers to explore how students' personalities are related to their academic performance.

Aside from employing different innovative approaches and methodologies in science teaching, another aspect that can be explored to improve science instruction and increase student engagement is understanding the different personalities of students. There are several studies that explored these variables such as the study of Li et al. (2018) which focused on determining the influence of the extroversion/introversion personality type on academic performance of college students. The results of their study showed that there does exist a correlation and that academic performance can be predicted based on a student's personality preference. Backed up with studies like this and the availability of the data became the inspiration of this research.

This study intends to investigate the relationship of personality type, based on the Murphy-Meisgeier Type Indicator for Children (MMTIC)–a version of MBTI for children, and academic performance in Science of Grade 3 students. The following questions will be answered in the conduct of the study:

1. What are the personality types of third-grade students as measured by the MMTIC?
2. Is there a significant relationship between students' personality types and science achievement as measured by their final average and achievement posttest results?
3. Is there a significant difference among the final averages and achievement test scores of students in Science based on their personality types?

In the past years, different approaches and methods have been put in place to improve classroom instruction in hopes to increase academic performance of students in different fields of discipline. Science as a field of discipline is responsive to this call. With the continuous advancement of technology and robotics, educational programs are crafted and aligned with these changes. However, teachers also recognize that students' personalities play a key role in how successfully they learn. When teachers understand the inclinations or preferences related to students' personality types, this insight can greatly contribute to the exploration of varied ways to teach science concepts and help students learn and apply these concepts.

Effective classroom instruction entails an understanding of the several aspects of the teaching and learning process, with the learner at the center of every academic planning and decision making. It can only be achieved through continuous search of better ways to deliver quality instruction and more creative ways to maximize student engagement. This study aims to provide another perspective on enhancing science instruction through exploring students' personalities. Through a better understanding of the students' personalities, teachers could:

- determine the best way each student learn;
- recognize students' strengths and help them work on with their weaknesses in terms of learning science concepts in relation to their personality types;
- improve science instruction based on students' personality types; and
- increase students' engagement and academic performance in science.

Literature Review

With the knowledge that students differ greatly in how they learn, the growing literature and innovations on personality testing, teachers and psychologists alike turn their attention to the factor that personality plays in the academic achievement of students and how instruction be designed that will maximize students' personality type. Although there are some teaching strategies useful to a whole class, the differences among students make it necessary to diversify those teaching strategies (Bargar et al., 1994).

Early attempts to explore this relationship were conducted with college students and the most widely used personality test is—the MBTI. An example of this study was conducted by Li et al. (2018) which aimed to determine the influence of the extroversion/introversion personality type on academic performance of college students. The results of their study showed that there does exist a correlation and that academic performance can be predicted based on a student's personality preference.

Another study conducted by Kun et al. (2015) focused on the effect of personality type and personality preferences measured by MBTI, on higher education students' choice of profession and on their academic performance. Bayne (as cited in Kun et al., 2015) stated that the concept of personality preference has no formal definition but can be described as feeling most natural and comfortable with. He further explained that preferences have a strong influence on, but are not identical to, behavior, because behavior is usually affected by many other factors simultaneously. The results of the data showed that the most frequent types were ENFJ and ESFJ, however, the frequencies of the personality types showed slight differences regarding the major (Kun et al., 2015).

Similarly, a study on personality type measured by MBTI and academic achievement was conducted by Jang et al. (2016) among Korean Medical students. Results showed that there was a statistical significance in academic achievement according to MBTI preferences (Jang et al., 2016). The researchers noted that Sensing type students had higher academic performance than Intuitive type students. Furthermore, they also pointed out that Judging type students had higher academic performance than perceiving type students. Conversely, there were no statistically significant differences between Extroversion and Introversion, as well as Thinking and Feeling type (Jang et al., 2016). The researchers further explain that although it is dangerous to reach the general conclusion between MBTI and academic achievement, the findings indicate that academic achievement was significantly related to their personality type.

The richness in information of these researches, the application of the theories of personality, and the use of varied personality tests in diverse populations provide ample proof how personality can affect academic performance to older populations of students. Interest on the effect of personality on academic performance does not stop with college students as subjects of exploration, teachers and psychologists ventured also on determining the relationship with these two variables to younger students in hopes to deliver instruction that maximizes their personality types and learning styles.

A study conducted by Lathey (1991) attempted to correlate the four learning styles conceptualized by Golay in 1982 i.e., actual – spontaneous, actual – routine, conceptual – specific, and conceptual – global, with academic achievement in early adolescence. The researcher also used MMTIC scores and traditional predictors of academic performance,

including ability data and achievement test results in reading and math, to predict performance in science and English courses in Grades 6-8 (Lathey, 1991).

For both the MMTIC total sample and the present total sample, more students showed preferences for E, S, F, and P. The sixth-grade data most closely resemble the present total sample results (Lathey, 1991). The S-N subscale data suggests a marked shift away from preference for intuition by Grade 8. Whereas one of three of the sixth-grade students demonstrated a preference for intuition, by Grade 8 only about one out of five students preferred intuition over the sensing function. The most stable results are provided by the E-I subscale. The percentage of students preferring the extraverted attitude showed relatively little variability across grade levels, ranging from 50 to 55%; preference for introversion ranged from 20 to 29%. These percentages resemble the MMTIC manual's Table 12 values by Meisgeier and Murphy, where for the total sample 55% of the students showed a preference for E and 20% showed a preference for I (Lathey, 1991).

Furthermore, inspection of the correlation coefficients suggests that traditional cognitive factors play a relatively greater role in accounting for academic performance in Grade 6 than in Grades 7 and 8 (Lathey, 1991). The researcher also mentioned that the present results suggest the importance of learning style or temperament factors in accounting for academic performance in early adolescence. Golay (as cited in Lathey, 1991, p. 57), recommends various instructional strategies that are most compatible with his four learning styles.

Cornett (as cited in Lathey, 1991) stated that even an advocate of matching teaching and learning styles cautions that the successful student must be flexible; the student must extend his or her "style range" to be comfortable with various instructional approaches.

One interesting finding on the study of personality type and school achievement is one statement of Morris (as cited in Fourqurean et al., 1988). Specifically, in the educational realm extraverts are superior to introverts in the preschool and primary school ages, up to about 12-15 years of age. This is in congruence with the study conducted by Eysenck and Cookson in 1969 where they found that extraverted boys and girls were scholastically superior to introverted ones (as cited in Fourqurean et al., 1988).

Laidra et al. (2006) conducted a study on personality and intelligence as predictors of academic achievement. The results showed that in all grades, correlations with GPA were highest for intelligence, although they became somewhat weaker in Grade 8 and onwards.

Based on Carl Jung’s theory of personality, the results of the MMTIC will be correlated with students’ academic performance in Science. Data will be subjected to statistical treatment to establish the relationship or non-relationship of the variables. This study adapts basic assumptions in psychological testing such as the acceptance that the personality inclination or preference of students are stable at the time that they are measured. It also assumes that students were in the right state of mind when they took the personality test and that they understood the statements that were used to measure their personality. Aside from assuming test accuracy and reliability, the study is limited to third grade students who attended school year 2019-2020.

Definition of Terms

1) *Academic Performance* - refers to the outcome of the achievement posttest and final average in Science at the end of the academic year
2) *Murphy-Meisgeier Type Indicator for Children (MMTIC)* - is a self-report assessment developed to measure children's psychological type preferences
3) *Personality Type* - refers to individual differences in characteristic patterns of thinking, feeling, and behaving as measured by the MMTIC

Methodology

This study employed correlational quantitative research design. The personality types of students, achievement test results, and final averages were analyzed using One-Way Analysis of Variance (ANOVA) and Spearman's Rho Correlation.

The data on personality types of the students came from the result of their MMTIC assessment. The MMTIC assessment, like the MBTI assessment, is based on Carl Jung's theory of personality. It identifies people as having preferences in four dimensions, all relevant to a whole or four-letter type. Moreover, the academic performance of students was based on their final average in Science and the achievement posttest in Science which they took towards the end of the school year.

The participants of the study were third-grade students, age ranging from 8 to 9 years old, from a private all-girls school in Metro Manila, Philippines. With the permission of the school authorities, the achievement test scores of the participants were provided by the school's Guidance, Testing, and Research Center (GTRC), while the final averages in Science were generated from the Student Database Management System (SDMS), the school's grading program. Using the Statistical Package for Social Sciences (SPSS) program, the data was analyzed through One-Way ANOVA and Spearman Rho's Correlation. The profiles of the students' personality types were presented using tables and descriptive statistics.

At .05 level of significance, the following hypotheses were tested:

1. The students' personality type and science achievement are associated as measured by their final average and achievement posttest results.
2. The final averages and achievement test scores of students in Science differ based on their personality types.

In compliance with the Data Privacy Act, the researchers sought the permission of the school's administrators to conduct the study and applied clearance from the Miriam College Research Ethics Committee (MCREC) to implement the research. To maintain the anonymity of the participants, names were replaced with code names and no identifying information were included in the study. Furthermore, the data was stored in an encrypted online storage which is accessible only to the researchers and the offices concerned. Personal sensitive information was stored separately (data with names is in a different folder) from the research data collected as part of the study (data with code names). The profiles, academic performance, and personality types of students were kept in utmost confidence. At the completion of the study, a copy of the results was submitted to the school office. Following the school's policy on data retention, safekeeping, and disposal, the data will be permanently deleted from the online storage after five years.

Results

This chapter presents the result, analysis, and interpretation of data in accordance with the specific questions posited on the statement of the problem.

Table 1 shows the personality profiles of the students. Of 201 students, 21.9% (44) showed the personality ESFJ which is the highest of the 15 personality types. Followed by ENFJ with 16.9% (34) of the students and ISFJ and INFJ with 16.4% (33) and 14.9% (30) of the students, respectively. It can be noted that the above-mentioned personality types fall under the Feeling and Judging types. On the contrary, personality types ESTJ and ESTP got the lowest number in terms of frequency.

Table 1
Personality Profile of the Students

Personality	Frequency	Percent
ENFJ	34	16.9
ENFP	18	9.0
ENTP	3	1.5
ESFJ	44	21.9
ESFP	9	4.5
ESTJ	1	.5
ESTP	1	.5
INFJ	30	14.9
INFP	7	3.5
INTJ	2	1.0
INTP	3	1.5
ISFJ	33	16.4
ISFP	9	4.5
ISTJ	5	2.5
ISTP	2	1.0
Total	201	100.0

Table 2 shows the students' final average in Science. It can be noted that 25.9% (52) of the students got an Excellent Performance, about 46.3% (93) of the students got an Outstanding Performance, and 29.1% (44) of the students got a Very Satisfactory final Grade in Science. A total of 94% of the 201 students showed above satisfactory performance in Science.

Table 2
Final Average of Students in Science

Final Average in Science	Frequency	Percentage
Excellent Performance	52	25.9
Outstanding Performance	93	46.3
Very Satisfactory	44	21.9
Satisfactory	9	4.5
Fairly Satisfactory	2	1.0
Needs Special Help	1	.5
Total	201	100.0

Table 3 further breaks down the percentages of the students who fall under each qualitative index. This shows that 95% of the students got an average and above score in the posttest with 13.4% and 40.8% gaining Excellent and Approaching Excellence, respectively.

Table 3
Achievement Posttest Result in Science

Posttest Qualitative Index	Frequency	Percentage
Excellent	27	13.4
Approaching Excellence	82	40.8
Average	82	40.8
Moving Towards Average	8	4.0
Needs Improvement	2	1.0
Total	201	100.0

Table 4 shows the mean of the Achievement Posttest scaled scores and final average in Science of the students, M = 345.68 indicative of students' above average level and M = 91.3996 which is above the satisfactory level.

Table 4
Academic Performance of Students in Science

	N	Sum	Mean	Std. Deviation	Variance
Posttest Scaled Scores	201	69481	345.68	41.406	1714.480
Final Average in Science	201	18371.32	91.3996	4.17998	17.472
Valid N (listwise)	201				

Table 5 shows the result of Spearman Rho statistical analysis which indicates that personality type has a small positive correlation only with final average in Science (r = .141, p = .046). Furthermore, the Final Average (expressed in letter grades) and the Qualitative Index (Achievement Posttest Result) have a large positive correlation (r = .580, p = .000).

Table 5
Summary Correlation Table of the Variables

	Final Average	Posttest Qualitative Index
Personality Type	.141*	.062
Final Average		.580**

*Note: *Correlation is significant at p < .05, ** at p < .01.*

Table 6 indicates that there is a significant difference among the final averages of students in Science based on their personality types [F (12, 186) = 2.343, p = .05] with a medium effect size (d = 0.13).

Table 6
ANOVA Among Final Average in Science Based on Personality Type

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	432.110	12	36.009	2.343	.008
Within Groups	2858.262	186	15.367		
Total	3290.372	198			

**p < .05*

Table 7 presents the assumption that homogeneity of variances was not violated (.268 > .05). Tukey HSD is the post hoc test for multiple comparisons since equal variances are assumed.

Table 7
Test of Homogeneity of Variances in Final Average

Levene Statistic	df1	df2	Sig.
1.226	12	186	.268

Looking at Table 8, three personality types emerged with significant mean differences in their final averages:

- ESFJ and ISFP (M = 87.57, SD = 4.36)
- ENFP and ISFP (M = 93, SD = 3.25)

Table 8
Multiple Comparisons Using Tukey HSD

(I) Personality Type	(J) Personality Type	Mean Difference (I-J)	Std. Error	Sig.
ISFP	ENFJ	5.11163*	1.46949	.035
	ENFP	5.42944*	1.60036	.045

** The mean difference is significant at the 0.05 level.*

Table 9 indicates that there is a significant difference among the achievement test scores of students in Science based on their personality types [F (12, 186) = 2.13, p = .05] with a medium effect size (d = 0.12).

Table 9
ANOVA Among Achievement Posttest Scaled Scores Based on Personality Type

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	40688.703	12	3390.725	2.130	.017
Within Groups	296057.568	186	1591.707		
Total	336746.271	198			

*$p < .05$

Table 10 presents the assumption that homogeneity of variances was not violated (.366 > .05). Tukey HSD is the post hoc test for multiple comparisons since equal variances are assumed.

In the post hoc test, no individual mean differences appeared. While the overall ANOVA model indicates significant variability among groups ($p < 0.05$), post hoc analyses did not reveal specific group differences, possibly due to small effect size and unequal distribution of students in each personality type. This suggests that while differences exist, they may be subtle and require further investigation.

Table 10
Test of Homogeneity of Variances in Achievement Posttest Scaled Scores

Levene Statistic	df1	df2	Sig.
1.095	12	186	.366

A one-way between-groups ANOVA was conducted to explore the impact of personality type on final averages and achievement test scores of third-grade students in Science, as measured by their posttest scaled scores. Subjects were divided into 13 groups according to their personality type. There were statistically significant differences at $p < .05$ level in final averages and achievement test scores in Science for the 13 personality groups [$F (12, 186) = 2.343$, $p = .05$] and [$F (12, 186) = 2.13$, $p = .05$] respectively.

Despite reaching statistical significance, the actual difference in mean scores between the personality types was moderate. The effect sizes, calculated using eta squared, were 0.13 for final averages and 0.12 for achievement test scores. Post-hoc comparisons using the Tukey HSD test indicated that the mean scores for a few personality types were significantly different in their final averages in Science.

Conclusions and Recommendations

Through the years, different innovations in teaching Science have emerged. Educators have tried different pedagogies and technologies to make science instruction more engaging and meaningful for students. It has become an endless journey to make science come to life with the use of different tools and methods of teaching. However, it is the desire of the researchers to approach science teaching based on the current state of development and personality of the students and how their personality types affect their academic performance in Science.

The Personality Types

MMTIC is a personality test based on the theory of Swiss psychologist Carl Jung. Bargar et al. (1994) explained that Jung identified three sets of psychological processes. The first is the Attitude - which includes Extraversion and Introversion. Some individuals are more oriented

to the people and events found in their external worlds. They are highly active and outgoing, have many friends, and prefer doing things with other people. Jung named this type of orientation EXTRAVERSION. On the other hand, some individuals are oriented to their inner thoughts and values. Jung named this type of orientation INTROVERSION.

The second is Perception - which includes Sensation and Intuition. Some people pay primary attention to what they see as real or concrete in their experiences. They are excellent observers and appreciate the beauty that surrounds them. Jung named this type of perception SENSATION. Other individuals pay more attention to the possibilities and symbolic meanings they see and are often imaginative in their work. Jung names this type of perception INTUITION.

The third is Judgment - which includes thinking and feeling. Some individuals use logic in making decisions. They tend to have firm convictions, to be serious and somewhat impersonal, and to value competence and fairness. Jung named this type of decision making as THINKING. Other individuals base their decisions primarily on values. They are compassionate and concerned about human welfare. These individuals appreciate harmonious settings and collegial relationships with others. Jung named this type as FEELING.

The fourth is Adaptation - which includes Judgment and Perception. Bargar et al. (1994) cited that as we relate to the world around us, judgment and perception influence the ways in which we approach our everyday tasks. Individuals with a JUDGMENT perspective approach activities in a structured fashion; they appreciate well-planned schedules and clear expectations for their work. Individuals with a PERCEPTION perspective approach their activities with flexibility. They look forward to new experiences and value spontaneity and novelty.

Based on the result of the MMTIC, out of the 201 students who took the personality test, 44 students (21.9%) fall under the Extrovert - Sensing - Feeling - Judging (ESFJ) type. ESFJs tend to enjoy being facilitators in the classroom; they like helping their teachers and coming alongside students who are struggling and giving encouragement. They are usually very hard working and responsible in their studies and are quick to pick up and memorize facts. Furthermore, they are described as excellent managers of day-to-day tasks and routine maintenance. They also have a strong sense of responsibility and strive to meet their obligations. They are very loyal and good at connecting with others. However, people with this personality type may also push their own beliefs too hard in an effort to establish them as mainstream. At times, they can be unwilling to step out of their own comfort zones, usually for fear of being (or appearing) different. Lastly, they have the tendency to be vulnerable to criticism, often too needy and too selfless.

The Extrovert - Intuitive - Feeling - Judging (ENFJ) type had the second most frequency with 34 out of 201 (16.9%) students falling under this personality type. ENFJs are natural leaders. They enjoy collaborative, harmonious learning environments and are particularly good facilitators and mentors to students who might be struggling in class or feeling left out. In a group discussion, ENFJs are very receptive to the different viewpoints of their peers, but they are also very aware of timing and schedule conflicts, and they may take a supervisory approach so that everyone stays on task. Conversely, ENFJs can be overly idealistic and can be sensitive to others that they tend to fix problems that aren’t their own.

Consequently, the Introvert - Sensing - Feeling - Judging (ISFJ) and the Introvert - Intuition - Feeling - Judging (INFJ) types had the third and fourth most frequency with 33 (16.4%) and 30 (14.9%) students, respectively. ISFJs thrive in a highly structured environment where the instructions are clear, and the routine is consistent. They like more time to observe and think over tasks and details of their lessons before interacting with a group. However, one area that they may struggle with is getting enough alone time to process the materials as well as they want to. They can feel overwhelmed with the commotion of classroom life. Furthermore, competition and rivalry do not appeal to ISFJs.

On the other hand, INFJs tend to see helping others as their purpose in life. They find it easy to make connections with others. They can be astonishingly good orators, speaking with warmth and passion. They also like learning that focuses on the future or the big picture, and they enjoy anything in a new and creative way. Nevertheless, INFJs are highly vulnerable to criticism and conflict. They can be extremely private when it comes to their personal lives that at times trusting a friend can be even more challenging to them. Moreover, they may have difficulty in finding a way to balance their ideals with the realities of day-to-day living.

Statistical Analyses of Personality Types and Science Achievement

Upon exploring the relationship between the variables, the result of Spearman Rho statistical analysis indicates that personality type has a small positive correlation with Final Average in Science at 14%. Furthermore, the Final Average (expressed in letter grades) and the Qualitative Index (for Achievement Posttest) have a large positive correlation. The result may be attributed to the varied instructional methods and classroom management techniques employed by the teachers in teaching Science.

Science teachers are observed to be very keen at establishing routines that guide students' behavior during science class. These routines are discussed and explained during subject orientation week and practiced throughout the school year. These structures in class help the students that fall in the dominant personality types to navigate and succeed academically in their Science class.

As important as classroom management techniques, varied instructional methods provide a venue for students of different personality types to excel in Science. Aside from the lecture approach, students also experience hands-on or laboratory activities which are done individually or in groups, engineering design challenges, and provision for robotics camps that hone the students' critical and creative thinking. In addition, completion of an end-task at the end of each quarter allows the students to explore and use STEM-related skills such as research and data gathering. Lastly, the utilization of Communication-Across-Curriculum and Cooperative Learning Strategies helps the students develop the 21st Century skills of collaboration and communication, allowing them to learn and express their learning, work with their peers, or work on their own ideas.

All these instructional activities and experiences cater to the varied developmental needs and personality types of the Grade 3 students. This is also aligned with the study of Golay (as cited in Lathey, 1991, p. 57) which rejects the lecture approach in favor of a fast-paced presentation with Audio-Visual aids, offering material with immediate relevance. Also, hands-on experience, instructional games, role playing, and dramatization exercises may be appealing to these students.

In conclusion, the study illustrated that Grade 3 students showed varying personality types and thus showed different tendencies to different conditions and instructional experiences they encounter in school. It is observed that most of the students fall under the extroverted types. Children in this grade level have a general tendency to pay more attention to the stimuli of their environment. Moreover, they lean toward the feeling and judging types, which explains how they can get affected by the interactions they have with their peers and teachers as they engage in different activities in school. Thus, it is important to note the important role that adults, especially the teachers, play in processing and managing the students' experiences, both positive and negative ones. Lastly, being in judging type, these children learn best given certain structures and well-planned activities.

The results of the statistical analysis showed a small correlation among the variables of the studies. This can be credited to several factors teachers employ in the classroom such as varied instructional designs together with supplemental programs namely robotics camp and ProDev+ STEM program (for high performing students), dynamic classroom management techniques, and educational thrusts that support science teaching.

The study has presented important implications about students' academic performance in science and personality types.

- Participants of the study, third grade students with ages that range from 8 to 9 years old, are observed to have tendencies leaning to extroversion, feeling, and judging types. Children with this personality type are more attuned to their external environment. They are more engaged in activities that involve working with peers, feedback from peers and adults around them; their teachers, most of the time, are important to them. They work better in well-planned and structured activities. However, it is also important to note that there are a few students who lean toward the introversion, feeling, and judging type. These students are more oriented to their inner thoughts and values. It is imperative to note the amount of time for these students to learn and grasp the concepts being taught.
- The study suggests that differences in personality types among students, that can affect learning and academic performance, can be addressed through using varied instructional design in teaching science, employing appropriate classroom management techniques, and providing supplemental activities.
- Finally, the result calls for science teachers to continually vary the design of science instruction to cater to different personality types of students. An annual review of the curriculum is encouraged to update the methods and strategies with the latest developments and trends in teaching science.

In light of the research findings, the following recommendations are provided:

1. continue using varied methods and strategies in science instruction not only to cater to the different developmental needs of students but also to their personality types;
2. to further monitor and improve students' academic performance in Science, it would be helpful to use the same personality test to track the shifts in personality types as students move to sixth grade, which is the puberty stage of development;
3. conduct the research using the data with sixth grade students and academic performance in science at the said grade level to aid in designing instruction to hone students as independent and collaborative learners; and
4. conduct the research in school with male students and compare the results with current study to identify possible trends or patterns.

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No Sirens: A Student Perspective on Using Virtual Reality in a Public Health Course

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Abstract

Lecturers of fully online qualifications face the challenge of designing activities that simulate real-life experiences for postgraduate students. Virtual reality has become increasingly popular in higher education since the exponential growth in technology and online education. The increasing demand for immersive, interactive learning environments drives this shift. This pilot study explored using a virtual reality platform called FrameVR in a research module to enhance student engagement and simulate the real-life experiences of designing a research protocol. This module was part of a fully online Postgraduate Diploma in Public Health. A virtual "Interview" environment was developed using the 7 Steps for Designing and Executing an Implementation Pilot Study, to explore the platform's usability. Feedback was collected from 54 participants using an online survey comprising two components: a checklist with 14 items and an open-ended question. Responses were summarized as proportions and thematic analysis was applied to the open-ended responses. The findings revealed that most participants could interact with the platform's features, such as 360° images, Portable Document Formats (PDFs), a whiteboard, videos, and the integration with the learning management system. While some participants appreciated the game-like experience of the platform, others reported feeling unsure of what to do when navigating the environment. Three participants could not navigate the platform or complete the learning activities. The study identified three key areas for improvement: platform navigation, clarity of instructions, and device compatibility. Addressing these issues could improve the effectiveness of virtual reality platforms in creating engaging and authentic learning experiences for postgraduate students.

Keywords: FrameVR, online education, pilot study, real-life examples, virtual reality

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Introduction and Literature Review

Technology has developed exponentially over the past few decades (Lege & Bonner, 2020). Today, we carry the internet in our pockets through smartphones (De Bruyckere et al., 2016), eye surgeons train using virtual reality simulations (Dormegny et al., 2024), space programs are planning missions to Mars (Mars.Nasa.Gov, n.d.), and artificial intelligence powers innovations such as autonomous vehicles (Biswal, 2025). Given these advancements, it is no surprise that technology is becoming a key part of education, specifically online education. Tools such as virtual reality (Lamb et al., 2020), augmented reality (Hidayat et al., 2021), and mixed reality through holographic learning (Leonard & Fitzgerald, 2018), are finding their place in lecture halls worldwide.

Online education has become a flexible option, especially for adult learners, as it allows them to manage their studies alongside work and personal commitments. Students can control their schedules, study at their own pace, and continue working while earning a qualification. Additionally, online learning reduces costs by eliminating travel and accommodation expenses, enabling students to study from home while earning an income (Digumarti, 2014). However, many online programmes lack human interaction (Della Longa et al., 2022) and real-life experiences. Research has therefore explored the use of virtual environments to facilitate online engagement (Rafiq et al., 2022) and increase communication (Jeong et al., 2022).

Virtual reality (VR) is gaining popularity in education due to the increasing demand for mobile learning, collaborative learning in remote learning, and immersive and interactive learning experiences (Dhapte, 2025; Lege & Bonner, 2020). VR combines 3D graphics with various interfaces to create a simulated environment that feels real (Lamb et al., 2020). Users wear a headset to explore and interact with the virtual world as if physically present (Routledge, 2021). However, some VR platforms, such as FrameVR, allow users to engage with the environment with, or without, a headset (https://learn.framevr.io/). This flexibility makes VR more accessible and affordable, particularly in emerging economies, while still preserving the immersive experience.

VR is featured in many fields of research, such as medicine, entertainment, engineering, and education (Hamad & Jia, 2022). Reported advantages of using VR immersive activities include improving students' access to a broader range of learning experiences, enhancing the accuracy of training (Asgodom et al., 2024), aligning learning outcomes with curriculum objectives and ensuring education at scale despite geographical limitations (Pottle, 2019). Unlike traditional campus-based simulations, VR can be used across different student cohorts and qualifications, regardless of time or location, making it ideal for online education (Hoffman & Argeros, 2021). Furthermore, VR enables online students to participate in simulations they would otherwise miss in traditional, in-person training (Hoffman & Argeros, 2021). Many students appreciate the realism and practical value of these experiences (Hoffman & Argeros, 2021). Examples of these practical experiences include real-world scenarios, such as consultations, home safety assessments, and patient interactions. These experiences are particularly valuable for developing communication skills and preparing students for real-life challenges in their field (Sapkaroski et al., 2022; Schaffer et al., 2016).

Using real-life examples or scenarios in education is not new (Errington, 2008). Integrating real-world applications into learning can help bridge the gap between academic knowledge and professional practice. For example, during the participation in real-world projects, nearly

all aspects of the learning experience change. The role of the facilitator, the behaviour of the students, and the boundaries of the lecture hall are all challenged (Boss & Krauss, 2008). To create these engaging environments, Boss and Krauss (2008) believe in placing greater emphasis on higher cognitive level thinking, students' ownership, real-life examples, and the use of technology.

Designing engaging and realistic learning activities for fully online postgraduate students in the Faculty of Health Sciences presents a similar challenge experienced in other settings (Mystakidis, 2020). Traditional texts, audio, and video alone may not fully replicate real-life experiences. To enhance student engagement and deepen learning, alternative approaches are needed. Practical experiences are an essential feature of programs in all of the health sciences which have to be reimagined for fully online students. For example, online Nursing Education students can evaluate a nursing training institution, Public Health students can practice monitoring and evaluation and interview skills, Orthodontists engage in interdisciplinary teamwork for treating cleft lip and palate anomalies, and Sports, Exercise and Health students discuss health prevention strategies with communities. But providing these real-world experiences to all students in an online environment can be difficult. Additionally, students must develop skills in communication, collaboration, presentations, and empathy—key competencies that traditional online methods may not fully support.

The Platform

One challenge of VR in education is cost. While setting up a virtual simulation can be more cost-effective than a physical simulation (Pottle, 2019), students in an online environment may not have access to university facilities or VR hardware. The additional cost and limited accessibility can create barriers for individual students (Asgodom et al., 2024). To ensure inclusivity and affordability, this study explores a web-based VR tool that does not require expensive equipment. This tool is a subscription-based, web-accessible platform that helps expand access to immersive learning activities while minimizing course costs. The selected platform is FrameVr (https://learn.framevr.io/).

FrameVR is a metaverse platform commonly used for virtual and augmented reality applications. The metaverse concept refers to a vast, interactive, and multi-user digital universe created with virtual world, virtual reality, and augmented reality technologies. This metaverse uses frames as online meeting spaces supercharged with artificial intelligence. FrameVR makes it easy to communicate, collaborate, and create in 3D environments from the web browser, creating an immersive experience (https://learn.framevr.io/). An advantage of web-based VR, such as FrameVR, is that it raises fewer ethical concerns than fully immersive VR systems. Unlike VR platforms that track body movements or eye activity, FrameVR collects only basic user data, similar to a Learning Management System (LMS). Since university policies and national laws protect LMS data, this approach ensures greater data security and student privacy (Asgodom et al., 2024). FrameVR also allows students to navigate the environment without hidden elements or unexpected scenarios, reducing psychological risks associated with fully immersive VR. In contrast, fully immersive VR environments using headsets and motion controls can trigger strong physiological and emotional responses to simulated situations (Asgodom et al., 2024; Valmaggia et al., 2016). By using accessible, cost-effective, and ethically-sound VR tools, educators can provide online students with immersive learning experiences that enhance both engagement (Rafiq et al., 2022) and social skill development (Howard & Gutworth, 2020).

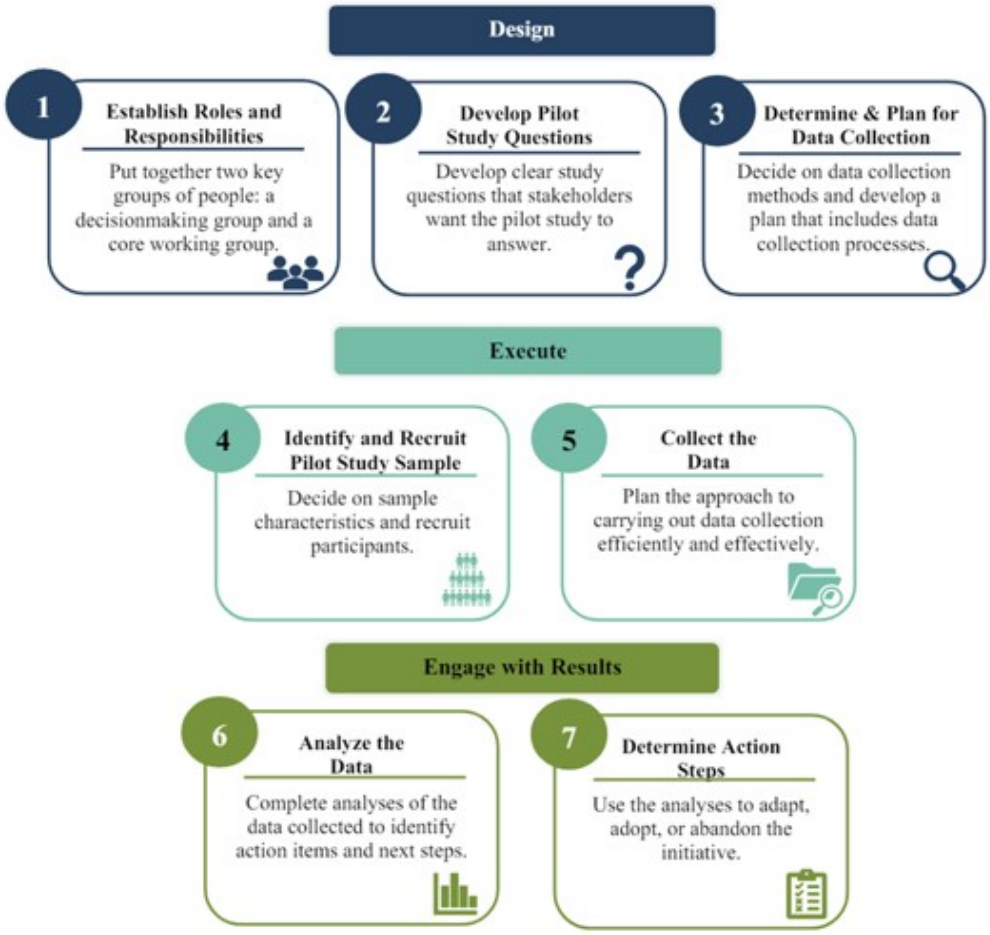
This pilot study explores the students' perspectives on using FrameVR in one module in a fully online program. The research question was: "What is the student perspective when participating in a virtual reality activity in an online course?"

Methodology

A descriptive cross-sectional study design was used for the pilot study. A pilot study is a small-scale version of a study and is mainly used to test the feasibility of the main study (Aziz & Khan, 2020), answering whether something can be done (In, 2017). Feedback from the pilot study can help the researchers to improve the quality of the intervention as well as the main study (In, 2017), to improve the methodology (Aziz & Khan, 2020), remove biases, practice data collection skills (Aziz & Khan, 2020) and refine survey questions (Aziz & Khan, 2020) of the main study. Also called implementation pilot studies, pilot studies can provide data on users' experiences that can be used to improve initiatives.

The 7 Steps for Designing and Executing an Implementation Pilot Study were used. These steps are grouped into three phases (Figure 1).

Figure 1
Steps for Designing and Executing an Implementation Pilot Study

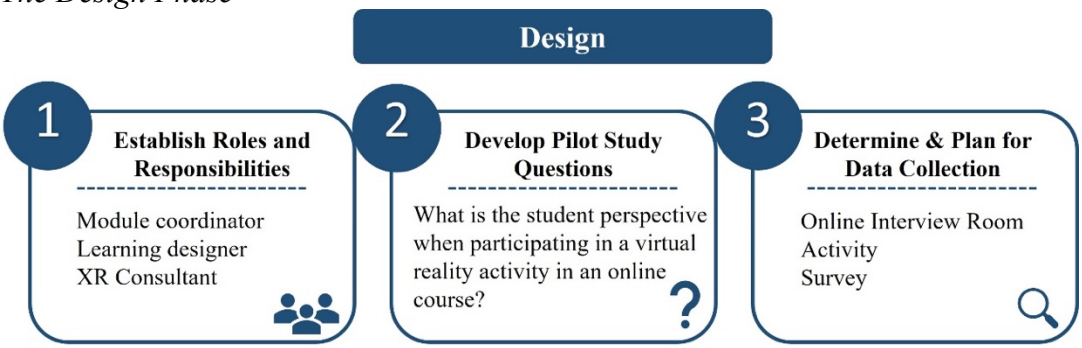


Source: REL Appalachia, 2021

The first two phases are discussed under the Methodology section and the last phase is discussed under the Findings and Discussion sections.

The Design phase (Figure 2) comprises three steps- establishing roles and responsibilities, developing study questions, and planning data collection.

Figure 2
The Design Phase



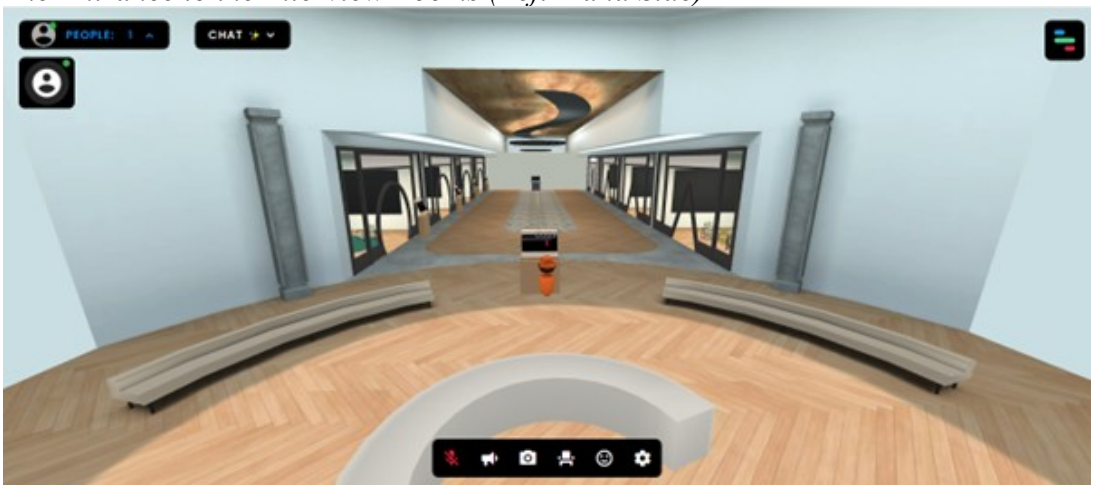
Source: REL Appalachia, 2021

Step 1: In this study, the module coordinator and the learning designer (also a researcher) constitute the decision-making group, as they had to decide how the activity should be integrated within the target module. The learning designer and an external VR consultant formed the core working group. The learning designer managed the project and the VR consultant advised and built, the FrameVR environment. The feedback from participants was incorporated in further edits.

Step 2: The research question was developed "What is the student perspective when participating in a virtual reality activity in an online course?"

Step 3: As Lege and Bonner (2020) suggest, new technology should be introduced cautiously. A Virtual Interview Room was incorporated into Week 5 of the Research Protocol module. The theme for the week, "Finding the Answers," covers qualitative and quantitative research methods. Participants sign in as guests in the FrameVR Interview room (Figure 3). Upon entering the Interview room, they are welcomed: "Walking through all the rooms you will find objects numbered 1 to 4. Engage/interact with each one and find a hidden letter in each. If you get thirsty, visit the coffee shop (no clues are hidden there)."

Figure 3
The Entrance to the Interview Rooms (Left-Hand Side)



A short narrative explains the research scenario and what they need to do (Text Box 1).

Text Box 1
An Example of a Virtual Reality Activity Is in the Research Protocol Module

Discussion

DUE: Wednesday, 23:59 & Sunday, 23:59

Now, you have looked at the common quantitative and qualitative research methods and described your chosen one. You have also considered your data collection instruments and the quality of data measures.

A researcher at the University of Pretoria wants to do an online study about patients' experience when visiting district hospitals regularly to renew their chronic high blood pressure and cholesterol medication. No clinical tests will be done, it is only the experience of the patients that is of value. All patients who come to the hospital for their high blood pressure and cholesterol medication could potentially participate in the interview. To save the time that the patients spend at the hospital, the researcher decided to design an online platform and test it before it is used for the actual study (Pilot study). You are invited to test the platform. But to help you test the platform, she added hidden clues in a 360 image, a PDF document, on the whiteboard and in the video. The clues are letters. You need to collect the 4 letters and then hit the red button.

Here is the link to a video that shows you the basics of the platform; more information is in the Student Support section or you can click here .

Here is the link to the platform. (Interview room is closed)

The red button will bring you back to ClickUp, and you need to complete her "Experience survey" and then, in the discussion forum, enter the following:

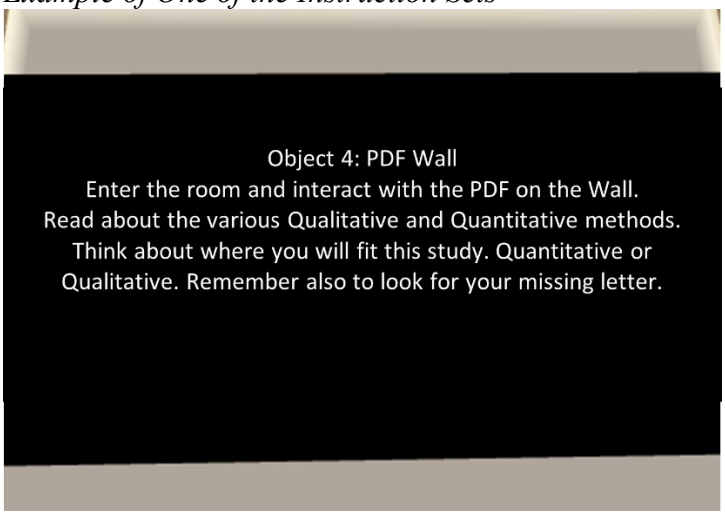
1. Pick at least one technique (either quantitative or qualitative) that you think you might use (see the extreme left or right of the reading) in your study. Post how you think this can be achieved in your study (e.g. will you REALLY be able to do member checking if you are working with migrant workers?)
2. In the virtual world, you can see information about qualitative and quantitative research and data collection. Which one of the questionnaires do you think is the most applicable for the pilot study and why? You can start this part of your post with: Similar to my study, I think the ……. questionnaire is applicable because …. OR Contrasting to my study, I think the …….. questionnaire is applicable because ….
3. Post on the discussion board called *'Week 5: Techniques to ensure quality'*. Keep your post short (less than 100 words) and focus on picking 1-2 key techniques that will be useful to you.

Please post your answer by Wednesday, 23:59 of this week. This will allow you and your classmates to read everyone's responses and respond to another student by Sunday, 23:59 of this week.

This assignment will count towards your module participation mark that will be allocated in week 7.

Further instructions (Figure 4) are given in the VR room to direct students on what to do in each interview room. Students may access the rooms in any order and learn about qualitative and quantitative research as well as how to navigate the platform while moving around. Soft background noise that resembles a hospital such as sounds of ambulances, heart rate monitors and people talking were audible in all the rooms to create an immersive experience.

Figure 4
Example of One of the Instruction Sets



The participants explore the platform by entering a 360° image (Figure 5), watching a video (Figure 6), writing on a whiteboard (Figure 7), downloading a PDF document (Figure 8), and collecting four clues. For a participant to find a clue they first needed to access the content and then look for the clue. For example, the letter "u" is found in the 360° image as visible in Figure 5.

Figure 5

An Example of a 360° Image

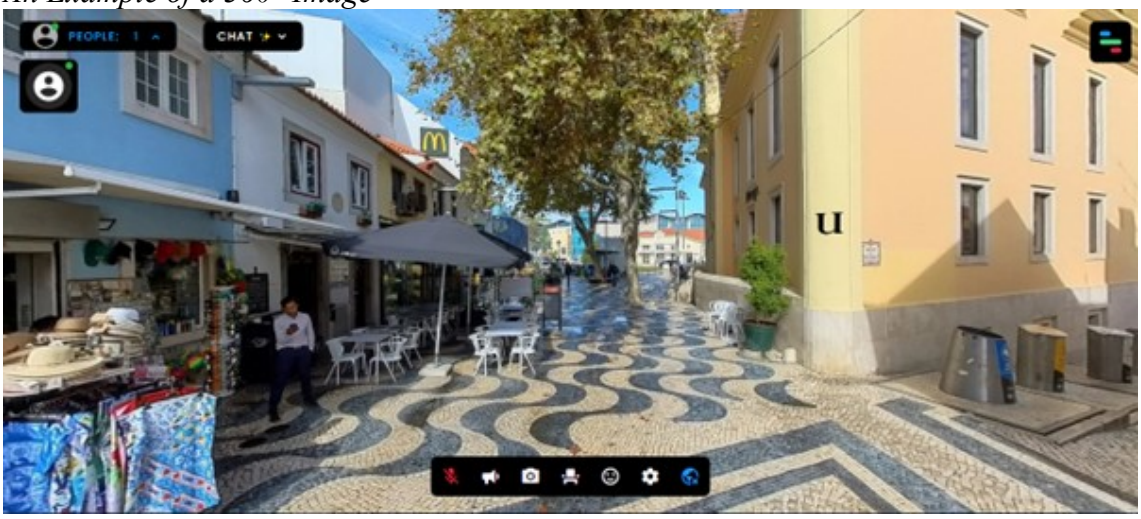


Figure 6

An Example of a Video Embedded in the Platform

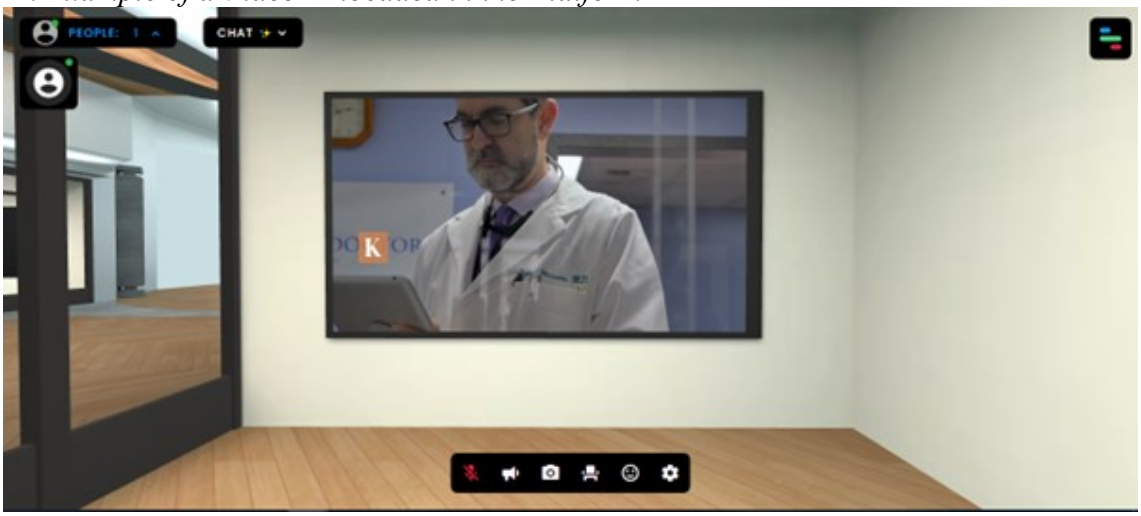


Figure 7

An Example of a Whiteboard on Which Participants Can Write

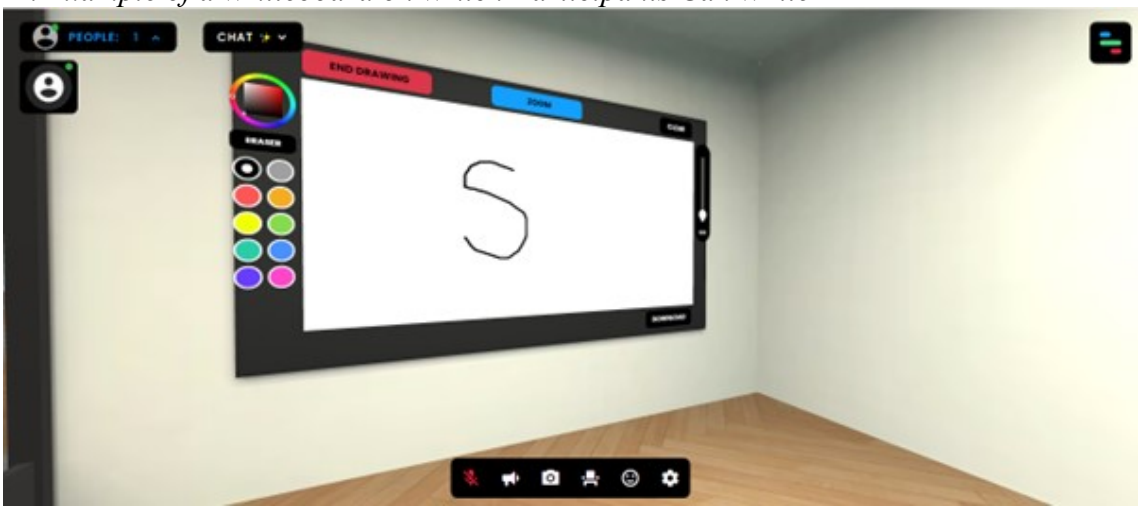


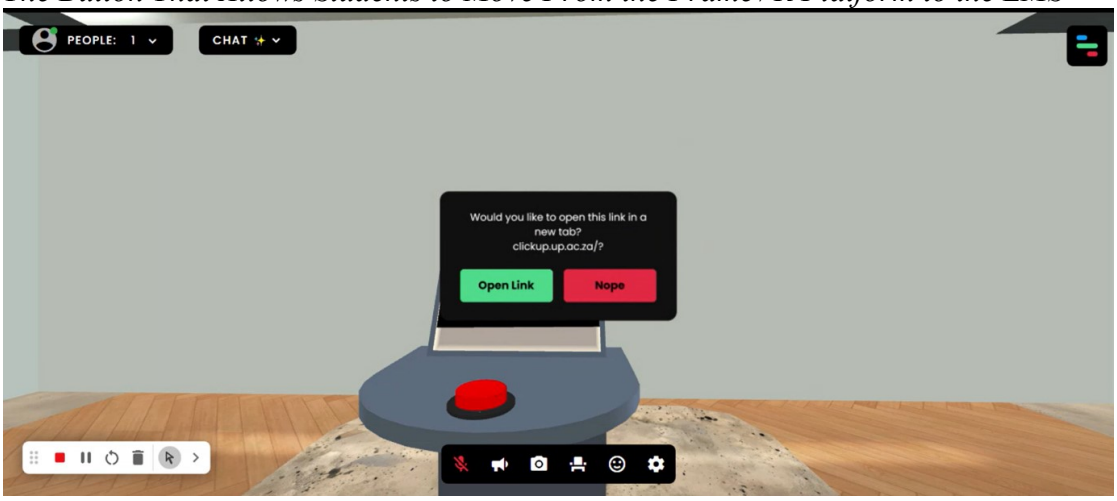
Figure 8

An Example of a PDF Document Embedded on the Wall That Participants Can Download and Keep

Participants had to move from the FrameVR platform to the Learning Management System (LMS) after visiting all four interview rooms and collecting all four clues (Figure 9).

Figure 9

The Button That Allows Students to Move From the FrameVR Platform to the LMS

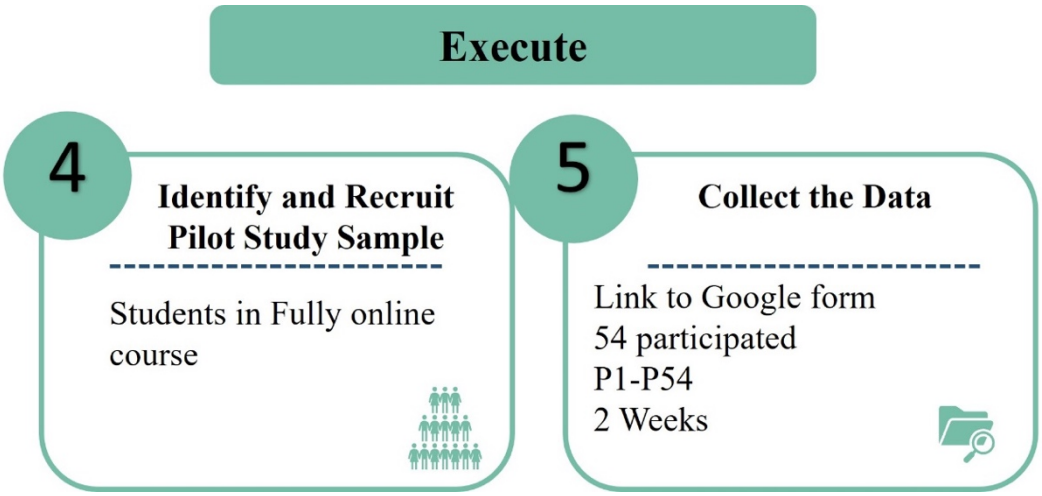


Students participated in the Discussion forum when they returned to the LMS and could participate in an online survey about the experience. The Execution phase (Figure 10) has two steps, Recruitment (Step 4) and Data collection (Step 5). The target population for this research are all the students enrolled for this fully online module (n = 122). Although the activity and the discussion were compulsory, participation in the survey was encouraged but voluntary and anonymous.

The data collection tool was a survey built with Google Forms© and comprised a checklist with 14 items and an open-ended question. All the questions revolved around the user experience such as navigating, searching for clues, and the loading speed of objects. The survey also asked students to make suggestions for improvements. Google Forms© was used as it is the most suitable application as it is accessible from any device. The students had two

weeks to complete the activity, the follow-up discussion and complete the survey via a link that was provided.

Figure 10
The Execution Phase



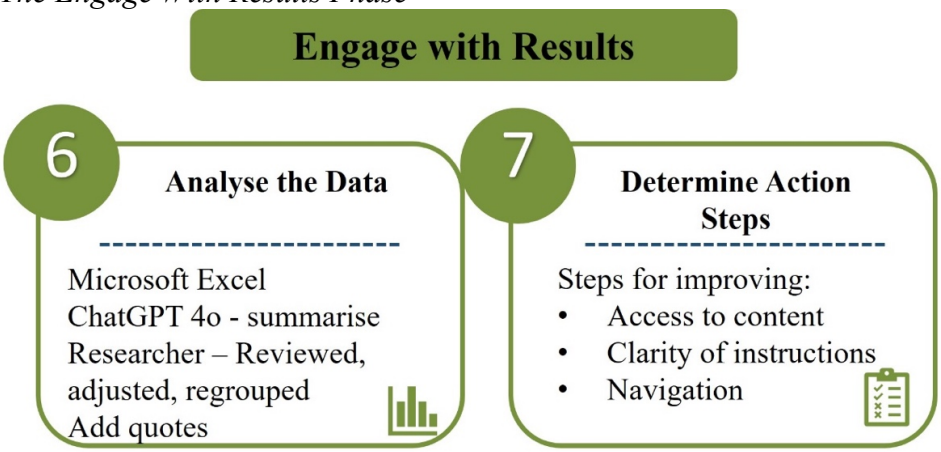
Source: REL Appalachia, 2021

This pilot study spanned two weeks. Ethical approval was granted by the University of Pretoria, Faculty of Education and Faculty of Health Sciences Research committees (EDU006/23).

Findings

Fifty-four students participated in the survey (response rate = 44.2%). The questionnaires were numbered P1-P54 and analyzed in Step 6 of the Engage with Results Phase (Figure 11). Since the survey was anonymous, no personal data was collected. The responses from the checklist were downloaded as a Microsoft Excel© spreadsheet and ChatGPT© 4o was used to help summarize and group both the checklist data and the responses to the open-ended question. The researchers then reviewed and adjusted the suggested themes, combining the checklist results with the open-ended responses. Participant quotes were added to support and illustrate the findings.

Figure 11
The Engage With Results Phase



Source: REL Appalachia, 2021

The participants could choose between using a desktop/laptop computer, Tablet/iPad, or mobile phone during the activity. The majority of participants (87%; n = 47) used their desktop/laptop computer, 4% (n = 2) used a Tablet/iPad and 9% (n = 5) used a mobile phone. Four of the five participants (P19, P26, P37, P51) who used a mobile phone could do the activity, and they only struggled with the navigation. However, one participant (P27) expressed frustration and switched between devices. While trying out two devices, the participant mentioned,

> I have struggled the whole week to access the platform. I even informed my tutor. My laptop and phone could not access the game. It is really frustrating if you have a task however it is difficult to access it.

Some who used an iPad found that the activity is "not iPad friendly" (P42) and could not scroll to read all the instructions. From the participants' feedback, it is clear that the FrameVR activity can work on all three devices, but desktops or laptops are more user-friendly.

A summary of online survey questions and the frequency with which they were selected (irrespective of the device) is summarized in Table 1.

Table 1
Participants' Feedback of the VR Experience (n = 54)

Theme	Statement	N	Percentage
Access to content	I could easily read the text since the font size is readable.	40	74%
	I could write on the whiteboard and save the output.	36	67%
	I could find all four the clues.	35	65%
Clarity of instructions	The instructions were clear and led me to the clue.	33	61%
	When landing on the platform, knowing what was expected from me was easy.	24	44%
Navigation and interaction with the platform	I could see and enter the 360 image and find the clue.	41	76%
	I could watch the video and find the clue.	41	76%
	The red button took me back to ClickUP.	41	76%
	I could see all the objects immediately as I walked around.	32	59%
	I could download the PDF and find the clue.	29	54%
	The background noise is a distraction when accessing the virtual world.	26	48%
	The experience of moving around was smooth.	23	43%

None of the statements that related to accessing the content received less than 65% (n = 35) agreement, with the legibility of the text having the highest level of agreement (74%; n = 40). These findings suggest that the quality of the textual and interactive elements that support user engagement and content manipulation were sufficient, but not universally experienced. Although the platform was described as "fun" (P46), "very nice and refreshing" (P1), "everything was clear" (P3), and "finding the clues were easy" (P10), one participant (P36) could "not find anywhere to enter the letters that I found in the rooms."

Less than half of the participants (44%; n = 24) agreed that it was easy to know what was expected once in the VR room. Despite most participants finding the clues (65%; n = 35), it is not clear whether this was due to them following the instructions or by trial and error. However, it is likely that those participants who did watch the instruction video might also have agreed that "at first the instructions were not clear so I think there is a need to improve the instructions so that one can understand them" (P16). This finding suggests that "the instructions in the Blackboard can be written in such a way that one can see from the beginning" (P8) or in such a way as "the students [currently] need to listen carefully to the instructions for a smooth experience" (P52) when looking for the clues. The use of an instruction video is in line with Fromm et al. (2021) who suggest visual instruction, but improvements are clearly needed.

The statements related to navigation and interaction explored how easily participants could move within the virtual world, access different media, and transition between environments. More than 70% of the participants could see and enter the 360° images, watch the video, and move between the virtual reality platform and the LMS. But barely half of the participants could download the PDF document and find the clue (54%; n = 29) and less than two-thirds (59%; n = 32) could see all the objects immediately as they walked around. It is not clear whether the participants could not download the PDF document, or if they could not find the clue once it was downloaded. Background noise was distracting to almost half of the participants (48%; n = 26). The poorest result was the problem to move around smoothly (43%; n = 23). Participants struggled "to get the hang of moving around, wasted a lot of time on learning to do so" (P49). Part of the problem was that "not knowing what to do makes the navigation difficult" (P2), which could be due to either not understanding the instructions, or not being able to complete the activity due to problems to move within the space. Movement within the rooms and between rooms was confusing suggesting that "the navigation instructions can be made easier" (P38) and "improved" (P47). It was also "not easy trying to navigate the room with other people" (P10). Participants suggested more opportunities to practice navigating the platform before starting activities in order to avoid "wasting too much time" (P6). This suggestion is in line with Nowparvar's (2022) work which mentioned that students with little previous experience in virtual worlds need more time to familiarize themselves with the virtual environment. It is likely that many participants did not have previous experience as they struggled with controlling the avatar and found it time-consuming and frustrating as they "got lost a couple times and took time to figure out how to go back to the previous room" (P28). Some lost control of their avatar as it "unintentionally moves to another room while you are still busy in another room looking for clues" (P47).

Responses from the open-ended question related to the value of communication with peers: "I liked that I could communicate with other colleagues who had joined at the same time as me" (P11). But this experience was not universal as some could not engage with peers despite being able to see them on the platform.

Discussion and Conclusion

This study explored students' perspectives on using VR in a fully-online course. In general, participants could find the clues hidden in the material but the low agreement related to whether all four clues could be found suggest that they are perhaps too well hid for the average student. As the purpose is to challenge participants and not discourage them, this aspect of the activity needs revision. Despite this hurdle, the overall positive reactions regarding the activity and access to the material support Pottle's (2019) notion that VR creates an enjoyable environment that encourages engagement and autonomous learning. More than half of the participants were unsure about what to do once on the platform despite the availability of video instruction. This finding suggests that further information is needed to understand whether this was due to inadequacy of the instructional video on the one hand, or that participants decided to rather skip the video and take their chances. If the video instruction is found to be a contributing factor, then the instruction could be provided in multiple forms such as written and video to support different learning preferences (Borup et al., 2015). For example, a quick-start guide can be provided before they enter the FrameVR platform, while a walkthrough video can be provided upon entering the platform. Additional hints and tooltips can be provided during the activities, especially for first-time users. Fromm et al. (2021) emphasize the importance of visual and animated instructions. Communicating each activity's purpose, including clear instructions, will assist students to access all the learning activities. Providing feedback messages, such as "*Your output was saved*!" or "the PDF document was downloaded successfully" in audio format can also enhance the clarity by removing doubt on the part of the participant (Olesova et al., 2011).

Navigation and interaction with the platform created fewer issues than expected. Only three participants could not navigate the platform or complete the learning activities. Despite most participants succeeding in completing the activities, the few who struggled could benefit from simplified designs or optional aids for the challenging aspects. The consequences of not knowing, or understanding, the platform is also highlighted in the research of Chong et al. (2021), who state that even if one knows how to navigate, not understanding the space can still hamper navigation. The inclusion of a Help button or chatbot for users who find navigation or activities challenging can add value to this activity (Asgodom et al., 2024; Valmaggia et al., 2016).

Some participants experienced the inclusion of the ambient noises as a distraction, which is the opposite of what Uhl et al. reported (2023). As a result, it will be useful to provide an option to mute, or adjust the volume of background noises.

The VR platform created an opportunity for engagement (Rafiq et al., 2022) and communication between participants (Howard & Gutworth, 2020). The reasons why some participants could not communicate with others in the same space at the same time needs to be explored in order to maximize the experience as this need to communicate and connect in the virtual world is a "human need for social interaction in a world that relies more and more on distant education" (Della Longa et al., 2022, p. 11).

It was clear from the few participants who attempted to do the activity on tablets and mobile phones that they were not satisfied with the experience. Devices such as an iPad could not scroll while navigating the mobile phone was challenging. It is important that students are able to work independently from time and place and therefore the application needs to be accessible and they know how to use the technology (Ally et al., 2014).

From this study, it is suggested that the hurdles experienced by the participants are addressed from both a function and content perspective in Step 7. The designers should also include direct participant experience feedback from within the platform to shorten the time to identify and address any obstacles to learning. While the FrameVR platform offers an engaging and immersive learning experience for postgraduate students, critical improvements in device compatibility, clarity of instructions, and navigation support are necessary to ensure equitable access and participation across different technologies. Taking these actions in Step 7 will enhance user experience, reduce unnecessary cognitive load, and foster meaningful engagement in virtual learning environments.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

ChatGPT 4o was used to help summarise and group both the checklist data and the responses to the open-ended question (Data analysis).

Grammarly was used to improve sentence construction, spelling and grammar.

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Community-Based Risk Communication for Raising Awareness of Rabies in High-Risk Communities in Thailand: A One Health Perspective

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Abstract

Rabies remains a significant public health challenge in high-risk communities, where limited awareness, cultural beliefs, and misconceptions hinder prevention efforts. This study integrates ethno-epidemiological insights within a One Health framework to enhance rabies awareness and community engagement. Ethno-epidemiology examines local beliefs and practices related to disease, helping to design culturally sensitive health messages. When combined with the multidisciplinary approach of One Health—connecting human, animal, and environmental health—this strategy promotes sustainable, community-centered interventions that are more acceptable and effective. Targeted educational activities conducted by the Thailand One Health University Network (THOHUN) and outreach programs aimed to improve understanding of rabies transmission and prevention. A total of 137 community health volunteers (VHVs), mainly women over 35 from various provinces, participated in a two-day workshop involving lectures and field surveys. Their risk communication skills improved significantly, with scores rising from an average of 26 to 41, as many moved from middle or low to higher levels. Participants reported increased knowledge (98), confidence in sharing information (59), expanded networking (53), and valuable practical experience (52). Some expressed hopes for salary increase, rewards, or career promotions. VHVs effectively conveyed culturally relevant rabies prevention messages, promoting responsible pet ownership and stray dog management. Recognizing indigenous beliefs helped build community trust and compliance, strengthening control efforts. Intersectoral collaboration among health, veterinary, and environmental sectors further supported sustainability. This integrated ethno-epidemiological and One Health approach offers a promising model for rabies elimination and can be adapted for other zoonotic diseases in similar high-risk settings.

Keywords: rabies, One Health approach, ethno-epidemiological approach

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Introduction

Rabies Situations

Global Context

Rabies is a deadly zoonotic viral disease transmitted primarily through the saliva of infected animals such as dogs, cats, cattle, reindeer, and foxes. Despite the availability of effective vaccines, rabies causes approximately 50,000–55,000 people dying from rabies each year worldwide (Wunner & Briggs, 2010), predominantly in Asia and Africa (WHO, 2018), where dog-mediated transmission remains prevalent (Knobel et al., 2005). Underreporting and limited access to post-exposure prophylaxis (PEP) hinder global control efforts. Enhancing community awareness and vaccination coverage is essential for disease prevention.

Situation in Thailand

Thailand continues to report cases of dog-mediated human rabies. The current vaccination coverage among dogs is approximately 39%, with persistent challenges in vaccinating stray populations. Over the past decade, Thailand has achieved a significant decline in rabies deaths—from over 200 annually to fewer than 10—thanks to improved access to PEP, increased awareness, and strategic national initiatives. The country has adopted intradermal rabies vaccination regimens and emphasizes rapid medical response after potential exposures. Nonetheless, community engagement, responsible pet ownership, and stray dog management remain essential for sustained rabies elimination.

Rabies predominantly affects developing countries and is mainly transmitted through dog bites, with human behaviors such as not vaccinating or sterilizing dogs contributing to its persistence. This study explores how participatory communication strategies in Bangkok's rabies control efforts influence community engagement in vaccinating and sterilizing free-roaming dogs, emphasizing the importance of empowering local populations for sustainable disease management (Barmish, 2019).

Ethno-Epidemiological Framework

Arthur Kleinman (Kleinman, 1980) introduced the concept of explanatory models, which describe how individuals and communities interpret illness, its causes, and appropriate treatments. These models influence health-seeking behaviors and responses to disease. This approach reflects a shift toward mixed-methods research, integrating ethnographic insights with epidemiological data to better understand disease causation, transmission, and prevention within cultural contexts. Historically, medical anthropology focused on folk illness concepts and indigenous healing practices. Over time, it has evolved into a discipline examining social and cultural factors affecting health behaviors. Epidemiology, emphasizing statistical analysis and disease trends, has increasingly collaborated with anthropology—especially through approaches like ethno-epidemiology—to better understand health risks rooted in cultural beliefs. Relevance to Rabies, understanding local beliefs about rabies—including its causes, transmission, and prevention—is vital for designing effective risk communication strategies. Recognizing indigenous explanatory models can foster trust and cooperation in vaccination campaigns and community interventions. This study employs an ethno-epidemiological approach, combining qualitative and quantitative methods to explore local cultural beliefs, practices, and knowledge about rabies. This methodology bridges medical anthropology and

epidemiology, acknowledging that cultural perceptions significantly influence health behaviors and disease outcomes.

One Health Approach

One Health is an integrated, multidisciplinary framework that promotes collaboration among human health, veterinary medicine, and environmental sciences. Its goal is to sustainably improve health outcomes by recognizing the interconnectedness of humans, animals, and ecosystems. Application in Rabies Control: By linking efforts such as dog vaccination, community education, and environmental management, One Health strategies can effectively reduce rabies transmission, improve surveillance, and promote responsible pet ownership (Purwo et al., 2019). To eliminate rabies will require time and commitment, as well as a combination of approaches employing the principle of One Health. This holistic approach addresses the entire spectrum of disease prevention, detection, and response, ensuring sustainable control efforts (Zinsstag et al., 2011).

Objectives

This study aims to explore the application of a One Health perspective to enhance rabies awareness in high-risk communities by integrating human, animal, and environmental health aspects.

Methodology

Participants

A total of 137 community members, primarily village health volunteers, community leaders, and local officials, were selected from various Provincial Public Health Offices across Thailand to participate in educational workshops and surveys. A two-day workshop was conducted to train participants on rabies awareness and risk communication strategies. Baseline and post-training assessments measured knowledge, attitudes, and practices related to rabies. Community surveys explored local beliefs and behaviors concerning rabies transmission and prevention.

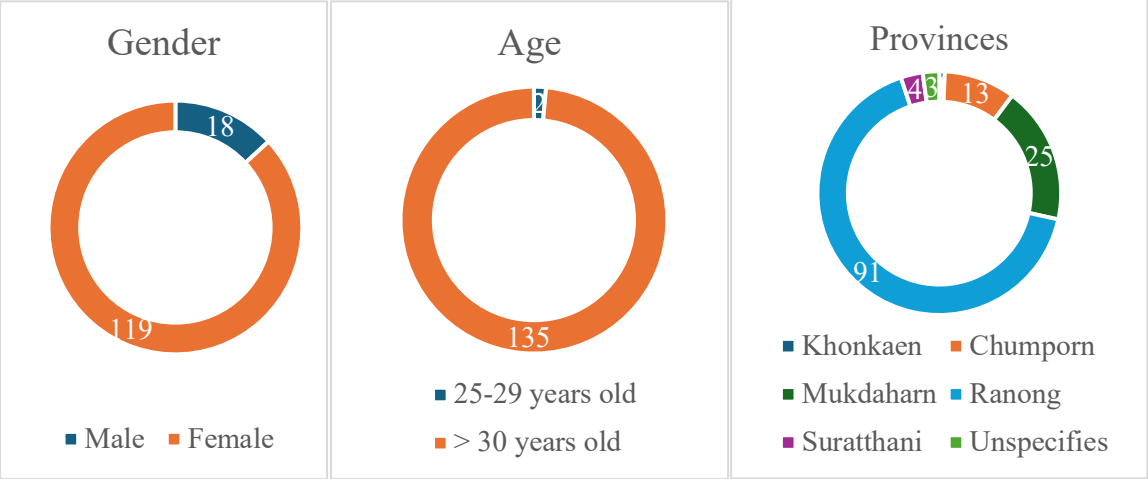
Data Analysis

Knowledge scores before and after training were compared to assess the impact of the educational interventions. Qualitative data provided insights into cultural perceptions and barriers to vaccination.

Results

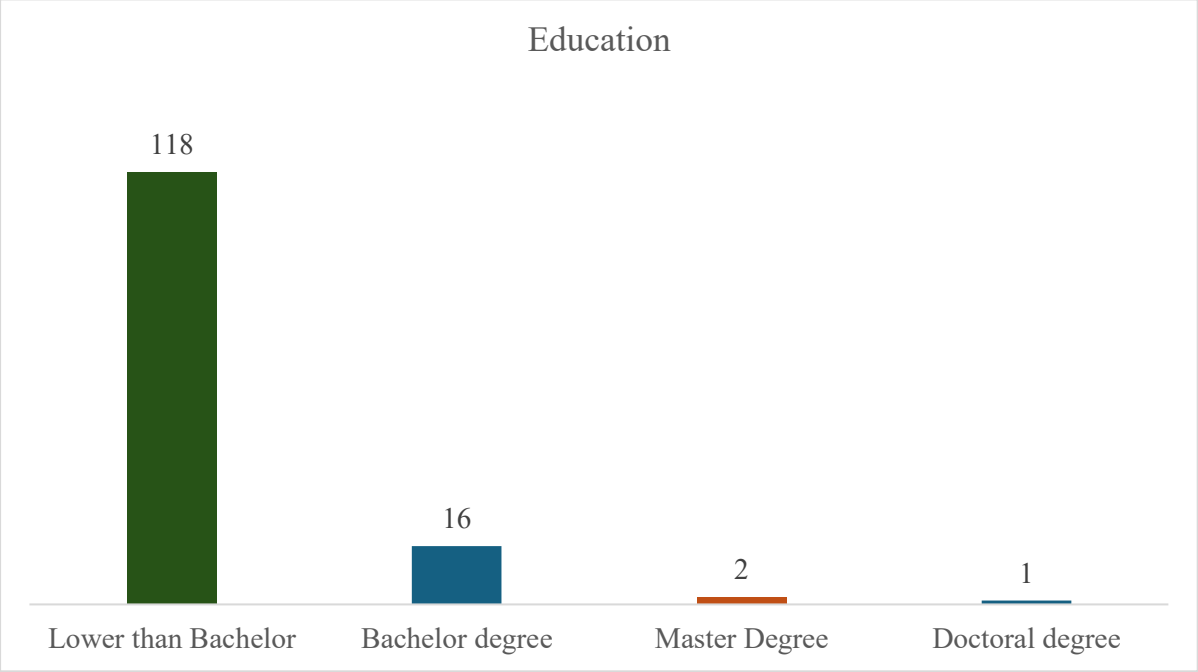
The study included a total of 137 participants, with women constituting the majority (119) and men representing a smaller group (18). The participants were predominantly over 30 years old, indicating an experienced, community-focused demographic (see Figure 1).

Figure 1
Demographic Data-Gender, Age and Provinces Distribution of All 137 Participants



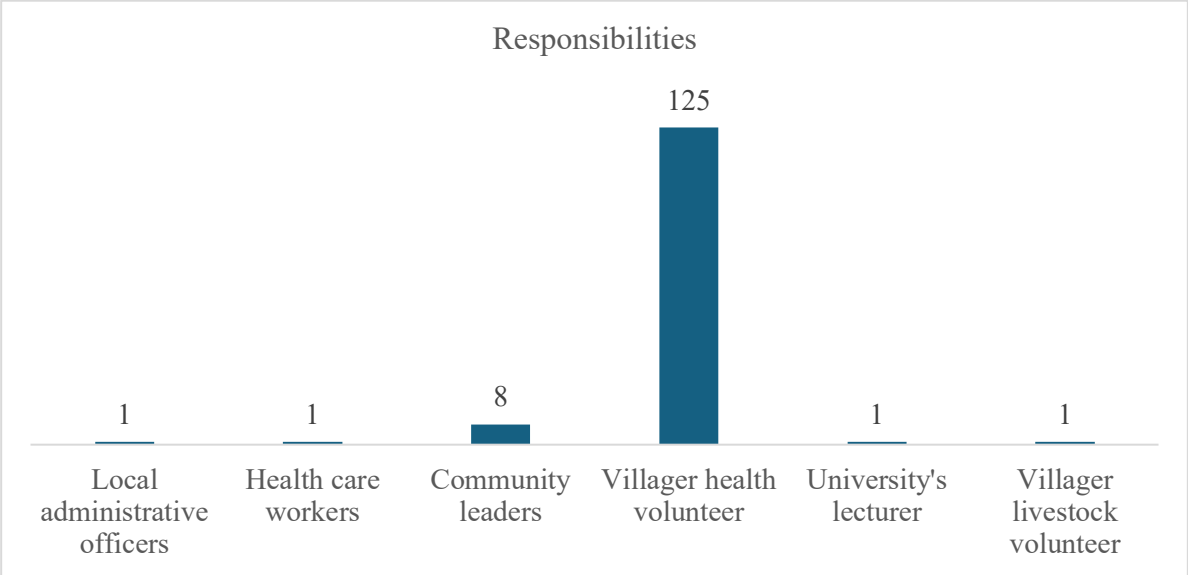
Most participants had education levels below a bachelor's degree (118), with 16 holding a bachelor's degree, indicating a predominantly local and grassroots population (see Figure 2).

Figure 2
Distribution of Education Levels Among All 137 Participants



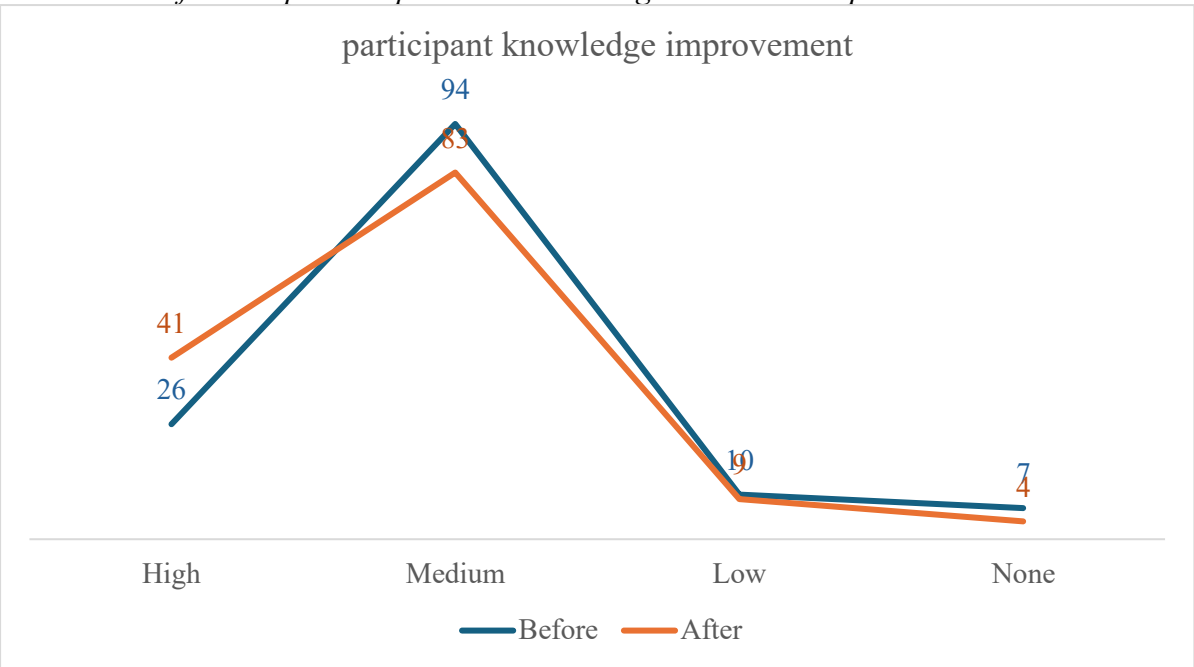
The participants occupied diverse roles, including village health volunteers (125), community leaders (8), healthcare workers (1), local officials (1), university lecturers (1), and livestock volunteers (1). All these roles are vital to the community's health initiatives and rabies prevention efforts (see Figure 3).

Figure 3
Distribution of Participant Responsibilities Among All 137 Participants



The knowledge improvement was notable, with the pre-training average score being 26 and the post-training average score increasing to 41. All groups demonstrated significant improvement, reflecting a substantial enhancement in their understanding of rabies transmission and prevention (see Figure 4).

Figure 4
Distribution of Participant Responsibilities Among All 137 Participants



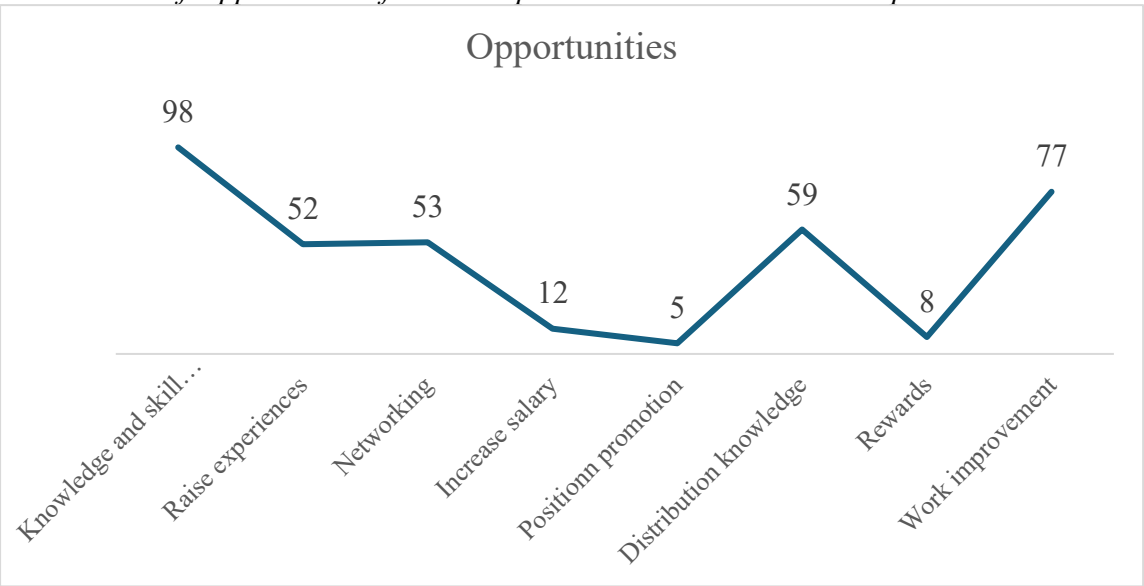
Opportunities for Participation

Participants reported that most of them could enhance their knowledge and skills (98), improve their work performance (77), and that their confidence in sharing information about rabies had

increased (59). Additionally, many expressed motivations to promote vaccination and responsible pet ownership within their communities (see Figure 5).

Figure 5

Distribution of Opportunities for Participation Across All 137 Participants



Discussion

The integration of ethno-epidemiological insights within a One Health framework has demonstrated a promising approach for increasing rabies awareness and strengthening control efforts at the community level. This study, involving 137 participants primarily composed of local community members—including village health volunteers (VHVs), community leaders, and local officials—illustrates the critical importance of culturally relevant health communication as a cornerstone of effective rabies prevention strategies. By recognizing that communities are not passive recipients but active participants with their own perceptions, beliefs, and social practices, health interventions can be tailored to resonate more deeply, fostering trust and cooperation.

Community Engagement and Culturally Sensitive Risk Communication

Most participants were women (119), over 30 years of age, with education levels below a bachelor's degree (118). These demographics reflect grassroots, experience-rich population deeply embedded within their local contexts. Such individuals often serve as trusted sources of information and influencers within their communities, making them ideal agents for disseminating culturally tailored messages about rabies prevention—including vaccination, responsible pet ownership, and stray dog management.

The significant improvement in participants' knowledge scores—from an average of 26 pre-training to 41 post-training—demonstrates the effectiveness of capacity-building activities that leverage local knowledge and social networks. More importantly, participants reported increased confidence in sharing rabies-related information (59), which is essential for community-wide awareness. Many expressed motivations to promote vaccination and responsible pet care, highlighting how empowering community members catalyzes broader behavioral change.

Linking Risk Communication With One Health Principles

Crucially, this study emphasizes how risk communication strategies are embedded within the broader One Health approach (Taisuwan et al., 2014), which recognizes the interconnectedness of human, animal, and environmental health. In practice, this involves not only delivering messages about rabies transmission and prevention but also integrating environmental sanitation, stray dog control, and ecological considerations.

For example, community-based communication campaigns included educational messages about the importance of environmental sanitation—disposing of waste properly to reduce stray dog food sources—and stray dog management—encouraging responsible pet ownership and community-led stray dog control initiatives. These messages were designed to be culturally sensitive, respecting local beliefs and practices, which increased their acceptance and efficacy (Taisuwan et al., 2014).

By engaging VHVs and local leaders, the program fostered multisectoral collaboration—a core principle of One Health—among health, veterinary, and environmental sectors. These sectors worked together to develop and deliver integrated messages, organize vaccination campaigns, and promote environmental health practices. This collaborative effort not only aimed to reduce rabies transmission but also sought to build resilient community systems capable of managing zoonotic disease risks holistically.

Environmental Aspects and Community Participation

Environmental health is a vital component of rabies control, as ecological factors influence the population dynamics of stray dogs and other reservoir hosts. The study's approach incorporated environmental management as part of the community's rabies prevention activities. For instance, community volunteers were trained to identify and report areas with high stray dog populations or environmental sanitation issues, facilitating targeted interventions (Morse et al., 2012).

This participatory environmental health component empowered communities to take ownership of local sanitation and stray dog management, which are critical for sustainable rabies control (Tridech & Liumwarangkul, 2000). Additionally, community-led initiatives such as waste disposal drives and habitat modifications contributed to reducing the environmental factors that sustain stray dog populations, thus lowering rabies transmission risks.

Bridging Ethnography and Epidemiology for Culturally Sensitive Interventions

The ethno-epidemiological framework was vital for understanding local perceptions of rabies, its causes, and transmission routes, which often diverge from biomedical explanations. Recognizing indigenous beliefs—such as the attribution of rabies to spiritual causes or traditional remedies—enabled the development of culturally sensitive messages that respect local worldviews while promoting scientifically accurate information.

This approach bridged ethnography and epidemiology, fostering trust and cooperation. For example, integrating traditional beliefs with biomedical messages—such as framing vaccination as a spiritual act of protection—helped overcome resistance and misconceptions (Oppong, 2014). Such culturally tailored communication strategies are more likely to result in

sustained behavioral change, including responsible pet ownership and participation in vaccination campaigns (Sudarshan et al., 2007).

Strengthening Multisectoral Collaboration for Sustainable Control

The One Health approach emphasizes that effective rabies control cannot be achieved in isolation. The study demonstrates that multisectoral collaboration—among public health authorities, veterinary services, environmental agencies, and local communities—is essential for sustained success. This collaboration facilitated coordinated activities, shared resources, and comprehensive surveillance, enabling timely responses to rabies outbreaks.

For example, joint community campaigns combined vaccination drives with environmental sanitation efforts, such as waste management and stray dog population control. These integrated interventions address the root ecological and social drivers of rabies transmission, moving beyond reactive responses to proactive, sustainable containment (Hampson et al., 2015).

Implications for Policy and Practice

The findings underscore that community-based risk communication, rooted in cultural understanding and supported by multisectoral collaboration, is pivotal for the success of rabies elimination efforts (Franka et al., 2013). Policymakers should prioritize capacity building among local volunteers, formalize multisectoral coordination mechanisms, and ensure that environmental health considerations are integrated into rabies control programs (Wallace et al., 2017).

Furthermore, adopting a participatory approach—where communities are involved in planning, implementation, and monitoring—can foster ownership, accountability, and resilience. Training community volunteers to identify environmental hazards, manage stray dogs, and disseminate culturally relevant messages enhances the sustainability of interventions.

Conclusion

In summary, this study demonstrates that integrating ethno-epidemiological insights within a One Health framework is an effective, culturally sensitive strategy for raising rabies awareness and strengthening community-level control efforts in high-risk areas of Thailand. By fostering multisectoral collaboration, empowering local community members, and addressing environmental factors, this approach achieves a holistic, sustainable model for rabies elimination.

The explicit linkage of risk communication with environmental management and multisectoral efforts ensures that interventions are not only scientifically sound but also culturally acceptable and practically feasible. Such integrated strategies can serve as a blueprint for other high-risk regions aiming to eliminate zoonotic diseases, ultimately contributing to global health security and the achievement of the Sustainable Development Goals.

Key Recommendation

Strengthen community-based education programs that respect and incorporate local beliefs and cultural practices. Promote responsible pet ownership and effective management of stray dog

populations. Enhance collaboration among health, veterinary, and environmental sectors to ensure coordinated responses. Expand such initiatives to other high-risk regions and adapt them for various zoonotic diseases, ensuring broader and sustainable impact.

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Workplace Happiness of Teachers in Lop Buri, Thailand: A Study Based on the Workplace Well-being Concept

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Abstract

Workplace happiness plays a pivotal role in enhancing teachers' performance and the overall quality of education. Despite its importance, research on teachers' workplace well-being in rural provinces of Thailand, such as Lop Buri, remains limited. This study adopts the Workplace Well-being framework to evaluate workplace happiness among teachers and analyze variations based on demographic factors. The research aims to: 1) assess the level of workplace happiness among teachers in Lop Buri Province, and 2) compare workplace happiness across demographic variables. A quantitative research design was employed, with a sample of 357 teachers selected through stratified random sampling. Data were gathered using a structured questionnaire derived from the Workplace Well-being model, incorporating dimensions such as autonomy, skill utilization, social support, and work-life balance. The findings revealed that workplace happiness among teachers was at a high level overall, with significant differences observed across demographic categories such as debt status, school size, and commuting distance. Appropriate status, opportunities for personal development, and social support emerged as key factors influencing teachers' happiness. The study underscores the need for educational institutions to create supportive work environments and promote professional recognition and personal development to improve teachers' well-being. These findings provide valuable insights for policymakers and administrators to develop interventions that enhance workplace happiness, thereby contributing to better educational outcomes in Lop Buri Province.

Keywords: workplace happiness, teachers, workplace well-being, Lop Buri

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Introduction

Workplace happiness has gained significant attention in recent decades due to its direct impact on employee performance, organizational commitment, and overall quality of life (Fisher, 2010; Warr, 2013). It encompasses not only positive emotions but also job satisfaction, work-life balance, and a sense of self-worth within the organization. The concept has been examined through various dimensions, such as organizational support, opportunities for personal growth, and engagement in meaningful tasks, all of which contribute to work efficiency, employee loyalty, and mental well-being (Lyubomirsky et al., 2005). In Thailand, workplace happiness is influenced by cultural factors, including respect and support from leadership, which differ from Western models that emphasize autonomy and performance-based rewards (Hofstede, 2011). Recent studies have highlighted concerns about teachers' workplace happiness, as excessive workload, stress, and inadequate compensation negatively impact their well-being. A 2023 survey by Reader's Digest ranked teachers as one of the least happy professionals in Thailand, with primary concerns including workload, low salaries, and curriculum pressures. Additionally, a 2023–2024 survey by Suan Dusit Poll and the Teachers' Council of Thailand revealed that 65.77% of teachers seek to reduce non-teaching responsibilities, while 62.18% desire salary adjustments to match the cost of living. Recognizing these challenges, the Thai government has emphasized the need to enhance teachers' workplace happiness to improve teaching effectiveness and student outcomes (Bangkok Business News, 2023).

The workplace well-being framework, developed by Peter Warr (2013), provides a theoretical foundation for analyzing workplace happiness, comparing essential workplace factors to "vitamins" that must be balanced to promote well-being. Applied to teachers, these factors include job autonomy, social support, and work-life balance, all of which contribute to job satisfaction and mental health. In Thailand, teachers' happiness is closely linked to school culture and community relations, especially in rural schools where resource limitations create additional challenges (Zembylas & Barker, 2007). Studies have shown that reducing non-teaching workload allows teachers to focus on instructional quality, aligning with findings from the Suan Dusit Poll. The Lop Buri context presents unique challenges, with teachers reporting excessive administrative tasks, project responsibilities, and extracurricular activities that interfere with classroom time. Many teachers struggle with work-life balance, leading to chronic stress and job dissatisfaction (Kyriacou, 2001). Additionally, concerns about job stability arise from changing education policies and economic factors affecting career progression and compensation. Some schools also face resource shortages, requiring teachers to invest their personal funds in educational materials. These factors underscore the urgent need for policies that address teachers' well-being to improve job satisfaction and retention.

To address these concerns, this study investigates the factors influencing workplace happiness among teachers in Lop Buri, utilizing the workplace well-being framework. Conducted by researchers from the Faculty of Education at Thepsatri Rajabhat University and experts in related fields, the study aims to identify key factors such as social support, work-life balance, and professional recognition, which are critical to fostering a positive work environment. By analyzing these elements, the research seeks to provide deeper insights into creating supportive workplace policies that enhance both teacher well-being and instructional effectiveness. The findings will contribute to the development of strategies that improve teachers' happiness, thereby fostering a sustainable and high-quality education system in Lop Buri (OECD, 2019).

Research Objectives

This research aims to 1) assess the level of workplace happiness among teachers in Lop Buri Province, and 2) compare workplace happiness across demographic variables.

Methodology

Sample

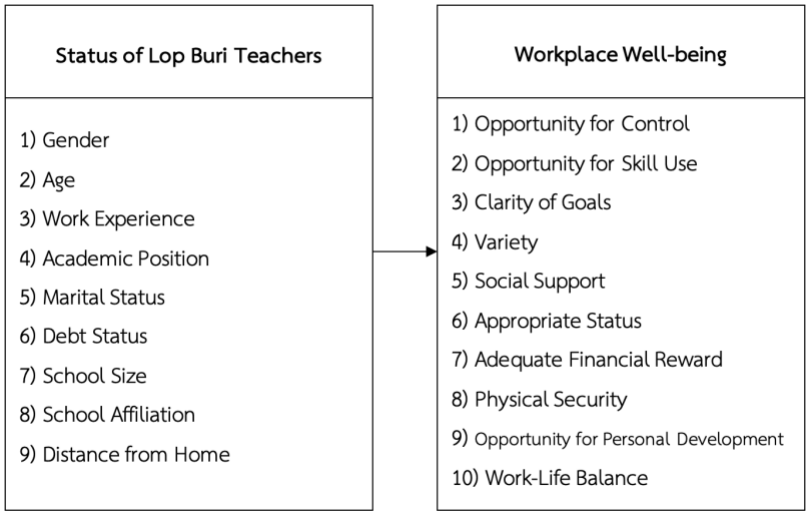
The population of this study consisted of 3,362 government school teachers in Lop Buri Province, under the Office of the Basic Education Commission (OBEC) (Office of the Basic Education Commission, 2024). The population was categorized by affiliation as follows: 1,172 teachers under Lop Buri Primary Educational Service Area Office 1, 1,197 teachers under Lop Buri Primary Educational Service Area Office 2, and 993 teachers under Lop Buri Secondary Educational Service Area Office.

The sample size was determined using Yamane's formula (1973) with a confidence level of 95% and a margin of error of 5%, resulting in an appropriate sample size of 357 teachers. To ensure proportional representation across different affiliations, proportional stratified random sampling was applied. The stratification was based on the teachers' affiliation with each educational service area office, and random selection was employed within each stratum to ensure accuracy and representativeness in accordance with the population structure.

Conceptual Framework

In this study, the researcher proposes the conceptual framework based on the Workplace Well-being Theory developed by Peter Warr (2013). This framework serves as the foundation for defining the content scope of the study as follows.

Figure 1
Conceptual Framework



The research instrument was a questionnaire developed to assess workplace happiness based on the Workplace Well-being Framework proposed by Warr (2013). The questionnaire consisted of two main sections, as follows:

Section 1: General Information

This section collected demographic data of the respondents, including gender, age, work experience, academic position, marital status, debt status, school size, school affiliation, and commuting distance. All items were presented in a checklist format.

Section 2: Workplace Happiness Questionnaire

This section consisted of 60 items designed to measure workplace happiness according to 10 key dimensions of workplace well-being: opportunity for control, opportunity for skill use, clarity of goals, variety, social support, appropriate status, adequate financial reward, physical security, opportunity for personal development, and work-life balance. A 5-point Likert scale was used for each item, ranging from 1 = Lowest Happiness to 5 = Highest Happiness.

Construction of Research Instrument

The researcher conducted the following procedures to construct the research instrument for assessing teachers' workplace happiness.

1) Studied relevant theories, academic texts, and prior research on workplace happiness, with particular focus on the educational context and the well-being of teachers, to develop the research framework and identify the variables of interest.

2) Developed a closed-ended questionnaire based on the conceptual framework of Workplace Well-being proposed by Warr (2013), ensuring comprehensive coverage of its core dimensions.

3) Submitted the initial draft of the questionnaire to five subject matter experts to assess content validity. The instrument was evaluated using the Index of Item-Objective Congruence (IOC), and necessary revisions were made according to expert suggestions.

4) Conducted a try-out of the revised instrument with a group of 30 teachers from primary and secondary schools in Lop Buri Province (not included in the main study sample) to test the instrument’s reliability, calculated using Cronbach’s Alpha Coefficient.

5) Administered the finalized questionnaire to the actual sample through field data collection.

6) The research instrument used in this study was a closed-ended questionnaire designed to measure teachers' workplace happiness based on Warr’s (2013) Workplace Well-being Framework.

7) The population consisted of 3,362 government school teachers in Lop Buri Province, categorized into three affiliations: 1,172 in Primary Educational Service Area Office 1, 1,197 in Area Office 2, and 993 in the Secondary Educational Service Area Office (Office of the Basic Education Commission, 2024).

8) The sample size of 357 teachers was calculated using Yamane’s formula (1973) at a 95% confidence level and a 5% margin of error. The proportional stratified random sampling technique was employed based on school affiliation.

9) Quantitative data were analyzed using descriptive statistics including frequency, percentage, mean, and standard deviation to respond to the first research objective regarding the level of workplace happiness.

10) To answer the second objective, inferential statistical analyses were conducted: Independent Samples T-Test for variables with two groups and One-Way ANOVA for those with more than two groups. LSD post-hoc tests were applied when significant differences were found.

11) The findings were then summarized to address both research objectives, followed by the preparation of a final research report and synthesis for potential academic publication.

Results

The majority of the questionnaire respondents were female teachers, accounting for 78.71% of the total sample. Approximately 50.70% were under the age of 31, while 78.43% had less than 10 years of teaching experience. A significant proportion (72.27%) did not hold an academic rank, and most respondents (65.55%) were single. Regarding financial status, 59.39% had debt obligations amounting to less than 10% of their monthly salary. Additionally, 42.02% were employed in small-sized schools, with 35.58% affiliated with the Lop Buri Primary Educational Service Area Office 1. In terms of commuting distance, 63.02% of the respondents traveled less than 50 kilometers from their residence to their workplace.

1) The first purpose of this research objective was to assess the level of workplace happiness among teachers in Lop Buri Province based on the framework of workplace well-being developed by Warr (2013). The assessment focused on ten key factors, namely: opportunity for control, opportunity for skill use, clarity of goals, variety, social support, appropriate status, adequate financial reward, physical security, opportunity for personal development, and work-life balance.

The results of the analysis indicated that the overall level of workplace happiness among teachers was high, with a mean score of 4.01 and a standard deviation of 0.75. This suggests that the majority of respondents had positive perceptions of their work environment and experienced a generally high level of workplace well-being, As shown in Table 1.

Table 1
Mean Scores of Workplace Happiness Factors

No.	Workplace Happiness of Teachers in Lop Buri Province	Happiness Level		
		$\bar{X}$	S.D.	Interpretation
1	Opportunity for Control	3.96	0.78	High
2	Opportunity for Skill Use	4.03	0.76	High
3	Clarity of Goals	4.01	0.80	High
4	Variety	3.98	0.79	High
5	Social Support	4.07	0.89	High
6	Appropriate Status	4.18	0.85	High
7	Adequate Financial Reward	3.85	1.03	High
8	Physical Security	4.05	0.89	High
9	Opportunity for Personal Development	4.09	0.86	High
10	Work-Life Balance	3.93	0.98	High
Overall		4.01	0.75	High

Among the ten factors examined, “appropriate status” received the highest mean score ($\bar{X}$ = 4.18, S.D. = 0.85), indicating that teachers in Lop Buri felt they were appropriately recognized for their professional role. This reflects the importance of status recognition in fostering motivation, sense of value, and overall job satisfaction. Following this, the factors “opportunity for personal development” ($\bar{X}$ = 4.09, S.D. = 0.86) and “social support” ($\bar{X}$ = 4.07, S.D. = 0.89) also received high ratings. These results demonstrate that the availability of professional development opportunities and the presence of supportive relationships among colleagues and administrators significantly contribute to teachers’ happiness at work.

Other well-rated factors included physical security ($\bar{X}$ = 4.05, S.D. = 0.89), opportunity for skill use ($\bar{X}$ = 4.03, S.D. = 0.76), clarity of goals ($\bar{X}$ = 4.01, S.D. = 0.80), and variety in work ($\bar{X}$ = 3.98, S.D. = 0.79). These findings indicate that teachers generally perceived their work as secure, meaningful, and suitably challenging, contributing to a sense of autonomy and engagement. The factor “opportunity for control” ($\bar{X}$ = 3.96, S.D. = 0.78) also showed a high level of satisfaction, suggesting that teachers had some degree of autonomy in managing their work responsibilities.

The lowest-rated factor was “adequate financial reward”, with a mean score of 3.85 and a relatively higher standard deviation of 1.03, indicating greater variability in responses. Although this factor was still interpreted as “high” based on the criteria, the lower score reflects a concern among many teachers regarding the sufficiency of their compensation relative to their workload and living costs. This result is consistent with national surveys and previous research highlighting the impact of financial dissatisfaction on teacher well-being.

Lastly, work-life balance received a mean score of 3.93 (S.D. = 0.98), showing that while most teachers maintain a positive view of their ability to balance personal and professional responsibilities, there is still room for improvement. Given the importance of maintaining

equilibrium between work demands and personal life, this area remains a critical factor for promoting long-term teacher retention and happiness.

In summary, the findings confirm that teachers in Lop Buri Province perceive themselves as experiencing a high level of workplace happiness, especially in terms of professional recognition, development, and support. However, financial compensation and work-life balance are two areas that require ongoing attention to further enhance teacher well-being in the context of Thai educational institutions.

2) To address the second research objective, statistical analyses were conducted to compare the levels of workplace happiness among teachers in Lop Buri Province across various demographic variables.

Independent Samples t-test and One-Way ANOVA were used to examine whether significant differences existed based on gender, age, work experience, academic position, marital status, debt status, school size, school affiliation, and distance from home to school. The results revealed that statistically significant differences ($p < .05$) in workplace happiness were found among teachers when grouped by debt status, school size, and commuting distance.

Teachers with lower levels of personal debt reported higher levels of workplace happiness, suggesting that financial well-being is a key factor contributing to job satisfaction. Additionally, teachers working in smaller schools demonstrated different levels of workplace happiness compared to those in larger institutions, possibly due to differences in workload, resource access, or organizational dynamics. Furthermore, the distance between home and school had a significant effect on workplace happiness, with shorter commuting distances associated with higher happiness scores. This finding aligns with existing research indicating that commuting time can affect stress levels and work-life balance.

In contrast, no statistically significant differences in workplace happiness were observed based on gender, age, years of teaching experience, academic rank, marital status, or school affiliation. These results suggest that while certain structural or contextual factors impact workplace happiness, many individual demographic characteristics do not lead to significant differences in perceived well-being at work. Overall, the findings highlight the importance of addressing economic and environmental factors in efforts to improve teacher well-being and foster a more supportive educational workplace.

Conclusion and Discussion

According to the results mentioned above, this study shows interesting points as follows.

1) The findings from this study indicate that teachers in Lop Buri Province experience a high level of workplace happiness, with an overall mean score of 4.01 (S.D. = 0.75). This suggests that despite occupational challenges, teachers perceive their work environment positively in terms of workplace well-being. The highest-rated factor was status recognition ($\bar{X}$ = 4.18, S.D. = 0.85), underscoring the importance of professional acknowledgment in fostering job satisfaction. This aligns with recent research indicating that professional recognition enhances teachers' motivation and organizational commitment (Skaalvik & Skaalvik, 2020). Additionally, social support ($\bar{X}$ = 4.07, S.D. = 0.89) emerged as a significant factor, reinforcing the view that a supportive work environment plays a critical role in teacher well-being (Choi et al., 2022).

Although financial aspects typically influence job satisfaction, the adequate financial reward factor received the lowest score ($\bar{X}$ = 3.85, S.D. = 1.03), suggesting that compensation remains an area of concern. This finding is consistent with recent studies that highlight financial dissatisfaction as a key contributor to stress and burnout among teachers (OECD, 2021). Despite these concerns, work-life balance was rated relatively high ($\bar{X}$ = 3.93, S.D. = 0.98), indicating that teachers maintain some equilibrium between professional and personal responsibilities. Research has shown that work-life balance is a significant predictor of teacher retention and job engagement (Kim & Park, 2022).

The Workplace Well-being Framework (Warr, 2013) provides a useful theoretical foundation for interpreting these results, conceptualizing workplace happiness as a function of job autonomy, social support, and opportunities for skill development. The results highlight opportunities for personal development ($\bar{X}$ = 4.09, S.D. = 0.86) as a highly valued component, supporting the argument that professional growth contributes to long-term job satisfaction (Klusmann et al., 2020). Additionally, workplace safety ($\bar{X}$ = 4.05, S.D. = 0.89) was rated highly, reflecting teachers' perceptions of a secure and stable working environment. This finding aligns with recent literature emphasizing the role of psychological and physical safety in enhancing employee productivity and well-being (Bakker & de Vries, 2021).

In conclusion, this study confirms that teachers in Lop Buri Province generally report a high level of workplace happiness, driven by factors such as status recognition, social support, and opportunities for professional development. However, concerns remain regarding financial compensation and workload balance, which should be addressed through policy reforms aimed at enhancing teacher well-being. Future research should incorporate longitudinal studies and qualitative methodologies to gain deeper insights into workplace happiness in different educational contexts. Implementing strategies such as financial incentives, workload management, and increased opportunities for skill development could further improve teachers' well-being and overall job satisfaction.

2) The findings of this study indicate that workplace happiness among teachers in Lop Buri Province varies significantly across specific demographic variables, namely debt status, school size, and distance from home at a significance level of .05. These results suggest that financial stability, institutional context, and commuting distance contribute to variations in workplace happiness. Teachers with lower debt levels tend to report higher job satisfaction and well-being, which aligns with previous studies demonstrating that financial security plays a critical role in reducing occupational stress and enhancing overall job contentment (Kim & Kang, 2020). Similarly, school size appears to influence workplace happiness, as teachers in smaller schools may face distinct challenges related to workload distribution, resource availability, and social support networks. Research has shown that teachers in smaller institutions often experience higher job autonomy but increased administrative burdens, which can either enhance or diminish workplace well-being depending on the availability of support systems (Han et al., 2021). Furthermore, commuting distance significantly impacts workplace happiness, as longer travel times have been linked to increased stress, fatigue, and work-life imbalance (Chatterjee et al., 2019).

Conversely, the study found that workplace happiness did not significantly differ based on gender, age, work experience, academic position, marital status, or school affiliation. These findings suggest that, despite individual differences, teachers in this province share similar perceptions of workplace happiness across these demographic categories. The non-significant

effect of gender aligns with recent literature suggesting that both male and female teachers generally experience comparable levels of job satisfaction when organizational conditions and professional responsibilities remain equitable (Richardson & Watt, 2021). Additionally, the absence of differences in happiness based on age and work experience indicates that teachers across different career stages may face similar challenges and derive similar benefits from their work environment. This contrasts with some earlier studies suggesting that novice teachers often report lower job satisfaction due to adjustment difficulties, whereas experienced teachers may struggle with burnout (Toropova et al., 2021). The lack of significant differences in workplace happiness across academic positions and school affiliations implies that institutional structures and policy frameworks might provide relatively uniform work environments, reducing disparities in teachers' job satisfaction.

The theoretical foundation of this study is supported by Warr's (2013) Workplace Well-being Framework, which highlights how financial stability, environmental conditions, and work-life balance shape workplace happiness. The findings reinforce the importance of addressing financial concerns, improving commuting conditions, and optimizing resource allocation in different school settings to enhance teacher well-being. Moreover, the lack of significant variation across certain demographic factors suggests that workplace happiness may be more strongly influenced by structural and organizational conditions rather than personal attributes. Policymakers and school administrators should therefore prioritize strategies such as financial incentives, workload adjustments, and transportation support to ensure equitable and sustainable workplace well-being for all teachers. Future research should explore these factors using longitudinal data and qualitative methods to gain deeper insights into how demographic and contextual variables interact to shape workplace happiness in education.

Limitation of the Study

This study was limited in several ways. First, the data were collected solely from teachers in Lop Buri Province, which may not fully represent the perspectives of teachers across other provinces or educational contexts in Thailand. Second, the study employed a quantitative method using a self-report questionnaire, which may be subject to response bias, particularly in relation to sensitive items such as perceptions of salary and job stress. Third, the cross-sectional nature of the data collection does not allow for longitudinal interpretation of changes in workplace happiness over time. Future research may address these limitations by incorporating mixed methods, expanding the geographic scope, and utilizing longitudinal designs to gain deeper and more generalizable insights into the workplace well-being of educators.

Suggestions for Future Research

1) Conduct longitudinal studies and qualitative research - Future studies should track workplace happiness over time and explore teachers' experiences through interviews and focus groups to gain deeper insights beyond quantitative data.

2) Explore regional and school-level variations - Comparative research across urban and rural schools, as well as different school sizes, can help identify specific challenges and inform targeted well-being policies.

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Development of a Training Package to Enhancing Innovative Leadership Among Society Expectations for Students of Higher Education Institutions in Thailand

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Abstract

The research aimed to 1) study the necessity of innovative leadership characteristics, 2) develop a training package, and 3) study the effectiveness of the training package to enhance the innovative leadership that society expects for Thai higher education students. The sample group consisted of 449 people. The data collection tools were a semi-structured interview and a 5-point scale questionnaire with a reliability of 0.89 for the whole questionnaire and 0.92 for the expectation questionnaire. The statistics used for data analysis were percentage, mean score, standard deviation, PNI, and one sample t-test. The results of the research found that 1) Observation characteristics There was a need value (PNI = 0.45), a questioning characteristic (PNI = 0.34), a connection characteristic (PNI = 0.30), a networking characteristic (PNI = 0.29) and a trial value (PNI = 0.23), respectively. 2) The training set construction had 5 training units: Open-mindedness, Challenging puzzles, Finding a solution, Collaborating together and Teachers creating teachers. All training units were appropriate. 3) Students who attended the training had higher post-test scores than the pre-test at the .01 level of statistical significance. The observation of the participants' behaviors was at a high level, with an average score of 4.43 and a high level of satisfaction with the organization of the activities, with an average score of 4.09, which was statistically significant at the .001 level.

Keywords: traits, leadership traits, innovative leadership

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Introduction

Currently, Thai society is changing rapidly in terms of economic development and expansion. Material advancement and technological modernity have resulted in the world society becoming a borderless society. In terms of politics, governance, and social context and structure, being a part of a world that is constantly changing and advancing, countries and the business sector not only have to adapt to the rapid changes, but also have to look ahead to create growth opportunities to keep up with the changes. At the same time, they have to prepare for the risks that will arise together. Therefore, in order to be able to develop and improve the country and the well-being of its people sustainably, distribute income, distribute growth opportunities, reduce social inequality, and enhance Thailand's capabilities to create stability, prosperity, and sustainability, it is necessary to seek opportunities and prepare personnel according to the strategy for developing and enhancing human potential of the 20-year national strategy (2018-2037) (Office of the National Economic and Social Development Board, 2018). In the present era, the world has entered the 21st century, in which the competitive foundations of various countries are changing due to increasingly intangible factors, such as knowledge, information technology, and international trade that relies on culture as a medium. Therefore, organizations need to prepare and adjust themselves to have a stable position in the knowledge-based economy. Therefore, innovation development is one way that will enable every organization to create a stronger position, in line with the global social and economic system. Innovation is considered an important part of education in many ways. This is because the era of globalization is changing rapidly in every aspect, especially the advancement of educational information technology, which requires the change of the existing education system to be modern, keeping up with technology and the constantly changing social conditions, in order to solve the educational problems that arise effectively.

Thai society has given importance to being an innovation leader to help create value and added value for the organization in the long term because the leader is the one who can determine the direction of the organization. The organization's achievement depends on the capability of the leader and innovation. The innovation process is therefore a tool for the innovation leader to lead the organization to excellence with innovation in products, processes, and services. Therefore, the innovation leader is considered that if innovation is an important mechanism for developing and increasing efficiency, solving problems that occur in the organization, the key players in driving innovation work are innovation leaders. However, whether in the role of an educational agency or a role in other private sector agencies, the innovation leader will be a person who is expected to be able to use knowledge and innovation skills to develop work effectively and efficiently. The organization's management must be consistent with the knowledge-based society system that emphasizes the use of knowledge to develop various objects and technologies. Therefore, it is considered that innovation can be used to manage and solve all problems. Innovation is therefore defined and used in organizations that emphasize modernity and efficiency of innovation. The innovation leader therefore has a broad role according to the various contexts of the organization (Yasamorn et al., 2017).

Innovative leadership traits are what enable leaders to work to create innovations or new things that are beneficial to educational institutions, and can develop quality education based on the constant changes in the world. Leaders who are directly involved in creating, developing, and are an important driving force for change in higher education institutions will emphasize participation from all relevant sectors, especially graduates from higher education institutions who need to have innovative leadership traits before working. Therefore, it is

very important for higher education institutions to promote graduates to have innovative leadership traits. Therefore, the researcher is interested in studying the current situation and expectations for fostering innovative leadership traits among students in higher education institutions, with the aim of achieving innovative leadership traits in graduates, as a guideline for proposing training packages and developing students to have more innovative leadership traits. The study selected concepts that are important for strengthening innovative leadership characteristics, namely the concepts of Dyer et al. (2011), Chanpla (2016), Prachan (2018) Higgins (1995), Tidd and Pavitt (2001), who summarized 5 important elements in developing innovative leadership characteristics: connecting, questioning, observing, having networks, and experimenting, to be used as important variables in strengthening innovative leadership that society expects for Thai higher education students.

From the problem, the researcher sees that innovative leadership and innovation are valuable and important for graduates who will graduate or work in various organizations. Therefore, graduates should have special characteristics that are different from general leadership. Therefore, they are interested in studying the development of training packages to enhance innovative leadership for Thai higher education students to enhance the innovative leadership that society expects. This will be useful in developing knowledge in leadership theory, innovation theory, and leadership development, which will lead to the development of innovative leadership. This will help push higher education institutions and executives in various organizations to apply it in practice as a guideline for developing themselves and their colleagues to have potential suitable for the state of an innovative organization. In addition, the researcher sees the importance and is interested in focusing on enhancing innovative leadership that society expects for Thai higher education students by conducting a pilot study from the core institutions of universities in the Technology Development and Innovation Promotion Group, King Mongkut's Institute of Technology Ladkrabang and Rajamangala University of Technology Thanyaburi, which are considered to have an old academic reputation and are ready to develop innovative leadership characteristics. They are also ready in terms of academic readiness that is recognized both nationally and internationally. As seen from the Times Higher Education World University Rankings, to bring the study model from other higher education institutions to study the necessity of innovative leadership characteristics that society expects for students, to develop a training package to enhance innovative leadership characteristics that society expects for students in Thai higher education institutions.

Research Objectives

This research was a research and development with the objectives of 1) Studying the necessity of innovative leadership characteristics that society expects for Thai higher education students, 2) Developing a training package to enhance innovative leadership that society expects for Thai higher education students, and 3) Studying the effectiveness of a training package to enhance innovative leadership that society expects for Thai higher education students.

Research Methodology

The research methodology consists of 3 steps as follows:

1. Needs study: Study the characteristics of innovative leadership that society expects by interviewing experts and 9 questionnaires to assess the current status and expectations

of 392 graduates who hire education students in the education field of Thai higher education institutions.
2. Training package development: Create and consider the training package by holding focus groups with 9 experts to consider the characteristics for selecting the sample group according to suitability.
3. Effectiveness study: Test the training package with 30 third-year students in the graduate program in Education, Srinakharinwirot University, and evaluate the results by pre- training tests and post-training tests, including student satisfaction assessment.

The sample group used in this research consisted of 440 persons. The data collection tools were semi-structured interviews and a 5-level rating scale questionnaire with a reliability value of 0.89 for both the actual condition questionnaire and 0.92 for the expectation condition questionnaire. The statistics used for data analysis were percentage, mean, standard deviation, Data Prioritization Index (PNI), and One sample t-test.

Research Results

The results of the research found that:
1. The results of the evaluation of the current situation and expectations in enhancing innovative leadership characteristics of students found that the observation characteristic had the highest need value, with a need value of (PNI = 0.45), followed by the questioning characteristic with a need value of (PNI = 0.34), and the connection characteristic with a need value of (PNI = 0.30), networking characteristic with a need value of (PNI = 0.29), and experimenting with a need value of (PNI = 0.23), respectively.
2. Mean and standard deviation scores of innovative leadership characteristics that society expects from Thai higher education students based on current conditions, expected conditions, and overall Modified Priority Needs Index: (PNIModified).

Table 1
Necessity of Innovative Leadership Characteristics That Society Expects for Thai Higher Education

Innovative leadership characteristics	n = 392				$PNI_{Modified}$	Order
	Current status		Expectation status			
	$\overline{X}$	S.D.	$\overline{X}$	S.D.		
1. Linking characteristics.	3.28	0.21	4.25	0.56	0.30	3
2. Questioning characteristics.	2.95	0.50	3.94	0.43	0.34	2
3. Observing characteristics.	3.05	0.60	4.43	0.43	0.45	1
4. Experimenting characteristics.	3.11	0.86	3.83	0.71	0.23	5
5. Networking characteristics.	3.54	0.45	4.57	0.28	0.29	4
Total	3.19	0.52	4.20	0.48		

3. 2.The development of training packages to enhance innovative leadership characteristics uses a training package quality assessment process. It consists of 5 training units: Open mindedness, Challenging Puzzles, Finding Solutions, Working Together, and Teachers Creating Teachers. All training units are appropriate.
4. The results of the study on the effectiveness of using the training kit to enhance innovative leadership characteristics of university students found that the students who participated in the training to enhance innovative leadership characteristics had post-test scores that were significantly higher than before studying at a statistical level of .01. The observation of the overall behavior of the trainees was at a high level, with an average score of 4.43, and their satisfaction with the organization of the activities was at a high level, with an average score of 4.09, statistically significant at a statistical level of .001.

Findings and Benefits

This research adopted a research and development (R&D) approach with three main objectives: 1) To identify the essential innovative leadership characteristics expected by society for Thai higher education students, 2) To develop a training package aimed at enhancing these characteristics, and 3) To evaluate the effectiveness of the developed training package. The sample group consisted of 449 participants. Data was collected using semi-structured interviews and a five-point Likert scale questionnaire. The reliability coefficients were 0.89 for the questionnaire assessing actual conditions and 0.92 for the questionnaire assessing expected conditions. Data was analyzed using percentage, mean, standard deviation, the Priority Needs Index (PNI), and a one-sample t-test. The research findings revealed that:

1. The evaluation of the current situation and expectations for enhancing students' innovative leadership characteristics revealed that the observation characteristic had the highest priority need (PNI = 0.45), followed by questioning (PNI = 0.34), connection (PNI = 0.30), networking (PNI = 0.29), and experimenting (PNI = 0.23), respectively.
2. Development of the Training Package to Enhance Innovative Leadership Characteristics, the development of the training package to enhance innovative leadership characteristics was carried out through a structured quality assessment process. The package consists of five training units: Open-Mindedness, Challenging Puzzles, Finding Solutions, Working Together, and Teachers Creating Teachers. Each training unit was evaluated and found to be appropriate and effective in supporting the intended learning outcomes.
3. Effectiveness of the Training Package, the study on the effectiveness of the training package revealed that university students who participated in the program demonstrated significantly higher post-test scores compared to their pre-test scores, with a statistical significance level of .01. Observations of trainee behavior showed a high level of performance, with an average score of 4.43. In addition, participants reported a high level of satisfaction with the training activities, with an average satisfaction score of 4.09, which was statistically significant at the .001 level.

Given the reasons mentioned above, it is evident that there is a pressing issue regarding the enhancement of innovative leadership among students in higher education institutions, an issue that directly impacts the development of graduates who meet the expectations of employers, society, and the nation. Therefore, it is essential to address and improve this matter. This research aims to explore the necessity of innovative leadership characteristics

expected by society, to develop a training package to foster such characteristics, and to evaluate the effectiveness of the package in enhancing innovative leadership among students in Thai higher education institutions. The study utilizes real-world data to ensure that the training package developed is practical, applicable, and capable of strengthening students' innovative leadership in a way that contributes meaningfully to future outcomes.

Conclusion

Evaluation of the Current Status and Expectations in Fostering Innovative Leadership in Thai Higher Education Students

The evaluation of the current status and expectations for fostering innovative leadership characteristics, as expected by society, in Thai higher education students revealed that the overall Priority Needs Index (PNI) was 0.32. When considering each characteristic individually, it was found that the observation characteristic had the highest need (PNI = 0.45), followed by questioning (PNI = 0.34), connection (PNI = 0.30), networking (PNI = 0.29), and experimentation (PNI = 0.23), respectively.

Development of a Training Package to Foster Innovative Leadership Characteristics

Based on the PNI ranking of each characteristic from highest to lowest, the researcher designed a framework for supplementary curriculum activities. The training package employed various instructional techniques, including blended learning, problem-based learning (PBL), active learning, and team-based learning (TBL). The package consisted of five activities: *Open-Mindedness*, *Challenging Puzzles*, *Finding Solutions*, *Working Together*, and *Teachers Creating Teachers*. The total duration of the program was 3 days (18 hours), including 1.5 hours for orientation, 15 hours for training activities, and 1.5 hours for the final review session.

Effectiveness of the Training Package

1. Academic Achievement, the results showed that the average pre-training score was 12.80 (S.D. = 1.372), while the average post-training score increased to 17.80 (S.D. = 1.627). The difference was statistically significant at the .01 level, indicating a substantial improvement in participants' knowledge after completing the training.

2. Behavioral Change in Innovative Leadership Characteristics, the average scores for each characteristic according to actual observed behavior were as follows:
    a. Questioning: 4.15, Observation: 4.47, Connection: 4.47, Networking: 4.42 and Experimentation: 4.63. The overall average score was 4.43 out of 5.00, which exceeds the benchmark of 3.51, indicating a high level of innovative leadership characteristics among participants. This confirms that the program met the specified behavioral criteria.

3. Participant Satisfaction, the participants reported high levels of satisfaction with the training package in all aspects. The overall average satisfaction score was 4.09, which was statistically significant at the .001 level, confirming the training package's effectiveness and relevance.

Suggestions

Suggestions for Research Application

1. The study found that the questioning characteristic is necessary (PNI = 0.45) because it is a characteristic that creates creativity and innovation. Innovative leaders must be thinkers, find new perspectives or approaches. Therefore, higher education institutions should develop questioning skills by integrating activities by encouraging students to always ask questions about things because asking questions will stimulate the process of thinking that builds on the questions asked to create out-of-the-box and creative thinking.

2. The study found that the observation characteristic is necessary (PNI = 0.34) because it is a characteristic that involves observing what is happening attentively and systematically in order to analyses or find the relationship between what is happening and other things. Innovative leaders must be able to see things around them and then think, analyse, and apply them to benefit themselves or those around them. Therefore, higher education institutions should develop observation skills by encouraging students to be interested in their surroundings. Observing to find new discoveries should be done in conjunction with asking questions.

3. The study found that the connection characteristic is necessary (PNI = 0.30) because it is a characteristic that systematically looks at the big picture. Innovative leaders must be able to connect things together, which can create new things or new ideas. Therefore, higher education institutions should develop connecting skills for new creative ideas, whether related or unrelated, to create a multidimensional perspective.

4. From the study, it was found that the networking characteristic is necessary (PNI = 0.29) because it is a characteristic related to relationships. Innovative leaders must coordinate things to develop new creative ideas. Therefore, higher education institutions should develop knowledge in a variety of ways by learning from partners or others to exchange and create experiences, stimulate new ideas, practices or invent new innovations.

5. From the study, it was found that the experimentation characteristic is necessary (PNI = 0.23) because it is a characteristic related to taking action by using various skills to find answers, find new methods or approaches that benefit oneself or others. Innovative leaders must be able to define problems and hypotheses, research, experiment and conclude results. Therefore, higher education institutions should develop skills in setting up various hypotheses, researching and experimenting, and be ready to learn and correct mistakes in order to bring those ideas to experiment. Crystallize ideas more clearly.

6. From the study, it was found that the training kit to enhance the characteristics of innovative leadership that society expects for students in Thai higher education institutions created by the researcher has a step-by-step creation process and complete components according to the training model. Therefore, those who will use this training kit should study and understand the details to avoid problems during the use of the training kit and be able to convey and organize activities for trainees to learn to the fullest of their abilities.

7. From the study, it was found that the training kit to enhance the characteristics of innovative leadership that society expects for students in Thai higher education

institutions created by the researcher is effective and can be applied in practice. It was found that the average score after participating in the activity (Post-test) of the participants was higher than the average score before participating in the activity (Pre-test). The experimental characteristics are the most important. Therefore, the training kit to enhance the characteristics of innovative leadership for students should be applied to develop graduates to have the characteristics of inventors through the experimental method to create quality graduates for the future lab or market.

Recommendations for Future Research

1. There should be a follow-up and evaluation of the development of the characteristics of innovative leadership that society expects for students in Thai higher education institutions with those who have been trained from the training kit to enhance the characteristics of innovative leadership. To observe the development of innovative leadership and to know whether the knowledge gained from the training can be applied to further develop the work in the organization.

2. Factors affecting the development of innovative leadership characteristics should be studied or components of innovative leadership should be studied in order to use the data for further development. Qualitative research should be conducted to study the necessity of having innovative leadership characteristics that society expects for students in Thai higher education institutions, including educational institutions in various regions, both public and private, in order to develop this research to be more intensive, which will be beneficial to the education sector in general.

The Value of Research

This research has the following important values:

1) Adapting to change: Promoting innovative leaders to drive change and develop higher education institutions to be modern.
2) Human resource development: Strengthening innovative leadership characteristics in students to prepare them for entering the labor market.
3) Education quality improvement: Using training packages to focus on innovative learning and essential skills.
4) Supporting national strategy: Consistent with the 20-year national strategy to enhance human potential and develop the quality of education.

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Guidelines for Enhancing Leadership of Art and Culture for Students Leaders at Srinakharinwirot University

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Abstract

This study aims to investigate the essential need for enhancing leadership in arts and culture among student club members at Srinakharinwirot University. The study also seeks to utilize the findings to develop a training model for fostering leadership in arts and culture for the sample group involved in this research. The sample comprised 181 student club members selected through simple random sampling. The research instruments used included questionnaires and in-depth interviews. The questionnaires employed a 5-point Likert scale, and the in-depth interviews utilized content analysis methods. The research findings revealed that students have a high level of necessity for enhancing leadership in arts and culture ($\bar{X}$ = 4.20, S.D = 0.78). Based on the survey results, a training model for fostering leadership in arts and culture for students was developed as follows: 1) Knowledge about Leadership and the Roles and Responsibilities of Leaders. This includes the definition of leadership, the importance of leaders, the qualities of leaders, and the characteristics of effective leaders. 2) The Art of Communication and Motivation This encompasses communication principles, communication processes, communicating through tone and emotion, the good qualities of a speaker, and methods of persuasive speaking. 3) Knowledge in Arts and Culture Management Students need to possess knowledge in managing arts and culture in various areas, including arts and culture management, creating and developing Thai artistic wisdom, Buddhist culture, and general cultural knowledge.

Keywords: leadership of art, students leaders

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Introduction

The current state of Thai society is entering into social, economic, and political changes. The nature of international cooperation has shifted towards regional groupings of countries to enhance economic competitiveness and other benefits. One such grouping is the ASEAN (Association of Southeast Asian Nations), which consists of three pillars: 1) the ASEAN Political-Security Community, 2) the ASEAN Economic Community, and 3) the ASEAN Socio-Cultural Community. As we move towards greater integration and transformation, it is crucial for Thailand to prioritize cooperation in various areas, particularly in arts and culture, alongside economics and politics. Thailand should maintain its unique identity amidst the current foreign cultures spreading into Thai society, as some Thais have changed to accept new cultures and values. In an era of globalization and social, cultural, and identity diversity, the survival of local and national arts and cultures requires "cultural leadership." That can create understanding, connect the past with the present, and creatively convey cultural and artistic values to the new generation, especially in the context of higher education institutions, which have an important role in developing youth in terms of intelligence, skills, and public consciousness. Therefore, promoting student leaders to have leadership in arts and culture is one of the important approaches to developing people for the country's future.

Cultural leadership is vital in contemporary society, particularly within educational institutions. These spaces are essential for creating and transmitting cultural values, as well as for cultivating identities that connect individuals, communities, and nations. Cultural leadership fosters a collaborative learning environment that encourages interaction among different generations and groups within the university, promoting creativity and shared understanding. However, from observation and review of past activities, it was found that there is still a lack of a systematic approach to developing leadership in arts and culture. To youth leaders at the student level regarding the knowledge, skills, and attitudes essential for driving valuable long-term activities.

Currently, higher education institutions worldwide emphasize the development of "student leadership" alongside classroom learning, especially student activity leaders who play a role in creating an atmosphere of participation and promoting social values.

This study will focus on analyzing the skills, leadership, and context of students' cultural activities, as well as developing appropriate approaches that connect with the university context and social changes to promote activist leaders to become "cultural leaders." To be powerful, drive the value of art, and create a sustainable living cultural space in the university.

Research Objectives

1. To study the necessity to enhance leadership in arts and culture for students
2. To propose guidelines for enhancing leadership in arts and culture for students

Related Documents and Research

Definition and Importance of Leadership

Leadership refers to the use of interpersonal behavior to seek cooperation from other personnel to accomplish the task. The concept of leadership is based on the communication

process or the relationship between superiors and subordinates, as described by Glueck (1980). Suwannapirom (2008) defines leadership as a process in which one or more individuals use their influence to motivate and encourage others to act in accordance with their goals. The success of the group depends on this dynamic.

In addition, Yukl (2002) gives the view that leadership is the process of influencing others to gain understanding and consensus on the goals and methods to be achieved. It is also a process of helping individuals achieve common goals. From the definition of leadership, it can be concluded that leadership refers to the process of behavior of a person or group of people who influence others to influence others to do things to achieve their goals.

Role of Leadership

Sangmani (2015) mentioned the role of leadership, stating that an effective leader must be capable of performing in various fields.

1. It can stimulate and strengthen the expectation or demand for returns arising from any success of subordinates.
2. The leader possesses the power or influence to exert stronger control. Subordinates are expected to align their performance with anticipated rewards, meaning they should believe that their efforts will result in the returns they expect.
3. Supervise, advise, and provide clear instructions to subordinates throughout the duration of their work.
4. It is essential to ensure that necessary resources, such as job skills and training tools, are adequate and available for the operator to utilize effectively for the operation's success.
5. Develop and present factors or drive incentives from within and outside of subordinates.

In addition to such leadership roles, good leadership has different elements, according to and Koontz and Dennal (1990).

1. Accessibility to the human condition and nuances - Each human being has a different condition. Therefore, it is important for leaders to try to meet those individuals' minimum needs or preferences.
2. To effectively persuade and motivate colleagues, we must encourage them to fully utilize its functions.
3. The capacity to exhibit administrative behavior encompasses various management traits. Leaders should remain consistent with unit events, timelines, and personnel.

Concepts and Theories Related to the Development of Leadership Skills

Leadership skills must be trained and developed according to the leadership skill development process. Dubin (1998) discusses the process of leadership development. as follows: Self-learning leadership development is an important thing that should be emphasized or remembered in development. The leader will recognize the problems that arise in two ways: from himself or herself and from the external environment. Important things that help with learning include enabling leaders to learn and have a positive effect from looking back on mistakes made. By addressing mistakes and supporting leaders, confronting crises allows for a stronger vision for group members. Self-development can be achieved through education, experience, and guidance from mentors. It is often caused by other factors than self-learning, with 3 main factors as follows.

Education is gaining insight into a particular subject. If a leader possesses potential, science can rationally solve complex problems. The level of education is linked to the administration's success. This will have more or less effect depending on the duration of study and the application of knowledge.Experience refers to past work experience and role in decision-making. Experienced leaders believe they can achieve their goals and minimize mistakes. Mentoring involves a more experienced senior employee helping less experienced colleagues advance to a higher level. This is done by providing advice, support, and encouragement to develop leadership skills in the younger generation, often through informal relationships. Barnard (1998) has given the following views on the characteristics of leadership that are striking:

1. Vitality, vitality, and a strong and patient mind.
2. Ability to make decisions.
3. Have the ability to motivate people.
4. Responsibly.
5. Good Intelligence.

Wisalaporn (2017) mentions the characteristics of modern leaders as follows. To achieve a transformative and improved organization, it is essential to be brave and open, and to confront the truth. It’s important to trust others by delegating tasks, believing in their abilities to succeed. Use shared values as a motivating force to help followers recognize the importance of the goal, thereby driving performance forward.

As lifelong learners, this type of leader will always take what went wrong in the past and learn and improve himself.

1. Ability to navigate complexities, ambiguity, and constant change.
2. The capacity to envision the future and realize dreams.
3. The significance and value of arts and culture in higher education institutions.

Meaning of Arts and Culture

The term "art" extends beyond the definition provided by the Royal Academy of Sciences, which describes it as military craftsmanship, emotional expression, and the ability to touch lives. Chaiyongyot (1995) defined art as an expression of the faith and beliefs of each era, while Pirasri characterized art as musical literature. Painting, sculpture, and architecture—these arts make mankind brothers and sisters. Art has no boundaries, no race, no competition, and art interests are an important medium that will elevate our minds to live in a higher kingdom and give us hope for an ideal future (Department of Fine Arts, 1999). Therefore, it can be concluded that art expresses emotions with faith and faith through literature, music, painting, sculpture, and architecture.

The Royal Academy of Arts Dictionary defines culture as something that makes the group prosper, its way of life. The Department of Fine Arts (1999) defines culture as the spirit and technique of the form of life and the advancement of art and science in improving the quality of life to live happily.

Art and culture, therefore, refer to things that represent the national identity and way of life, as well as values in various matters that are practiced, inherited, praised, appreciated, and preserved to maintain national uniqueness.

The Role of Arts and Culture in Higher Education Institutions Higher education institutions have four primary missions:

1. Academic and professional teaching to meet the manpower needs of society
2. Research for Academic Progress
3. Academic Services to Society
4. Transmitting culture and cultivating good citizenship

Role and Operation of Art and Culture Maintenance in Thai Higher Education Institutions

1. Higher education institutions are a source of gathering and producing a large number of brain-rich human resources to go out to develop people.
2. Higher education institutions are leaders in studying, researching on science, technology, and culture for the survival of the country in an era of increased international competition.
3. Higher education institutions are places where there is more freedom of thought and academics than any other organization in the country.

Concept of Organizing Arts and Cultural Activities in Higher Education Institutions

The implementation of the task of preserving arts and culture has a variety of modes of operation, which may summarize the following important modes of operation.

1. Concept of teaching arts and culture
2. Concept of Art and Culture Research
3. The concept of academic services in the field of arts and culture preservation
4. Ideas for organizing student activities in the field of arts and culture preservation
5. Concept of Arts and Culture Management

Research Methodology

Population and Participants

The population used in this research was 335 students of the Srinakharinwirot University Student Club, Semester 1, Academic Year 2024.

The sample of Objective 1 used in this research was Srinakharinwirot University Student Club students in the 1st semester of the academic year 2024 based on the calculation of the Yamane formula with an expected displacement of 0.5 to obtain a sample of 181 people.

Table 1
Table of Population and Sample

No	Faculty	Population	Sample
1	Faculty of Education	15	8
2	Faculty of Humanities	15	8
3	Faculty of Science	42	23
4	Faculty of Social Science	13	7
5	Faculty of Medicine	24	13
6	Faculty of Nursing	15	8
7	Faculty of Physical Therapy	18	10
8	Faculty of Pharmacy	15	8
9	Faculty of Fine Arts	40	22
10	Faculty of Engineering	14	8
11	International College for Sustainability Studies	16	9
12	College of Social Communication Innovation	15	8
13	Phothivilai College	19	10
14	Faculty of Economics	10	5
15	Faculty of Culture, Environment and Ecotourism	16	8
16	Faculty of Physical Education	15	8
17	Faculty of Dentistry	18	10
18	Faculty of Technology and Agricultural Products	15	8
Total		**335**	**181**

The sample of Objective 2 uses 7 Experts who are involved in the development of students' leadership in arts and culture by purposive sample.

Research Instrument and Analyzing Data

The tools used to collect data this time are questionnaires and interviews.

Questionnaire

There are 2 parts:

- Part 1: Questionnaire about general information of respondents, with analysis of basic statistics of the sample by finding the frequency and percentage values.
- Part 2: Questionnaire on the Needs to Strengthen Leadership in Arts and Culture. This questionnaire is based on the Likert Scale. At the end, there is an open-ended questionnaire for respondents to comment. It was analyzed by finding the mean score and the standard deviation.

Interview

The interview is thorough, and the interviewer suggests guidelines for improving the situation. Leaders in the field of arts and culture are examined through content analysis.

Results of Data Analysis

Table 2
Number of People and Percent Students of the Srinakharinwirot University Student Club

Variables Studied	Number of People	Percent
1.Gender		
1.1 man	69	38.10
1.2 woman	112	68.90
Total	181	100.00
2.Disciplines		
2.1Humanities and Social Sciences	84	46.40
2.2 Health Sciences	59	32.60
2.3 Science and Technology	38	21.00
Total	181	100.00
3.Academic Year		
3.1 Year 1	9	5.00
3.2 Year 2	73	40.30
3.3 Year 3	56	30.90
3.4 Year 4 and above	43	23.80
Total	181	100.00

Table 2 shows the total number of students who responded to the questionnaire 181 people, Male Student 69 (38.10%) and 112 female students (68.90 %).

It was found that he was a student in the humanities and social sciences group. 84 (46.40%) in the Health Sciences 59 (32.60%) and the Science and Technology Major 38 people (21.00%).

In terms of the year of study, it was found that 9 students were year 1 students (5.00%), 73 year 2 students (40.30%), 56 year 3 students (30.90%), and year 4 students and above, 43 (23.80%).

Table 3
Average Score and Standard Deviation of Requirements Necessary to Strengthen Leadership in Arts and Culture of Srinakharinwirot University

Need to strengthen leadership in arts and culture.	N = 181		Need Level
	$\bar{X}$	S.D	
1.Leadership Knowledge	4.23	0.72	very
2. Knowledge of the role and duties of a leader.	4.13	0.75	very
3. Creative	4.34	0.75	very
4. Moral and ethical development	4.23	0.75	very
5. determination	4.28	0.74	very
6. Persuasive Speaking Techniques	4.26	0.76	very
7. Knowledge to determine future destinations	4.24	0.81	very
8. Expression Modalities to convey Emotions	4.19	0.77	very
9. Effective in-meeting communication	4.27	0.73	very
10. self-confidence	4.25	0.81	very
11. Human Relations	4.26	0.75	very
12. Adaptation to the environment	4.20	0.79	very
13. Flexible management	4.18	0.78	very
14. Knowledge of Arts and Culture Management	4.06	0.83	very
15. Knowledge of the creation and development of Thai wisdom art.	4.08	0.90	very
16. Multicultural knowledge	4.06	0.90	very
Total	4.20	0.78	very

Conclusion and Discussion of Results

The students of the club have a need to strengthen their leadership in the arts and culture. This may be due to the fact that students see the importance of applying skills in the operation of students as a university student club. Engage in creative activities, as mentioned, to address behavioral issues. Leadership is a sign of an individual's qualities. How effective and suitable are these leadership characteristics? An obvious example is that in the case of a leader who needs to change the organization to keep up with the global situation. Nowadays, organizational leaders must communicate with their subordinates to understand and acknowledge the ways and policies as well as the need for change. It can be said that leaders are the most important human resources of the organization, and in terms of art and culture with an increasing trend of conservation, it may be the reason why students are enthusiastic about seeking new knowledge about the organization of art and culture for conservation. According to Thephasdin Na Ayutthaya (1997), art and cultural activities foster students' pride in their national identity. Appreciate arts and culture, music and dance traditions, and develop students to have harmony and good behavior.

Guidelines for leadership in the arts and culture can be developed for training cultural leaders. It consists of content that will be used to develop students—knowledge about leadership and the role and duties of student leaders. It is necessary to have knowledge about leaders and the roles and duties of leaders in various matters. Some students are still not successful in managing student clubs, student club affairs are not strong, so knowledge about leadership and the role and duties of leaders is the basis that student clubs should receive to develop. This is in line with Limpanich's (2002) Buddhist statement that leaders must have knowledge and expertise in techniques and methods of working and knowing their roles.

Communication skills are essential for working with multiple parties. As Panyarachum (1998) said, leaders for Thai society in this era must have the ability to speak and communicate with others in an understanding manner according to the concepts of Koontz and Donnel (1976). That said, a good leader must understand key elements, including the ability to address human differences and motivate performance. Knowledge of arts and culture management is essential. Students need to have knowledge in arts and culture management in various matters, including knowledge of arts and culture management, knowledge of art creation and development, Thai wisdom, knowledge of multiculturalism, etc. This cultural knowledge is the basic knowledge in the management of arts and culture, which will help encourage students to have an increased understanding of art. The perspective on creating events is evolving. Art and culture are being approached in innovative ways. There is a deep understanding of cultural diversity and multiculturalism, which is essential for adapting to modern society, while still valuing traditional Thai wisdom. By integrating local knowledge with contemporary culture, we can foster sustainability.

Policy Recommendations

The study found that student club students Srinakharinwirot University there is a high demand for strengthening leadership skills in all aspects of arts and culture. Therefore, the information obtained should be used in the development of activities. In addition, the experts have suggested guidelines for the development of training courses to strengthen leadership skills in arts and culture, including the importance of providing knowledge on arts and culture management to students in addition to being packaged as a specific curriculum so that students have knowledge and abilities and use them to develop creative and sustainable arts and culture work.

Future Research Recommendations

1. A training course has been developed to strengthen leadership skills in arts and culture so that they can be put into practice.
2. Study to develop the form of organizing arts and cultural activities to be creative and developmental in addition to conservation continuation.

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A Study on the Requirements of Private Sector on Research Investment Ratio and Intellectual Property Ownership for Collaborative Research

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Abstract

This research aims to investigate the preferred research investment ratios and intellectual property ownership requirements of small and medium-sized enterprises (SMEs) involved in collaborative research with the College of Arts, Media, and Technology, Chiang Mai University. It also examines the research topics businesses are interested in pursuing collaboratively within Upper Northern Provincial Cluster 1, focusing on Chiang Mai Province. Data were collected through questionnaires and in-depth interviews with 29 SME owners in Chiang Mai who expressed interest in commercial research and development (R&D) collaboration with the college. The findings reveal that 58.6% of the surveyed SMEs operate as registered companies, 27.6% as community enterprises, and 13.8% are in the process of registering companies. The businesses are primarily engaged in manufacturing (75.9%), followed by services (13.8%) and trading (10.3%). Regarding collaborative research topics, most respondents expressed interest in content and media (44.8%), followed by tools and equipment (24.1%), platform systems (17.2%), new products (10.3%), and multiple topics (3.4%). With its collaborative nature, this research involves the active participation of SMEs, making them an integral part of the process. Concerning funding, 55.2% of the respondents were willing to contribute 25% of the total research costs. Regarding intellectual property (IP) ownership, 79.3% preferred negotiating ownership arrangements post-research, while 17.2% were willing to assign full IP ownership to Chiang Mai University. These findings provide valuable insights into SMEs' investment and IP ownership expectations, which can help inform the design and execution of collaborative research projects between academia and the private sector.

Keywords: collaborative research, research investment ratios, intellectual property ownership, academia-private sector collaboration

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Introduction

The Thailand 4.0 initiative, aimed at establishing a “stable, prosperous, and sustainable” nation, drives economic transformation through innovation-led growth (Tesarint, B, 2017). The 9th National Research Policy and Strategy (2017-2021) underscores this goal by supporting private-sector R&D, fostering investments, and enhancing internal capabilities to generate innovations and technologies that advance manufacturing, commerce, and services (National Research Council of Thailand, 2016). This vision seeks to position Thailand as a research-driven nation, leveraging outputs to benefit economic and social development. Chiang Mai University aligns with this national vision by emphasizing social responsibility and sustainable development through research and innovation. The College of Arts, Media, and Technology prioritizes collaboration with the private sector to transform industries using digital technologies. This research, focusing on investment ratios and intellectual property ownership in commercial collaborative R&D between SMEs in Chiang Mai Province's Upper Northern Provincial Cluster 1 and the College of Arts, Media, and Technology, Chiang Mai University, seeks to inform and refine the college’s R&D planning and budget allocation strategies (Budget Allocation) by broader national policy objectives.

Research Objectives

1. To investigate the desired investment ratios and intellectual property (IP) ownership preferences of businesses engaging in collaborative research and development (R&D) with Chiang Mai University's College of Arts, Media, and Technology. The study focuses on small and medium-sized enterprises (SMEs) within Upper Northern Provincial Cluster 1, with a case study focusing on Chiang Mai Province.
2. To identify the research topics SMEs prefer in Upper Northern Provincial Cluster 1 for collaborative R&D projects with Chiang Mai University's College of Arts, Media, and Technology. The study utilizes a case study approach focused on Chiang Mai Province.

Literature Review and Related Research

Conceptual Framework of Chiang Mai University's College of Arts, Media, and Technology

In 2022, the College of Arts, Media, and Technology (CAMT) at Chiang Mai University offered the following undergraduate programs:

1. Software Engineering
2. Modern Management and Information Technology
3. Animation and Visual Effects
4. Digital Games
5. Digital Industry Integration

The following postgraduate (Master's and Doctoral) programs were also available:

1. Software Engineering (Master's)
2. Knowledge and Innovation Management (Master's)
3. Digital Technology Management (Master's)
4. Knowledge and Innovation Management (Doctoral)

Research areas within CAMT encompass the following:

1. Animation Production
2. Game Design and Development
3. Augmented Reality
4. Modern Management Practices
5. Information Technology for Tourism
6. Tourism Experience Design
7. Logistics Management
8. Knowledge Management
9. Digital Marketing
10. Data Mining
11. Data Analytics
12. Artificial Intelligence
13. Internet of Things (IoT)
14. Software System Design
15. Programming
16. Application Development
17. Educational Innovation
18. Learning Models
19. Business Analytics
20. Digital Content Creation
21. Digital Transformation
22. Software Analytics
23. Machine Learning
24. Sensor Technology
25. Uncrewed Aerial Vehicles (UAVs) and Remote Sensing

Conceptual Framework of Small and Medium-Sized Enterprises (SMEs)

The Ministry of Industry (2002) defines Small and Medium-sized Enterprises (SMEs) as outlined in the Promotion of Small and Medium-sized Enterprises Act, B.E. 2543 (1993), Article 4. This definition encompasses four main business categories: 1) Manufacturing, 2) Wholesale, 3) Retail, and 4) Services, along with other businesses designated by the Minister.

The Ministry of Industry further delineates SME size based on the following criteria:

a) Small Enterprises: These are characterized by:
   - Manufacturing and service businesses: Employing no more than 50 people or possessing fixed assets valued at no more than 50 million baht.
   - Wholesale businesses: Employing no more than 25 people or possessing fixed assets valued at no more than 50 million baht.
   - Retail businesses: Employing no more than 15 people or possessing fixed assets valued at 30 million baht.

b) Medium Enterprises: These are characterized by:
   - Manufacturing and service businesses: Employing more than 50 but no more than 200 people or possessing fixed assets valued at more than 50 million baht but no more than 200 million baht.
   - Wholesale businesses: Employing more than 25 but no more than 50 people or possessing fixed assets valued at more than 50 million baht but no more than 100 million baht.

- Retail businesses: Employing more than 15 but no more than 30 people or possessing fixed assets valued at more than 30 million baht but no more than 60 million baht.

Review of Relevant Literature

Lee (2000) investigated the sustainability of inter-organizational collaborations, focusing on the reciprocal benefits between university and industry partners. The sample included university faculty and technology managers from companies. The study found mutual benefit is crucial for sustainable collaboration, with industry partners seeking novel research findings and increased research output. At the same time, universities require funding, knowledge-creation opportunities, and graduate students' research spaces.

Sáez et al. (2002) examined the characteristics of collaborations between universities and various research centers. Their study, based on a sample of 747 research collaborations in Spain, revealed that most funding was directed towards fundamental research related to central and regional research management. Formal agreements were prevalent in collaborations between diverse organizations (e.g., competitors, suppliers, clients), each with distinct research goals and success metrics.

Laosirihongthong (2008) explored university-industry partnerships in innovation development, identifying factors contributing to successful collaborative R&D projects. The research highlighted the critical role of mutual understanding in project participation. Successful collaborations require mutually beneficial outcomes and clearly defined objectives. While such partnerships offer significant mutual benefits, government support and policy facilitation (e.g., legal frameworks and investment incentives) are essential drivers.

Viboolsakchai (2012) studied models for collaborative research between universities and industry, surveying 52 university administrators, industry executives, and relevant stakeholders involved in such collaborations in Thailand. The study categorized collaborative R&D activities into four aspects: principles of collaboration, collaborative structure and mechanisms, supporting resources, and operational processes. Significant challenges included the lack of perceived importance, insufficient motivation for cooperation between some university and industry partners, and a lack of clear operational frameworks.

Sukasiriwat and Kerdsi (2014). Investigated challenges and limitations driving innovation within Thai SMEs. Their research, which included a literature review, analysis of research papers and databases, and interviews with top executives of SMEs who had received research funding from the National Innovation Agency (NIA), identified key obstacles to SME innovation: 1) Insufficient government support, 2) high R&D and innovation development costs, and 3) difficulty in securing funding.

Amnuaypravit (2016) examined funding access strategies for SMEs in Bangkok. The study indicated that SMEs must enhance their accounting and financial systems, aligning with standard financial practices, improving relationships with financial institutions, and facilitating future collaboration.

Sinsomboon and Disthanon (2019) investigated the commercialization process of research outputs using a single case study of a Thai research university. This qualitative study examined four stages of commercialization: idea generation, IP protection, prototyping, and

commercialization, identifying 13 key activities. The findings suggest that carefully considering these activities throughout the commercialization process enhances efficiency and quality, providing valuable insights for similar institutions.

Research Methodology

Population and Sample

The target population for this study comprises owners of small and medium-sized enterprises (SMEs) located in Chiang Mai Province, Thailand, who have expressed interest in participating in commercially oriented collaborative research and development (R&D) projects with Chiang Mai University's College of Arts, Media, and Technology. The sample comprises 29 SME owners, selected from participants registered in a university-led digital innovation program for SMEs.

Research Instruments

The primary research instrument was a researcher-developed questionnaire.

Data Collection

Due to the COVID-19 pandemic, data were collected via telephone interviews. Data collection followed a one-respondent-per-SME approach. This qualitative study prioritized an in-depth understanding of the phenomenon under investigation. Data were gathered through semi-structured interviews with key informants and/or in-depth interviews, each lasting approximately 20 minutes.

Data Analysis

Data analysis involved coding the completed questionnaires and using the Statistical Package for the Social Sciences (SPSS) software to perform descriptive statistical analysis and cross-tabulation to identify relationships between variables.

Research Finding

SME Characteristics

1. Gender: 75.9% of respondents were female business owners; 24.1% were male.
2. Age: The most significant proportion of respondents (44.8%) were aged 40-49; 27.6% were aged 30-39.
3. Business Size: All respondents were classified as small businesses (100%). Further questions were asked regarding business registration status to gather additional relevant information.
4. Business Registration Status: The majority of businesses were registered as companies (58.6%), followed by community enterprises (27.6%), and in the process of registering companies (13.8%).
5. Business Type: The dominant business type was manufacturing (75.9%), followed by services (13.8%) and trading (10.3%).
6. Research Interests: The most popular areas for collaborative R&D were Content and Media (44.8%), followed by Tools and Equipment (24.1%), Platform Systems

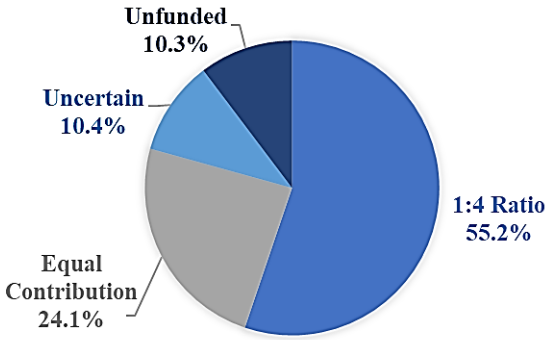
(17.2%), and New Product Development (10.3%). A small percentage (3.4%) expressed interest across multiple areas.

Investment Preferences

Figure 1 highlights the preferred funding ratios among SMEs engaging in commercial collaborative research and development projects. The majority of respondents (55.2%) preferred an investment ratio of 1:4 (SME: University), suggesting their reliance on substantial institutional support while contributing a smaller portion of the required funding themselves. The second most favored preference, chosen by 24% of respondents, was an equal funding arrangement (1:1). Meanwhile, 10.4% were uncertain about their investment preferences, while 10.3% indicated no intention to provide financial contributions. These findings underscore SMEs' financial constraints and strategic priorities when engaging in collaborative research initiatives.

Figure 1

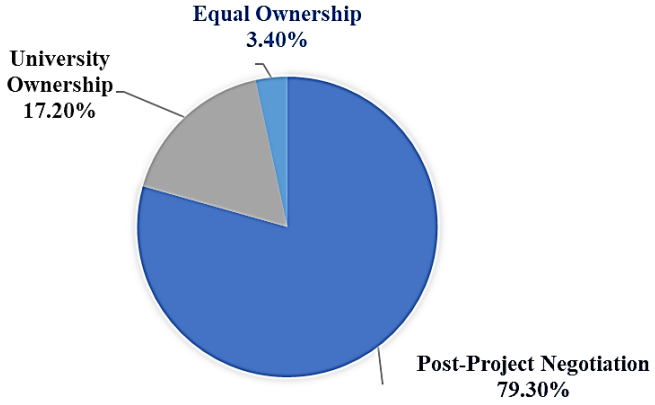
Investment Preferences



Intellectual Property (IP) Ownership Preferences

Figure 2 illustrates SMEs' intellectual property (IP) ownership preferences in commercial collaborative research and development projects. Most respondents (79.3%) preferred to negotiate IP ownership arrangements after the completion of the research project, highlighting the need for flexibility and adaptability in such agreements. Additionally, 17.2% of respondents preferred that Chiang Mai University retain full ownership of the resulting intellectual property. Meanwhile, a smaller proportion of respondents (3.4%) preferred shared IP ownership on an equal basis with Chiang Mai University. These findings underscore the importance of accommodating diverse SME expectations to foster effective academic-industry collaborations.

Figure 2
Intellectual Property (IP) Ownership Preferences



Conclusion

Summary

This study explores the characteristics, investment preferences, and intellectual property (IP) ownership expectations of small and medium-sized enterprises (SMEs) involved in collaborative research and development (R&D) with Chiang Mai University. The findings reveal key demographic and operational profiles, highlighting critical factors influencing academia-industry partnerships.

SME Characteristics

The majority of respondents were female business owners (75.9%), aged 40-49 (44.8%), and operating small businesses (100%). Most businesses were registered as companies (58.6%) and predominantly involved in manufacturing (75.9%), with services (13.8%) and trading (10.3%) following behind. SMEs showed the most interest in R&D in the areas of Content and Media (44.8%), Tools and Equipment (24.1%), and Platform Systems (17.2%).

Investment Preferences

Most SMEs (55.2%) preferred an investment ratio of 1:4 (SME: University), reflecting their dependence on institutional financial support. Equal funding arrangements (1:1) were selected by 24%, while 10.4% were uncertain about their preferences, and 10.3% did not intend to contribute financially. These preferences emphasize SMEs' financial constraints and strategic priorities when engaging in academic collaboration.

Intellectual Property Ownership Preferences

The preferred model for 79.3% of SMEs was negotiating IP ownership after project completion, indicating a need for flexibility in such agreements. A smaller proportion (17.2%) supported full IP ownership by Chiang Mai University, and only 3.4% favored equal shared ownership. These findings suggest that accommodating diverse IP expectations is crucial for fostering effective academic-industry collaborations.

Discussion

The findings from this study provide critical insights into the collaborative dynamics between small and medium-sized enterprises (SMEs) and Chiang Mai University. The demographic profile of SMEs, predominantly led by female entrepreneurs aged 40-49, reflects the significant role of experienced women in driving small businesses. The dominance of manufacturing (75.9%) as the primary operational sector highlights a key area for targeted academic-industry collaboration.

The investment preferences of SMEs, with the majority (55.2%) favoring a 1:4 funding ratio (SME: University), indicate their firm reliance on institutional financial support. This reliance underscores the financial constraints that small businesses face, likely exacerbated by external economic pressures such as the COVID-19 pandemic. By contrast, the minority preference for equal funding contributions (24%) reveals opportunities to engage more financially capable SMEs in deeper collaboration. For institutions like Chiang Mai University, adopting tiered funding models could accommodate diverse financial capabilities among SMEs and encourage higher participation rates.

The preference for negotiating intellectual property (IP) ownership post-project (79.3%) highlights a critical need for flexibility in IP agreements. This approach suggests that many SMEs prefer to retain adaptive options depending on research outcomes. However, the low awareness of IP's commercial value among SMEs may also play a role, reinforcing the need for universities to provide IP education as part of R&D agreements. The small proportion of respondents (3.4%) favoring equal IP ownership further demonstrates diverse expectations, emphasizing the importance of personalized collaboration frameworks.

In conclusion, these findings highlight the need for adaptable, inclusive research models and transparent negotiations to bridge gaps in funding and IP ownership preferences. Chiang Mai University is pivotal in fostering trust, empowering SMEs through capacity-building initiatives, and strengthening academia-industry partnerships to drive regional innovation and growth.

Recommendations for Aligning Policy and Practices for Effective Collaboration

The study identifies gaps between current university practices and the preferences of SMEs, particularly in terms of funding and IP ownership. To build stronger and more sustainable academia-industry partnerships, universities should aim to bridge this gap by adopting more adaptable research models and enhancing transparency in collaboration agreements. Facilitating open dialogue during initial collaboration stages can help address SME concerns and establish mutually beneficial frameworks. Additionally, integrating capacity-building initiatives, such as financial planning and IP management training, can empower SMEs to participate more effectively in collaborative research.

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Adapting for Survival: Self-Learning as a Trajectory to Overcome Precarity Among Young Urban-to-Rural Migrants in Vietnam

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Abstract

The trend of urban-to-rural migration in Vietnam among young people aged 20 to 35 has emerged in recent years in Vietnam, especially post-covid 19. This paper explores how these individuals keep enhancing their skills and knowledge through online platforms or short-term courses, even after relocating from urban to rural areas. Based on data acquisition from two fieldworks in Vietnam Central Highland since 2016, along with follow-up interviews in Hanoi, the study examines the motivation and experiences of these migrants when they seek and take part in different learning settings. The findings indicate that while big cities are often perceived as hubs of learning opportunities that attract young people to migrate, my interlocutors even demonstrated a stronger motivation for self-improvement upon returning to rural areas rather than to urban centers. Particularly, they frequently participate in online courses, travel within Vietnam and abroad, and engage in a diverse range of educational activities. The study also aims to explore the concepts of Susanne Klien's experimental ground as these individuals show an ongoing process of learning and acquiring new skills and knowledge in each moving journey. The research compares the context of the post-growth society in Klien's work with that of developing countries like Vietnam. It argues that despite a lack of government incentives, accumulated capital, or the societal maturity found in developed countries, these individuals still display a self-learning commitment to overcome rural life's precarity and sustain their relocation.

Keywords: urban-to-rural migration, self-learning, counterurbanization, youth, Vietnam

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Introduction

In September 2016, I came across a volunteer recruitment post on a Facebook group titled "bỏ phố về rừng" (literally translated as "leaving the city for the forest") from a homestay in Dalat – a mountainous area in Vietnam's Central Highlands. It invited anyone interested in experiencing a "rural happy life" to stay there for two weeks. While the owner covered all accommodation and meal expenses, volunteers were required to contribute at least four hours of work per day to support the homestay's operations.

I packed up and stayed there for one month with 4 other volunteers. We shared a room with the owner, who was also in their twenties. The volunteers came and went, but they all showed a deep sense of connection and even a serious interest in relocating to rural areas after their experience, despite being aware of the challenges.

Similar posts can be found in abundance in social media platforms with high levels of interaction, reflecting an increasing number of young people choosing to permanently relocate to rural areas. This shift is visible through the engagement of millions of users in relevant Facebook communities (Figure 1). Notably, in 2021, over 2.2 million people migrated from major cities to rural areas during the COVID-19 pandemic, marking a significant statistic number reflecting the reverse migration trend.[1]

Figure 1

Facebook Groups With Thousands of Urban-Rural Participants

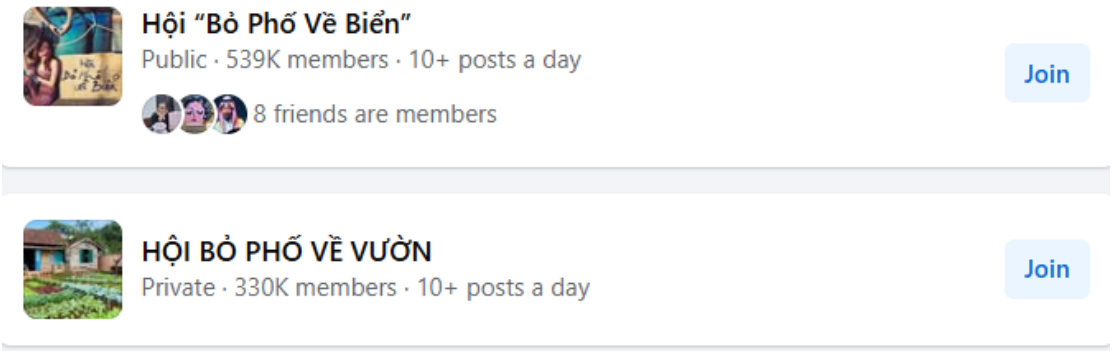

Image captured by the author on Facebook search in 1/4/2025

On the other hand, the sudden popularity of this trend has raised questions about its sustainability and generated some negative public perceptions. The accumulated experiences of many failed attempts in earlier phases highlight the challenges inherent in going against the mainstream trajectory of urbanization. Insecurity regarding career prospects, daily income, and disrupted social networks often creates anxiety among individuals undertaking such mobility, as reflected in common public discourses found in mass media. As a result, people have increasingly realized that migrating to the countryside should not be driven solely by anti-urban sentiments or an idealized view of rural life; reverse migration also presents considerable challenges to those who diverge from the mainstream.

[1] Statistic number collected by the author from the General Statistics Office, available at: https://dtinews.dantri.com.vn/vietnam-today/over-22-million-people-leave-cities-during-covid-19-pandemic-20220107125323337.htm

Nevertheless, ethnographic data in this study reveals the interplay between precarious conditions and positive self-learning experiences among migrants. In particular, the limitations of rural settings have fueled stronger aspirations among young individuals to improve themselves, while self-learning has supported their efforts to remain in these areas in a sustainable way. Therefore, this paper argues that although urban areas are often perceived as the primary hubs for learning and growth, my interlocutors demonstrated strong determination and resilience in overcoming challenges by upgrading their skills and acquiring practical knowledge.

Drawing on Susanne Klien's concept of the "experimental ground" (Klien, 2021) and de Haas's framework of "aspirations and capabilities" in migration (de Haas, 2021), this study presents findings from multi-sited ethnographic fieldwork that explore the self-learning trajectories of young individuals following their relocation to rural areas.

The structure of this paper is as follows: (1) a review of the relevant literature to justify the significance and feasibility of the research; (2) presentation of ethnographic data on both short-term and long-term migrants; (3) discussion of common patterns in their self-improvement efforts to overcome challenges; and (4) analysis of self-learning as an expression of aspirations and capabilities within their migration trajectories.

Revisiting Literature Review of Urban-to-Rural Migration and Self-Studying

The topic of urban-to-rural migration can be traced back to Berry's studies, which identified a demographic reversal trend in the United States beginning in the 1950s (Berry, 1980). This phenomenon expanded to developed countries in Europe during the final decades of the 20th century, and more recently to East Asian countries such as Japan and China in the early 21st century. The trend has gained considerable momentum following the COVID-19 pandemic (McManus, 2022; Tammaru & Leetmaa, 2007), as evidenced by the publication of special issues on the subject in major academic journals including Elsevier in 2024,[2] Wiley in 2023,[3] and Taylor & Francis in 2022.[4]

However, the majority of studies continue to focus on urban-to-rural migration in developed countries (Champion, 1989; Fielding, 1982; Klien, 2021; Kontuly et al., 1986; Lewis et al., 1989). These studies often associate the trend with lifestyle migration, particularly among affluent individuals seeking fulfillment beyond material wealth (Benson & O'Reilly, 2009). While there is a growing body of literature linking urban-to-rural migration to rural entrepreneurship (Halfacree, 2008) and rural revitalization efforts, particularly in China (Liu et al., 2023; Yu et al., 2024), academic attention to this phenomenon in developing countries remains limited, especially in the context of Vietnam.

Meanwhile, the migration studies in Vietnam have traditionally been dominated by rural-to-urban and rural-to-rural movements (Nguyen, V., 2021, p. 90). Although a significant wave of decentralization occurred in Vietnam between 1970 and 1990, and was addressed by some

[2] See more at: Counterurbanisation, again: Rural mobilities, representations and policies, https://www.sciencedirect.com/special-issue/10H87RD3DC2
[3] See more at: Population, Space and Place: Volume 29, Issue 6, https://onlinelibrary.wiley.com/toc/15448452/2023/29/6
[4] See more at: Counter-urbanisation in Australia: reviewing current trends in migration from urban to regional places, https://www.tandfonline.com/toc/cage20/53/4

scholars (e.g., Nguyen, D., 1984; Desbarats, 1976), their research primarily focused on state-led policies aimed at redistributing the population after the Communist Party came to power. These historical patterns are fundamentally different from the current trend of voluntary urban-to-rural migration.

In the early 21st century, with the acceleration of urbanization, scholarly attention to migration increasingly prioritized rural-to-urban dynamics, and the topic of urban-to-rural migration largely faded from academic discourse. Notably, in 2008, a large-scale research project led by Nguyen Thi Thieng and colleagues investigated decentralization in Vietnam's two largest cities, Hanoi and Ho Chi Minh City (Nguyen Thi Thieng et al., 2008). Despite some academic interest, urban-to-rural migration in Vietnam remains an underexplored area within migration studies.

Therefore, to fill this research gap, this study focuses on young people who have relocated from urban centers to mountainous areas in Vietnam's Central Highlands. Ethnographic fieldwork was conducted in two phases: from February to March 2023, and from March to May 2024. During these periods, I lived among young migrants aged between their early 20s and mid-30s, participating with them in daily farming activities, local events, and occasional travels. Data was collected through participant observation and a combination of open-ended and semi-structured interviews, both in-person and online, during and after the fieldwork.

"Thợ đụng" – Those Who Do It All: Multi-skilled Learning for Sustainable Livelihoods

> If you want to return to the countryside to build a career, you have to become a thợ đụng – those who can do it all. (Interview Bang in Gia Lai Province, 10/2023)

Thanh (all names in this paper are pseudonyms) is the son of a working-class family in a small city in Vietnam's Central Highlands. He was considered a successful student of his generation, earning admission to one of Vietnam's top ten universities in Hanoi. Upon graduation, he launched his own entrepreneurial venture and quickly found early success. Expanding his business to major cities such as Ho Chi Minh City and Da Nang, he rapidly became a millionaire at a young age. At 30, he sold his business, moved to Gia Lai, and acquired almost 10 hectares of land, where he began building his own farm in a rural, and even isolated area.

There were only about ten neighbors in the vicinity, each living a hill apart from the others, which meant limited human interaction and minimal neighborhood interference. Nevertheless, there is still human interaction inside the farm. Thanh teamed up with Bang (an agricultural engineer) to manage and be responsible for the farm during weekdays. He also hired local farmers and volunteers to work with him. The two later became key hosts for my fieldwork in Gia Lai while the volunteers were also my indebted interlocutors.

The first time I arrived at the farm, I was surprised to see that despite Thanh's wealth and affluent ongoing business ventures, including trading investments and launching online teaching courses, he still devoted his free time to engage in almost all of hands-on agricultural work. Remarkably, he was almost as skilled as Mr. Bang. He selected high-quality seedlings, watered the plants each morning, tilled the soil, mowed the grass, and pruned branches and leaves. In the second time I came one year after, he upgraded his knowledge about agriculture as much as an expert, including the bacteria affecting different

species, and the organic methods used to treat them. These practices made his farm stand out in the neighborhood.

Learning instinctively and closely following Bang's guidance, Thanh absorbed new knowledge each day on how to apply organic farming methods and manage the farm, often entirely by himself. Although he often said, "Everyone should do what they're good at; Bang is good at farming, so he should do it," he also emphasized two things: first, working with your hands helps keep you healthy; and since the farm belongs to him, he believes he must at least master the basics himself (Figure 2).

Figure 2
Thanh Wrapping Guavas to Prevent Pests on His Farm

Image captured by the author on Facebook search in 1/3/2025

Meanwhile, Bang perfectly embodies the concept of a "thợ đụng." I first learned the term from him, as it is not commonly used in contemporary Vietnamese. "Đụng" means "to touch," while "thợ" refers to workers or technicians. Together, the phrase describes someone who "touches everything"—a versatile worker capable of doing it all.

Before becoming the farm manager, Bang held a high-paying job in agriculture in a major city. However, he recalled feeling trapped in a rigid routine — "coded," as he described it — working from 8 a.m. to 7 p.m. with little time for personal reflection. While he earned significantly less after relocating to the countryside, "the salary here is just for fun," he admitted, "sometimes I even go broke", he gained something more valuable: time. Time to reflect, to recognize the knowledge gaps he hadn"t noticed before, and to pursue learning on his own terms.

> 'I used to think being an expert in my field was enough,' he shared, 'but in today's world, we need to know more. And learning is exciting — it's about exploring something new. The joy of self-learning I experience now is truly fulfilling. It's not about getting a high score or a promotion but about enriching myself.' (Interview, 5/2024)

While Bang primarily oversaw farming activities, he also took on business and marketing strategies to help distribute their agricultural products. He expanded his network through social media, established a dealer system to sell fruits in urban markets, and later began exploring financial investments in sectors that piqued his interest. He shared: "The most

important freedom is financial freedom. Being a farmer means you'll never go hungry, but if I want a secure future — especially with the instability of agricultural markets — I must keep learning more" (Interview, 11/2023).

During the three months I stayed there, I often saw Bang enrolled in online courses on financial management and investment. He was eager to absorb everything, applying new knowledge directly into his daily life — topics he had never previously considered when his life in the city was consumed by work.

Aside from the knowledge and skills related to their main work, what stands out about these two young men is their ability to acquire a wide range of additional skills to manage their everyday lives. They repaired plumbing, built wooden huts, and came up with creative ways to cook meals using ingredients available on the farm. Most of these skills were learned through online resources and accumulated gradually over time. These capabilities not only help them meet the demands of daily life but also contribute to a sense of security and self-sufficiency for their future.

The stories of Thanh and Bang illustrate how young urban-to-rural migrants adopt a wide range of practical and entrepreneurial skills to navigate the challenges of rural life. Far from being passive relocators, these individuals actively transform their environments through continuous self-learning and adaptation. The rural setting, often perceived as isolating or stagnant, in fact provided them with inspiring conditions, such as time, space, and a slower pace of life—that allowed for deep self-reflection and earnest motivation to grow.

Whether through hands-on farming, financial investment, or everyday problem-solving like plumbing and food preparation, they embody the spirit of the "thợ đụng"—those who do it all. This multi-skilled adaptability is not only a strategy for livelihood sustainability but also a form of personal empowerment and fulfillment. Their experiences suggest that the countryside, rather than being a retreat from learning, can become an experimental ground where learning thrives through necessity, curiosity, and the pursuit of a freer, more self-determined life.

Learning as Self-Fulfillment: Adopting Recreational and Soft Skills for a Meaningful Rural Life

One of the key challenges faced by urban-to-rural migrants, equally significant as income generation, is the pursuit of spiritual and emotional fulfillment. While urban environments offer an abundance of recreational opportunities and entertainment venues that cater to young people's need for stimulation, rural areas are often perceived as monotonous and isolating. This perception contributes to the common trend of rural outmigration, even among those who initially chose to relocate to the countryside.

However, for Thanh and Bang, self-directed learning emerged as a powerful strategy to counteract the solitude and emotional inertia of life in a remote, mountainous region. In the absence of direct, high-frequency social interaction, the pursuit of knowledge became both a form of engagement and a source of inner vitality, allowing them not only to endure but to thrive in their chosen rural lifestyle.

In the quiet evenings on the farm, far from the urban buzz, I often found Thanh sitting on a small wooden stool, strumming his guitar softly under the light of a solar lamp. His phone

stood upright in front of him, displaying a music theory lesson. “Just a bit of learning each day”, he said with a smile. Meanwhile, in another corner of the hut, Bang lay on a hammock, headphones in, deeply absorbed in a podcast on emotional intelligence. The peaceful silence of the highlands seemed to cradle these moments of self-driven learning, giving them space to breathe and grow.

Despite being two straight young men in their thirties, living in an isolated farm with little direct social interaction, their emotional lives were far from stagnant. Each cultivated a distinct path toward personal fulfillment, embracing learning not just for practical gain, but for emotional and spiritual nourishment.

On the other hand, in order not to feel left behind while living in such an isolated area, both Thanh and Bang remained actively connected to the outside world through social media platforms. One of the common leisure rituals on the farm, especially after long working hours, was the gathering of all members (Thanh, Bang, and the volunteers) on the front porch. Under the dim farm lights and the cool mountain breeze, they would sit together, scrolling through their phones to catch up on news, social trends, or viral videos to unwind and keep abreast of the young’s trends.

These informal digital gatherings became more than entertainment, they were moments to reconnect with urban rhythms, laugh at memes, discuss political headlines, or reflect on pop culture. As one of them joked while watching a TikTok video: “Watch to not turn into cavemen.” (Mai – a volunteer of the farm, Interview, 12/2024). In other words, they used digital media not only to stay informed but also to maintain a sense of social currency and belonging, even from the remote hills of Gia Lai.

Furthermore, both Thanh and Bang embraced new digital skills such as video-making and podcast recording. Although they did not need professional equipment and relied solely on their mobile phones, they edited videos daily using simple mobile apps, documenting their everyday life on the farm. These recordings served not only as a way to capture joyful moments and express creativity but also as a tool for building personal brands in the digital space.

Particularly, Bang has become a relatively well-known podcaster, with over 5,600 followers on Facebook and recognition as one of Spotify Vietnam’s top 200 podcasts. Their media presence extended beyond self-expression: they leveraged these platforms for economic purposes as well. Between 2019 and 2023, the pair successfully marketed and sold over five tons of avocados and durians on behalf of their neighbors, transforming digital engagement into a means of community-based agricultural commerce.

Last but not least, except for online updates, the two set a plan for themselves to travel to different places at least once every month. Their destinations were often major cities, where they participated in educational workshops, creative events, and recreational activities. For Thanh especially, the amount of time spent on the road sometimes exceeded the days he stayed on the farm.

> ‘The traveling is to keep a new me constantly,’ he told me with a grin. ‘Once I watched a video that changed my life—it was about the Big Bang theory. It enlightened me that the entire universe was created in a single explosion and that everything can vanish in an instant. Life is short, so why should we be so constrained?

> That's when I started traveling. The more places I go, the more excited I feel. It's incredibly satisfying to taste new food, see new landscapes, and meet new people.' (Interview, 10/2023)

While the desire to explore and refresh their worldview drives their journeys, there is also a quieter, more existential reason behind their movement: the fear of stagnation. Living in remote rural areas, they are acutely aware of how easy it is to fall into a routine—where days become indistinguishable, aspirations fade, and personal growth halts. Thanh once confessed: "If I don't go traveling, it means I'm standing still, I need to move forward" (Interview, 2/2025). In other words, the novel elements from each trip fuel them with the certainty to be always updated and upgraded.

In a world where rural life is often framed as static or backward, Thanh and Bang offer a contrasting narrative: one where both physical and mental is essential for sustaining a fulfilling and forward-looking life. Their journeys blur the boundary between urban and rural areas, work and leisure, routine and adventure.

Self-Learning As Adoption: Aspirations and Capabilities to Migrate in Rural Areas

The narratives of Thanh and Bang reflect a growing phenomenon of young people who relocate from cities to rural areas. To overcome the precarity upon their relocation, these individuals represent a self-determined cohort engaging in forms of self-learning that simultaneously express their life aspirations and develop their capabilities to realize them.

In a broader conceptualization of migration, this paper draws on de Haas's proposal to bridge the dichotomy between voluntary and forced migration, as well as the long-standing debate over whether migrants act with agency or are merely pushed and pulled by external factors within the current theoretical framework of migration studies. According to de Haas, migration decisions must be understood through the dual concepts of aspirations and capabilities (de Haas, 2021).

In a similar vein, the self-education practices of my interlocutors are, on one hand, driven by the precarity produced by the social contexts of post-modernization and chaotic urbanization. These include the conventional pressures embedded in dominant social discourses, such as the association of rural settlement with failure, the exhaustion stemming from overloaded and alienating neoliberal working conditions, and the inescapable trap of stable but unfulfilling monthly income in urban areas. On the other hand, the self-education efforts of my interlocutors also reflect their capabilities to response to the above external challenges. Learning, in this context, is not simply a means of coping, but a deliberate strategy for adopting a viable and empowering life trajectory. It allows them to reclaim control over their futures, reframe rural life as a space of possibility, and construct new pathways for growth beyond the confines of conventional urban success.

In addition, the self-learning of these migrants signals a broader diversification of migration and mobility patterns in today's globalized world. Within Appadurai's five-scapes of globalization (Appadurai, 1996), urban centers are no longer the exclusive hubs of learning. Thanks to digital technologies, learning is increasingly decentered and mobile which can be accessible from virtually anywhere as my interlocutors engage in self-education through digital media, creative production, and frequent travel, making their personal development processes both flexible and translocal.

However, in comparison with their counterparts in developed countries, it is apparent that my interlocutors face a heightened level of precarity regarding unstable income streams and limited institutional support. While lifestyle migrants in these countries, as Klien observed, may benefit from government promotion, social welfare systems, or mature infrastructures that facilitate rural resettlement (Klien, 2021, p. 75), young migrants in Vietnam must navigate rural life with far fewer resources. Their decisions are not buffered by savings, state subsidies, or access to rural development programs, but are instead propelled by personal drive and the urgency to create sustainable livelihoods from the ground up.

This disparity underscores the context-specific dimensions of agency: whereas agency in developed settings is often exercised through choice and lifestyle experimentation, in Vietnam it is deeply entangled with necessity and survival. The turn to self-learning, therefore, is not merely aspirational but strategic - an adaptive mechanism through which migrants compensate for the absence of external safety nets, which, nevertheless, also indicates both negative and positive aspirations and capabilities of the migrants.

Conclusion

This study documents the everyday strategies of two young urban-to-rural migrants who navigate precariousness, not just economic uncertainty and unstable career paths, but also emotional pressures, social expectations, and the fear of stagnation. In response, they actively engage in self-learning across multiple domains: from sustainable agriculture and financial literacy to emotional wellbeing and creative expression. This continuous learning is not only a way to secure a livelihood, but also a means to live a fulfilling, autonomous, and dynamic life.

As a result, the findings point out that rural migration is not a return to tradition but a reorientation toward personal growth. “Going” becomes a form of “learning”: the act of moving, both geographically and mentally, enables young people’s reflection, experimentation, and reinvention. This challenges dominant urban-centered educational models and calls for a broader understanding of learning spaces, one that values mobility, rurality, and non-institutional forms of self-development.

Nonetheless, the study is limited by the scale and timeframe of the fieldwork. Further research is needed to explore how such trajectories are unfolding among wider groups of rural migrants and how they might signal new directions in youth learning and rural development in Vietnam and beyond.

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How Can Artificial Intelligence Improve Children's English Reading Comprehension?

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Abstract

The increasingly extensive application of artificial intelligence in various societal domains has a progressively profound impact on education reform. The proper use of AI can create a favorable English learning environment for students to promote English reading comprehension. This research investigates whether children can improve their English reading ability and enhance their interest in learning English with the help of AI. The participants of the research were 14 students from Grade Six in a primary school in Xuzhou. The duration of the research was six weeks. In the first week, students were given a TOEFL Primary Step 1 reading test and an English reading interest questionnaire. After the pre-test, teachers converted each student's reading score into a Lexile level and selected English reading picture books suitable for their Lexile level to teach in the next four weeks. From the second week to the fifth week, the teacher selected a reading lesson every week for AI-assisted teaching. Each class consisted of three parts: the teacher uses a multi-modal teaching method to teach picture books; students use an AI tool, Reading Coach, to read the picture books they have learned and choose new ones to read. Four weeks later, the 15 students took the TOEFL Primary Step2 test and the same questionnaire survey again. By comparing the average reading scores of the pre-test and post-test and analyzing the results of two survey questionnaires, we found that students' reading comprehension ability has improved, and students' interest in English learning has also been enhanced.

Keywords: artificial intelligence, English reading comprehension, learning interest, AI-assisted teaching, Lexile framework

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Introduction

English reading comprehension occupies a core position in primary school English teaching. It is not only the embodiment of comprehensive use of language knowledge, but also an important way to cultivate students' thinking ability and cross-cultural communication awareness. With the rapid development of artificial intelligence technology, its penetration in the field of education has brought new opportunities and challenges for primary school English reading teaching. How to effectively use artificial intelligence to improve primary school children's English reading comprehension has become an urgent research topic. I am a first-year postgraduate student majoring in primary education. I have a very strong interest in integrating artificial intelligence into primary school English teaching, so I chose this topic for research.

Theoretical Framework

Theory of Constructivism

Constructivism believes that learning is a process in which learners take the initiative to process new information and construct the meaning of knowledge (assimilation and adaptation) based on original knowledge experience and in a certain social and cultural environment. In terms of artificial intelligence helping primary school children to improve their English reading ability, based on the constructivist learning theory, artificial intelligence can provide children with rich reading materials and multiple interactive situations (Piaget, 1977). For example, intelligent reading software can push personalized English stories, articles, and other reading materials according to children's reading level and interest preferences, which becomes the basic information source for children to construct an English knowledge system. At the same time, English reading situations created by virtual reality or augmented reality technology, such as virtual English library and story scene reproduction, enable children to deepen their understanding and construction of reading content in interaction with the environment. Children no longer passively accept knowledge, but actively explore and discover in the interaction process with the resources provided by artificial intelligence, and constantly adjust their cognitive structure to improve their English reading ability. As Piaget emphasized, children develop cognition in interactions with their environment, and AI provides a broader, more personalized space for such interactions (Vygotsky, 1978).

Theory of Multiple Intelligences

Gardner's multiple intelligence theory proposes that human beings have linguistic intelligence, logic-mathematical intelligence, spatial intelligence, body-movement intelligence, musical intelligence, interpersonal intelligence, introspective intelligence, natural observation intelligence, and other intelligences. In primary school English reading teaching, artificial intelligence can fully tap and develop children's various intelligences to improve reading ability (Gardner, 1983). For example, intelligent speech recognition technology can assist children in English reading training, in the process of exercising children's language intelligence, at the same time, software feedback to children reading, such as pronunciation correction, intonation evaluation, etc., help children to develop introspective intelligence, so that they can realize their shortcomings and improve. Some interactive artificial intelligence reading platforms, such as role-playing and group cooperative reading games, involve the cultivation of interpersonal intelligence, and children can better understand the connotation and meaning of reading texts in interaction with peers or virtual characters. In addition, the use of artificial intelligence reading tools rich in multimedia resources, such as animation, video, and

other forms to display reading content, can stimulate children's visual-spatial intelligence, help them more intuitively build an understanding framework of English reading content, to improve English reading ability in multiple dimensions (Gardner, 2011).

The Importance of Primary School Children's English Reading Comprehension Ability

In today's era of globalization, English has become a universal language and has gradually become one of the core subjects in the education system of various countries. For primary school children, English reading comprehension is not only the basis of learning English well, but also the key to their future academic development. With the rapid development of information technology, English has become not only a tool for daily communication but also a necessary means to acquire knowledge, participate in global cultural exchanges, and develop critical thinking. Therefore, it is of profound educational and social significance to cultivate children's English reading comprehension ability.

First of all, English reading comprehension is the core of language learning. For primary school students, English reading comprehension is not only the mastery of vocabulary and grammar, but also the accurate understanding and analysis of the topic of the article, the meaning of the sentence, and the author's point of view. The cultivation of this ability helps students to expand their vocabulary and enhance their language sense, thus laying a foundation for their future English writing and oral communication abilities. Reading comprehension is the most basic and key part of language learning, which directly affects students' English mastery and application ability (Lalićić & Dubravac, 2021).

Secondly, English reading comprehension is conducive to the improvement of comprehensive quality. Primary school is a critical period for the development of children's cognitive and thinking abilities. Through reading, students can not only increase their knowledge but also exercise their analytical, reasoning, and critical thinking skills. For example, when reading an English story, students should not only understand the literal meaning but also be able to infer the motives of the characters, the development of the plot, and the deep meaning behind it. The cultivation of this ability helps students develop the habit of independent thinking and enhances their ability to solve problems.

In addition, English reading comprehension is crucial to the improvement of academic performance. In every subject in elementary school, reading and comprehension skills are fundamental to success. Especially in interdisciplinary learning, students need to acquire information from other disciplines through English reading and knowledge transfer. Therefore, if students have a good grasp of English reading comprehension skills, they will be able to cope with various learning tasks and challenges more easily. For example, the English textbooks or materials used in science, history, and other courses require students to have a certain English reading comprehension ability to fully understand and absorb the knowledge (Denton et al., 2022).

Furthermore, the improvement of English reading comprehension helps to cultivate cross-cultural communication ability. In the context of globalization, English, as the main tool of international communication, plays an increasingly important role. Being able to understand and appreciate English reading materials not only helps students to be exposed to cultures and ideas from around the world, but also fosters their global perspective. By reading works from different countries and cultural backgrounds, students can broaden their minds and enhance

their understanding and respect for multiculturalism, thus preparing them for future cross-cultural exchanges and international cooperation.

To sum up, the cultivation of primary school children's English reading comprehension ability has important academic, cognitive, and social significance. It is not only a basic skill for children to master English, but also a key factor to promote all-around development. How to effectively improve children's English reading comprehension has become an important problem to be solved urgently in the field of education. Through advanced educational technology and innovative teaching methods, we can provide children with a more personalized, interactive, and fun learning experience to help them thrive in the world of reading in English.

The Application of Artificial Intelligence in Primary School English Reading Teaching

In China, there are more and more artificial intelligence platforms to assist teachers in teaching. For example, Yike.com can provide rich picture book reading materials for primary school English reading teaching, accurately evaluate students' reading accuracy and fluency, etc., and develop personalized learning paths and plans based on students' learning data. The "Homework Together" platform can stimulate students' interest in the form of gamified homework, and its standard pronunciation error correction system can point out pronunciation errors in time, help improve oral English ability, and reduce the burden of homework correction. Qingrui Education can be used as an anthropomorphic interactive language training platform to correct pronunciation in students' imitation reading training. Its scoring system adopts brain-like cognitive calculation to provide clear standards for pronunciation evaluation.

These platforms can provide personalized learning support for students. By analyzing students' learning data, they can develop personalized reading learning paths, recommend resources, and give feedback guidance, such as pushing suitable reading materials according to students' vocabulary and reading ability. It can also provide intelligent interaction and feedback, with the help of speech recognition, intelligent question and answer, and other technologies to interact with students, timely and accurate feedback, such as the system automatically points out pronunciation errors after students read and correct. Some are more capable of creating situations, using virtual reality and augmented reality technology to create realistic English reading situations, such as allowing students to experience the story scenes immersive way and enhance the depth of understanding.

However, the application of artificial intelligence to children's English reading also faces problems and challenges. For example, there are some technical limitations, some tools have inaccurate speech recognition, situation creation is not real enough, and other problems, affecting the user experience and student experience. Secondly, some teachers lack knowledge and skills training related to artificial intelligence, which makes it difficult to give full play to its advantages, and they face new challenges in teaching design and classroom management. In addition, there may be data privacy leakage and security risks. The collection, storage, and use of students' learning data have privacy disclosure risks, and protection measures need to be strengthened. Finally, the issue of educational equity may arise. There is a gap between schools in economically developed areas and remote areas in the equipping and use of artificial intelligence educational tools, which may lead to the uneven distribution of educational resources.

Introduction to Microsoft Reading Coach

Artificial intelligence covers many advanced technical elements, such as new intelligent algorithms and big data. By introducing artificial intelligence into primary school English reading teaching, teachers create teaching situations around English reading teaching content based on a correct understanding of artificial intelligence technology, and encourage students to devote themselves to English reading learning. Microsoft Reading Coach is a generative AI tool from Microsoft for student groups designed to help learners improve their reading skills through personalized and engaging exercises. Reading Coach has the following features:

The first is its ability to provide personalized Reading exercises. The Reading Coach sets training tasks based on the user's reading questions, provides immediate feedback on pronunciation and fluency, and provides fluency coaching at the end of the chapter for words that the user finds challenging. The second is the ability to create AI stories, where users can freely choose characters, Settings, and reading levels to create their own AI stories, which are reviewed by Microsoft's Responsible AI guidelines and can be read in an "immersive reader." Third, a Reading coach can also provide a variety of reading modes, including creating stories, reading from libraries, and adding their content, to meet different learning needs. Finally, it can also provide learning progress tracking, so that teachers can understand the progress of students' learning to understand the improvement of students' reading ability.

In my opinion, using Microsoft Reading Coach to help children improve their English reading ability is of great significance in many aspects. First of all, it can provide students with a personalized learning experience. It can provide customized reading exercises according to children's reading level and learning situation, automatically detect and generate supplementary exercises for children's unfamiliar words, and create personalized reading trips tailored to children's needs according to their preferences for the content of story chapters. So it can better meet the learning needs of different children and improve learning efficiency.

Secondly, it can also provide immediate feedback and guidance for children in pronunciation and fluency, after reading a paragraph or chapter, can quickly point out the most difficult words, and guide them step by step how to break down the words by syllables, read each syllable clearly, help children timely detect and correct reading problems. Effectively improve the accuracy and fluency of reading.

Thirdly, it can stimulate students' interest in English learning to a certain extent. By allowing children to freely choose the characters and scenes in the story and determine the development direction of the story chapters, they can fully participate in the reading process and seem to become the creator of the story, which greatly enhances the interest and attraction of reading, thus stimulating children's interest and enthusiasm in English reading. Get them more engaged in learning.

Fourthly, I think it can enhance students' confidence in English learning. When children make progress in the reading process, such as completing chapter reading, correctly reading difficult words, etc., the app will reward them with badges focused on effort and unlock new characters and scenarios for the next story. This reward mechanism can make children feel recognized and affirmed for their efforts, which can increase their self-confidence and make them more motivated to continue reading and learning.

Fifthly, it can cultivate students' self-learning ability. In the process of using Microsoft Reading Coach, children can choose the learning content and determine their learning progress independently, gradually learn self-management and self-supervision, and cultivate the ability of independent thinking and problem-solving, which lays a good foundation for future learning and development.

Finally, Reading Coach can also assist teachers in teaching. Through this tool, teachers can understand children's learning progress and reading ability improvement, to make more targeted teaching plans and guidance strategies, provide more accurate education support for each child, and improve teaching effects.

Research Design

The purpose of this study was to test whether children's English reading comprehension improved with the assistance of artificial intelligence. The subjects were students from two classes of Grade Three in a primary school in Xuzhou city. The specific study design was to divide the two classes into an experimental group and a control group. At the beginning of the semester, the students of the two classes were given a TOEFL Primary Step 1 reading test, which consisted of 30 minutes of reading. The average scores of the two classes were compared after the test was completed. The pre-test also includes an English reading interest questionnaire to investigate students' attitudes and interest in English reading. According to each student's TOEFL Reading score, the teacher can convert the reading score into Lexile level, select English reading picture books suitable for their Lexile level, and input the picture book reading materials into the Reading Coach in advance. After the semester begins, the teachers in the experimental group will select a reading lesson every week. In the first round, students are asked to spend 10 to 15 minutes reading picture book reading materials suitable for their situation with Microsoft Reading Coach. The reading Coach can provide reading accuracy according to students' reading situation, and present students' misreading or unfamiliar words for repeated practice. The second task is to let students read freely, and students can create their reading materials. One function of the Reading Coach is to freely choose roles, scenes, and reading levels, create exclusive artificial intelligence stories, and read them. In this process, teachers need to make inspections and help students answer questions. The teachers in the control group taught normally and did not use artificial intelligence tools to assist the teaching. After one semester, we conducted the TOEFL Primary Reading comprehension test and post-test of the English reading interest questionnaire for the two classes again, and compared the average scores of the two classes. It is expected that the average scores of the experimental group will be higher than those of the control group, and the reading comprehension ability of the students in the experimental group will have been significantly improved, and the interest in English reading of the students in the experimental group will also have been significantly improved.

Prospects of Using Reading Coach to Improve Children's English Reading Comprehension

In the future, Microsoft Reading Coach will be deeply integrated into the English teaching scene and become the core tool for teachers to improve children's reading comprehension. With its advanced artificial intelligence technology, it can conduct real-time analysis of each child's reading behavior, generate detailed reports from multiple dimensions such as reading speed, comprehension accuracy and vocabulary mastery, so that teachers can accurately grasp the learning situation and formulate highly personalized teaching strategies.

In the classroom teaching, it will achieve seamless docking with the teaching process. Teachers can use their extensive library to easily conduct thematic reading lessons, such as natural science topics, and quickly select multiple articles suitable for children of different levels. The reading coach can provide immediate pronunciation and intonation correction when the children read, initiate interactive discussion on the content of the article after reading, guide the children to actively participate in the article with virtual characters, cultivate critical thinking and oral expression skills, and make the class full of vitality and depth.

For after-school learning, the Microsoft Reading coach will build a solid bridge for co-education. As children continue their reading journey at home, the software recommends extended reading material based on what they have learned in class and intelligently tracks their progress. Parents can intuitively understand their children's learning trajectory and receive professional guidance and suggestions through the supporting parent application, to better accompany and encourage their children to read and realize the organic combination of home-school education.

In the future, Microsoft Reading Coach is expected to integrate with emerging technologies. For example, with the help of virtual reality (VR) technology, create an immersive reading environment for children, so that they seem to be in the story scene, greatly enhancing the reading experience and memory effect. This innovative tool will continue to promote the transformation of children's English reading teaching, open a door to a broad world of knowledge for children, help them steadily move forward on the road of English learning, and lay a solid foundation for future academic and life development.

Conclusion

This study demonstrates the significant potential of artificial intelligence (AI), particularly tools like Microsoft Reading Coach, in enhancing primary school children's English reading comprehension and fostering their interest in English learning. By integrating AI into a six-week intervention program, students in the experimental group exhibited measurable improvements in reading scores on standardized tests (TOEFL Primary) and reported increased engagement and motivation through post-intervention surveys. Key findings highlight the effectiveness of AI in providing personalized learning experiences, immediate feedback, and interactive, gamified content that aligns with constructivist principles and Gardner's theory of multiple intelligences.

The success of AI-assisted teaching lies in its ability to adapt to individual learners' Lexile levels, offer dynamic error correction (e.g., pronunciation guidance), and empower students to co-create stories, thereby enhancing autonomy and creativity. Furthermore, AI tools like Reading Coach alleviate teachers' burdens by generating data-driven insights for targeted instruction, bridging classroom learning with at-home practice, and fostering home-school collaboration.

However, challenges remain, including technical limitations (e.g., speech recognition accuracy), uneven access to AI resources across regions, and the need for teacher training to maximize AI's pedagogical value. Future research should expand sample sizes, extend intervention durations, and explore integrations with emerging technologies like VR to create immersive reading environments. Policymakers and educators must address equity gaps to ensure all students benefit from AI-driven innovations.

In conclusion, AI represents a transformative force in primary English education. By leveraging its strengths while mitigating limitations, stakeholders can cultivate a generation of confident, skilled, and globally minded young readers prepared for the demands of a rapidly evolving world.

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Direction of AI Technologies in Education: An Empirical Case Study of Student Teachers in Thailand

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Abstract

Artificial Intelligence (AI) is becoming increasingly popular in Thailand as a tool for teaching and learning in the field of education. This research explores the use of AI in learning by student teachers for teaching and learning, assessment, ethics, essential skills and future applications of the teaching profession. The objectives of this study are: 1) Analyze the influence of AI use on learning and teaching; 2) Investigate the impact on the teaching and learning process and 3) Predict the influence on student teachers' use of AI. Therefore, to achieve this goal, this study uses an empirical case study approach based on a survey of N = 254 final-year student teachers. The results of this study support the important role of AI in the future for student teachers. The study reveals that student teachers need to integrate AI more extensively, accounting for 97%, to prepare for future professional teaching. The results also indicate that AI has a positive impact on the learning experience by facilitating the acquisition of new knowledge and skills and should be more comprehensively integrated into teacher training curricula. Developing student teachers' ability to use AI effectively helps them better meet the future demands of the teaching profession.

Keywords: AI, education, student teacher

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Introduction

The integration of artificial intelligence (AI) technology in education has transformed teaching and learning processes worldwide. AI-driven technologies are being utilized to enhance adaptive learning, reduce administrative workloads, and personalize learning experiences for students (Luckin, 2017; Selwyn, 2019). In the context of teacher education, AI presents both opportunities and challenges, particularly in developing countries like Thailand, where educational institutions are striving to incorporate digital technologies amidst infrastructural and pedagogical constraints (Schmid et al., 2021). As AI applications such as intelligent tutoring systems, automated grading, and predictive data analytics become increasingly prevalent, it is essential to examine their impact on teacher training and preparedness.

Thailand's education system has undergone continuous reform over the past decades, with a growing emphasis on technology-driven learning. Government policies, such as Thailand 4.0, highlight digital transformation as a key driver for economic and social development (Office of the Education Council, 2020). However, despite AI's growing influence across various sectors, its integration into teacher training curricula remains in its early stages. Many teacher education institutions face challenges related to digital literacy, resource allocation, and resistance to technological change (Zawacki-Richter et al., 2019). This study aims to explore the trajectory of AI technology in Thai teacher education by analyzing its implementation, benefits, and limitations in teacher training programs.

AI-powered educational tools offer personalized learning pathways, enabling student teachers to develop teaching skills through analytical feedback and interactive simulations (Chen et al., 2020). For instance, AI-driven platforms can assess student engagement, evaluate teaching performance, and provide tailored recommendations to enhance instructional effectiveness (Holmes et al., 2021). Additionally, AI can support collaborative learning environments by facilitating peer assessment and promoting reflective teaching practices (Goodyear & Retalis, 2019). However, concerns regarding data privacy, algorithmic bias, and ethical implications of AI in education need to be addressed to ensure equitable and inclusive learning experiences (Williamson & Eynon, 2020).

This empirical study focuses on student teachers in Thailand, investigating how AI technology is being utilized in teacher training programs and assessing its impact on teaching effectiveness. Employing a mixed-methods research approach including surveys, interviews, and classroom observations, this study provides a comprehensive analysis of AI adoption in teacher education curricula. The findings will contribute to policy recommendations for promoting AI integration in Thai higher education institutions and preparing future educators for AI-driven learning environments.

Research Objectives

The objectives of this research are as follows:

1. To analyze the influence of AI on teaching and learning by examining its impact on student teachers' learning processes and teaching effectiveness.
2. To study the role of AI in teacher training and preparation by exploring how it enhances teaching skills and improves training curricula.

3. To predict future trends and the impact of AI on the teaching profession by assessing student teachers' readiness and proposing AI integration strategies in teacher education.

This empirical study aims to examine the direction of AI technologies in education, specifically within the context of student teachers in Thailand. By analyzing AI adoption trends, pedagogical outcomes, and institutional challenges, this research seeks to provide valuable insights into the effectiveness of AI integration in teacher training. The findings will contribute to the existing body of knowledge on AI in education and offer evidence-based recommendations for policymakers, educators, and institutions seeking to enhance AI-driven teacher training initiatives. Furthermore, this study will explore the perceptions and experiences of student teachers in utilizing AI-powered tools, shedding light on their readiness, challenges, and attitudes toward AI adoption in their professional development.

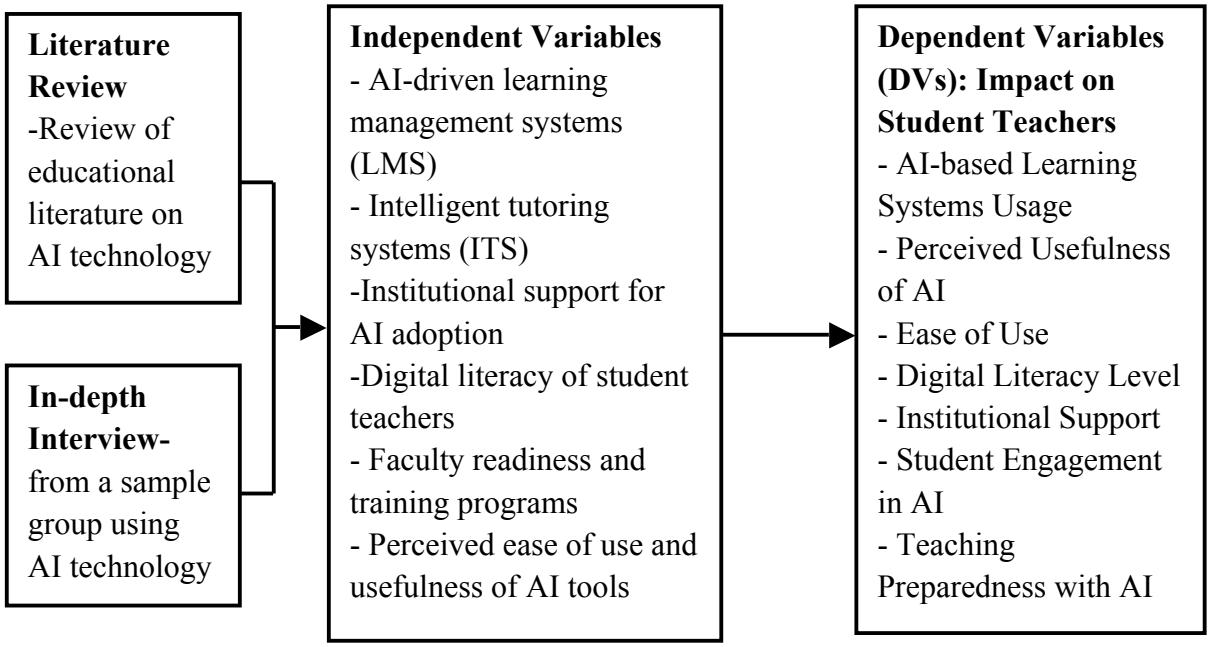
Research Hypotheses

Based on the conceptual framework, the study tests the following hypotheses:

H1: AI-driven teacher training programs positively influence student teachers' pedagogical effectiveness.
H2: Institutional readiness and support mediate the relationship between AI adoption and student teachers' engagement.
H3: Digital literacy moderates the impact of AI technologies on student teachers' ability to integrate AI into their teaching practices.
H4: Perceived challenges (e.g., lack of AI training, data privacy concerns) negatively affect student teachers' adoption of AI technologies.

Conceptual Framework

Figure 1
Conceptual Framework Fundamentals for Case Study of Student Teachers in Thailand



Literature Review

Artificial Intelligence (AI) is increasingly regarded as a transformative tool in the field of education worldwide, including in teacher training programs. The integration of AI into educational contexts promises to revolutionize how teachers are prepared for the challenges of the 21st century, through enhancing learning personalization, reducing teaching workload, and supporting professional development. This review synthesizes empirical research, theoretical frameworks, and international best practices regarding AI technologies in teacher education, with particular emphasis on the Thai context.

Context of AI Technologies in Education

Artificial Intelligence (AI) has emerged as a transformative force across various sectors, including education, where its applications are reshaping teaching methodologies, curriculum design, and student engagement. AI-driven technologies, such as intelligent tutoring systems, learning analytics, automated grading systems, and adaptive learning platforms, have revolutionized traditional educational practices by providing personalized learning experiences, real-time feedback, and predictive analytics (Luckin, 2017; Zawacki-Richter et al., 2019). The adoption of AI in education is particularly significant in teacher training programs, where student teachers must acquire pedagogical skills, digital literacy, and technological adaptability to meet the demands of 21st-century classrooms (Chen et al., 2020). However, the integration of AI in teacher training remains a complex challenge, particularly in developing countries like Thailand, where issues related to infrastructure, policy, and pedagogical adaptation persist (Schmid et al., 2021).

AI in Teacher Training: Potential and Challenges

Teacher training institutions worldwide are incorporating AI to enhance instructional methods and optimize learning outcomes. AI applications in teacher education include AI-powered lesson planning, classroom simulation, virtual reality teaching assistants, and automated assessment tools that provide insights into student performance (Selwyn, 2019). These innovations aim to equip student teachers with the necessary skills to navigate technologically advanced educational environments. However, challenges remain in the effective adoption of AI technologies, such as resistance to change among educators, ethical concerns regarding data privacy, and disparities in access to AI-powered resources (Holmes et al., 2021). Additionally, the pedagogical implications of AI remain underexplored, particularly in contexts where traditional teaching methods are deeply ingrained (Roll & Wylie, 2016). Understanding how AI influences teacher training and its potential to improve pedagogical practices is crucial in shaping effective educational policies and strategies.

The Case of Thailand: Policies, Adoption and Implementation

Thailand's education system has undergone significant transformations in response to technological advancements. The Thai government has prioritized digital education initiatives through policies such as the Thailand 4.0 strategy, which aims to integrate technology into various sectors, including education (Office of the National Economic and Social Development Council, 2020). However, the integration of AI in teacher training programs remains in its early stages, with varying levels of adoption across institutions. While some universities have introduced AI-powered learning management systems and virtual teaching assistants, many institutions still rely on conventional teaching approaches due to limited

technological infrastructure and insufficient faculty training (Ministry of Education, Thailand, 2021). These disparities highlight the need for a systematic evaluation of AI's impact on teacher education and the challenges associated with its implementation in Thai higher education institutions.

Research Methodology

Research Design

This study employs a mixed-methods research approach, integrating both quantitative and qualitative methodologies to provide a comprehensive understanding of AI adoption in teacher training programs in Thailand. A survey-based empirical case study was conducted to assess the perceptions, experiences, and readiness of final-year student teachers in integrating AI into their learning and teaching processes.

Participants

The target population consists of final-year student teachers (N = 254) from Thai higher education institutions. These participants were selected based on their exposure to AI-enhanced teaching tools and their active engagement in teacher training programs.

Data Collection Methods

This study employed a mixed-methods approach to data collection, combining quantitative and qualitative techniques to ensure a comprehensive understanding of student teachers' experiences with AI technologies in teacher training. The methods included structured questionnaires, semi-structured interviews, and classroom observations. Firstly, a structured survey questionnaire was administered to all 254 student teachers. This instrument was designed to evaluate their familiarity with AI tools, perceived effectiveness, and challenges encountered in AI adoption. Most of the survey items used a Likert scale to assess the impact of AI on learning processes, teaching effectiveness, and professional readiness. The quantitative data obtained from the survey provided a broad overview of the general attitudes and experiences of student teachers regarding AI integration in their training. Secondly, a subset of 30 participants (N = 30) was selected for semi-structured interviews to gain deeper qualitative insights. These interviews explored participants' individual experiences with AI tools, focusing on critical themes such as ethical considerations, the role of AI in lesson planning, and institutional support for AI integration. This qualitative method allowed for the exploration of nuanced perspectives that could not be fully captured through the survey alone. Lastly, classroom observations were conducted during AI-integrated teaching sessions to analyze real-time interactions between student teachers and AI-powered educational technologies. These observations focused on key aspects such as AI's role in adaptive learning, automated assessment, and student engagement. The observational data offered practical insights into how AI technologies function in authentic teaching environments and how student teachers interact with these tools in real-world settings. Together, these three methods of data collection survey questionnaires, interviews, and classroom observations provided a rich and multifaceted dataset. This approach not only enhanced the validity of the study through methodological triangulation but also enabled a thorough analysis of the role of AI in shaping teacher education in the Thai context.

Data Analysis

The data analysis in this study encompassed both quantitative and qualitative approaches to ensure comprehensive and reliable findings. For the quantitative data, descriptive statistics such as mean and standard deviation were employed to summarize survey responses, while inferential statistical methods including regression analysis and ANOVA were used to examine the relationship between AI usage and teaching effectiveness. In terms of qualitative data, thematic analysis was conducted on interview transcripts and classroom observation notes, with the aid of SPSS software to systematically identify key themes related to the adoption, benefits, and challenges of AI in teacher education. Ethical considerations were strictly observed throughout the research process; participants provided informed consent prior to participation, and all data were handled with strict confidentiality and anonymity in accordance with the research ethics guidelines set by the Strategic Wisdom and Research Institute at Srinakharinwirot University. To ensure reliability, the survey questionnaire was pilot-tested with a group of 20 participants (N = 20) to assess its clarity and consistency. Additionally, triangulation of methods comprising surveys, interviews, and observations was employed to validate the study's findings and enhance the credibility of the results.

Results and Discussion

The following section presents the results of data analysis based on the research methodology. The study employs both quantitative (survey analysis, descriptive statistics, and Structural Equation Modeling) and qualitative (thematic analysis from interviews and observations) approaches.

Quantitative Data Analysis

This quantitative data analysis aims to explore the adoption of artificial intelligence (AI) in teacher training programs within Thai higher education institutions. Descriptive statistics in Table 1 reveal generally positive perceptions toward AI usage, although limited institutional support may hinder broader implementation.

Table 1
Descriptive Statistics of AI Adoption in Teacher Training

Variable	Mean (M)	Standard Deviation (SD)	Min	Max
AI-based Learning Systems Usage	3.89	0.76	1	5
Perceived Usefulness of AI	4.12	0.83	1	5
Ease of Use	3.95	0.79	1	5
Digital Literacy Level	3.72	0.91	1	5
Institutional Support	3.45	1.02	1	5
Student teachers Engagement in AI	4.02	0.85	1	5
Teaching Preparedness with AI	3.68	0.89	1	5

The majority of student teachers perceive AI tools as useful (M = 4.12) and easy to use (M = 3.95), though institutional support remains lower (M = 3.45), indicating a potential barrier to AI adoption in student teachers training.

Table 2
Structural Equation Modeling (SEM) – Path Coefficients

Hypothesis	Path Coefficient (β)	p-value	Support (Yes/No)
H1: AI Adoption → Teaching Preparedness (AI positively influences teaching preparedness)	0.62	< 0.001	Yes
H2: Institutional Readiness → Engagement (Institutional support is crucial for engagement)	0.45	0.002	Yes
H3: Digital Literacy → AI Integration (Digital literacy enhances AI integration)	0.38	0.015	Yes
H4: Perceived Challenges → AI Adoption (Perceived challenges hinder AI adoption)	0.54	< 0.001	Yes (negative effect)

AI adoption significantly impacts teaching preparedness ($\beta = 0.62$, $p < 0.001$), and institutional readiness enhances engagement ($\beta = 0.45$, $p = 0.002$). However, perceived challenges positively affect AI adoption ($\beta = 0.54$, $p < 0.001$), highlighting key barriers to implementation.

Qualitative Data Analysis (Thematic Analysis From Interviews & Observations)

This thematic analysis highlights student teachers' overwhelmingly positive experiences with AI, while also revealing significant challenges related to institutional support and digital literacy.

Table 3
Thematic Analysis of Student Teachers' Experiences With AI

Information	Frequency	Key Quotes from Respondents
Positive Impact of AI	29/30 (97%)	"AI helps me design lesson plans more efficiently."
Lack of Institutional Support	18/30 (60%)	"Our university lacks sufficient AI training programs."
Challenges with AI Integration	15/30 (50%)	"I struggle to incorporate AI tools due to a lack of guidance."
Digital Literacy as a Key Factor	19/30 (63%)	" Student teachers who are tech-savvy adapt faster to AI-powered teaching methods."

Most student teachers recognize the benefits of AI in education (97%), but institutional support remains inadequate (60%). Additionally, digital literacy influences AI adoption success, as 63% of participants noted that tech-savvy student teachers adapted more effectively.

Conclusion

The integration of Artificial Intelligence (AI) into teacher education in Thailand represents both an unprecedented opportunity and a formidable challenge in the ongoing transformation of education in the 21st century, particularly in the context of rapidly evolving pedagogical demands and digital innovation imperatives under national policies such as Thailand 4.0. This empirical study revealed the intricate dynamics, potential benefits, and systemic limitations associated with incorporating AI into teacher training programs. The findings highlight that the majority of student teachers possess a positive perception of AI tools, recognizing their potential to enhance lesson planning, automate assessments, support adaptive learning, and personalize student engagement, yet these benefits remain partially unrealized due to inconsistent institutional support, unequal digital literacy, and infrastructural disparities across higher education institutions. The study's quantitative analysis, utilizing descriptive statistics, confirms the significant impact of AI adoption on teaching preparedness and underscores the mediating role of institutional readiness and digital literacy in fostering meaningful AI engagement among student teachers, while perceived challenges such as lack of training and ethical concerns inversely affect AI adoption. Qualitative data further reinforces these findings, with 97% of interviewees expressing that AI positively influences their teaching practice, though many lamented insufficient institutional infrastructures limited hands-on exposure to AI platforms, and inadequate mentorship in using AI tools effectively. The research emphasizes that AI should not be perceived as an optional add-on but as a fundamental component in preparing educators for future classrooms that are increasingly shaped by automation, real-time analytics, and data-driven decision-making. Moreover, the challenges unearthed by this study reflect broader systemic constraints, limited access to reliable internet and hardware, insufficient policy translation from national strategies to local implementation, resistance to change among faculty, and the lack of an ethical framework to guide AI deployment in educational settings. To bridge the gap between AI's potential and its practical integration in teacher education, the study proposes five key policy recommendations: (1) the development of a national AI competency framework for pre-service teachers that encompasses technical knowledge, pedagogical integration, and ethical awareness; (2) the formal inclusion of AI-related content within teacher education curricula, emphasizing interdisciplinary applications and critical digital pedagogy; (3) the establishment of AI learning innovation centers within universities to provide experiential learning, digital sandboxing, and capacity building for both students and faculty; (4) the promotion of cross-sector collaborations between higher education institutions and the AI industry to facilitate real-world exposure and contextualized use cases of educational AI; and (5) the implementation of a national digital equity policy that ensures access to AI resources and training opportunities for student teachers regardless of geographical location or socioeconomic status. Furthermore, this research advocates for longitudinal studies to evaluate the sustained impact of AI-enhanced teacher training on in service teaching effectiveness, and calls for the development of robust, culturally relevant assessment tools that measure AI literacy and ethical decision-making in classroom scenarios. The study also urges the inclusion of research on algorithmic bias, student data protection, and transparency in AI systems, particularly in the context of automated grading and learning analytics, which carry the potential to influence learners' trajectories in profound. As such, AI in education must be implemented not only with technical proficiency but also with pedagogical sensitivity and ethical foresight. In synthesizing the Thai case study, this research asserts that the evolution of teacher education must be reframed from a content-delivery model to a systems-thinking paradigm, in which pre-service teachers are empowered to design, adapt,

and lead AI-enhanced learning environments through iterative reflection and human centered innovation.

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Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

This research uses AI technology to check sentences for grammatical correctness.

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The Effect of Applying AI Reading Coach to Primary School English

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Abstract

This study examines the use of AI reading coaches in primary school English classrooms, particularly their positive impact on students' pronunciation accuracy. Implementing the AI Reading Coach in English teaching enhances teachers' knowledge and fosters students' listening, speaking, and reading skills, increasing their motivation to learn. A 6-week experiment involved 29 students from two primary schools in northern Jiangsu, China, where teachers introduced picture book stories before using the AI for pronunciation testing. Students practiced corrections based on the feedback from the Reading Coach and were tested again. After that, students selected picture books of interest from the built-in library of Reading Coach for learning and testing. Before the picture book teaching began, students' listening and reading comprehension levels were determined through the TOFEL Primary Step 1; thus, appropriate levels of picture books from Heinemann could be chosen for classroom communication. In class, students' pronunciation accuracy and fluency were recorded. Classroom oral communication and students' pronunciation levels were assessed from two aspects: the accuracy rate given by the Reading Coach and the effectiveness of English communication in small group discussions. Data collected during the learning progress showed that students' pronunciation accuracy and fluency improved after using the AI Reading Coach for pronunciation correction. In conclusion, AI in English teaching is a general trend, and the AI Reading Coach used in this study positively impacts students' pronunciation accuracy and interest in learning English.

Keywords: AI, English pronunciation, AI-assisted teaching

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Introduction

Over recent decades, the globalization of English has brought about significant changes in language, with English pronunciation becoming more diverse than ever before. During the learning process, pronunciation plays a crucial role in oral communication. This study aims to explore the impact of the AI-powered "Reading Coach" on students' spoken English pronunciation in classroom teaching, as well as the challenges encountered in applying Reading Coach to classroom instruction.

The Compulsory Education Curriculum Standards (2022 Edition) states that language knowledge—including phonetics, vocabulary, grammar, discourse, and pragmatic knowledge—serves as an important foundation for developing language skills. Phonetics is one of the effective means of conveying information, through which a speaker's attitudes, emotions, and intentions can be reflected. The correctness of pronunciation and intonation directly affects communication outcomes (Yu, 2024). Requirements for English phonics learning increase as students progress through higher grades. In response to the demands of the times, we must not only teach students language skills but also enable them to integrate knowledge with practice, empowering them to express, communicate, and act in daily life.

In recent years, artificial intelligence (AI) has developed rapidly, driving advancements across numerous fields—education being no exception. In teaching, AI acts as an "assistant," collaborating with teachers to educate students and empowering classroom instruction. The rational application of AI in English classroom teaching can enhance teaching quality and efficiency, foster students' interest in English learning, and facilitate the cultivation of their core competencies.

As an emerging and potential teaching tool, Reading Coach involves fundamental principles of key AI technologies such as speech recognition and natural language processing. Developed by Microsoft, Reading Coach is a free, personalized AI reading learning coach that also plays a significant role in pronunciation learning. It provides tailored services to children based on their current proficiency levels and interests, using speech-to-text AI technology to record reading accuracy, speed, and duration. Additionally, Reading Coach offers targeted exercises based on students' reading performance to assist with error correction. Featuring a vibrant interface with cartoon avatars and dynamic visuals, it maintains a simple layout that is easy for students to understand and navigate. The rational integration of AI-powered Reading Coach into teaching is poised to have positive impacts on the development of teachers, students, and the teaching process itself.

Focusing on Reading Coach: How It Assists, Assesses, and Corrects Students' English Pronunciation

In the process of language learning, accurate and error-free pronunciation holds a pivotal role, and its significance is self-evident. In primary school English teaching, ensuring the rational and effective application of AI-powered Reading Coach in classrooms is a key factor in promoting students' pronunciation learning, and its importance cannot be understated. This section will focus on how AI-powered Reading Coach aids students' English pronunciation learning, assesses their pronunciation status, and corrects their inaccurate pronunciation.

Diverse Learning Modes to Create Rich Contexts for Pronunciation Practice

AI-powered Reading Coach provides students with three modes: Create a Story, Read a Passage, and Add a Passage.

In the "Create a Story" learning mode, students can design personalized narratives based on their individual preferences and interests. As learners immerse themselves in self-selected characters and scenarios, they engage in contextualized language production by reading aloud the on-screen text, thereby establishing a natural and immersive language output environment.

Pedagogical observations indicate that when children encounter compelling story segments, they demonstrate heightened focus on phonological accuracy and fluency. Notably, some learners actively emulate character speech patterns, utilizing this mimicry to better assimilate English prosody and rhythmic structures.

The character creation system incorporates three distinct genres: Animals, Fantasy, and Science Fiction. Each category features a selection interface displaying icons in two states: activated (black) and locked (gray). The gamified progression mechanism requires 20 minutes of sustained reading to unlock new characters, which can then be integrated into narrative development. This design provides expanded opportunities for experiential learning through diverse character interactions and scenario exploration.

Comparative analysis reveals that AI-enhanced English language instruction significantly outperforms traditional pedagogical approaches in multisensory engagement. The technologically mediated learning environment facilitates deeper cognitive immersion, effectively stimulating learner motivation and fostering intrinsic interest through optimized instructional scaffolding.

The scenario creation process likewise requires student selection, transferring learning autonomy to students and granting them sufficient self-determination rights.

Finally, students select their reading level based on current proficiency. The Reading Coach system categorizes texts into eight distinct levels, each corresponding to specific word counts and lexical difficulty gradients. As levels progress, the linguistic demands on students' vocabulary and expressive capabilities increase proportionally. Within this framework, educators serve as pedagogical facilitators, providing targeted guidance to help learners identify their optimal challenge level (ZPD).

In the "Read a Passage" mode, students can select appropriate reading materials from the system's built-in digital library based on their English proficiency level and text length preferences. The reading corpus encompasses diverse thematic categories including daily life knowledge, cultural narratives, and popular science content. Through this scaffolded reading experience, learners systematically acquire domain-specific vocabulary and syntactic structures while engaging with authentic texts.

In the "Add a Passage" mode, educators can manually input customized learning materials into the system through a content authoring interface. This functionality enables targeted instruction by allowing students to focus on specific areas of difficulty, thereby facilitating differentiated learning through personalized content curation.

Implementation of Personalized Solutions

The AI Reading Coach constructs a personalized reading material recommendation model based on students' language proficiency assessment results and interest profiles, enabling precise content delivery matched to learners' characteristics. By dynamically collecting pronunciation data during reading practice, the system employs Natural Language Processing (NLP) technology to generate differentiated feedback solutions, covering real-time diagnostics of pronunciation accuracy, speech fluency, and other dimensions. During learning, the system automatically records multimodal data such as reading accuracy rate, speed, and duration, and generates personalized practice paths through data mining algorithms.

The system establishes an evaluation foundation with advanced Speech-to-Text (STT) technology, constructing a real-time feedback mechanism. Evaluation results are instantly presented through a visual interface, accurately locating pronunciation errors and fluency deficiencies, while simultaneously generating lists of problematic words to support learners in targeted training. The vocabulary practice module adopts a three-stage design of "demonstration-imitation-reinforcement": students can first listen to standard speech samples, then engage in interactive shadowing practice through the interface. The word learning interface integrates multimodal auxiliary tools, including speech demonstration buttons, morpheme segmentation functions, and graphic-semantic association modules, to achieve collaborative construction of phonological representation, spelling rules, and semantic understanding.

In the pronunciation correction phase, the system generates dynamic correction plans by comparing students' speech features with a standard sound library. When improvements in pronunciation are detected, an adaptive motivation mechanism is triggered (e.g., achievement badges, instant praise feedback). In cases of persistent errors, a cyclic intensive training module is activated, generating special exercise sets for specific phonetic difficulties (such as consonant clusters, vowel oppositions, etc.). For example, for learners struggling with consonant cluster pronunciation, the system automatically pushes graded reading materials containing target phonemes and configures targeted speech training tasks. Additionally, the system builds a learner motivation system based on behavioral data such as study duration and task completion rate, visualizing learning progress through a badge system to enhance learning motivation and continuity.

Necessity of Applying AI Reading Coach in Primary School English Classrooms

Facilitating the Enhancement of Students' Basic English Proficiency and the Cultivation of Core Competencies

In the Compulsory Education Curriculum Standards (2022 Edition), it is stipulated that teaching should implement the cultivation of students' core competencies in the English subject, including language proficiency, cultural awareness, thinking quality, and learning ability. With the iterative upgrading of educational concepts, there is now a stronger emphasis on the all-round development of children's English capabilities, requiring learners not only to master language knowledge systems but also to possess practical abilities to apply the language in real-life scenarios. As an intelligent teaching assistant, the AI Reading Coach is designed to highly align with the requirements of the new curriculum standards, systematically assisting students in basic "listening, speaking, and reading" skill training and

achieving multi-dimensional language learning enhancement through technological empowerment.

Reading Coach offers three learning modes: create a story, read a passage, and add a passage. Through these modes, students can achieve spiral development of "language knowledge internalization-cultural schema construction-thinking ability advancement" in the reading process. The reading materials feature carefully selected cross-cultural representative texts covering local customs and traditions, historical cultures, and technological developments of various countries, such as thematic chapters on British afternoon tea culture, African animal migrations, and Chinese traditional festivals, helping students establish a multi-cultural cognitive framework. This "language + culture" dual-track input model not only meets the new curriculum standards' requirements for cultivating "cultural awareness" but also lays a foundation for in-depth text comprehension. By accumulating socio-cultural background knowledge, students can significantly improve their ability to interpret text themes, implicit semantics, and cultural metaphors in reading, embodying the practical application of Schema Theory in cognitive linguistics within reading instruction.

In a smart classroom environment, teachers can easily integrate teaching resources and create diverse, interactive teaching activities, promoting reforms in primary English teaching and constructing classroom teaching models conducive to developing students' core competencies in the English subject, which is beneficial for fully implementing the cultivation of students' core competencies (Cao & Liu, 2024). As a graduate student in primary education, this translation adheres to the accuracy of professional terminology and academic norms.

Facilitating High-Quality Resource Sharing and Promoting Educational Equity

In the era of artificial intelligence, promoting the deep integration of primary English teaching and information technology, and incorporating diverse technologies into classrooms, can inject more vitality and innovation into English education (Zeng, 2024). With the advent of the intelligent era, educators can access high-quality teaching resources through multiple channels, making full use of online premium resources to assist teaching and creating an open learning environment for students. The reading materials in the AI Reading Coach's library help students broaden their horizons and accumulate knowledge.

The application of artificial intelligence in primary English classrooms has broken the traditional teaching model where teachers impart knowledge and students learn exclusively in class. Students can now use AI for learning anytime and anywhere after class, forming an integrated online-offline teaching format that establishes a convenient and open environment. Teachers can screen appropriate reading materials from the AI Reading Coach library based on teaching objectives and students' current proficiency levels, then create reading lists for children to choose from. This integration of excellent teaching resources into daily English learning enriches curriculum content, improves teaching quality, and promotes educational equity.

Enhancing Students' Interest in English Learning and Providing Personalized Services

John Dewey once stated, "When a child regards his work as a task, he will only engage under compulsion. Whenever external pressure ceases, his attention is released from restriction and flies to where his interest lies."

Primary school students are in a critical period of language development, during which iconic thinking dominates, and there is a strong demand for concrete and interesting learning carriers. The AI Reading Coach transforms abstract language knowledge into visual scenes through multimodal interaction (such as animated illustrations, voice demonstrations, and gamified tasks), which aligns with children's cognitive characteristics.

Primary school students are in the early stage of emotional development and have a strong curiosity about novel things. If teachers can arouse students' enthusiasm for English learning, it will benefit their future study. In teaching, by using the AI "Reading Coach," teachers can leverage children's curiosity about artificial intelligence to stimulate their learning enthusiasm and improve their initiative. In the traditional "teacher lectures - student listens" model, students' initiative in English learning is not high, often being pushed forward by parents and teachers, with limited development of autonomous learning.

There are significant differences in English proficiency among students in primary school classes, and traditional classrooms struggle to cater to all individuals. Reading Coach constructs dynamic ability profiles by real-time collecting learning data (such as pronunciation accuracy, reading speed, and interaction duration). For example, it automatically pushes "consonant cluster special training" for students with weak pronunciation and recommends graded short passages for those with slow reading speed, achieving "one student, one plan" precise teaching to make up for the shortcomings of traditional "one-size-fits-all" teaching.

Potential Issues in Applying AI Reading Coach to Primary School English Classrooms

Technical Aspects

First, the AI Reading Coach cannot currently operate offline and relies heavily on stable internet connectivity to ensure its functions run smoothly. This imposes high requirements on school network signals, making it difficult to implement in primary schools in remote mountainous areas or old urban districts. Unstable internet may cause malfunctions in the system's speech recognition function, such as delays or incorrect identifications, which not only reduce teaching efficiency but also disrupt students' learning rhythms and hinder their ability to focus on reading.

Second, when the system evaluates students' pronunciation, it requires a quiet environment. However, if only some students use the tool in class, it fails to ensure inclusive education for all students. Children who do not receive teacher feedback may feel anxious or doubtful. Additionally, if students read in a noisy environment, the AI Reading Coach's scoring accuracy will be affected. This not only undermines classroom efficiency but also forces teachers to extra monitor students and compare the system's evaluations with their own observations, thereby increasing teachers' workload.

Finally, as software, the system is prone to bugs such as crashes or data calculation errors, which can compromise the accuracy of pronunciation assessments. The Reading Coach includes an unlocking feature that grants access to characters and scenes in the "create a story" mode based on reading duration. Data loss due to system crashes can dampen students' enthusiasm for learning.

Pedagogical Aspects

While the AI Reading Coach excels in delivering personalized services, it is crucial to acknowledge the complexity of individual student differences. For children with emotional anxiety or reading disabilities, the system may fail to accurately identify their needs, as artificial intelligence lacks the ability to provide emotional support or flexibly adjust teaching methods, which can hinder their learning. In the teaching process, teachers serve not only as knowledge transmitters but also as protectors of children's mental well-being. Over-reliance on the AI Reading Coach may inadvertently create emotional distance between students and teachers, undermining children's emotional development and impeding the cultivation of their core competencies.Additionally, the system's automated feedback may reduce opportunities for authentic human interaction in the classroom. When teachers excessively delegate pronunciation correction and reading guidance to the AI, they may neglect the subtle emotional cues and real-time learning difficulties of students. For example, a student struggling with a particular phoneme may require not just repeated technical drills but also personalized encouragement from the teacher. Moreover, while the AI provides data-driven individualization, it lacks the human capacity to integrate holistic classroom dynamics—such as adjusting group activities based on students' emotional states or fostering collaborative learning through real-time observation. This limitation can exacerbate the challenge of teachers managing students at different progress levels, as the system's focus on individual metrics may overshadow the need for peer interaction and teacher-student rapport in holistic skill development.

Student-Related Aspects

First, during the primary school stage, students' self-regulation abilities are still developing, and most children lack the capacity for self-monitoring. When using the AI Reading Coach, students inevitably encounter new vocabulary. However, the system's instant word explanations may lead children to refrain from independent thinking, passively waiting for the tool to provide definitions. This undermines the cultivation of their ability to infer meanings from context and hinders the formation of habits such as consulting dictionaries promptly. Consequently, the development of students' independent problem-solving skills and autonomous inquiry capabilities may be impeded. Additionally, since the AI Reading Coach relies on internet connectivity, students may easily disrupt their learning processes (e.g., switching to non-academic applications), and teachers cannot monitor every student's "distractions," potentially reducing learning efficiency.

Second, while the novelty of the AI Reading Coach initially stimulates students' interest, this novelty gradually diminishes as they become familiar with its functions and operation modes. For example, once students unlock all characters and scenarios, the tool may lose its challenge. Fixed practice formats can also reduce students' enthusiasm for English reading and even trigger resistance. The impersonal, mechanistic nature of artificial intelligence makes it difficult to sustain students' long-term learning motivation and emotional engagement, thereby affecting their intrinsic drive.

Research Design

This research aims to investigate whether the AI Reading Coach can enhance primary students' English oral pronunciation. The subjects are third-grade students from two classes in a primary school in Xuzhou City. The two classes were kept relatively balanced in terms of

student number, gender ratio, and English proficiency level, ensuring the comparability of the experiment. Except for differences in teaching methods, the curriculum arrangements and teaching activities of the two classes were basically consistent to reduce the interference of external factors on the experimental results. In addition, the same teacher was responsible for both the experimental group and the control group.

The pre-test includes an English reading interest questionnaire and the TOEFL Primary Step 1 test. The questionnaire focuses on students' attitudes toward oral English and their motivation for English learning, while the TOEFL Primary test assesses their current listening proficiency. Post-administration, mean scores of the two groups are compared to verify pre-intervention equivalence. Based on TOEFL reading scores, teachers convert results to Lexile levels and select age-appropriate English picture books, which are then uploaded to the Reading Coach system in advance.

During the semester, the experimental group receives one weekly reading class utilizing the AI Reading Coach. In the first task, students spend 10–15 minutes reading level-appropriate picture books via the platform. The system provides real-time accuracy feedback on reading performance, highlighting mispronounced or unfamiliar vocabulary for targeted practice. The second task involves free reading with a creative component: students use the coach's AI story generator to customize characters, scenarios, and difficulty levels, then read their generated stories aloud. Teachers circulate during both tasks to provide guidance and address questions. The control group receives traditional instruction without AI tools, maintaining identical lesson structures and materials.

At the semester's end, both groups undergo the TOEFL Primary listening test and a post-test version of the reading interest questionnaire. Mean scores are compared to evaluate treatment effects. It is hypothesized that the experimental group will demonstrate significantly higher post-test scores in listening comprehension and report greater reading engagement than the control group, indicating the AI Reading Coach's effectiveness in enhancing language skills and motivational outcomes.

Conclusion

The experimental results show that the class using the AI Reading Coach for auxiliary teaching during instruction demonstrated a significant improvement in pronunciation accuracy. In terms of learning interest, both classes showed similar levels at the initial stage of the experiment. However, as time progressed, the AI Reading Coach better integrated students' interests, provided more personalized services, and motivated students to actively engage in the learning process.

The AI Reading Coach's empowerment of English classroom teaching is evidenced by its dynamic error-correction functions (e.g., pronunciation guidance) and mechanisms that enable students to co-create stories, thereby enhancing learning autonomy and creativity. Additionally, AI tools like Reading Coach collect students' learning data, providing data-driven support for personalized teaching. This not only alleviates teachers' workload to some extent but also achieves integration of online and offline learning, promoting home-school collaboration.

With the rapid development of artificial intelligence technology and the continuous deepening of educational reforms, the AI Reading Coach holds broad prospects for

development in the field of primary English teaching. By continuously innovating, we aim to build a more intelligent, efficient, and humanistic classroom for students, providing a solid foundation for their comprehensive development. This will steer education toward greater precision, personalization, and scientificity, positioning AI as a core driving force in advancing educational modernization.

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The Value Orientation of Education in Chinese Society From the Application of the Three Kingdoms Story in Chinese Nine-Year Compulsory Education Textbooks

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Abstract

The Three Kingdoms period is one of the most heroic and most beloved eras in Chinese history. The historical text *Records of the Three Kingdoms* by Chen Shou and the novel *Romance of the Three Kingdoms* by Luo Guanzhong both vividly recreate the turbulent and war-torn era, leaving a profound impact on later generations. *Romance of the Three Kingdoms* emphasizes the promotion of "morality and righteousness," which has contributed to its widespread popularity. Even today, many stories from the Three Kingdoms have been included in textbooks used in China's nine-year compulsory education. In this paper, the author will take the "People's Education Press edition" as an example to explore the application of Three Kingdoms stories in these textbooks, thereby analyzing the value orientation of contemporary Chinese education and attempting to offer a modest supplement to previous research.

Keywords: Three Kingdoms stories, China's nine-year compulsory education textbooks, contemporary China, educational value orientation, people's education press edition

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Introduction

The Three Kingdoms period at the end of the Han dynasty refers to the nearly one hundred years of history from the Yellow Turban Rebellion in 184 to the unification under the Western Jin in 280. The earliest historical record of this era is *Records of the Three Kingdoms* written by Chen Shou (Chen, 2000). This work regards the state of Cao Wei as the legitimate successor of the Han dynasty, and Chen Shou often praised and defended both the Cao Wei regime and the Sima clan, which has drawn criticism from later generations for over a thousand years.

In the late Yuan and early Ming dynasties, Luo Guanzhong compiled historical records and folk tales to create *Romance of the Three Kingdoms*, one of the Four Great Classical Novels of Chinese literature (Luo, 2013). The novel regards Shu Han as the rightful successor, displaying a clear bias in favor of Liu Bei and against Cao Cao. Since the publication of *Romance of the Three Kingdoms*, most of the general public's knowledge of the Three Kingdoms has been based on the novel. It can be said that the creation of *Romance of the Three Kingdoms* greatly increased the public's interest and enthusiasm for studying the history of that period.

Due to the widespread popularity of *Romance of the Three Kingdoms*, many stories from the Three Kingdoms period have been incorporated into China's nine-year compulsory education textbooks. These stories are presented in various forms such as poetry, essays, and narratives, each carrying educational significance. Since the "People's Education Press edition" is the mainstream and most widely used set of textbooks in China, this paper will take it as an example to discuss the application of Three Kingdoms stories in China's nine-year compulsory education textbooks. Through this analysis, the paper aims to explore the value orientation of contemporary Chinese education and to supplement and correct previous studies, offering a reference for future research.

The Application of "Wisdom"-Related Stories From *The Three Kingdoms* in China's Nine-Year Compulsory Education Textbooks

The Story of *Cao Chong Weighs an Elephant*

The story of *Cao Chong Weighs an Elephant* tells how Cao Chong, the son of Cao Cao, cleverly determined the weight of an elephant. It is based on *Records of the Three Kingdoms* (Sanguozhi), though it includes some slight modifications.

Cao Chong Weighs an Elephant is the first story from *The Three Kingdoms* to be included in China's nine-year compulsory education textbooks, highlighting the uniqueness of this tale. It appears in the first volume of the second-grade Chinese language textbook. The purpose of its inclusion is to emphasize Cao Chong's extraordinary intelligence, encouraging students to learn from his cleverness, to think critically when faced with problems, and to try different approaches to find solutions.

The Story of *Borrowing Arrows With Straw Boats*

The story of *Borrowing Arrows With Straw Boats* is included in the fifth-grade second-semester Chinese language textbook published by the People's Education Press. Adapted from the novel *Romance of the Three Kingdoms*, it tells how Zhuge Liang cleverly used straw boats to "borrow" arrows from Cao Cao. Originally, this event was attributed to Sun Quan, but Luo Guanzhong reassigned it to Zhuge Liang in *Romance of the Three Kingdoms* to highlight Zhuge Liang's

extraordinary intelligence. Zhuge Liang's *Borrowing Arrows With Straw Boats* strategy, through which he obtained over 100,000 arrows without expending the slightest effort, showcases his brilliant foresight and strategic genius (Luo, 2013, pp. 250-252).

The version of the *Borrowing Arrows With Straw Boats* story found in the textbook is largely the same as the one described in *Romance of the Three Kingdoms*, but it has been rewritten in simpler and more accessible language to make it easier for students to understand. At the end of the story in the textbook, there are several follow-up questions designed to promote further thinking. One example asks students to "Describe the main content of the story in the order of cause, process, and result," which aims to develop students' logical thinking and memory skills.

The Story of *Sun Quan Encourages Learning*

The story of *Sun Quan Encourages Learning* is included in the second-semester Chinese language textbook for seventh grade, published by the People's Education Press. It is based on a passage from Zizhi Tongjian (*Comprehensive Mirror to Aid in Government*) and tells how Sun Quan encouraged Lü Meng to devote himself to studying (Sima, 2013, pp. 1760-1761). Lü Meng came from a military background and was known for his bravery, but he lacked strategic insight. Sun Quan believed that a general should possess both intelligence and courage, rather than relying solely on physical strength, and thus urged Lü Meng to study diligently.

As a result, Lü Meng followed Sun Quan's advice and began studying. His talent and strategic abilities greatly improved, which highlights Sun Quan's wisdom in recognizing and utilizing talent.

The story of *Sun Quan Encourages Learning* is excerpted from Zizhi Tongjian and is consistent with the original account. This story highlights Sun Quan's wisdom as a ruler in his ability to "wisely use people."

At the end of the *Sun Quan Encourages Learning* text, there are several follow-up questions, one of which asks, "Why did Sun Quan encourage Lü Meng to study, and how did he persuade him?" Sun Quan used himself as an example to persuade Lü Meng to humble himself and dedicate himself to learning, emphasizing that intelligence and insight are crucial qualities for a general. This question aims to strengthen students' thinking and help them realize the importance of learning. The story of *Sun Quan Encourages Learning* is included in the first-year middle school Chinese language textbook to encourage students to learn from Lü Meng, recognize the importance of studying, and avoid neglecting their education, thereby making significant progress in their knowledge.

The Application of "Loyalty and Righteousness": Stories From *The Three Kingdoms* in China's Nine-Year Compulsory Education Textbooks

The Memorial to Launch the Campaign

The Memorial to Launch the Campaign (Chushi Biao) is a formal memorial submitted by Zhuge Liang, the Chancellor of Shu Han during the Three Kingdoms period, to Emperor Liu Shan before launching a northern expedition against the state of Cao Wei. The full text of *The Memorial to Launch the Campaign* (Chu Shi Biao) has been included in the second volume of the Grade 9 Chinese language textbook, and its content is entirely consistent with the version recorded in The Collected Works of Zhuge Liang (Zhuge, 2012, pp. 5-7).

This memorial primarily takes the form of a persuasive argument, while also incorporating elements of narration and emotion. With earnest and sincere language, Zhuge Liang urges the emperor to welcome open counsel, enforce clear rewards and punishments, and stay close to virtuous officials while distancing himself from flatterers, all in the hope of restoring the Han dynasty. At the same time, the memorial expresses Zhuge Liang's unwavering loyalty and dedication to the Han cause.

At the end of *The Memorial to Launch the Campaign* text in the textbook, there are several reflective questions. One of them is: "In the first half of the text, what suggestions does Zhuge Liang make to Emperor Liu Shan regarding domestic political matters? Which suggestion do you think is the most important?"

This question is intended to help students understand the content of the text, identify the advice Zhuge Liang gave to the emperor, and analyze which suggestion was most significant in the context of the time. It aims to develop students' critical thinking skills and deepen their understanding of Zhuge Liang as a historical figure.

The Application of "Aspiration and Ambition" Stories From *The Three Kingdoms* in China's Nine-Year Compulsory Education Textbooks

Ancient Chinese Poem *Viewing the Sea*

Viewing the Sea is included in the first-year middle school Chinese language textbook. The poem is selected from the Collected Poems of Cao Cao under the "Poetry Anthology" (Cao, 2013, p. 19). In the 12th year of the Jian'an era of the Eastern Han Dynasty (207 AD), Cao Cao led a northern expedition against the Wuhuan and achieved a decisive victory, successfully unifying the north. On his triumphant return, as he passed by Mount Jieshi, he composed the poem *Viewing the Sea*, expressing his deep emotions and lofty aspirations. *Viewing the Sea* is entirely a descriptive poem. Through the portrayal of the vast and surging sea, Cao Cao expresses his grand ambition of unifying the world and his broad, expansive mindset.

Ancient Chinese Poem *Though the Tortoise Lives Long*

Though the Tortoise Lives Long is included in the second-year middle school Chinese language textbook. The poem is selected from the Collected Poems of Cao Cao under the *Poetry Anthology* (Cao, 2013, p. 22). At the end of the 12th year of the Jian'an era of the Eastern Han Dynasty (207 AD), after Cao Cao suppressed the Wuhuan rebellion and eliminated the remaining forces of Yuan Shao, he wrote this poem in high spirits.

Though the Tortoise Lives Long is a philosophically rich poem that expresses the poet's spirit of growing stronger with age and his proactive, enterprising mindset, as well as his ambitious resolve to expand territories and unify the realm.

Ancient Chinese Poem *To My Younger Cousin* (Second Poem)

To My Younger Cousin (Second Poem) is a poem by the Three Kingdoms–era writer Liu Zhen, written for his younger cousin. It is included in the second-year middle school Chinese language textbook. The content is selected from "Collected Works of the Seven Masters of the Jian'an Era (Yu, 2017, p. 160). Although the poem appears to praise the resilience of pines and

cypresses, it is actually an expression of personal aspiration. Using these trees as metaphors for steadfastness, the poet conveys his firm resolve and places high hopes on his cousin.

The Application of Three Kingdoms Stories on "Character" in China's Nine-Year Compulsory Education Textbooks

Admonition to My Son

Admonition to My Son is a personal letter written by Zhuge Liang, Chancellor of Shu Han during the Three Kingdoms period, to his son Zhuge Zhan. The letter is filled with Zhuge Liang's earnest expectations for his son and reflects the deep affection between father and child. The *Admonition to My Son* (Jie Zi Shu) has been included in the Grade 7 Chinese language textbook, with its content selected from The Collected Works of Zhuge Liang (Zhuge, 2012, pp. 27-28).

In the twelfth year of the Jianxing era of Shu Han (234 AD), Zhuge Liang fell ill and died in the army camp at Wuzhangyuan. On his deathbed, he composed the timeless masterpiece *Admonition to My Son*, in which he counseled his son Zhuge Zhan on the principles of "cultivating one's character and setting firm aspirations" and "calming the mind to establish one's studies," thereby highlighting the author's profound life wisdom.

The Three Visits to the Thatched

The Three Visits to the Thatched is included in the third-year middle school Chinese language textbook, with the original text coming from *Romance of the Three Kingdoms* (Luo, 2013, pp. 200-205). In the 12th year of the Jian'an era of the Eastern Han Dynasty (207 AD), Liu Bei visited Zhuge Liang's humble thatched three times to seek advice on strategies for stabilizing the country. Luo Guanzhong, drawing from his imagination, wrote the highly engaging *Three Visits to the Thatched* episode. *The Three Visits to the Thatched Hut* allows students to learn from Liu Bei's humility and sincerity, as well as Zhuge Liang's visionary wisdom.

The Application of Three Kingdoms Stories on "Emotions and Sentiments" in China's Nine-Year Compulsory Education Textbooks

Ancient Chinese Poem *Liang Fu Xing*

The ancient poem *Liang Fu Xing* was written by the literary figure Cao Zhi during the Three Kingdoms period. It is included in the second-year middle school Chinese language textbook, with the content selected from The Collected Works of Cao Zhi (Cao, 2013, pp. 104-105). *Liang Fu Xing* describes the difficult lives of the people living along the border and sea, profoundly reflecting the harsh and miserable conditions faced by the common people of that era. The poem expresses the author's deep sympathy for the lives of the laboring masses. In *Liang Fu Xing*, Cao Zhi depicts the tragic lives of the disaster-stricken people, showcasing his kind-hearted nature and compassionate empathy for the suffering masses.

Ancient Chinese Poem *Red Cliff*

The ancient poem *Red Cliff* was written by the late Tang Dynasty poet Du Mu and is included in the second-year middle school Chinese language textbook. The poem vividly depicts scenes from the Battle of Red Cliffs during the Three Kingdoms period, illustrating the idea that the

success or failure and the honor or disgrace of historical figures are subject to certain elements of chance. Du Mu wrote this poem after passing by the ancient battlefield of Red Cliffs, reflecting on the rise and fall of heroes from the Three Kingdoms era. The poet uses the historical event of the Battle of Red Cliffs to express his frustration and sorrow over his inability to serve the country and his feelings of disillusionment.

Conclusion

A total of eleven Three Kingdoms-related stories are included in China's nine-year compulsory education textbooks. The themes of these stories cover wisdom, ambition, loyalty, character, and sentiment, with three stories each on "wisdom" and "ambition," two stories each on "character" and "sentiment," and one story on "loyalty." From this breakdown, it is evident that contemporary Chinese education values the promotion of "wisdom" and "ambition," encouraging students to learn from the outstanding qualities of historical figures, set lofty goals from a young age, enhance their problem-solving abilities, and establishing the correct "values" and "outlook on life," and striving to achieve lofty ideals through hard work and determination.

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Disparities Across Borders: Analysing Educational Inequities in the Context of Federal and State Governance

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Abstract

Educational equity remains a persistent challenge in Australia, where access to quality education is significantly shaped by structural governance, geographic location, and socio-economic circumstances. While much attention has been paid to rural-urban divides or funding disparities between sectors, less attention has been given to the inequities that emerge at jurisdictional borders. This paper explores the educational landscape of Canberra in the Australian Capital Territory (ACT) and neighbouring Queanbeyan in New South Wales (NSW), highlighting how governance fragmentation and systemic funding disparities can produce unequal outcomes for students living just kilometres apart. Drawing on a mixed-methods approach that includes policy analysis, funding data, and national assessment results, the study reveals that schools in Queanbeyan experience more complex bureaucratic structures, lower per-student funding, and greater socio-economic challenges than their counterparts in the ACT. The result is a consistent underperformance in NAPLAN, compounded by limited infrastructure and declining enrolments in NSW border schools. This paper also incorporates first-hand insights from educators, policy experts, and parents in both jurisdictions, illustrating how governance decisions play out in daily educational practice. We argue that federal-state misalignment in education governance undermines Australia's national commitment to equity. The paper concludes with recommendations for policy harmonisation, increased funding equity, and targeted support for cross-border communities.

Keywords: educational equity, school funding, cross-border governance, Canberra, Queanbeyan, NAPLAN, ICSEA, Australia

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Introduction

Equity in education remains a central policy goal in Australia, yet the reality is that access to educational opportunity is often dictated by postcode. The Australian education system is one of the most decentralised among OECD countries, with governance responsibilities divided between federal, state, and territory governments. This fragmentation results in wide disparities in educational funding, teacher quality, curriculum delivery, and student outcomes (OECD, 2024).

While education is universally acknowledged as a human right, Australia's multi-tiered governance structure complicates the implementation of consistent national strategies. Students' educational journeys are profoundly shaped by the policies of the jurisdiction in which they reside, even when communities are spatially close. Canberra and Queanbeyan exemplify this dynamic. Despite sharing a labour market, health system, and cultural infrastructure, they remain bifurcated in terms of school governance and funding priorities.

This paper investigates educational disparities between Canberra (ACT) and Queanbeyan (NSW), two cities located within close physical proximity but administered by different jurisdictions. Canberra benefits from a streamlined, centralised education directorate, while Queanbeyan is governed by NSW's broader and often more bureaucratic education system. Despite being neighbours, students in these two cities experience markedly different educational conditions.

The central research question guiding this inquiry is: How do federal and state governance structures, socio-economic conditions, and funding mechanisms contribute to educational disparities between Canberra and Queanbeyan, and what policy interventions could address these inequities?

By situating this case study within broader educational policy debates, we offer a unique contribution to the field, particularly in the context of cross-border education and intergovernmental coordination. This paper aims not only to analyse disparities but to contribute to discussions about how structural reforms can foster fairer outcomes in all Australian jurisdictions.

Background and Context

Australia's education system is shaped by a complex interplay of federal, state, and territory responsibilities. While the federal government provides funding and overarching policy frameworks, states and territories are responsible for delivering and administering schooling. This division can work against national equity objectives, especially when state-level education systems are under-resourced or subject to political fluctuations (Reid, 2019).

Canberra and Queanbeyan present an illustrative case of how governance fragmentation can produce unequal outcomes. In Canberra, the ACT Education Directorate oversees all public schools through a centralised model that allows for consistent resource allocation and planning (ACT Education Directorate, 2024). In contrast, Queanbeyan's schools operate within the NSW Department of Education's regional structure, which is often stretched thin across vast geographic areas (NSW Department of Education, 2025).

This jurisdictional complexity is further exacerbated by differences in political priorities and budget commitments across state and territory governments. In recent years, the ACT government has pursued progressive education reforms focused on inclusion, early years investment, and wellbeing-based schooling models. NSW, by contrast, has been slower to implement reforms due to the scale and complexity of its system, which services a more diverse and geographically dispersed population.

Socio-economic conditions also differ sharply. ABS (2021) data shows that Queanbeyan has a higher proportion of low-income households, rental stress, and Indigenous populations compared to Canberra. These factors contribute to increased demand for student support services, which are often not adequately resourced in NSW's regional schools (NSW Teachers Federation, 2024).

This disparity is also reflected in the broader social infrastructure. Canberra, as a planned city with a highly educated workforce and stable public service employment, benefits from better public transport, more accessible early childhood services, and higher engagement in post-secondary education. In contrast, Queanbeyan faces the challenges of a transitional regional economy, with greater workforce casualisation, lower parental education levels, and less access to tertiary education institutions.

Community feedback gathered through informal interviews with principals and teachers in Queanbeyan revealed frustrations with inconsistent policy directives and inflexible funding allocations. Many school leaders cited difficulty accessing targeted supports for high-needs students and a lack of autonomy to respond to emerging challenges. This reinforces existing research suggesting that systemic inflexibility can entrench rather than alleviate educational disadvantage.

Methodology

To understand the educational inequities between Canberra and Queanbeyan, we used a mixed-methods approach integrating both quantitative and qualitative data sources. Mixed-methods research is well-suited to complex policy issues, as it allows for the triangulation of data and offers both breadth and depth of insight (Creswell & Plano Clark, 2018).

Quantitative Data:

- **NAPLAN Results (2018–2022)**: We retrieved national testing data for literacy and numeracy performance from the My School website and analysed trends across five years.
- **ICSEA Scores**: These were examined to determine differences in school community advantage based on parental education, occupation, and school remoteness.
- **Per-Student Funding**: We accessed publicly available education budget reports and per-student expenditure data from the ACT and NSW departments.

Qualitative Data:

- **Policy Documents**: We reviewed the Gonski 2.0 report, the National School Reform Agreement, state education strategies, and budget papers.
- **Stakeholder Perspectives**: We conducted informal interviews with five educators (three from Queanbeyan, two from Canberra) and two local parents from each jurisdiction to capture perspectives on equity and access.

- **Media Analysis**: We included news reports, union statements, and advocacy group submissions to contextualise public debate and policy responses.

This blend of methods enables a layered understanding of systemic disparities. It also supports the identification of gaps between intended policy outcomes and on-the-ground realities. Importantly, stakeholder voices help humanise the data, reminding us that behind every statistic is a young person whose life trajectory may be shaped by the system's response to their needs.

Findings

Funding Disparities

ACT public schools receive an average of $22,500 per student (ACT Education Directorate, 2024), with full compliance to the Schooling Resource Standard (SRS). In contrast, Queanbeyan schools receive between $18,796 and $26,447 depending on school profile, enrolments, and targeted equity funding (NSW Department of Education, 2025). However, many NSW schools are still below the 100% SRS benchmark, with the Australian Department of Education (2024) noting that full funding is not expected until 2029–2034.

This delay directly impacts school infrastructure, teacher availability, and student services. For instance, ACT schools often have dedicated wellbeing staff, learning support teachers, and consistent access to technology. Meanwhile, Queanbeyan schools report outdated facilities, large class sizes, and difficulty attracting experienced educators (NSW Teachers Federation, 2024).

More broadly, the fragmented nature of NSW funding policies, particularly the unpredictable distribution of needs-based funding, exacerbates inequalities. Some schools in Queanbeyan report that their funding does not consistently reflect the actual socio-economic challenges their students face. This issue is compounded by rigid budget allocations that limit the ability of principals to redirect resources towards emergent priorities such as student wellbeing or literacy support.

NAPLAN and ICSEA Gaps

NAPLAN results reveal persistent achievement gaps between the two regions. Between 2018 and 2022, ACT schools consistently outperformed Queanbeyan schools by 30–40 scale points in writing and numeracy (ACARA, 2023). These gaps are significant, particularly in primary years where foundational skills are established. The disparities in test performance are also reflected in the transition to secondary school, where students from Queanbeyan tend to exhibit lower engagement and achievement in STEM subjects and overall literacy.

ICSEA scores mirror these findings. While ACT schools average around 1060, Queanbeyan schools typically fall between 975 and 991, indicating a higher concentration of socio-educational disadvantage. Given that ICSEA takes into account parental education, occupation, and school location, the data reflects systemic differences in community support and student readiness.

Teachers from Queanbeyan reported that external accountability pressures linked to NAPLAN performance can be demoralising and result in narrowed curricular focus. Unlike

their ACT counterparts, who often feel supported by policy frameworks that emphasise wellbeing alongside academic performance, NSW teachers expressed concern that their capacity to address underlying barriers to achievement is limited by time and resourcing.

Socio-Economic Vulnerability

Queanbeyan schools serve more vulnerable populations. Census data shows higher rates of Aboriginal and Torres Strait Islander students, low-income families, and parents without formal qualifications (ABS, 2021). Despite these challenges, NSW's equity loading is often insufficient to close the resource gap, particularly in areas just outside major urban centres.

Moreover, anecdotal evidence from local educators highlights a rise in behavioural and mental health issues post-pandemic, with limited access to school psychologists, speech therapists, and community services. In contrast, ACT schools benefit from coordinated wraparound services and centralised professional development offerings.

One Queanbeyan principal described their school's situation as "crisis-driven," noting the increasing burden placed on teachers to act as frontline responders to trauma and instability. These staff members often lack the time and support to adequately differentiate curriculum or maintain consistent parent communication, further perpetuating cycles of disadvantage. On the other hand, ACT principals reported strong relationships with local health and youth services, enabling them to take a more proactive, preventative approach.

Governance Misalignment

Policy misalignment between ACT and NSW creates administrative and logistical challenges for students who cross the border for schooling. There is no shared funding model for students who cross state borders, and data systems are siloed, making it difficult to track student progress across jurisdictions (Australian Government Department of Education, 2024).

For example, students living in Queanbeyan but attending ACT schools may fall through policy gaps in terms of enrolment quotas, eligibility for transport subsidies, and access to mental health programs. Teachers report challenges in assessing the cumulative impact of schooling transitions on these students, who often move between sectors without adequate records or support plans.

This disjointed approach undermines continuity of learning and frustrates efforts to build strong learning partnerships between families and schools. Without integrated governance, regional planning is near impossible, leading to duplication of services in some areas and neglect in others.

Teachers and school leaders consistently emphasised the need for a more cooperative and transparent relationship between jurisdictions. Suggestions included a shared student data portal, joint professional learning initiatives, and a memorandum of understanding to address cross-border funding inconsistencies. These strategies could reduce administrative burdens and foster a more unified educational experience for students and families.

The findings presented here point to a broader truth: that structural inequities are not simply a by-product of disadvantage but are actively sustained through governance decisions.

Addressing these inequities requires a holistic understanding of how systems interact—and where they fall short.

Discussion

The findings from this study underscore the complex and multi-layered nature of educational inequity at jurisdictional borders. Despite a shared geographic and cultural context, Canberra and Queanbeyan illustrate how structural divides—rooted in governance, policy, and socio-economic conditions—can manifest in vastly different educational experiences for students.

Funding discrepancies between ACT and Queanbeyan are not solely a matter of dollars per student; they are symptomatic of broader systemic priorities and capabilities. The ACT's centralised governance allows for cohesive planning and responsiveness, including targeted support for vulnerable students, consistent policy implementation, and the integration of wellbeing frameworks. NSW, in contrast, is encumbered by the scale of its education system and a less nimble administrative structure. The result is a funding model that often fails to address the nuanced needs of regional communities, particularly those near jurisdictional borders.

These funding gaps are compounded by accountability systems such as NAPLAN, which measure student outcomes without accounting for input disparities. The pressure to perform in standardised tests has led to narrowed curricula and increased stress among educators, especially in under-resourced schools. This dynamic exacerbates disadvantage rather than mitigating it. When schools lack the capacity to respond to diverse learning needs, national assessments serve as instruments of blame rather than tools for equity-based reform.

The governance misalignment between ACT and NSW further entrenches inequities. Cross-border families face bureaucratic confusion, fragmented services, and inconsistent enrolment policies. Educators working in these regions report frustration at the lack of data-sharing and limited collaboration between jurisdictions, which undermines efforts to implement holistic, long-term educational strategies. In regions where communities operate as single ecosystems, separate education systems generate inefficiencies and perpetuate inequality.

This situation echoes concerns raised in international literature. For example, in Canada—another federal system—educational disparities between provinces have led to similar cross-border inequities, prompting calls for greater interprovincial coordination. In New Zealand, a more unified education system has allowed for consistent implementation of national equity goals, demonstrating the benefits of centralised oversight where appropriate. Australia has an opportunity to learn from these models by exploring collaborative governance mechanisms that do not require full centralisation but do mandate transparency, equity, and shared accountability.

Ultimately, addressing educational disparities at jurisdictional borders requires more than improved funding formulas; it necessitates a paradigm shift. Policymakers must view equity not as an aspirational ideal but as a measurable, actionable commitment that guides all decisions, from budget allocations to classroom practices. Stakeholders in education—including governments, unions, communities, and researchers—must come together to challenge systems that reinforce disadvantage and build new frameworks rooted in justice and inclusion.

Policy Recommendations

To move towards a more equitable education system, we propose the following actionable recommendations, which are grounded in both the data collected in this study and the broader national policy discourse.

1. Secure Full SRS Funding for NSW Schools

- Expedite full delivery of the Schooling Resource Standard to all NSW public schools, particularly in regional and border towns, ahead of the current 2029–2034 timeline.
- Introduce supplementary federal equity payments for jurisdictions that fall below the SRS, to accelerate levelling the playing field.
- Implement a funding index that accounts for border complexity and cross-jurisdictional service needs.

2. Establish Cross-Border Education Governance Frameworks

- Create a standing NSW–ACT Cross-Border Education Council comprising departmental representatives, school leaders, union officials, and parent representatives.
- Formalise data-sharing agreements between ACT and NSW education departments, including protocols for student transitions and access to support services.
- Pilot a joint enrolment scheme in the Queanbeyan–Canberra corridor to address enrolment inefficiencies and expand access to choice.

3. Support Teacher Workforce Development and Retention

- Provide cross-jurisdictional professional learning networks to support collaboration and knowledge exchange among educators in ACT and Queanbeyan.
- Offer financial and housing incentives for early career teachers and specialists (e.g., psychologists, speech pathologists) to work in regional schools.
- Establish a shared online portal for career development and resource access to reduce isolation among staff in border communities.

4. Invest in Holistic Student Support Systems

- Fund school-based wellbeing coordinators in every Queanbeyan school to address rising student mental health and behaviour issues.
- Expand early years intervention programs that focus on speech and language development, parental engagement, and trauma-informed pedagogy.
- Develop culturally responsive and community-led Indigenous education initiatives that empower local Elders and leaders.

5. Enhance Learning Access and Equity

- Introduce targeted STEM and VET pathways in Queanbeyan schools to ensure alignment with ACT-based post-school opportunities.
- Fund access to extracurricular, cultural, and leadership programs for students from low-SES backgrounds.
- Ensure all border schools have digital equity through high-speed internet, device access, and training in technology-enhanced learning.

These recommendations are not exhaustive but represent foundational shifts needed to realign Australia's education system with its equity ambitions. Crucially, they signal a movement

away from isolated policy fixes and towards a structural transformation grounded in collaboration, transparency, and justice.

Conclusion

This paper has explored the profound and persistent educational inequities between Canberra and Queanbeyan—two cities separated by a border but united by shared communities, economies, and families. Through a mixed-methods approach, we have illuminated how governance structures, funding models, and socio-economic profiles converge to produce unequal educational opportunities for students living just kilometres apart.

The evidence presented here reveals not only systemic shortcomings but also missed opportunities for collaboration and innovation. The disparities in NAPLAN results, ICSEA scores, funding levels, and access to support services are not inevitable; they are a product of policy decisions that fail to fully account for the unique challenges and possibilities presented by cross-border communities.

It is clear that reforms are urgently needed—reforms that go beyond superficial funding adjustments to include deeper structural coordination between jurisdictions. As highlighted, effective solutions will require a multi-pronged approach: secure and equitable funding, integrated service delivery, inclusive governance frameworks, and robust support for teachers and students. These are not radical demands; they are necessary steps toward delivering on the promise of equity that underpins Australia's educational values.

Furthermore, the insights shared by educators, parents, and leaders in both regions highlight a deep commitment to student wellbeing, success, and community cohesion. These voices must be centred in future policy design. Solutions developed in consultation with local communities are far more likely to achieve long-term success than top-down reforms that overlook contextual realities.

The Canberra–Queanbeyan case is emblematic of broader issues facing Australia's federal education system. As global challenges—from climate change to automation—reshape the future of work and learning, Australia cannot afford to leave regional and border communities behind. Equity must be the compass by which we navigate these transformations.

In conclusion, this study affirms the need for a renewed national commitment to educational equity—one that recognises that structural barriers, when left unaddressed, perpetuate generational disadvantage. Bridging the border divide between Canberra and Queanbeyan is not just a policy challenge; it is a moral imperative. By working together across jurisdictions, Australia can begin to deliver an education system that is genuinely fair, inclusive, and future-focused.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

This manuscript involved the use of OpenAI's ChatGPT for assistance with drafting, editing, and proofreading. The AI was used to refine structure, improve clarity, and enhance academic tone based on author-provided content and ideas. All intellectual contributions,

critical analysis, and final revisions were conducted by the authors. The AI tool functioned solely as a language assistant and did not generate original research content or interpretations.

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Crisis Leadership of School Heads in Private Basic Education Institutions in Region Xi, Philippines: A Concurrent Mixed-Method

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Abstract

The study aimed to investigate the crisis leadership practices of school heads in Region XI. This study employed a concurrent mixed method approach; QUAN and QUAL data were collected simultaneously to understand the phenomenon comprehensively. Descriptive design was used to provide comprehensive description in level of crisis leadership, while interpretative phenomenology to explore school heads experiences in leading crises. In QUAN, descriptive method was used to identify school heads' crisis leadership levels through the lens of their subordinates utilizing an adopted survey questionnaire by Turgeon (2017). Moreover, interpretative phenomenology to examine their leadership strategies, and explore the insights of these strategies on crisis leadership outcomes through an in-depth interview guide question. Complete enumeration was utilized in identifying the participants of the study. As a result, one hundred twelve (112) subordinates and five (5) school heads were informants. Five (5) schools representing one per province of Region XI served as the locale of the study. Findings in the QUAN data, indicators such as: participatory management, resourcefulness, and sense-making got overall men of 4.22 describe as very high. It means that the school heads showed unprecedented crisis leadership skills, providing effective and efficient responses to the situation. While, QUAL provides that school heads experienced declining student's enrollment, human resource turnover, financial resources, and stakeholder's expectations as challenges. In addition, strategies was also identified by the school heads exercising to improved academic outcomes, strengthen institutional capacity building, efficient utilization of available resources, and foster open communication in providing shared ownership. Moreover, demonstrating agility, setting clear vision, being adaptable, and consistent communication with the stakeholders where the clustered themes generated as school heads insights in effectively and efficiently leading schools in crises.

Keywords: crisis leadership, school heads, private basic education institutions, Philippines

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Introduction

This concurrent mixed-method study aimed to explore the level of crisis leadership among school heads in the Private Basic Education Institutions in Region XI regarding participatory management, Resourcefulness, and sense-making. By examining the competencies in real-world crises, the study identified areas for improvement and opportunities for enhancing crisis leadership development programs for school leaders in Region XI. On the other hand, the study explored the lived experiences of school heads in Private Basic Education Institutions in Region XI. The results present how these experiences may influence their crisis leadership behavior and how school heads past experiences, both personal and professional, shape their crisis leadership.

Literature Review

School leaders in the Philippines have been navigating significant challenges in crisis management, including resource constraints such as inadequate funding, lack of essential equipment, and limited personnel to address emergencies effectively (Cervantes & Gatdula, 2019). The complexities of crises, notably the COVID-19 pandemic, have further exposed the limited capacity of school heads in terms of skills, knowledge, and confidence required to manage disasters (Amutao et al., 2021). Their capacity is often stretched due to insufficient support from external agencies, with delays in assistance compounding the difficulties of decision-making under uncertainty.

The COVID-19 pandemic has intensified these challenges, particularly in terms of resource scarcity and communication breakdowns. School heads were often left to make critical decisions without the full backing of stakeholders or the necessary tools to execute effective crisis responses (Amutao et al., 2021). This environment of constant pressure has led to increased stress and burnout among school leaders, ultimately undermining their ability to manage crises effectively (Kim & Jung, 2019). Leaders also contend with emotional and interpersonal difficulties, including the need to regulate their own stress while offering emotional support to others, further adding to their burdens (Volante, 2021; Wang & He, 2019).

Addressing these challenges necessitates a comprehensive approach involving resource preparation, communication improvement, emotional resilience, and robust training for school heads (Liu & Li, 2021). In a study on the pandemic's impact on schools, Oesterreich (2019) identified specific difficulties such as the lack of resources and the challenges of distance learning implementation. The study called for further research on how school heads can develop resilient institutions capable of managing crises effectively (Tejada, 2021). Such research is crucial to understanding the strategies school leaders employ and how to build crisis-ready schools.

This study contributes to the literature by exploring the crisis leadership of school heads through three key dimensions: participatory management, resourcefulness, and sense-making. Participatory management has been identified as critical in crisis situations, with Edris and Atarodi (2021) emphasizing the importance of involving stakeholders in decision-making and problem-solving. Resourcefulness, the ability to use limited resources creatively, also plays a vital role in crisis leadership, as demonstrated by Dizon and Santos (2021) in their study on school heads in the Davao Region. Moreover, sense-making, the process by which leaders

interpret and respond to crises, ensures adaptability and responsiveness to ever-changing circumstances (Kim & Hwang, 2021).

Given these findings, the study highlights the need for a holistic approach to crisis leadership, blending participatory management, resourcefulness, and sense-making to ensure school organizations remain resilient and adaptive during crises. More research is necessary to explore the lived experiences of school heads, the challenges they face, and the coping mechanisms they adopt during crises. Such research can inform the development of leadership training programs and policies that will equip school heads with the tools and support needed for effective crisis management.

By focusing on the practices, challenges, and leadership strategies of school heads, this research seeks to contribute to the broader understanding of crisis leadership in education. The findings will support the development of interventions and policies that enhance the capacity of school leaders to navigate crises, thereby ensuring the safety, well-being, and continuity of education for both students and staff.

Research Questions

Hence, exploring the lived experiences of school heads, the study findings provided insights into the subjective factors that influenced their crisis leadership beyond just the objective measures of their leadership competencies.

Specifically, it sought to answer the following questions:

1. What is the Level of Crisis Leadership of the School Heads in the Private Basic Education Institutions in Region XI through the Lens of its Subordinates in terms of:
   1.1. participatory management
   1.2. resourcefulness
   1.3. sense-making
2. What are Lived experiences of School Heads in Leading Crises in the Private Basic Education Institutions in Region XI?
   2.1. Challenges
   2.2. Coping Mechanism
   2.3. Insights

Participants

The research informants for this study were selected using complete enumeration sampling. The key participants comprised school heads, faculty, and staff from private basic education institutions within the region. Specifically, the study involved five (5) school heads or principals from the identified participating schools, alongside a total of one hundred twelve (112) faculty and staff members. By including all relevant personnel in the selected schools, the study ensures a comprehensive analysis of crisis leadership practices across various roles, providing a robust dataset for both qualitative and quantitative insights. This approach allowed for a thorough exploration of crisis leadership dynamics, decision-making processes, and the collaborative efforts required to manage crises effectively within the educational context.

Methodology

This study employed a concurrent mixed-method design to comprehensively understand crisis leadership among school heads in private basic education institutions in Region XI. By integrating both quantitative and qualitative data, the study provided a more holistic exploration of the crisis leadership practices of school heads, generating valuable insights for educational leadership theory and practice.

The study covered five provinces in Region XI: Davao Occidental, Davao Oriental, Davao del Norte, Davao del Sur, and Davao de Oro. One school from each province was selected based on two criteria: (1) operating for at least two decades and (2) being a non-stock, non-profit institution affiliated with churches or religious denominations. These criteria ensured that the schools had long-term community involvement and a history of crisis management.

In the quantitative phase, the study used the C-LEAD (Crisis Leader Efficacy in Assessing and Deciding) Scale developed by Jamie Brownlee-Turgeon, Ph.D., in 2017. This 35-item scale, which measures school leaders' effectiveness in managing crises, has a high internal consistency, with a Cronbach's alpha of $\alpha = .95$. The survey was distributed to all faculty and staff from the five selected schools. Respondents were given sufficient time to complete the survey, which gathered data on their perceptions of the school heads' crisis leadership.

The qualitative phase involved face-to-face interviews with school heads to explore their lived experiences in leading during crises. A validated interview guide with open-ended questions was developed by experts to investigate the specific challenges, strategies, and emotional responses of school leaders. Interviews were conducted with the approval and availability of the participants, offering in-depth insights into the crisis leadership experiences within the schools.

This mixed-method approach ensured that both quantitative data on leadership efficacy and qualitative insights into personal leadership experiences were integrated to create a comprehensive understanding of crisis leadership in Region XI's private basic education institutions.

Implications

Considering the study results, the following are the implications regarding knowledge, theory, practice, and policy.

Implications for Knowledge/Theory:

1. Practical Insights for Leadership and Policy: The study provides crucial insights into the crisis leadership of school heads in Region XI, offering actionable strategies and lessons for educational leaders, policymakers, and practitioners. The findings help shape guidelines and policies for improving crisis preparedness and response in basic education institutions.
2. Contextual Understanding of Crisis Leadership: By focusing on Region XI, this research highlights the unique challenges shaped by cultural and socio-economic factors. This localized knowledge informs tailored strategies for crisis management in schools in the region, making the findings contextually relevant and effective.
3. Informing Leadership Development: The study identifies critical leadership competencies for crisis management. This can guide professional development

programs in enhancing school heads' capabilities in crisis leadership, leading to better preparedness and outcomes for schools and communities.
4. Theoretical Advancement: The research extends existing crisis leadership theories by uncovering new insights or validating current frameworks. This contributes to the academic literature on crisis leadership and establishes a foundation for future research.

Implications for Practice:
1. Enhancing Crisis Preparedness: The study provides best practices for school heads in Region XI to improve crisis preparedness. Schools can implement comprehensive crisis management plans, establish protocols, and conduct regular training to enhance their ability to manage diverse crises.
2. Developing Leadership Competencies: The research highlights the essential leadership skills required for effective crisis management, such as decision-making under pressure, strategic planning, and team coordination. This can inform professional development and coaching initiatives targeted at school heads.
3. Promoting Collaborative Decision-Making: The findings emphasize the need for shared decision-making during crises. School heads are encouraged to foster collaboration, communication, and team participation, leading to more effective crisis responses.
4. Strengthening Communication and Stakeholder Engagement: Effective communication is essential during crises. This study stresses the importance of timely, transparent communication with stakeholders such as students, parents, and staff. It also promotes stakeholder involvement in crisis planning, which strengthens trust and collaboration.
5. Building Resilient School Communities: The study identifies leadership strategies that help foster resilience and post-crisis recovery. By supporting the well-being of students and staff, providing counseling services, and ensuring educational continuity, school heads can build stronger, more resilient school communities.

These implications underscore the importance of informed leadership in navigating crises in education, providing both theoretical contributions and practical applications for Region XI's educational landscape.

Conclusions

This study explores the essential crisis leadership competencies of school heads in private basic education institutions within Region XI, highlighting both challenges and strategies that guide effective crisis management.

Key findings indicate that resourcefulness and sense-making are critical competencies demonstrated by successful school heads. Resourceful leaders effectively utilize available resources during crises to enhance decision-making and problem-solving. School heads with strong sense-making abilities can analyze crises, allowing them to make informed decisions and take appropriate actions. The study suggests that future research should focus on specific sense-making strategies to provide insights for educational leaders seeking to improve their crisis management capabilities.

Moreover, the lived experiences of school heads reveal that crisis leadership is both demanding and complex, requiring resilience, adaptability, and decisive action. Effective

leaders maintain open communication, foster collaboration, and prioritize the well-being of students, staff, and stakeholders. They continuously assess evolving situations, learn from experiences, and adjust their approaches as necessary.

In terms of challenges, school heads face a variety of operational crises, including declining student enrollment, high turnover rates, financial constraints, unmet parent expectations, the absence of leadership preparation and succession plans, internal disputes and conflicts, and external pressures from competitors. Despite interventions, these challenges remain significant, and school heads often find that short-term solutions do not provide long-term stability.

Coping mechanisms employed by school heads include building support networks, fostering shared decision-making, implementing cost-cutting measures, seeking expert guidance, and actively involving stakeholders. Additionally, they explore alternative funding sources such as government subsidies, income-generating projects, and personalized learning experiences for students. Professional development opportunities and emotional support are also identified as crucial for helping leaders navigate crises effectively.

These findings underscore the need for a comprehensive leadership approach that equips current and future educational leaders to manage crises in basic education schools. By developing resilience, resourcefulness, and collaborative networks, school heads can better guide their institutions through crises and contribute to the long-term sustainability of their schools in the Davao Region.

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Graded Reading in Primary English Classes Based on the Lexile Framework for Reading With the Assistance of Reading Coach

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Abstract

Reading is an ability that cannot be ignored in the process of learning and life. According to Krashen's linguistic input hypothesis and Gardner's theory of multiple intelligences, individuals have different reading levels. In the traditional mode of reading teaching, the whole class uses the same reading content, and this kind of reading can not improve the students' reading ability. Therefore, teachers should innovate teaching methods and guide students to read graded reading. The study will conduct an empirical investigation with 24 volunteers aged 9-11 in graded reading in English classes based on the Lexile Framework for Reading with the assistance of a Reading Coach, using experimental methods, questionnaire surveys, and interviews. There are three research questions for this study. (1) How using the Lexile Framework for Reading can enhance students' motivation and interest in reading; (2) How using the Lexile Framework for Reading can improve students' reading literacy and English achievement. (3) How using the Reading Coach can improve teaching effect. The study's results indicate that by analyzing students' literacy levels, the Lexile Framework for Reading suggests reading materials that align with their reading ability and interests. This recommendation is based on the analysis of Lexile growth value and student evaluations. It is concluded that: (1) It can enhance students' motivation and interest in reading. (2) It can improve students' literacy in reading and English. Through feedback from teachers and students, it is concluded that: (3) Using the Reading Coach can improve the teaching effect.

Keywords: Lexile framework for reading, reading coach, reading literacy, graded reading

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Introduction

The 21st century is an era of rapid information development, and the timeliness of information resources affects many aspects of society. Reading is essential for obtaining time-sensitive information. An individual's reading ability is directly related to the extraction and comprehension of key information, an ability that cannot be ignored in learning and life.

According to China's Compulsory Education English Curriculum Standards 2022, it is pointed out that "this curriculum standard for the core literacy of English subjects should be realized," and "English language proficiency constitutes the basic elements of the core literacy of English subjects." Reading is the most important component of English language proficiency. Reading is essential for human development; it can help us understand the world better, and it is an important way for people to obtain information, know the world, develop thinking, and gain aesthetic experience.

According to Gardner's Multiple Intelligences Theory and Krashen's linguistic input hypothesis, individuals have differences. Based on individual comprehension, the higher the interest and relevance of the input material, the better the acquisition effect. In the traditional mode of reading teaching, the whole class uses the same reading content, which will inevitably make the weaker students feel strenuous in the reading process, thus they will feel powerless and gradually losing interest in the reading activity, while the students with strong reading ability will feel bored, and this kind of reading can not improve the students' reading ability (Song & Li, 2022). Therefore, in the context of the information age, teachers should innovate teaching methods and guide students to read graded reading according to the Lexile Framework for Reading with the assistance of Reading Coach.

The concept of graded reading originated in the West. In the 1920s, as Western countries proposed readability standards, many developed countries began scientifically analyzing children's physical and psychological development characteristics. On this basis, various graded reading systems have gradually entered people's field of vision (Sun, 2012, p. 159). In the 1930s, exact grading standards emerged in Western countries. In the 1950s, the education department of the United States conducted a large-scale study on children's reading ability and formed a relatively complete set of graded reading standards (Wang, L., 2015). Up to now, graded reading in the United States has mature, perfect, and diverse grading methods and standards. Among them, the most credible reading grading systems include: Lexile Framework and the A-Z Framework. Since its introduction, the Lexile Framework has gradually developed into one of the most recognized scientific English reading assessment systems. It has been widely used in educational institutions around the world (Wu, 2024, p. 10).

Domestic graded reading research started late, and the successful experience of graded reading in Europe and the United States was learned from the research process. Wang Quangen, a scholar of graded reading, put forward a view: "The core of graded reading is 'selecting a bibliography,' what to choose, how to choose, and who chooses." It can be concluded that the content, the way of selection, and the selector are all very important (Wang, 2009). Wang Qiang defined English graded reading books as:

> English graded reading system standards is a set of standards covering both subject matter and proficiency level for the level of development of students' English reading ability at each level, which is the basis for constructing a scientific English graded

> reading series that meets the needs of students' language and physical and mental development. (Wang, Q, 2015)

In recent years, some scholars have begun to study the application of graded reading in English teaching, but researches are scattered, and the total number of researchers is not large.

The existing research on graded reading in China is still mainly at the theoretical level, and few scholars have observed the changes in students' English reading ability, reading habits, and reading interest in the practice of graded reading teaching. In addition, front-line teachers have not widely used graded reading in teaching. Thus, there is still a lack of scientific, systematic, and effective graded reading teaching methods in China.

However, we should also know that no grading standard applies to all countries or regions. Therefore, while learning from the advanced experience of the Lexile Framework for Reading, we should also consider the actual situation in China, gradually build a graded reading system, and use a model suitable for cultivating our students' reading ability.

The Design

This study conducted a four-month teaching experiment (including a pre-experimental questionnaire and test, and post-experimental questionnaires and tests) with 24 volunteers from Primary School A, ages 9 to 11. The study hoped to empirically study the effect of the Lexile Framework for Reading and Reading Coach on English Reading Literacy, and teacher interviews were conducted to gain a deeper understanding of the students' learning.

This study conducted a four-month Lexile graded reading teaching experiment on 24 volunteers, with the assistance of a Reading Coach. It tested the effect of graded reading on primary school students' English learning and reading literacy by collecting and analyzing the changes in test scores and the changes in the rankings of the English test scores in their classes and grades.

This study designed a 20-question questionnaire using the Likert scale to assess students' motivation and interest in English reading learning. The questionnaires were distributed and collected for analysis (Zhao, 2021, p. 16).

To explore the questions that cannot be revealed in the questionnaire and test scores, this study conducted in-depth interviews with 10 students out of the 24 volunteers and some teachers to understand further their views and experiences on implementing the Lexile Framework for Reading and Reading Coach.

Conclusion

The Lexile Framework for Reading and Reading Coach have notable benefits for English learning and teaching. The Lexile Framework aids in enhancing students' English achievement, as demonstrated by the significant improvement in scores, rankings, and performance across reading, listening, grammar, and writing sections among volunteers after the reading experiment, highlighting the advantages of graded reading for overall language learning. It also boosts students' reading literacy in multiple ways: improving language proficiency by enriching vocabulary and cultural horizons through diverse reading materials

and enabling teachers to adjust teaching based on Lexile values; cultivating regular reading habits, increasing reading frequency, and training effective reading methods; and enhancing reading experience by allowing students to choose materials according to their interests and abilities, which in turn boosts their reading confidence and motivation. Additionally, Reading Coach meticulously assesses students' reading levels, formulates personalized learning plans, provides instant feedback on reading performance, and empowers teachers to offer more targeted guidance, thereby accelerating students' reading progress.

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Thai EFL Student Teachers' Challenges of Classroom Implementation Using Cooperative Learning Practices

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Abstract

To foster pre-service English language teachers' positive motivation for their teaching practicum is a must, as English language teachers' training in Thailand faced various challenges, including training content, knowledge, and experiences, and training activities. Therefore, This study investigated the challenges of using cooperative learning practices to enlarge Thai EFL student teachers' implementation of the approach in Thai elementary school as it promotes students' collaboration, academic achievement, positive attitudes toward teaching, and social skills. However, challenges in implementing were found in their classrooms, such as teachers' lack of confidence, insufficient administrative support, and training in the Cooperative learning approach. Therefore, 19 Thai student teachers of the English language were selected through purposive sampling to get training in CL based on the framework for Language Teacher Education in Thailand and (RE) Making a Modular Model by Kumaravadivelu (2012, p. 12), it divided into three stages of developing cooperative learning practice. The data were gathered through semi-structured interviews, classroom observation protocols, and reflective journal protocols. The thematic analysis was used to analyze the essential challenges in implementing cooperative learning. The research findings indicated that five important challenges were student teachers' low confidence and content knowledge, student teachers' preparation and planning, classroom management, students' engagement, and individual classroom assessment, respectively. These challenges pointed out the complexity of implementing cooperative learning and highlighted the proper need to support student teachers for effective implementation and facilitate successful implementation.

Keywords: cooperative learning, challenges, English language classroom, classroom implementation

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Introduction

English language teacher training in Thailand faces countless challenges in enlarging pre-service teachers' teaching competence and confidence, one of the founding principles of teacher preparation. These challenges include implementing theory into practice, teaching skills, content knowledge, limited classroom management experiences and lack of pedagogical confidence (Damnet, 2021; Imsa-ard et al., 2021; Richards, 1998). According to Tique (2023) highlights that student teachers gained valuable professional experiences, including adapting to students' English proficiency levels, teaching multi-level classrooms, employing diverse strategies, engaging in professional development, and using effective facilities.

Implementing cooperative learning in teacher training could significantly enhance their pedagogical skills and content knowledge, preparing them for a real classroom context. To promote teacher students' competence, cooperative learning is an effective pedagogical approach to foster motivation, critical thinking, communication, and student participation as it enhances collaboration through group activities and actively engages students in constructing knowledge while developing essential social skills (Gillies, 2016; Johnson & Johnson, 2009; Slavin, 1995). This could also deepen student teachers' understanding of classroom dynamics, effective classroom management, and strategies to foster student engagement, as indicated in Castañeda-Trujillo and Aguirre-Hernández (2018). Moreover, educators must carefully design cooperative learning activities that align with learning objectives while balancing structure and flexibility to accommodate diverse student abilities and learning preferences. Overcoming these challenges requires thoughtful planning and effective classroom management strategies. Based on the aforementioned studies, this study investigated the challenges of using cooperative learning practices to enhance Thai EFL student teachers' implementation in Thai elementary schools.

Research Objective

To examine Thai EFL student teachers' relevant issues and challenges in implementing CL in the actual language classrooms.

Literature Review

Pre-Service Teachers' Challenges in Teacher Training

Teacher training plays an important role in preparing pre-service teachers with the skills and knowledge needed to become effective teachers in the future. However, pre-service teachers face challenges during their training, including classroom management, planning lessons, building confidence, and applying what they learned in real classroom situations (Farrell, 2007; McIntyre, 2003; Richards, 1998). These challenges often create a gap between theoretical knowledge and practical application, which leads to difficulties for pre-service teachers to fully prepared for real classroom contexts. As a result, pre-service teachers feel overwhelmed when they have to deal with classroom realities and diverse students.

The Challenges of Cooperative Learning

Despite its widespread implementation and positive perceptions, various obstacles may confront educators when implementing cooperative learning in their classrooms. Challenges

such as the curriculum and students' attitudes are also found to be significant barriers to this approach. Teachers encounter hurdles when setting up cooperative learning exercises (Hämäläinen & Vähäsantanen, 2011; Van Leeuwen et al., 2013). These challenges include organizing suitable group tasks, forming teams, and managing class time (Gillies & Boyle, 2010). According to McManus and Gettinger (1996), students expressed considerable dissatisfaction with group conflicts during collaborative work. This sentiment was also confirmed by a study of Phipps et al. (2001), who found that fewer than 20 % of the students in their study believed that group work positively influenced their learning. Hinson (2015) noted that students exhibited increased engagement and motivation when completing assignments in a team setting. However, the study highlighted challenges teachers face in implementing cooperative learning, including time constraints and the need for support among educators. In the international context, Keramati and Gillies (2021) investigated challenges across two cultural settings in Iran and Australia. The challenges in Iran included a preference for traditional teaching methods, limited knowledge of teamwork fostering, and inadequate access to current teaching materials. Conversely, challenges in Australia involved adapting courses, collaborating with external students, addressing individual learning needs, and nurturing positive interpersonal connections when implementing cooperative learning. Similarly, Slavin (2014) & Wossen (2011) identified challenges such as implementing cooperative learning in large class sizes, inadequate classroom organization, insufficient teaching materials, and a lack of well-trained instructors. These findings underscore the importance of providing educators with comprehensive support, resources, and training to overcome these obstacles.

Methodology

Partticipants

The participants in this study consisted of 19 Thai EFL student-teachers selected for training as an extracurricular activity aimed at enhancing students' competencies. All student teachers have been studying in the Department of English, Faculty of Education. This specific group was targeted because they were at a stage where they received fundamental theoretical knowledge and needed to implement it in actual classroom settings during their teaching practicum.

Setting

The current study is conducted at the Department of English, Faculty of Education, as it represents the academic environment where the student teachers are currently enrolled, which provides access to the specific group of student teachers targeted for the study.

Research Instruments

Classroom Observation Protocol

The cooperative learning observation protocol was used to investigate how the student teachers implemented the CL practice. Student teachers were asked to cooperate in pairs while being observed by the researchers. The observation protocol was adapted from a study by George (2017), which was used to support student teachers' perceptions of their classroom implementation.

Reflective Journal Protocol

The reflective teaching approach was part of the teaching and learning process that mirrored the student-teacher learning journey, adapted from a study of Cañabate et al. (2019). The reflective journal protocol in this study consisted of four elements: (1) identifying the situation, activity, or experience; (2) identifying prior conceptions, beliefs, knowledge, and experiences; (3) focusing on and probing the core of reflection, context, and professional context; and (4) understanding the process of transformation by establishing, articulating, and transferring students' concrete learning objectives, followed by the implementation of new action plans.

Semi-structured Interview

The semi-structured interview was employed to investigate student teachers' challenges of classroom implementation using the Cooperative Learning. This enabled the researcher to gather in depth information of individual experinces. The interview questions were designed to elicit responses regarding the difficulties encountered by student teachers during cooperative learning implementataion.

Data Analysis

The data collected from semi structured interview were transcribed and coded into themes. Each transcript was coded using open and axial coding methods based on Strauss and Corbin (1998) Data obtained from written documents were also analyzed using similar techniques, which allowed the researcher to identify and clarify interrelated challenges in the implementation of cooperative learning.

Result

Implementing cooperative learning can be challenging for student teachers who are in the stage of developing their teaching skills and pedagogical knowledge. The current study identifies five main challenges, including student teachers' low confidence and content knowledge, their preparation and planning, classroom management, student engagement, and individual classroom assessment.

Student Teachers' Low Confidence and Content Knowledge

Many student teachers expressed that teaching in a real classroom setting brought them a mix of emotions and challenges, especially when confronted with unexpected classroom scenarios. Many participants shared that linguistic insecurity and lack of confidence play significant roles. This lack of confidence makes it difficult for them to implement cooperative learning strategies effectively. They feel overwhelmed by trying to manage multiple tasks at once and ensuring that all students participate equally. Some also expressed anxiety about not being able to answer students' questions, as they reported, as indicated below.

> My challenge is my linguistic insecurity, which makes me anxious and less confident. This often leads me to be very quiet and not talk much. I need to start with the easiest steps and try to improve each time I teach in class.... (Tom)

> I feel very excited, scared, and anxious about teaching in a real classroom. I'm also very concerned about the content I need to teach and my language proficiency. (Lisa)
>
> ...I'm also afraid that I don't have enough knowledge and confidence to teach students. (Anna)
>
> My challenge is my confidence. I sometimes doubt my self. The content I prepare often turns out to be too easy for the students, which makes them bored... (Lizzy)
>
> My challenge is my knowledge. I feel like I need to improve a lot in class. Sometimes I struggle, and it's embarrassing when I don't know the vocabulary. (Phyllis)
>
> I'm worried about whether I know enough. When I prepare, I have to think about what the students will want to know. If I can explain things well, they'll understand because I'm their teacher. But I also have to think about what they might ask. If I don't have an answer, they might wonder why. So, I need to prepare a lot, and it's stressing me out... (Nick)

It was noticeable when they faced unexpected classroom situations, such as struggling to answer students' questions. These scenarios not only increased their anxieties but also impacted their teaching effectiveness and affected the overall learning experience for students. Additionally, their lack of self-confidence made it harder to implement cooperative learning as they often felt overwhelmed by the need to balance multiple tasks and ensure equal participation from all students.

Student Teachers' Preparation and Planning

Preparation and planning emerged as significant challenges for student teachers as they must carefully design lesson plans that focus on students' levels, effective grouping strategies, and appropriate, engaging activities. The student teachers in this study highlighted their difficulties in designing activities that engage all learners and the need to remain flexible when unexpected situations arise. One of the significant challenges was ensuring that the planned activities align with students' level, background knowledge, interests, and language proficiency. The following excerpt illustrates:

> Sometimes, an activity aligns with the content but is too difficult for the students, it won't be effective. So, preparing activities that fit the students' level is the toughest part for me. (Nick)
>
> Another challenge is managing confusion and anxiety regarding my teaching methods and unexpected situations during lessons. Sometimes things don't go as planned, and students lose interest or become distracted... (Andy)
>
> ...The content I prepare often turns out to be too easy for the students, which makes them bored. Finding suitable lessons that engage them is really challenging for me... (Lizzy)
>
> ...Sometimes I feel disappointed when things don't go as planned, but I try to move on and work on improving the situation... (Fiz)

As described above, preparation and planning were significant challenges for student teachers when implementing cooperative learning. Choosing an appropriate activity can be difficult. Additionally, managing unexpected classroom scenarios and adapting lessons on the spot adds to the complexity of the planning process. In conclusion, the lack of real-world classroom experience may cause student teachers to feel underprepared to handle unexpected situations and to prepare effective lessons.

Classroom Management

Managing an environment where students work as a group can be challenging. The participants in the study highlighted that the dynamic nature of group work often leads to noise, distractions, and occasional conflicts among students. The excerpt below illustrates the challenges that student teachers encounter in their classroom management during cooperative learning:

> My challenge is how to manage the classroom effectively. It's essential to maintain control during activities to prevent chaos and ensure that students are focused on the lesson. Moreover, having sufficient knowledge to teach them is crucial, whether it's about the subject matter or classroom management techniques. (Luna)
>
> One of my biggest challenges is managing the classroom. If I don't handle it properly, the effectiveness of teaching and learning decreases, and the classroom can quickly turn chaotic... (Andy)
>
> ...Students can become very loud, and the classroom can turn chaotic. However, it's easier to manage with a smaller number of students. Cooperative learning is more suitable for small classes rather than large classes... (Lisa)

In conclusion, the participants revealed that classroom management is challenging, especially when students work together in groups, as the dynamic of group work often causes noise, conflict, and distraction, which can create an ineffective learning environment.

Student Engagement and Participation

The analysis of semi-structured interviews revealed that student engagement and participation are significant challenges faced by student teachers. They expressed that some students engage in activities while others let their friends complete the tasks and refuse to share ideas or discuss in groups. The following section explores the difficulties related to student engagement and participation, as shared by the participants in this study:

> Students often struggle to collaborate effectively in teams, some often allowing others to take the lead. They prefer choosing their own group or partner, and while some may be upset when the teacher assigns groups but as a teacher, it's essential to consider each team's dynamics. (Emily)
>
> …Some students are interested, while others are not. I have to solve problems on the spot, and that makes me nervous. (Tyla)
>
> The challenge is when students collaborate in groups, some may choose not to share their ideas. (Shasha)

Student engagement and participation highlight a critical area of concern for student teachers. The difficulties shared by participants indicated that some students dominate discussions while others remain passive. Moreover, they also expressed that another challenge was that students sometimes don't want to work in assigned groups; they prefer to work with their friends. This could limit opportunities for diverse interaction and reduce the learning experience.

Difficulty in Individual Evaluation

Assessing individual contributions in group work poses a significant challenge for student teachers. Ensuring that each student is evaluated fairly becomes difficult when some students dominate tasks while others contribute less. Student teachers often struggle to distinguish individual efforts from group achievements. This issue becomes particularly problematic when students rely heavily on their peers or when group dynamics lead to unequal contributions, making it hard to evaluate. The excerpt below illustrates what student teachers experience when facing this challenge:

> When students work together, sometimes only one student takes charge and completes the task. Evaluating the group is difficult, and assessing individual contributions is even harder. (Alisa)
>
> Since students work in groups, some might not engage fully and may not understand the lesson. (Tyla)
>
> I believe we can use cooperative learning as a classroom activity, but not for evaluation. (Phylis)
>
> I start by evaluating students as a group during activities and discussions. Then, I assess them individually when they give presentations; however, cooperative learning is difficult to determine. (Jes)

In conclusion, assessing individual contributions in group work remains a significant challenge for student teachers. Student teachers highlighted that ensuring fair evaluation is quite challenging, as some students take on more responsibilities while others contribute less. As the excerpts show, many student teachers struggle to accurately assess everyone's understanding and participation, especially when students rely on their peers. Moreover, some student teachers also suggested that cooperative learning is effective for classroom activities; however, it presents difficulties in terms of evaluation.

Lesson Observation Protocol

Cooperative Group Responsibilities

The challenge emerging from lesson observation protocols and anecdotal evidence was the concept of group responsibilities. Throughout various lessons, student teachers attempted to foster a sense of responsibility within cooperative groups by assigning specific roles, encouraging collaboration, and designing tasks that required teamwork. However, the effectiveness of these strategies varied based on the complexity of tasks, clarity of instructions, and structure of group roles. In some lessons, challenges arose due to task difficulty and lack of role clarity, which limited active group participation. When tasks were

too basic, students had little incentive to cooperate, contribute, or share ideas. Furthermore, as student teachers did not clearly define roles, some students were unsure of their responsibilities within the group, leading to a situation where sure students dominated tasks while others became passive observers. The excerpt below illustrated the student teachers' challenge in assigning group responsibilities:

> In Lisa's sports equipment vocabulary lesson, circling vocabulary items on a single worksheet reduces opportunities for each group member to contribute actively, often leading to one or two students taking charge while others remain passive.
>
> In Emily's crossword puzzle activity, unclear instructions left students uncertain about what to do, resulting in minimal group teamwork, and only a few students actively participated.
>
> Andy's activity involved only one worksheet per group, which allowed a few students to work actively while others just observed, making each student feel less responsible for the group's activity.

Classroom Interaction and Student Engagement

One key theme was the importance of classroom interaction and student engagement. Effective teaching goes beyond content delivery; it involves creating an interactive and engaging learning environment that actively involves students in their learning process. The interaction between teacher and students, as well as among students themselves, is essential to engagement, participation, and comprehension. This feedback highlighted the need for stronger strategies to enhance classroom interaction and engagement. In some lessons, there was a lack of interaction, with students having limited opportunities to practice vocabulary and sentence structures in meaningful ways:

> Sally's lesson started off engaging but lacked clear objectives. The vocabulary was too narrow, and there was no pronunciation practice or challenging activities.
>
> Lisa's objectives were unclear, leading to an ineffective lesson structure. Activities didn't align with the learning objectives, and tasks were too easy for students. Moreover, when the teacher presented content, it was mostly teacher talk.
>
> Emily's activities, such as the ice-breaking activity and vocabulary introduction, didn't align with the objectives. The teacher read from the slide and did not encourage students to practice.
>
> Nick followed the lesson plan but seemed unsure as he considered what to do next. This disrupted the lesson flow and highlighted a need for more transparent structure. Students struggled to understand what he was trying to convey.

The excerpt above illustrates the importance of clear objectives and structured activities for effective classroom engagement. It highlights how lessons with unclear goals, tasks that do not fit students' levels, or limited interaction can often hinder student understanding and engagement. Moreover, it also emphasizes the crucial role of classroom interaction and student engagement. Overall, lessons without clear objectives, engaging tasks, or sufficient interaction often decrease students' understanding and engagement.

Challenges of Classroom Management

An important theme from the researcher's classroom observations was classroom management and the challenges teachers face in maintaining a structured and engaging learning environment. The unclear instructions and lack of engagement strategies led to classroom chaos, creating an unproductive learning atmosphere. In some cases, tasks that didn't align with students' abilities or interests led to disengagement, as students either finished an easy task too quickly or felt demotivated to participate, as illustrated by the following examples:

> Phylis's lesson lacked effective strategies for managing interactions between the teacher and students. She did not set time limits for practice activities, which caused the lesson to run over time, leaving the teaching process incomplete with only practice and no production or wrap-up phase. Additionally, only one worksheet was provided per group, and Phylis did not ensure that each student was actively engaged and participating, resulting in some students being excluded from the activity.
>
> Lisa's lesson was affected by overly simple tasks that students completed quickly, which affected the lesson flow and overall classroom control. The content was not suited to their skill level, and once students finished the tasks, they lost interest in continuing the lesson and became less attentive.
>
> Emily's lesson was affected by poor management, primarily because of unclear instructions that left students uncertain about what was expected of them.
>
> Nick's lesson was often interrupted by pauses between activities, as he took time to decide on the next steps. Students became disengaged and felt uncertain about what to do next.

Assessment and Evaluation

Assessment and evaluation were noted in the classroom observation as essential components of effective teaching. They measure student comprehension and provide valuable feedback to students, helping teachers identify areas for improvement in future lessons. However, the observations revealed that lessons lacked structured assessments.

> Assessment and evaluation were almost entirely missing from Nick's lesson, making assessing student understanding and progress difficult. There were no quizzes or individual tasks to evaluate students' abilities in the lesson.
>
> In Andy's lesson, the lack of structured assessments was evident, as there were no checkpoints to evaluate student comprehension throughout the activities. For example, rather than using short quizzes, reflective questions, or quick written responses at the end of each activity, Andy moved directly from one task to another without checking students' understanding.
>
> Tyla used worksheets for assessment, but the questions mainly focused on basic memorization. This made it difficult to assess students' comprehension since the worksheets didn't encourage them to apply concepts in new ways or think critically.

Lisa used a worksheet in her lesson, but it was done as a group activity, which made it hard to see each student's individual understanding. The questions on the worksheet were also too simple, offering little challenge and not encouraging critical thinking.

Discussion

Five important challenges in implementing cooperative learning for student teachers in the classroom include student teachers' low confidence and content knowledge, their preparation and planning, classroom management, students' engagement, and individual classroom assessment. Teacher confidence and knowledge are crucial issues in shaping student teachers' training. Many student teachers expressed significant concerns about their confidence and knowledge in facilitating cooperative learning, especially when managing group activities and responding to student questions. Moreover, they revealed that linguistic insecurity is one of the main issues causing them uncertainty and lack of confidence in front of the classroom, as they feel unsure about their teaching performance and content knowledge. This aligns with Moges (2019), who found several challenges when implementing cooperative learning, including instructors' limited knowledge, inadequate administrative support, lack of instructional materials, and insufficient training.

The preparation and planning for student teachers were essential yet challenging. The participants revealed that they must consider how to group students and engage in tasks and activities since planning requires the selection of cooperative learning strategies that align with both the students' proficiency and levels (Johnson et al., 2013). Another key challenge was designing tasks that were suitable for students' levels and promoted individual accountability while encouraging positive interdependence among group members. According to Slavin (2014), well-structured cooperative learning tasks require clear guidelines and well-defined roles, which help prevent unequal participation. The findings also emphasized the challenges that student teachers face in the preparation and planning phase of cooperative learning. This stage was particularly crucial as it directly impacted the effectiveness of the learning activities and students' engagement. Through the semi-structured interviews, a common challenge was aligning activities with the students' proficiency levels, knowledge, and age. This challenge becomes harder when student teachers need to quickly change their plans due to unexpected situations in the classroom. Effective lesson planning was often one of the most challenging aspects for teachers, particularly in aligning activities with student needs and adapting to classroom dynamics (Darling-Hammond, 2006; Richards & Bohlke, 2011). Additionally, the anxiety and uncertainty about unexpected classroom situations and the effectiveness of their lesson plans align with findings from Borko (2004), which highlighted that novice teachers frequently feel unprepared for the unpredictable nature of classroom environments. The lack of real classroom experience exacerbates this issue, suggesting a gap between theoretical training and practical application. This is supported by Darling-Hammond et al. (2005), who emphasize the need for stronger practical training components in teacher education programs to better equip student teachers for classroom management and practical instruction challenges. In addition, Abramczyk and Jurkowski (2020) also point to factors such as class size, group formation, task design, diverse student needs, and teachers' attitudes toward cooperative learning as significant challenges for classroom implementation.

The classroom management was also crucial in implementing cooperative learning. According to Johnson & Johnson (2018), structured cooperative learning settings need clear guidelines and organization to ensure all students engage. Effective classroom management

in this context includes establishing well-defined roles and responsibilities for each group member, fostering accountability, and ensuring students have clear objectives and tasks (Slavin, 2015). It involves actively monitoring progress and providing feedback, with teachers playing a crucial role in supporting students throughout each stage of group work (Gillies, 2016). However, in this study, student teachers faced several challenges when implementing cooperative learning, including student distractions from group activities, noise, and a lack of effective strategies for managing interactions between students in groups. These findings are consistent with Slavin's (2014) and Wossen (2011) research, who similarly identified classroom management challenges such as the difficulty of managing large class sizes and inadequate classroom organization.

The engagement and participation of students posed another challenge for student teachers. The results indicated that students struggle to motivate students to work in groups, as some students were leaders while others remained passive learners. This aligns with a study by Molla (2015), which indicated that some students may dominate group discussions while others remain passive, resulting in unequal participation and limited learning outcomes. Furthermore, when students lacked accountability for both their learning and their peers.

In addition, the challenge of individual evaluation in cooperative learning, separate from the overall group effort, was also found in this study. Since cooperative learning prioritizes teamwork and shared problem solving, assessing each student’s performance becomes complicated. Moreover, students' levels of participation can vary; some contribute more than others, while some may engage less in the activity, making it harder to ensure fairness in individual assessments. The semi-structured interview revealed that they struggled to assess students individually. Additionally, it was found that some participants did not know how to assess students due to the ineffective activities or tasks given to students and their roles within their teams. This aligns with Blatchford et al. (2003) once students work together, some may contribute more significantly than others, making it difficult for instructors to assess each student's performance accurately.

In many cases, dominant students may assume leadership roles, completing tasks on behalf of the group, while others may contribute less or fail to engage fully. Moreover, Slavin (2011) highlighted the challenge of evaluating individual contributions in cooperative learning and pointed out the importance of designing assessments that account for group and individual performance. Without clear ways to track each student’s work, there is a risk of relying too much on group outcomes.

Conclusion

Teacher training plays a fundamental role in preparing student teachers or preservice teachers to become effective educators in the future, as it equips them with essential pedagogical knowledge, classroom management strategies, and practical teaching experience to handle real classroom settings. Despite the advantages of implementing cooperative learning in the classroom to promote students’ social skills, critical thinking, and engagement, student teachers still encounter several difficulties when applying cooperative learning. These challenges include low confidence and content knowledge when teaching, preparation and planning, classroom management, student engagement, and individual classroom assessment. Therefore, to help student teachers overcome these challenges, the educator must provide support by enhancing training programs focused on developing confidence, effective classroom management, and appropriate assessment strategies. The findings from this study

shed light on critical areas that teacher training must address to support student teachers or educators in implementing cooperative learning effectively. However, a limitation of this research is that it did not include a training program to build student teachers' confidence.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

The current study utilized AI-assisted programs such as Grammarly, ChatGPT, and Qillbot to improve the coherence of our writing. Grammarly helped us refine grammar, punctuation, and sentence structure. ChatGPT also supports our writing by paraphrasing and rewording to enhance overall fluency. Moreover, we use Qillbot to paraphrase and summarize complex ideas and improve paragraph fluency. While these AI tools were used to refine writing, all intellectual content, analysis, and interpretation remain entirely my own.

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AI-Assisted Learning and Concept Mapping for SDG-Focused Cross-School Outdoor Education in Taiwan

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Abstract

This study employs a quasi-experimental design to investigate the differences in learning outcomes and performance of junior high school students from metropolitan areas in Taiwan under various regional environments when engaging with water resource topics integrated with Sustainable Development Goals (SDGs). Students engaged in diverse outdoor environmental education activities, followed by classroom instruction on related issues. Their learning was assessed through text reading comprehension tests and the creation of concept maps. AI-assisted tools were used to evaluate students' learning progress and provide recommendations for deconstructing textual content. The preliminary research outcomes include: 1. Establishing practical models for cross-school collaboration to explore SDG-related topics; 2. Developing a process record for AI-assisted teaching evaluation and feedback systems; 3. Creating an assessment model utilizing AI to support concept map analysis; 4. Offering recommendations for the development of issue-oriented, cross-regional outdoor education curricula for sustainable development.

Keywords: concept mapping, AI-assisted teaching evaluation, SDGs

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Introduction

Integrating the United Nations Sustainable Development Goals (SDGs) into curricula has become a global educational trend. This approach enhances students' awareness of global issues and fosters responsibility and engagement as global citizens. By exploring topics like climate change, inequality, and sustainable energy, students develop interdisciplinary thinking and problem-solving skills. SDG-focused education promotes active learning, critical thinking, and collaboration, making it a key strategy for cultivating sustainability-minded future generations.

Taiwan's subtropical climate and diverse ecosystems make it ideal for outdoor learning, particularly for water-related education. The Ministry of Education promotes outdoor programs where students explore rivers, conduct field experiments, and apply scientific methods such as water testing and biodiversity monitoring. Research shows that experiential learning improves both ecological understanding and emotional connection to environmental issues (Liefländer et al., 2013), while encouraging systems thinking about the links between environment, health, and social equity.

Due to geographic constraints, not all students can directly access natural environments. In such cases, texts and recorded media serve as alternatives. This presents a challenge for educators: how to evaluate students' understanding of unfamiliar contexts. Traditional tests may not capture the depth of students' cognitive engagement.

Concept maps help assess students' grasp of content structure and their ability to organize information. Visualizing concept relationships reveals how well students connect and integrated ideas. Network-style maps often indicate deeper understanding. As both learning and diagnostic tools, concept maps offer valuable insight into students' thinking.

However, evaluating concept maps is time-consuming. With the advancement of artificial intelligence (AI), automated tools now offer potential solutions. AI can interpret user input and images, raising the question: can it reliably assess student-generated concept maps and provide individualized feedback?

Recent studies show strong alignment between AI and human scoring of concept maps. For example, Bleckmann and Friege (2023) found that AI scored student maps with 80% accuracy and a Cohen's κ of 0.73—comparable to human raters. Medical education research supports AI validity as well. Ho et al. (2018) found strong correlations between AI-scored maps and manually graded essay questions, highlighting the efficiency and consistency of automated assessment. With proper training and frameworks, AI can score concept maps with a reliability close to human judgment (Bleckmann & Friege, 2023; Ho et al., 2018). Yet, challenges remain. Hubal et al. (2020) noted that while AI captured conceptual complexity, it struggled with evaluating organizational structure, suggesting a need for further refinement. As AI evolves, scoring accuracy continues to improve, narrowing the gap with human evaluation. This progress opens promising possibilities at the intersection of educational assessment and AI.

Building upon the preceding discussion, this study seeks to investigate the following research questions:

1. What are the processes involved in establishing cross-school collaboration to explore water resource issues in the context of the Sustainable Development Goals (SDGs)?

2. In what ways can artificial intelligence (AI) support teachers in assessing and analyzing student-generated concept maps, and what are the critical stages of this process?
3. How do assessment outcomes differ between AI-based evaluations and those conducted by human teachers?

Research Design

Outdoor Education

A substantial body of research has demonstrated that when students engage in outdoor learning experiences facilitated by teachers, they tend to exhibit enhanced development across cognitive, physical, social, and emotional domains. Utilizing natural environments as an extension of the indoor classroom has been shown to improve both academic performance and lifelong learning behaviors (Ruether, 2018). Compared to traditional, monotonous classroom instruction, outdoor environments foster greater student engagement and active participation (Dettweiler et al., 2015). Furthermore, students involved in outdoor educational activities not only achieve more enduring learning outcomes but also benefit from interdisciplinary learning experiences gained through direct interaction with the natural world (Becker et al., 2017).

According to a comprehensive study by Ruether (2018), outdoor education typically encompasses the following six characteristics:

1. It enables students to form meaningful connections between acquired knowledge and real-life contexts;
2. It supports learning through multisensory experiences;
3. It enhances students' intrinsic motivation to learn;
4. It provides more opportunities for peer interaction through physical movement;
5. It facilitates the development of students' social skills;
6. It contributes to behavioral improvements, particularly among students with attention-related difficulties, such as those with ADHD.

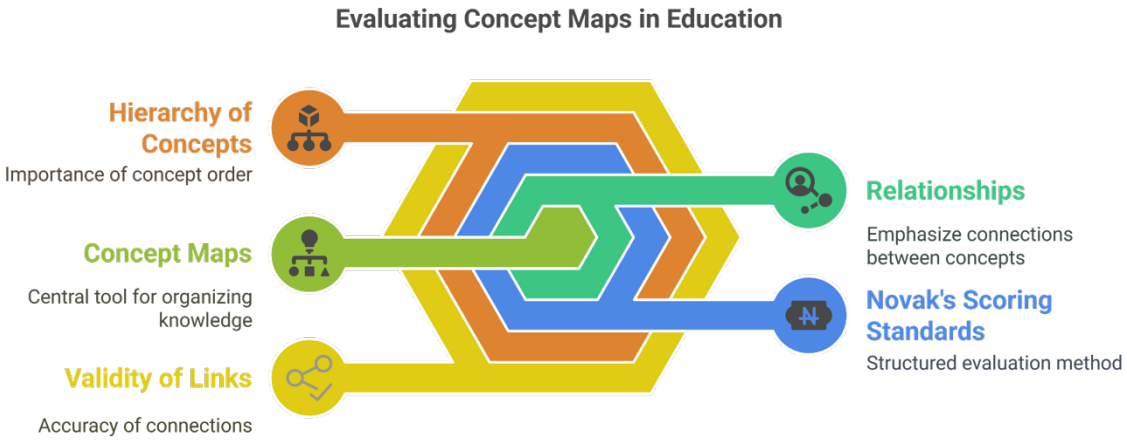
For students residing in urban environments, opportunities to engage with untouched natural settings are often limited. Therefore, educators can consider utilizing semi-natural environments, such as riversides, as alternative outdoor learning spaces. Such settings are likely to elicit distinct and potentially enhanced learning outcomes from students participating in these courses.

Concept Maps in Education (Concept Maps and Novak's Scoring Standards)

Concept maps are graphical tools used to organize and represent knowledge, emphasizing the relationships between different concepts. They are particularly effective in science education, where complex ideas and their interconnections are central to learning. Novak's scoring standards provide a structured approach to evaluating concept maps, focusing on the hierarchy of concepts, the validity of links, and the overall structure of the map. These standards have been widely adopted in educational research and practice, offering a reliable method for assessing the depth and accuracy of conceptual understanding (Adlaon, 2012; Lubberts, 2009; Novak & Gowin, 1984).

The scoring criteria for concept maps are mainly based on the N-G scoring method proposed by scholars Novak and Gowin (1984), which is based on Ausubel's learning theory and divides concept maps (Figure 1) into four items for scoring (Ausubel, 1968). These four items and their scoring criteria are listed below:

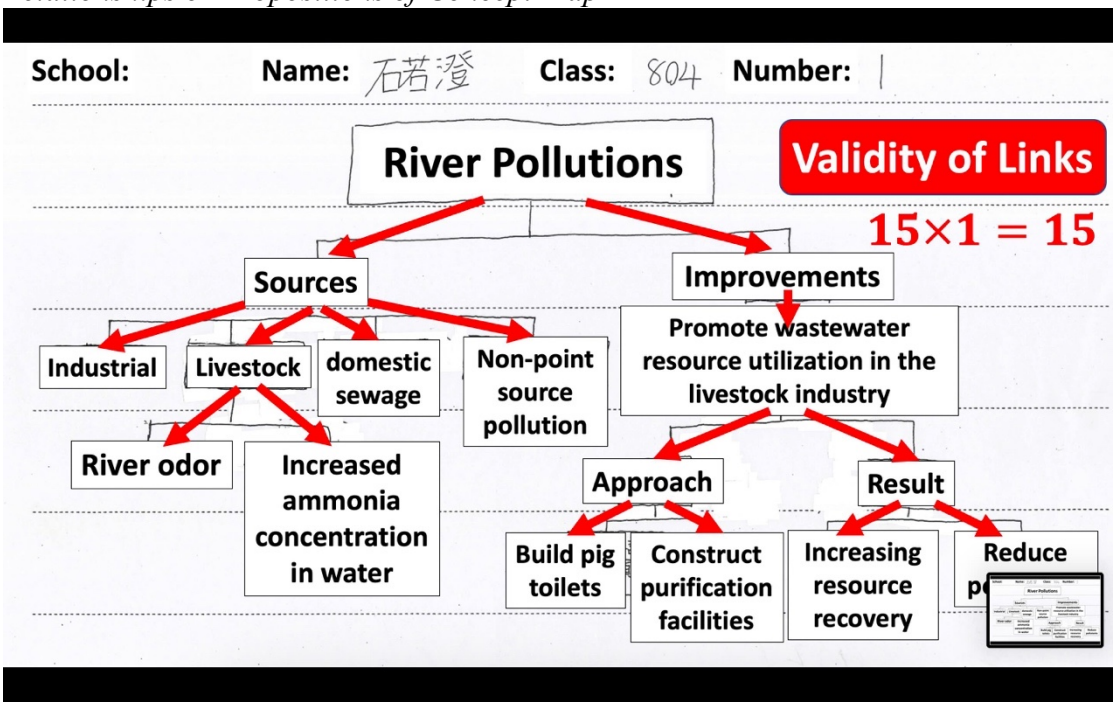
Figure 1
Concept Maps and Novak's Scoring Standards



Relationships or Propositions

One mark is awarded for each valid proposition (i.e. a meaningful link between two concepts). No marks will be awarded or deducted for vague or incorrect links, as shown in Figure 2.

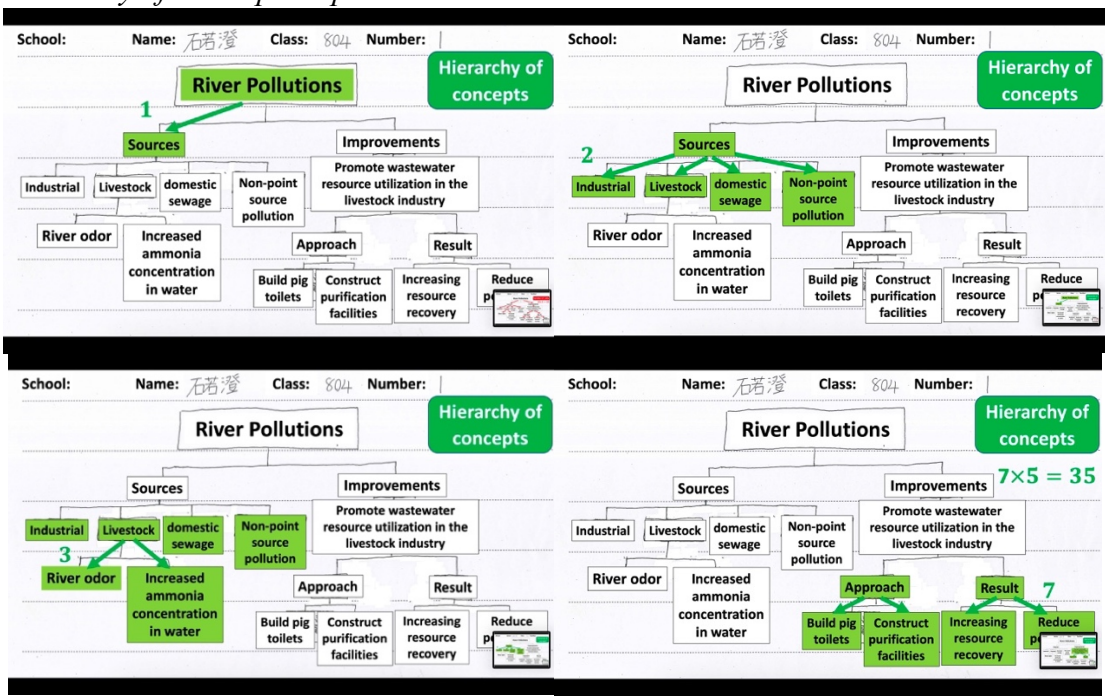
Figure 2
Relationships or Propositions of Concept Map



Hierarchy

The concept map is presented in a hierarchical format, with 5 points given for each valid hierarchical relationship. The hierarchical relationships indicate the organization of the concept, as shown in Figure 3.

Figure 3
Hierarchy of Concept Map



Cross-Links

Ten marks were awarded for effective cross-linking, indicating that students were able to make meaningful connections between different areas of knowledge and demonstrate creative thinking. If the cross-linking is effective but the conceptual propositions cannot be combined, 2 marks will be awarded.

Example

The student explains the meaning of the concept through a specific event or object, awarding 1 mark for an effective example.

In addition, there are other scoring methods such as Goldsmith and Johnson's Closeness index scoring method, which is assessed by comparing the structural similarity of the students' concept maps to the experts' concept maps.

Concept Map Scoring Formula

Total Score = (5 × number of valid strata) + (1 × number of valid propositions) + (10 × number of valid cross-links) + (1 × number of valid examples).

Benefits of Concept Maps

Visual organization of knowledge: Concept maps help students understand the relationships between concepts by presenting complex knowledge in a visual way.

Promoting Creative Thinking: Through cross-linking, students are able to make connections between different areas of knowledge and develop creative thinking skills.

Assessing Learning Outcomes: Concept maps can be used as a tool to assess student learning outcomes, reflecting students' knowledge organization and understanding.

AI in Educational Assessment

The advent of AI has revolutionized various aspects of education, including assessment. AI-powered tools are increasingly being used to automate grading, provide personalized feedback, and enhance the efficiency of educational evaluations. In the context of concept mapping, AI can potentially analyze the structure and content of maps, offering objective and consistent scoring based on predefined criteria. However, the consistency of AI-generated scores with those of human teachers remains a critical area of investigation (Ivanova et al., 2024; Ogunsakin, 2024; Owan et al., 2023).

The Prompt Framework in AI Research

The Prompt Framework refers to a structured approach used in AI systems to generate responses to specific tasks. In the context of educational assessment, this framework can be adapted to guide AI systems in evaluating concept maps. By incorporating Novak's scoring standards into the Prompt Framework, AI systems can be trained to assess concept maps with a high degree of accuracy and consistency. This integration has the potential to address some of the challenges associated with manual scoring, such as subjectivity and time constraints (Anohina & Grundspenkis, 2007; Ivanova et al., 2024).

Score Consistency Between AI Evaluation and Human Teachers

The consistency of scores between AI evaluation systems and human teachers is a crucial factor in the adoption of AI in educational assessment. Studies have shown that AI systems can achieve high levels of accuracy in scoring concept maps, particularly when trained on large datasets of human-scored maps. However, the consistency of AI-generated scores with those of human teachers can vary depending on the complexity of the maps and the specific criteria used for evaluation. For instance, AI systems may struggle with assessing the hierarchical structure of concepts, a key aspect of Novak's scoring standards, leading to discrepancies in scores (Anohina-Naumeca et al., 2010; Pramjeeth & Ramgovind, 2024; Zhao, 2024).

Research Design

Participants

In this study, a purposive sampling method was used to select two classes in each of the two junior high schools in Taipei City and New Taipei City, two administrative districts in Taiwan, for the teaching experiment (n = 110). Four classes with a total of 110 students were

selected using the intentional sampling method with eighth-grade students. Students were given an instructional design that included a concept map and a text on water pollution. There was no significant difference in the pre-test scores of the four classes in their respective schools compared to their science scores in the previous semester.

Research Tools: AI Platform Usage

Claude

After testing on various AI platforms, Claude can currently read the image files, but not the images in the PDF.

NotebookLM

It is currently the only AI interface that can read PDFs of students' hand-drawn conceptual maps.

AI-Scored Content Checking

A scoring consistency test is conducted, and the prompts are then analyzed and optimized by natural science subject matter experts to determine the content of the scores that meets the needs of the subject matter.

We found that the only mainstream AIs that can read handwritten and hand-drawn messages in pictures and perform scoring accurately during the study period are Claude and notebooklm, but Claude can only read picture files.

However, the large number of images in the scanned PDF files can be easily read and accurately scored by notebooklm. So we chose notebooklm to build a fast and convenient AI personalized scoring system.

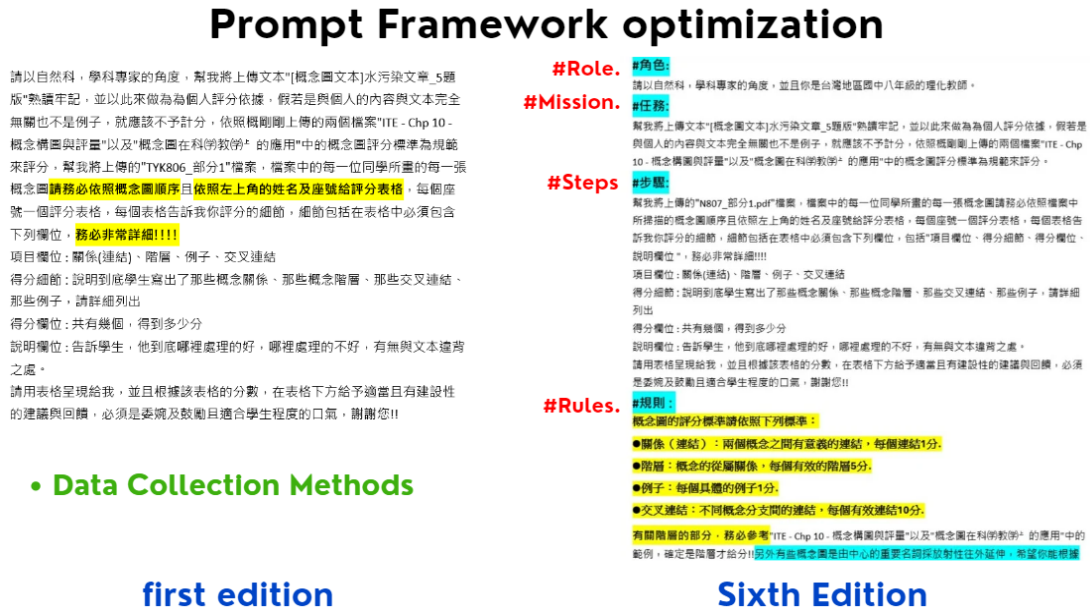
Verify AI Scoring Consistency

We were concerned about the impact of version updates and the time gap between ratings on the consistency of ratings, so we did a ratings consistency test, and the result was that after a week both the total score and the sub-items were perfectly consistent.

Prompt Framework Optimization

In the part of prompt Framework optimization, we went through six iterative optimization processes and finally reached a relatively stable state that is closer to the scoring of human teachers. It is mainly divided into four parts: roles, tasks, steps, and rules. Among them, the rules part is the focus of optimization and can correct more problems, as shown in Figure 4.

Figure 4
Prompt Framework Optimization



Differentiated Feedback

The section on differentiated feedback is outlined below. The red box on the left side of the picture is about how to ask AI to give feedback in a tactful way and it must be feedback that is appropriate for the students. The red square on the right is the personalized feedback message given by AI to give students positive reinforcement.

Data Collection Methods

In this study, students were provided with a text article discussing the issue of water pollution in Taiwan. The content covered key aspects such as the sources of pollution, relevant environmental regulations, the proportion of various pollutants, and the underlying causes associated with each source. Furthermore, the article introduced the River Pollution Index (RPI) as a framework for evaluating pollution levels, using the Bei-gang River as a case study. Following the reading, students were required to construct concept maps that visually represented the main ideas and relationships presented in the text.

Results

Grading Consistency Between Human Teachers and AI

From the results, three of the four classes in this study reached a "high degree of consistency", while the class of TYK 804 had a large difference in the scores between the AI and human teachers; therefore, it is an important reference for the optimization of cues in the following section.

This indicates a fair level of consistency, suggesting that the two grading mechanisms have limited consistency in classifying students' scores. (Table 1)

Table 1
Grading Consistency Between Human Teachers and AI

Group	Kappa	Interpretation	ICC	Interpretation	Overall Evaluation
N803	0.687	Substantial Agreement	0.835	High Agreement	Highly reliable
N807	0.78	Substantial Agreement	0.83	High Agreement	Highly reliable
TYK806	0.766	Substantial Agreement	0.923	Very High Agreement	Extremely reliable
TYK804	0.236	Fair Agreement	0.331	Moderate Agreement	Needs improvement

Teachers reviewing the concept maps drawn by students will give appropriate differentiated feedback on each section (relationships, hierarchy, examples, cross-links), but the time cost of reviewing is enormous.

Comparative Analysis of AI and Human Teachers

Relationship Score

Human teachers averaged 10.44 and AI averaged 10.89, a relatively small difference.

The correlation coefficient of 0.90 indicates a highly consistent trend in the relationship score ratings between AI and human teachers.

t examined ($t = -1.19$, $p = 0.25$), indicating that there was no statistically significant difference between the relationship scores of the human teachers and the AI.

Class Score

Human teachers had the same mean (18.33) and the same standard deviation as AI.

The correlation coefficient of 0.96 indicates that the trend of AI and human teachers' rank score ratings is very consistent.

The t-test ($t = 0.00$, $p = 1.00$) shows that they are identical with no significant difference.

Example Score

The mean value of both human teachers and AI is 0.22, and the correlation coefficient is 1.00, which means that the AI and human teachers' ratings are identical.

The t-test could not be calculated, probably because of the distribution of the data, but there is no significant difference between the two in terms of mean and correlation.

Crosslink Fraction

Human teachers averaged 5.00, AI averaged 3.89, and AI was slightly lower.

The correlation coefficient of 0.89 indicates that the trend in cross-linking scores between AI and human teachers remains fairly consistent.

t test (t = 1.46, p = 0.16), indicating no statistically significant difference between the two. (Table 2)

Table 2
Comparison of Human and AI Scores Across Different Score Types

Score Type	Human Mean	AI Mean	Correlation Coefficient	t-test (t, p)	Summary
Relationship Score	10.44	10.89	0.90	t = -1.19 p = 0.25	No significant difference
Class Score	18.33	18.33	0.96	t = 0.00 p = 1.00	Identical ratings with consistent variability
Example Score	0.22	0.22	1.00	Not calculated	Identical ratings
Crosslink Fraction	5.00	3.89	0.89	t = 1.46 p = 0.16	No significant difference

Statistics of Students' Concept Map Performance

Overall, students from TYK outperformed Nangang students in terms of total conceptual map scores, especially in the relationship and example categories. This suggests that TYK students tended to provide more examples and achieved higher overall coherence in their maps. However, Nangang students displayed more cross-linking among concepts, indicating stronger connections between different parts of their conceptual maps. (Table 3)

Table 3
Statistics of Students' Concept Map Performance

Score Category	Nangang (Mean ± SD)	Taoziqiao (Mean ± SD)	Comparison/Note
Relationship Score	9.68 ± 3.84	14.47 ± 5.82	Taoziqiao students scored significantly higher.
Hierarchy Score	16.58 ± 8.39	18.91 ± 5.67	Taoziqiao students scored slightly higher.
Example Score	0.66 ± 0.78	1.13 ± 2.04	Taoziqiao students provided more examples; higher SD indicates larger individual differences.
Cross-Link Score	3.95 ± 5.95	0.36 ± 2.70	Nangang students showed more frequent cross-linking among concepts.
Total Score	28.58 ± 14.31	33.91 ± 10.12	Taoziqiao students had a higher overall score for conceptual maps.

Discussion

Potential Influencing Factors

1. Instructional Strategies**:** Variations in teaching methods between Nan-Gang and TYK may influence how students construct concept maps. For instance, the pedagogical approach in Nan-Gang may emphasize making inter-conceptual connections, while TYK may prioritize the development of hierarchical structures.
2. Student Learning Backgrounds**:** Differences in students' prior knowledge of subject content may also impact concept map performance. TYK students may demonstrate stronger understanding of hierarchical relationships, resulting in higher scores in related categories. Conversely, Nan-Gang students may be more adept at identifying cross-conceptual links, thereby excelling in cross-linking assessments.
3. Scoring Rubrics and Complexity**:** Discrepancies in scoring standards or students' varied interpretations of how to construct concept maps may contribute to significant differences in performance. Further refinement of rubric clarity is necessary to address such inconsistencies.

Conclusion

1. Frequent updates by AI software providers present a key challenge for maintaining consistent scoring when using AI for assessment and feedback.
2. Even in the absence of such updates, temporal variations in AI scoring suggest that model stability must be ensured—an issue not exclusive to AI, as human raters also exhibit variation over time.
3. Evaluation results revealed a limited understanding of the concept of "hierarchy" among both AI systems and students. To address this, students should receive clearer definitions, illustrative examples, and additional practice before generating concept maps. The hierarchical dimension is particularly suitable for analyzing structured scientific texts.
4. AI systems sometimes misclassify concept relationships as examples, leading to slight scoring inconsistencies.
5. The current assessment approach measures quantity but lacks the ability to weight scores based on concept importance. For instance, in the Beigang River article, livestock wastewater is heavily emphasized. Students accurately representing this key issue should be awarded higher scores, but current scoring methods cannot account for such qualitative distinctions.
6. Complex conceptual maps can present interpretive challenges for teachers, often requiring subjective inference. In such cases, AI-assisted scoring can help identify the underlying logic and support scoring consistency.
7. While AI effectively identifies handwritten concepts and even recognizes spelling errors, its performance decreases significantly when faced with illegible handwriting. Misinterpretation of handwritten terms remains a challenge—particularly in languages like Chinese—highlighting the current limitations of AI compared to human evaluators.

Suggestions and Future Improvements

1. Enhancing the AI Scoring System

   AI scoring should incorporate weighted adjustments based on human grading patterns. For example:

- Relationships: 40%
- Hierarchy: 30%
- Examples: 20%
- Cross-links: 10%

A hybrid scoring model could be developed, allowing AI to learn from historical teacher grading data and better predict scores rather than relying solely on additive calculations.

2. Aligning AI with Human Scoring Standards

Regarding standardized scoring criteria, the limited influence of example scores and cross-links may stem from ambiguities in current guidelines. These should be refined to enhance scoring reliability. Additionally, prompt optimization is essential to align AI-generated feedback more closely with human ratings. The inclusion of "cross-linking" in scoring should also be revisited, as current AI systems often fail to recognize this element—perhaps due to its underrepresentation in human instruction.

Final Reflections

- Human evaluators demonstrate greater flexibility, particularly in assessing relationships and hierarchical structures.
- In contrast, current AI models apply equal weighting across all subcategories, resulting in overly mechanical assessments.
- Optimizing AI scoring to reflect human grading logic will enhance consistency and trust in automated systems.
- Human raters can likewise benefit from more standardized rubrics to ensure fairness and coherence in evaluations.

These findings provide valuable insights for improving AI-based scoring models and enhancing teacher assessment practices. Moreover, engaging students in outdoor exploration and direct interaction with natural environments fosters greater sensitivity toward sustainability issues. When students care deeply about the environment, teachers can more effectively guide them through issue-based instruction. Combined with AI-assisted feedback, this approach supports deeper learning and a more comprehensive educational experience.

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Career Development Events Evaluation: Basis for Career Information Service

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Abstract

Students discover and develop skills related to their chosen degree programs through Career Development Events, it was found that individuals with higher levels of planning, motivation, and a present-time focus tend to engage in more proactive career behaviors like networking, skill development, and career planning (Bazine et al., 2023). The study aims to evaluate the impact of these events in addressing the career-related concerns and needs of students based on their college affiliation and year level. Using a mixed-methods approach, the study explores the college students' perceived satisfaction and preferences in terms of career development services. Quantitative data was gathered through a facilitator-made rating scale, enabling the measurement of satisfaction levels among participants about the topics presented. Concurrently, qualitative data was obtained via open-ended feedback and suggestions provided by students during and after the sessions. The qualitative analysis sought to identify recurring themes regarding preferred topics and actionable insights for improving the sessions. Participants included university students who attended career information sessions during the academic year, with their profiles categorized by college and year level. The satisfaction level of students in the career information sessions shows that the students are highly satisfied with the company events. However, the students also expressed that the company events should be more relevant to their specific college programs and that the sessions be a venue to guide job applications.

Keywords: career development events, career information services, career development evaluation, mixed-method design

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Introduction

Career development activities support students in identifying and cultivating career-related skills, with universities playing a vital role in offering such opportunities. Bazine et al. (2023) found that students with strong planning and motivation engage more actively in career development. However, many students question the relevance and satisfaction of the career information provided. This study aims to evaluate the effectiveness of career development sessions, specifically by analyzing student feedback on satisfaction and relevance based on college affiliation and year level. Data will be drawn from evaluations of career information sessions conducted by various companies.

Existing literature highlights the importance of delivering relevant and personalized career information to guide students in their decision-making (Hidayati et al., 2021), especially as many pursue higher education to improve employability (Villanueva, 2021). Students value intellectually stimulating experiences that foster self-confidence and provide guidance (Dean et al., 2020). The study emphasizes the need to address diverse student needs across academic levels to improve the impact of career services.

Career development events enhance students' preparedness for a technologically advanced workforce and serve as a foundation for improving career information services (Nassar-McMillan et al., 2019). Despite their potential, these programs often lack customization (Rowe & Mauer, 1991). In response, institutions and companies have launched programs to support students' career exploration and planning (Burke et al., 2024).

This research explores the satisfaction levels, experiences, suggested topics, and recommendations of college students who attended company-led career events. With participation from 15 national and international companies and one government agency, the study aims to offer insights for enhancing career services in both academic and organizational settings, making career development more intentional and impactful.

Literature Review

Career Guidance

Career guidance is essential for helping students explore, understand, and align their interests, skills, and values with appropriate career options (Abubakar, 2013; Buraga & Caballero, 2018). Such guidance fosters deeper self-awareness, enabling informed and fulfilling career decisions that reflect personal goals (Kazi & Akhlaq, 2017; Luken, 2019; Ran et al., 2023). Through assessments and exploration activities, students can better match their competencies with occupational environments, leading to improved job satisfaction and productivity (Dodd et al., 2021). In today's competitive context, informed career choices, facilitated by thorough guidance programs, significantly enhance students' ability to effectively utilize their potential (Dodd et al., 2021; Kulcsár et al., 2020).

Effective career guidance requires collaboration among counselors, educators, and administrators, creating robust, interdisciplinary support systems (Singh & Jagdev, 2018). Such collaborative approaches foster student engagement, optimizing their career decision-making processes and overall potential, which ultimately benefits broader society (Abubakar, 2013).

Targeted interventions play a significant role in adolescent career development. According to Jemini Gashi et al. (2023), these interventions include personalized career counseling (Jemini Gashi et al., 2019, as cited in Jemini Gashi et al., 2023), choice interventions for evaluating career options (Koivisto et al., 2011, as cited in Jemini Gashi et al., 2023), comprehensive training programs that enhance self-awareness and job search skills (Koen et al., 2012, as cited in Jemini Gashi et al., 2023), and peer counseling to encourage experience-sharing and supportive networks (Wong et al., 2016, as cited in Jemini Gashi et al., 2023).

The study by Jemini Gashi et al. (2023) highlights adolescence as a critical period for career guidance interventions, noting significant impacts on career self-efficacy, goals, and decision-making skills. Their research found marked improvements in adolescents' career decision-making competencies following structured workshops that promoted self-awareness, professional knowledge, interactions with career professionals, and decision-making processes. These interventions positively influenced adolescents' career trajectories and underscored the crucial role of self-efficacy in successful career planning.

Ultimately, the research emphasizes that strategic career guidance interventions are essential within educational contexts, contributing significantly to adolescents' development of decision-making competencies and supporting their long-term career success (Jemini Gashi et al., 2023).

Career Information Service (CIS)

CIS in higher education play a crucial role in supporting students' career development by offering resources and guidance (Chin et al., 2019). These services help students navigate the process of career exploration and decision-making. Specifically, CIS provide crucial information on job openings, networking opportunities, required skills, and labor market trends. They also offer personalized guidance through individual meetings with advisors, where students can discuss their goals and refine their job search skills. Beyond these core services, some CIS integrate career exploration into the educational institution's curricula and facilitate connections with professional student organizations. These services empower students to understand the connection between their studies and potential career paths, ultimately enabling their success in their chosen fields.

Making well-informed decisions about one's learning and career goals is essential for achieving success (Su et al., 2019). Thorough research, understanding potential outcomes, and aligning decisions with personal values and strengths lead to informed choices that minimize risks and maximize the chances of reaching desired goals. When students choose their learning paths based on their interests, capacities, and aspirations, they are more likely to succeed and find fulfillment in their careers. (Fatima et al., 2020) Being informed about the wide range of opportunities that learning can provide helps individuals make better choices that align with their values and goals. Comprehensive and high-quality career information is vital for making excellent career decisions, covering details on education and training options, characteristics of different occupations, labor market supply and demand, and potential career pathways from various educational choices. CIS also aim to explain how educational decisions can significantly impact career options and the diverse pathways to specific careers (Brüning & Mangeol, 2020).

CIS offers activities and resources promoting career exploration and self-assessment, enabling students to identify their strengths, interests, and values. By fostering greater self-

awareness and skills-building, CIS supports students in aligning their career decisions with personal attributes, enhancing their employability and job satisfaction (Pengnate, 2018).

CIS also aids in developing job search skills. They equip students with essential skills like resume and cover letter writing, interviewing techniques, and networking strategies, which are crucial for securing internships and jobs after graduation. Many career services also host fairs, networking events, and employer information sessions, enabling direct connections between students and potential employers (Burke et al., 2024). These connections can lead to internships, job offers, and valuable industry insights.

At the heart of every academic counseling office is career counseling, where competent individuals provide personalized guidance to students, helping them navigate career choices, develop plans, and overcome job search challenges (Buraga & Caballero, 2018). Career information services, through individual career counseling, also offer support for managing career transitions, such as changing majors, pursuing further education, or transitioning from college to the workforce.

Career guidance workshops, designed primarily for secondary students, are grounded in Social Cognitive Career Theory (SCCT) and labor market realities. These workshops provide adolescents with detailed insights into various professions, aligning career options with their interests and personalities (Jemini Gashi et al., 2023). Practical interactions, such as meeting professionals or workplace visits, offer firsthand experiences that clarify career opportunities, entry paths, and challenges, enabling informed decisions. Rooted in SCCT, these workshops emphasize self-efficacy, outcome expectations, and realistic goal-setting, enhancing students' confidence and future career outlook. They also integrate current labor market demands, ensuring relevance and alignment with employment trends. Jemini Gashi et al. (2023) underscore the significance of such workshops in developing adolescents' career self-efficacy and decision-making competencies, ultimately contributing to their long-term success.

Career Development Events

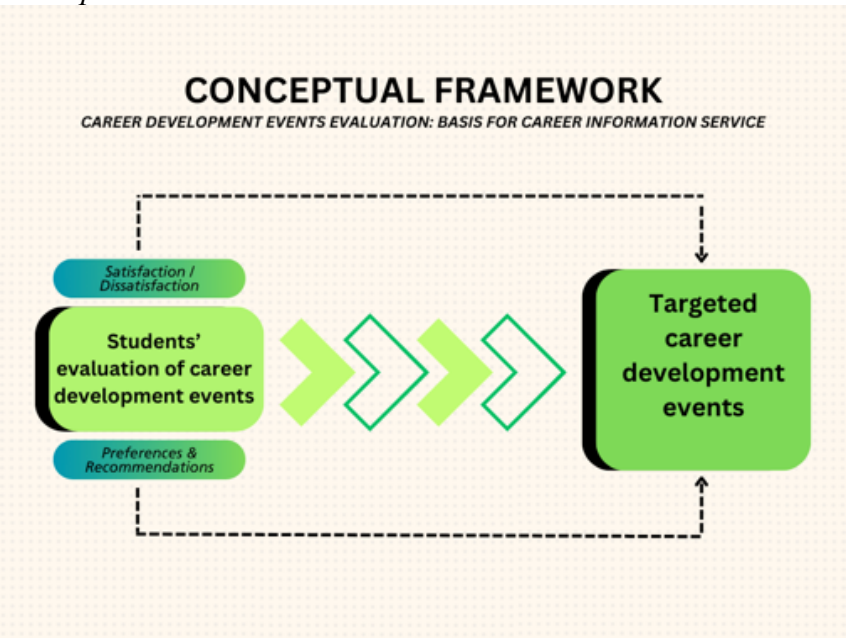
Participation in career guidance activities helps young adults become productive, responsible, and well-prepared for today's dynamic, technology-driven workforce (Abubakar, 2013). These activities enhance students' self-awareness, helping them identify their interests, skills, and aptitudes, which are essential for aligning their career choices with labor market demands (Super et al., 1996, as cited in Abubakar, 2013). Effective career guidance equips students with the knowledge and skills necessary to understand career options and navigate the job market, thus preventing mismatches between their abilities and chosen careers, a critical factor in today's competitive environment (Herr, Cramer, & Niles, 2004, as cited in Abubakar, 2013).

The evolving nature of work demands continuous skill development and adaptability (Reardon, et al., 2000, as cited in Abubakar, 2013). Career development events provide practical training in creating resumes, writing cover letters, and performing effectively in interviews. Such events offer comprehensive industry exposure and skills training, enabling informed career decisions aligned with students' strengths and interests (Jemini Gashi et al., 2023). These interventions significantly boost students' career self-efficacy and decision-making skills, facilitating smoother transitions into higher education and employment and contributing to their long-term career success (Jemini Gashi et al., 2023).

Career Development Events Evaluation

Students' perspectives are essential in tailoring career guidance to their specific needs and preferences. Effective career information must not only be accurate but also relatable to each student's context, enabling them to translate it into actionable career choices (Abubakar, 2013). Professional counselors and school-based career activities are crucial in guiding students through this process of interpretation and informed decision-making. This study emphasizes college students' proactive participation in career development events, using their feedback as critical input. The conceptual framework (Figure 1) utilizes student evaluations to design targeted, student-centered career information services that align with college affiliation and year level. Such tailored events are anticipated to enhance students' employability by equipping them with the relevant insights needed to navigate their career pathways effectively.

Figure 1
Conceptual Framework



Theoretical Framework

Holland

Holland's theory maintains that in choosing a career, people search for environments that will let them use their skills and abilities and express their attitudes and values. People are attracted to a given career that has similar qualities to their peculiar personalities and other background variables (Holland, 1992, as cited in Abubakar, 2013). Holland's perspective accentuates the accuracy of self-knowledge and career information as necessary prerequisites for career decision-making (Abubakar, 2013). Holland's theory emphasizes the accuracy of self-knowledge and career information necessary for career decision-making (Zunker, 1994, as cited in Abubakar, 2013).

Bandura

Participation in career guidance enables students to achieve social modeling, which Bandura (1995, as cited in Abubakar, 2013) described as the second domain through which individuals develop self-efficacy (Abubakar, 2013). Self-efficacy beliefs are people's assessments of their ability to plan and carry out the actions necessary to achieve specific goals or desired outcomes. These beliefs play a crucial role in Bandura's theory by influencing one's thoughts and actions (Bandura, 1986, as cited in Jemini Gashi et al., 2023).

Lent

Social Cognitive Career Theory (SCCT) proposes that participation in career guidance can reduce perceived career barriers by strengthening the translation of interests into actionable career goals (Brown & Lent, 1996, as cited in Abubakar, 2013). SCCT emphasizes three key cognitive-personal factors—self-efficacy beliefs, outcome expectations, and career goals—that collectively facilitate professional development (Lent et al., 1994, as cited in Jemini Gashi et al., 2023). Individuals with strong self-efficacy are more likely to pursue ambitious career objectives, remain persistent through obstacles (Lent et al., 1994, as cited in Jemini Gashi et al., 2023), and actively engage in career-enhancing activities like seeking guidance, networking, and skills development (Hackett & Lent, 1992, as cited in Jemini Gashi et al., 2023).

Lent and Bandura

SCCT draws on Bandura's social cognition theory, highlighting the complex interplay between personal agency and environmental factors. Similar to Bandura's general theory, it assumes that individuals not only possess a degree of autonomy or self-direction but also have to deal with a range of external factors, such as environmental facilitators and obstacles, that can either reinforce or diminish personal agency and, in some cases, completely override it (Bandura, 1986, as cited in Jemini Gashi et al., 2023). Self-efficacy beliefs are used in career guidance and choice in SCCT (Gashi et al., 2023; Lent et al., 1994), which builds on Bandura's (Bandura, 1986; Gashi et al., 2023) thesis.

Data collection, analysis, and interpretation tailored to the specific variables (college and year level) are used to answer the research questions.

Methodology

This study uses a mixed-method descriptive survey design to present participant profiles by college and year level, assess their satisfaction with career development events during the Job Expo, and gather suggestions for future topics and improvements. The data is collected through the Company Event Evaluation Form, which includes both quantitative and qualitative items. The first part measures satisfaction using closed-ended questions, while the second part gathers open-ended responses on preferred topics and recommendations. The survey also collects demographic data. To ensure accuracy, the survey was carefully constructed, organized, and targeted toward students about to begin internships or graduate. It was administered online via Google Forms.

Participants were selected based on their attendance at the Company Events during the Job Expo. To generalize findings, the study used non-probability convenience sampling, as the

total population size was unknown and not all members had an equal chance of selection, increasing the risk of bias. The sample included students from seven colleges—College of Education (CED), College of Computer Studies (CCS), College of Liberal Arts (CLA), College of Engineering (COE), College of Business (COB), and School of Economics (SOE)—primarily targeting those about to graduate or begin internships in the next two terms. Due to limited access to the full target population, researchers gathered responses from as many eligible students as possible during the event.

Table 1
Sample Population According to College

College	f	%
CED	29	0.53
CCS	571	10.43
CLA	1741	31.79
COS	1688	30.83
COE	418	7.63
COB	982	17.93
SOE	47	0.86
Total	5476	100

Frequency distribution of respondents based on participants' respective colleges.

Grouping was also done by year level. A larger sample size was prioritized to increase the reliability of generalizing results to the broader population.

Table 2
Sample Population According to Year Level

Year Level	f	%
Sophomore	1148	21.04
Junior	3170	58.22
Senior	1127	20.70
Total	5445	100

Frequency distribution of respondents based on participants' year level.

Data was collected using the Evaluation Form for Job Expo Company Events. It comprises six sections, namely Privacy Notice, Consent Confirmation, Personal Information, Event Evaluation, and Additional Feedback. The instrument has been validated by registered guidance counselors, psychometricians, and a psychologist. Cronbach's alpha was used to measure the reliability of survey questions.

Table 3
Cronbach's Alpha Reliability Statistics

Cronbach's Alpha	Number of Items
.900	7

Cronbach's alpha result of the Evaluation Form for Job Expo Company Events.

Table 4
Item-Total Statistics

Survey Questions:	***Scale Mean if Item Deleted***	***Scale Variance if Item Deleted***	***Corrected Item-Total Correlation***	***Cronbach's Alpha if Item Deleted***
The company event presented up-to-date information about their industry and employment processes.	27.95	10.610	.703	.889
The company event was relevant to my career.	28.22	9.386	.609	.903
The company event was interactive.	28.18	9.060	.746	.882
The company event was able to assist me in my career path.	28.14	9.428	.766	.878
The venue was conducive for the career event.	28.04	9.820	.732	.883
I am satisfied with the organization of the career event.	28.00	10.114	.762	.881
I am satisfied with my overall experience with the career event.	27.99	10.119	.744	.883

Data collection was conducted online via Google Forms, distributed through a link and QR code. Responses were organized by participants' year level, college, and satisfaction levels, and exported to Google Sheets for analysis.

Satisfaction was measured using seven items on a 5-point Likert scale (1 = extremely unsatisfied to 5 = highly satisfied), assessing aspects such as relevance to career, interactivity, venue conduciveness, and overall satisfaction. Frequency distributions were used to analyze response patterns, while mean scores were calculated to determine satisfaction levels using defined scale intervals: 1 - 1.79 indicated extremely unsatisfied, 1.80 - 2.59 indicated unsatisfied, 2.60 - 3.39 indicated neutral, 3.40 - 4.19 indicated satisfied, and 4.20 - 5.00 indicated highly satisfied.

Qualitative data from open-ended questions captured participants' suggestions for future career topics and feedback on the events. Responses were thematically coded into categories such as "preferred career topics," "event improvements," and "positive feedback." These themes were then ranked by frequency to identify the most commonly cited suggestions. The data were organized and interpreted in alignment with the study's research objectives.

Ethical Considerations

The researchers are dedicated to ensuring the confidentiality and protection of the responses of the participants. Their participation in the evaluation form is entirely voluntary, and they are free to withdraw at any time. To guarantee the safe and transparent use of the personal information of the participants, they are asked to carefully read and understand the provisions of the Privacy Notice, which complies with the Data Privacy Act of 2012 and its Implementing Rules and Regulations (IRR) effective September 9, 2016.

Results

The satisfaction level of the participants of the career information session per college were identified.

Table 5
Satisfaction Level of Participants According to the College They Belong to

	COLLEGES							
Survey Statements	***CED***	***CCS***	***CLA***	***COS***	***COE***	***COB***	***SOE***	**Total**
The company event presented up-to-date information about their industry and employment processes.	4.68	4.74	4.74	4.86	4.84	4.83	4.7	**4.77**
The company event was relevant to my career.	4.57	4.60	4.34	4.39	4.68	4.72	4.62	**4.56**
The company event was interactive.	4.68	4.61	4.52	4.72	4.78	4.72	4.68	**4.67**
The company event was able to assist me in my career path.	4.64	4.62	4.45	4.55	4.74	4.70	4.66	**4.62**
The venue was conducive for the career event.	4.86	4.75	4.69	4.80	4.83	4.78	4.79	**4.79**
I am satisfied with the organization of the career event.	4.89	4.74	4.68	4.81	4.80	4.78	4.77	**4.78**
I am satisfied with my overall experience with the career event.	4.93	4.71	4.66	4.8	4.81	4.8	4.79	**4.79**
Total	**4.75**	**4.68**	**4.58**	**4.70**	**4.78**	**4.76**	**4.72**	**4.71**

The overall satisfaction rating across all colleges is 4.71, indicating a “highly satisfied” average. With a calculated deviation of 0, there is no significant difference in satisfaction ratings across the colleges regarding the current activities offered. The highest satisfaction

score was recorded by the College of Engineering (COE) at 4.78, while the lowest score came from the College of Liberal Arts (CLA) at 4.58.

The satisfaction level of the participants of the career information session per year level were also identified.

Table 6
Satisfaction Level of Participants According to Their Year Level

Survey Statements	Seniors	Juniors	Sophomores	Total
The company event presented up-to-date information about their industry and employment processes.	4.79	4.79	4.86	**4.81**
The company event was relevant to my career.	4.59	4.47	4.41	**4.49**
The company event was interactive.	4.67	4.62	4.71	**4.67**
The company event was able to assist me in my career path.	4.61	4.55	4.57	**4.58**
The venue was conducive for the career event.	4.75	4.75	4.79	**4.76**
I am satisfied with the organization of the career event.	4.76	4.74	4.80	**4.77**
I am satisfied with my overall experience with the career event.	4.75	4.72	4.79	**4.75**
Total	**4.70**	**4.66**	**4.70**	**4.69**

This table presents the survey results grouped by year level and reveals an overall average rating of 4.69, indicating a “highly satisfied” response. Both sophomores and seniors recorded an average score of 4.7, while juniors had a slightly lower rating of 4.66. Deviation of scores among three sample groups was also close to 0, a strong indication that there’s no significant difference in terms of level of satisfaction.

Information about the preferred relevant topics according to the responses of the participants were also identified and classified by college and year level.

Table 7
Preferred Relevant Topics of the Participants According to Colleges

Theme	Description	College	Illustrative Texts
Comprehensive Career Exploration	Feedback related to more in-depth and comprehensive discussion on career options, related roles, and industries/sectors specific to their program or degree, along with insights into potential career progression. Additionally, this covers graduate studies and alternative career paths. This also includes a request for the list of organizations or companies (both public and private sectors) where they could pursue employment opportunities aligned with their field of study.	**Education (CED)**	"More catered to English Language Studies, or courses from CED that do not focus solely on teaching." "More career topics about Education to help us students from CED department gather more experiences and knowledge related to our course." "Companies that would be aligned with courses under education or liberal arts." "career growth."
		Computer Studies (CCS)	"Possible Job Paths for CCS Students" "Things to consider when you want to diverge to a different path" "Job opportunities for tech" "Career opportunities for the tech industry" "Finding Job Opportunities" "Internships"
		Liberal Arts (CLA)	"More about company recruitments and processes" "Internship Opportunities for Communication Arts Students" "Careers for Communication Students" "Not necessarily for the workforce, but maybe how to apply to grad school." "Opportunities for students applying for further studies (law, med, masters, etc.)" "Graduate studies opportunities" "Psychology related careers" "Opportunities in the government (HOR/Senate)" "More opportunities in non-STEM fields" "Social Science related career talks"
		Science (COS)	"I would like to have career talk about freelancing." "Career topics related to the field of science." "More symposiums focused on medicine, particularly about the career aspect of the field." "Internship/residency preparation." "Science career topics." "More on the science field." "Having more on the industrial setting, not only on the corporate setting." "More science-related career topics." "I would like to discover more about freelancing."

			"Topics about International Careers." "How to get into a field or industry far from your chosen course." "Entrepreneurship and Freelancing."
		Engineering (COE)	"Civil engineering career" "Civil engineering companies" "Civil engineering career paths" "Civil engineering career topics" "Engineering industry" "Engineering related fields" "Internships for Engineering Students" "Internship procedures, opportunities, and benefits per company"
		Business (COB)	"internship opportunities" "internship guides and preparations" "More internship opportunities" "Internship Opportunities" "Legal related internships and career options" "internships" "Start-up opportunities" "Those in the area of entrepreneurship" "Topics about financial careers and financial literacy about current market trends" "Financial literacy and the financial markets and careers" "More career topics related to the banking industry" "those in the area of law" "Topics for students who are not in the business field but would like to pursue business" "Choosing a career outside my program" "More topics about redirection in case your course taken in college is different from your job."
		School of Economics (SOE)	"Economics related jobs" "More careers in Economics" "Economics related" "Company exposure from more industries" "Market conditions from more companies, of other industries"
Job Readiness	Pertains to the students' need for additional guidance on job applications and job readiness. This includes workshops on resume writing, acing job interviews, job	**Education (CED)**	"Dealing with nerves during the application and interview process." "More job applications guidance." "Job applications guide."
		Computer Studies (CCS)	"How to find Internships" "Internship preparation" "Interview tips" "How to mentally prepare yourself for

	search skills, and career decision-making skills, among others.		interviews” “How to handle interviews and overcome socializing anxiety” “Possible Interview Questions with Answers” “Mock Interview” “How to make a resume with no experience” “Resume writing” “Resume making” “Resume writing skills” “Resume writing creativity vs content” “I would like to see a seminar or workshop about resume writing”
		Liberal Arts (CLA)	“I would suggest to put more emphasis on career requirements such as creating of resume, and the like.” “Career guidance e.g. interviews and applications” “How to write a successful work resume” “More resume writing and interview tips as career topics” “Skills Development and Employability” “A seminar about the resume” “Application process of internships/jobs” “More in depth in interview questions” “How to adapt in the real world as a fresh graduate” “Would love to have in-person mock interviews for practice.” “How to answer interview questions” “What do companies want to see in resumes” “What to prepare for internship/OJT” “How to stand out among other candidates” “How to deal with anxiety during the employment process” “Tips if you're not sure on your career path” “How to make the good career choices”
		Science (COS)	“How to get a job without experience.” “How to answer well in interview questions.” “More on the skills for the workspace.” “Tips for Fresh Grads entering Work.” “Internship/residency preparation.” “Transition from a Student to a Career Person.” “Honing your skills from school to a new job.”

		Engineering (COE)	"Improving Interview Skills" "More tips about interview skills" "Interview skills" "More interview questions and practice!" "Honing interview skills" "how to ace interviews, build portfolio" "More talks on how to ace resumes and interviews" "How to sound good in the interview" "how to project yourself in an interview" "how to answer interviews 101" "Interview Q&A 101" "Career topics revolving around how to answer controversial interview questions" "How to leave an impression to interviewers" "How to apply for an internship easier" "How to find internships" "Using AI to our advantage in job hunting"
		Business (COB)	"More talks on internship preparation" "Resume writing" "how to create a commendable resume" "creating resume" "resume related things" "resume creation, portfolio (marketing) creation, cover letters, job/internship interview process guide." "How to make a resume." "Resume Writing." "Finding the right career path" "more about career advice for graduating students" "career planning / resume making" "Career path decisions/deciding the right career path" "how to know which opportunities are for you" "how to navigate the first years post-college" "How to ace an interview" "Job interview tips" "Application techniques/tips or Interview related events" "More about interview preparation" "I would like to experience a virtual mock interview."
		School of Economics (SOE)	"Choosing from job offerings" "Internship preparation" "Internship preparation and

			application” “Interview Tips” “How to build your resume” Job Application Documents “Files needed for job application” “Legal documents to prepare as an employee” “Files and IDs needed for application”
Essential Skills	Topics related to fundamental abilities and knowledge needed to perform tasks effectively in a given field. These skills are often core to success in specific industries or roles and are typically transferable across various contexts, and those that are not part of the core competencies of their course but are considered essential for their career paths.	**Education (COE)**	“Marketing.” “Starting an own business: Tips.” “Talks for english/communications majors. Leaning towards the humanities side.” “Talk about financial literacy and how to invest at young age.”
		Computer Studies (CCS)	“Tech - Data Analytics” “Cybersecurity” “Artificial Intelligence and Machine Learning” “Game development in the video game industry” “Topics related to Computer Science/IT field” “More on Systems Engineering”
		Liberal Arts (CLA)	“Topics on advertising, filmmaking, or writing please” “More Communication Arts Topic” “Topics on advertising, filmmaking, or writing please” “More Communication Arts Topic” “Psychology or Medical Field Related” “Human resources” “Advertising”
		Engineering (COE)	“Application of AI in the workforce industry” “More on AI and Industry 4.0” “Engineering topics”
		Business (COB)	“Entrepreneurship” “entrepreneurship” “Entrepreneurship topics.” “Financial Literacy” “More on financial literacy topics.” “Developing soft skills” “Communication Skills” “Leadership Skills” “More on leadership!” “more about the psychology behind business!”
Realistic Job Preview	Provides students with a clear and honest view of what a job truly entails. It goes beyond	**Education (COE)**	“Different types of work environments and how it affects employee engagement.” “Tips on how to get back in the work

	the idealized description typically found in job postings and includes both the positive aspects and the challenges of the role. This helps them understand the work environment, tasks, expectations, and potential difficulties they might face in the position.		field after taking a 2-4 year break.”
		Science (COS)	“Office dynamics, recovering from fear of rejection.” “Dealing with problematic colleagues.” “How to handle working abroad.”
		Engineering (COE)	“Resolving conflicting issues in the workspace” “Adapting to work culture in the hybrid setting would be also interesting” “Workplace culture” “More on job inclusivity”
		Busniess (COB)	“Challenges and opportunities of marketing in the global context” “Toxic work environments.”
		School of Economics (SOE)	“Work-life balance” “Job Culture tips and how to maintain a healthy job relationships” “Navigating the workplace”
Personal Development	Encompasses ongoing process of improving oneself through various activities, habits, and experiences that enhance an individual’s skills, knowledge, mindset, and overall well-being (mental and physical). This is focused on self-improvement, empowering individuals reach their full potential, and stress management.	**Liberal Arts (CLA)**	“Mental Health in Work Setting” “Nurturing one's well-being in order to thrive in the workplace.” “Stress management” “More on mental health topics”
		Science (COS)	“Gaining confidence in the workplace.” “How do I know if the career I want is the right career for me?” “More information on how to maintain a good career performance without sacrificing mental health.”
		Engineering (COE)	“More about how to grow and improve the self” “Something about burnout” “How to handle pressure of doing well in your first year”
		Business (COB)	“Topics regarding handling rejections.”
		School of Economics (SOE)	“Managing depression in career progress”

College of Education (CED)

Students from the College of Education (CED) expressed interest in topics related to comprehensive career exploration, employability guidance, essential skills training, and

realistic job previews. While they noted that discussions were primarily focused on English Language Studies, they recommended "a more in-depth and comprehensive exploration of career options, industries, and roles specific to our program." Several students emphasized the value of understanding potential career progression, and suggested inviting "companies that align with courses under education or liberal arts." Guidance on job readiness was also highlighted, with one student requesting support for "dealing with nerves during the application and interview process." Although most CED programs are education-focused, some students showed interest in business-oriented topics, including "marketing," "tips for starting a business," and "discuss financial literacy and how to invest at a young age." Lastly, they expressed a desire for realistic insights into various work environments, as one noted: "Different types of work environments and how it affects employee engagement."

College of Computer Studies (CCS)

Students from the College of Computer Studies (CCS), which offers programs in computer science, computer engineering, and information technology, highlighted three main areas of interest: job readiness, comprehensive career exploration, and essential tech-related skills, particularly in AI. Many emphasized the need for practical guidance on resume writing and interviews, especially for those without experience. As one student suggested, "I would like to see a seminar or workshop on resume writing," while another asked, "How to mentally prepare yourself for interviews?" There was also interest in internship opportunities, with a request for advice on "how to find internships." A strong desire for career path exploration emerged, with students seeking insight on "possible job paths for CCS students" and "things to consider when you want to diverge to a different path." Lastly, several responses underscored the importance of keeping pace with technology trends, particularly in "cybersecurity," "game development," and "AI and machine learning."

College of Liberal Arts (CLA)

Responses from the College of Liberal Arts (CLA) students revealed four key themes: comprehensive career exploration, job readiness, personal development, and essential skills. Students showed strong interest in career opportunities and further education aligned with their fields, with one noting, "Opportunities for students applying for further studies (law, med, masters, etc.)." Under job readiness, many emphasized the need to stand out in the job market through resume writing, interview preparation, and employability skills. As one student put it, "I would suggest putting more emphasis on career requirements such as creating a resume and the like." Personal development was also a priority, particularly mental well-being and work-life balance. Lastly, students highlighted the importance of field-specific skills in areas like human resources, advertising, filmmaking, and psychology, which they viewed as essential to their future professional success.

College of Science (COS)

Students from the College of Science (COS) expressed interest in four main themes: comprehensive career exploration, job readiness, realistic job previews, and personal development. Beyond traditional science-related paths, students showed curiosity about alternative careers such as international employment, corporate roles, entrepreneurship, and freelancing. Like peers from other colleges, they emphasized the need to strengthen employability skills and professional attitudes for a smooth transition to the workforce. Some responses highlighted interest in realistic job previews, including workplace dynamics and

overseas work. One student shared, “Office dynamics, recovering from fear of rejection.” Personal development also emerged as a priority, particularly maintaining well-being while pursuing career success, as reflected in the comment, “More information on how to maintain a good career performance without sacrificing mental health.”

College of Engineering (COE)

Engineering students identified five key areas of interest: comprehensive career exploration, job readiness, essential skills, personal development, and realistic job previews. They expressed a strong desire to learn more about companies, industries, and career paths aligned with their specific disciplines. In terms of job readiness, students focused on resume writing and interview preparation, with one unique interest being the use of AI in job applications. Under essential skills, students highlighted both engineering-specific competencies and emerging technologies like AI, emphasizing the need to stay updated with industry trends. Personal development responses centered on self-improvement, stress management, and coping strategies for burnout—acknowledging the mental demands of engineering careers. Lastly, students showed interest in realistic job previews, particularly workplace dynamics, conflict resolution, adapting to diverse work cultures, and fostering inclusive environments.

College of Business (COB)

Students from COB identified five key themes: comprehensive career exploration, job readiness, essential skills, personal development, and realistic job preview. In career exploration, students expressed interest in internships, career paths aligned with their field, alternative roles, and entrepreneurship. One noted the need for guidance on “redirection in case your course taken in college is different from your job.” Job readiness responses focused on resume writing, interviews, and career planning, with a student requesting, “I would like to experience a virtual mock interview.” Under essential skills, students emphasized both technical competencies in finance and entrepreneurship and soft skills such as leadership and communication. Personal development responses included coping with setbacks, particularly “handling rejections.” For realistic job previews, students raised interest in understanding “the challenges and opportunities of marketing in the global context” and dealing with a “toxic work environment.”

School of Economics (SOE)

Students from the School of Economics (SOE) identified four key themes: job readiness, comprehensive career exploration, personal development, and realistic job preview. In job readiness, beyond common interests in resume writing, interview skills, and internships, students also expressed curiosity about pre-employment requirements. For comprehensive career exploration, they sought deeper insight into economics-related careers, with one noting the need for “company exposure from more industries.” In terms of realistic job previews, students emphasized interest in learning about workplace culture and achieving work-life balance. Under personal development, one student highlighted the importance of “managing depression in career progress,” underscoring the need for mental health support in career development.

The preferred topics relevant to the students and their year level through data gathering and thematic analysis were also identified.

Table 8
Preferred Relevant Topics of the Participants According to Year Level

Theme	Description	Year Level	Illustrative Text
Comprehensive Career Exploration	Feedback related to more in-depth and comprehensive discussion on career options, related roles, and industries/sectors specific to their program or degree, along with insights into potential career progression. Additionally, this covers graduate studies and alternative career paths. This also includes a request for a list of organizations or companies (both public and private sector) where they could pursue employment opportunities aligned with their field of study.	**Sophomores**	"More companies having talks" "Medical-related seminars for medical careers" "Medical field topics" "More medical topics, like tips and tricks in Med school or how to ace your exams" "Medical-related career talks"
		Juniors	"More career topics that are leaned on Biology majors" "How to align my degree with the job opportunities?" "Psychology or medical related career topics" "More on IT field" "how to get into a field or industry far from your chosen course/career shifting" "Shifting careers"
		Seniors	"Internship opportunities" (mentioned multiple times) "More ojt opportunities" "More job opportunities" "Other careers besides corporate (medicine and the like)" "Career opportunities outside the realm of business-related courses" "Alternative Career Paths" "Mechanical engineering related" "Civil engineering career"
Job Readiness	Pertains to the students need for additional guidance on job application and job readiness. This includes workshops on resume writing, acing job interviews, job searching skills, career decision-making skills, among others.	**Sophomores**	"How to Prepare for Interviews" "Interview skills/How to answer difficult interview questions" "Interview Skills" "Resume writing" "Topics on where to apply for jobs?" "Resume making" "Transition from a Student to a Career Person"
		Juniors	"Helping students to get Internship" "Internships" "Finding jobs as a fresh graduate"

			"Helping students to get Internship" "Finding jobs as a fresh graduate" "How to create a resume" "I would like to see a seminar or workshop about resume writing" "More talks on interview preparation" "Career topics about psychology"
		Seniors	"Internship preparation" (repeated) "More details to improve in job interviews" "Interview Tips and Presentation tips to senior executives" "how to answer interviews 101" (repeated) "How to ace interviews and how to market yourself." "How to prepare for interviews" "Important skills to develop for job hunting" "Career topics revolving around controversial interview questions 101"
Essential Skills	Topics related to fundamental abilities and knowledge needed to perform tasks effectively in a given field. These skills are often core to success in specific industries or roles and are typically transferable across various contexts and those that are not part of the core competencies of their course but are considered essential for their career paths.	**Sophomores**	"More about acquiring and practicing soft skills"
		Juniors	"How to develop soft skills while in college" "Topics that are more related to soft skills" "Event on soft skills"
		Seniors	"Relevant skills and certificates to acquire for jobs nowadays" "Finance related" "Anything about investing" "Investments and the like"
Personal Development	Encompasses ongoing process of improving oneself through various activities, habits, and experiences that enhance an individual's skills, knowledge, mindset, and overall well-being (mental and physical). This is focused on self-improvement, empowering individuals to reach their full potential, and stress	**Sophomores**	"The moment when to switch or to stay in a career" "Gaining confidence in the workplace" "The measurement of if it is for the enjoyment or the money" "How to not become stagnant in your career?"
		Juniors	"Taking care of mental health

	management.		while balancing work life" "More about adapting to current trends and how it can help you in the workforce" "How to handle work life balance"
		Seniors	"Networking" "How to carry yourself to employers" "How to work with people in the corporate world and building a proper professional behavior and relationship." "Mental health in the workplace" "About confidence and stepping out from your comfort zone."
Realistic Job Preview	Provides students with a clear and honest view of what a job truly entails. It goes beyond the idealized description typically found in job postings and includes both the positive aspects and the challenges of the role. This helps them understand the work environment, tasks, expectations, and potential difficulties they might face in the position.	**Juniors**	"Tips on how to get back in the work field after taking a 2-4 year break"
		Seniors	"what to expect during internships" (repeated) "How to deal with coworkers" "how to handle coworkers in the workplace" "Toxic work environments" "Adjusting to workplace culture" "Workplace culture"

Sophomore Students

Sophomore students emphasized four main themes: comprehensive career exploration, job readiness, essential skills, and personal development. They expressed a desire for tailored career insights, especially related to their specific fields of study such as medical sciences. Workshops on resume writing, interviews, and transitioning from student to professional were frequently requested—e.g., "How to prepare for interviews." There was also growing interest in soft skills, as shown by remarks like "More about acquiring and practicing soft skills." In terms of personal development, students reflected on building confidence and avoiding career stagnation, showing early signs of career self-awareness. Overall, sophomores are seeking foundational career knowledge, preparation strategies, and tools for personal growth.

Junior Students

Juniors demonstrated a broader and deeper engagement with five key themes: comprehensive career exploration, job readiness, essential skills, personal development, and realistic job previews. They sought clearer academic-to-career pathways, specialized industry knowledge (e.g., psychology, IT, biology), and guidance on career shifts beyond their degrees. Requests for seminars on resume writing, internships, and job search strategies were prominent, reflecting their concern about employability. Soft skills training and support for mental health

and work-life balance were also valued. One student's comment—"Tips on how to get back in the work field after taking a 2–4 year break"—highlights emerging interest in realistic job challenges. Juniors appear highly motivated to gain both practical experience and personal resilience as they near the transition to work.

Senior Students

Senior students showed the most advanced level of career concern, focusing on comprehensive career exploration, job readiness, essential skills, personal development, and realistic job previews. They sought in-depth, field-specific guidance, including OJT and internship opportunities, and alternative career options beyond their academic focus. Job readiness concerns were especially detailed, with repeated requests for interview tips, resume building, and self-presentation strategies for competitive job markets. A strong interest in finance and investment skills also emerged. Personal development was more frequently cited compared to other year levels, with emphasis on networking, confidence-building, and stress management in high-pressure environments. Seniors also expressed the need to understand workplace dynamics, citing concerns about "toxic work environments" and adapting to corporate culture. Overall, senior students are seeking comprehensive preparation that blends technical competencies with emotional readiness and professional adaptability.

Recommendations of participants were also noted. These were also identified firstly by college.

Table 9
Recommendations of Participants According to Colleges

Theme	Description	College	Illustrative Text
Content and Relevance	Tells about the insights participants would be able to gain from the talk. It makes the discussion more relatable for the participants as they can learn from the speaker's lectures, sharing, examples, and speech.	**Computer Studies**	"I just wished speakers would also discuss challenges in their work, not just the positives." "I wished they talked about negative aspects of the job too."
		Liberal Arts	"More diverse options for seminars." "I suggest that the event will be able to give... items that are related to the topic."
		Science	"Please have career sessions for students who are planning to go to the medicine field." "I hope there will also be career topics more inclined to the field of healthcare." "Please cater human biology or other COS students…" "offer more STEM related career talks pls" "Please consider catering human biology or other COS students" "Please offer more STEM-related job opportunities
		Engineering	"Provide significant tips for fresh graduates."

		Business	"More topics focused on other fields." "I suggest more at least 1 more speaker for broader perspective." "Offer more career events."
Training Structure	The dynamic and interactive way of maximizing learning and engagement for the participants.	**Computer Studies**	"Probably some ice breakers in the middle of the event."
		Liberal Arts	"Make it interactive and fun."
		Science	"I suggest a short group engagement activity at the end of the session…" "The session felt a little rushed. I feel like I could've gotten more from it." "Please make the presentations more engaging."
		Engineering	"More giveaways." "More prizes."
		Business	"I hope they make it more interactive." "More interactive activities." "Ice breaker to keep the audience more alive and engaged." "Make it more engaging and interactive." "More loot bags." "More prizes." "Small games at the beginning can make it more engaging!"
Presentation Aids	The visuals and sounds experienced by the participants during the event. This has focus on the specific aspects of the presentation and its delivery that impacts the interest of participants.	**Computer Studies**	"The PPT slides were terrible and unreadable."
Facilitator Delivery and Style	It is how the participants viewed the speaker is he energetic and fun for the audience that would make them look forward for more events. This also highlights the impression the speaker has made which makes the participants excited to join more future events.	**Computer Studies**	"The speaker was bad and only read his script."
		Liberal Arts	"Hosting could be improved." "Can you open creative employers too in the future?"
		Business	"More engaging hosts." "Would have been better if the hosts were livelier."
		School of Economics	"More lively hosts"

Facilities and Environment	Focus on ensuring optimal technical quality and comfort during the event.	**Liberal Arts**	"My suggestion would be to improve the audio quality of the mic that the speaker is using."
		School of Economics	"Provide bigger venues"

Among the 29 CED attendees, no recommendations were provided. However, suggestions from both CED and CCS students emphasized improving content relevance, training structure, presentation aids, and facilitator delivery. These included calls for more realistic job previews, interactive icebreakers, clearer slides, and more engaging facilitators. CLA students recommended enhancements in training facilities, content variety, and facilitator style, with suggestions for more seminar options, examples, and better audio quality to improve learning conditions. COS students focused on content specialization and training structure, advocating for sessions tailored to their field, interactive group activities, and optimized session durations. COE students suggested including practical tips for fresh graduates and increasing giveaways. COB students valued engaging formats, recommending interactive activities, prizes, and field-specific content, along with more frequent career events. SOE students generally provided positive feedback, though minor concerns were raised about host delivery and the training venue.

Next, the recommendations of participants were studied according to their year level.

Table 10
Recommendations of Participants According to Year Level

Theme	Description	Year Level	Illustrative Text
Content and Relevance	Tells about the insights participants would be able to gain from the talk. It makes the discussion more relatable for the participants as they can learn from the speaker's lectures, sharing, examples, and speech.	**Sophomores**	"Please talk about medical-related opportunities" "Please have topics about medicine" "Hopefully, there would be more career talks for medicine or talks that would cater to Veterinary Sciences" "Add more speakers." "more COS related companies" "offer more STEM related job opportunities"
		Juniors	"More seminars for med bio." "More NGOs to accommodate Liberal Arts students."
		Seniors	"More diverse subjects of talks" "More topics focused on other fields"
Training Structure	The dynamic and interactive way of maximizing learning and engagement for the participants.	**Sophomores**	"Have some games for the talk to be more engaging." "I suggest a short group engagement activity at the end of the session" "It would be better if the event is more interactive"
		Juniors	"A little bit more engagement that the audience can do."

			"I think it will be better if they did something more engaging and interactive." "The event can be more interactive." "Can you open creative employers too in the future?"
		Seniors	"The session felt a little rushed," "Maybe a better venue coz it was a little cramped…" "More speaker or games!" "I suggest more at least 1 more speaker for broader perspective,"
Facilities and Environment	Focus on ensuring optimal technical quality and comfort during the event.	**Juniors**	"Better audio, please." "Improve projector screen." "my suggestion would be to improve the audio quality of the mic that the speaker is using since I noticed that the audio was slightly muffled..."
		Seniors	"Better venue," "Less aircon power because it was really cold"
Presentation Aids	The visuals and sounds experienced by the participants during the event. This has focus on the specific aspects of the presentation and its delivery that impacts the interest of participants.	**Seniors**	"PPT was not clearly visible from the left side of the auditorium…"
Facilitator Delivery and Style	It is how the participants viewed the speaker is he energetic and fun for the audience that would make them look forward for more events. This also highlights the impression the speaker has made which makes the participants excited to join more future events.	**Seniors**	"More engaging hosts…" "Encourage speakers to be more engaging and interactive," "Very BORING," "The hosts weren't as interactive and didn't feel too exciting..."

Sophomore students recommended improvements in training structure and content relevance. They suggested incorporating interactive elements such as games and group activities to enhance engagement. For content, they called for a broader exploration of career paths, proposing the inclusion of more guest speakers and companies to present postgraduate and career opportunities aligned with their fields.

Junior students focused on enhancing training facilities, particularly improving audio and projector quality to support a better learning environment. Structural feedback emphasized the need for more engaging and dynamic sessions, with one suggestion to invite creative

employers. Content-wise, juniors requested discussions tailored to the specific career guidance needs of their academic programs.

Senior students identified several areas for enhancement. Structurally, they found sessions rushed and recommended adding interactive components and more speakers. Content suggestions included expanding topic diversity and aligning discussions with their respective fields. Concerns were also raised about facilitator engagement, with some describing sessions as "boring." Facility-related feedback pointed to discomfort with the cold venue, and presentation aids were critiqued for poor slide visibility, particularly from certain seating areas.

Conclusion

The study revealed that students are generally highly satisfied with the career development events offered, largely due to their relevance and alignment with students' interests, strengths, and aspirations. Drawing from Holland's theory, students find fulfillment when provided with opportunities that allow them to explore and express their personalities and skills, which these events successfully support. Five key themes emerged from the students' responses: comprehensive career exploration, job readiness, essential skills, realistic job previews, and personal development. These reflect students' evolving needs as they move through their academic journey—ranging from learning about career paths and developing practical job application skills to building confidence and managing well-being.

The events not only increased students' awareness of diverse career options but also sparked motivation to prepare for life beyond the university. Requests for more internship opportunities, career talks, and activities such as mock interviews underscore students' desire for experiential learning and real-world preparation. Moreover, effective career development programs were found to benefit from relevant content, interactive formats, strong facilitation, clear presentation aids, and comfortable environments. These elements enhance engagement and ensure that sessions are meaningful and memorable.

Insights from the sessions also highlighted the importance of addressing students' perceived skill gaps and real-world workforce expectations. When provided with accurate information and relatable testimonies, students felt more empowered to make informed career decisions and pursue growth. To maintain high satisfaction, several actionable recommendations were identified: inviting more NGOs aligned with student interests, organizing college-specific programs, actively involving career development counselors, and collaborating with the alumni office for mentorship opportunities. Additionally, sharing feedback with partner companies fosters better alignment with student expectations, while offering experiential, industry-aligned, and engaging sessions ensures continued relevance and effectiveness.

In sum, the findings emphasize the value of intentionally designed, student-centered career development events. By integrating data-driven improvements and tailoring approaches to student needs, such programs can significantly contribute to students' career confidence, preparedness, and success.

The findings from the evaluation of career development events manifest its significant role in shaping students' professional readiness and personal growth across all year levels and academic disciplines. As students progress through their college journey, their needs evolve—from foundational guidance and career exploration in the early years to targeted

skills training, mental well-being support, and realistic job previews as they near graduation. The consistent call for relevant, interactive, and field-specific content highlights the importance of designing programs that are not only informative but also responsive to students' diverse aspirations and concerns. By integrating dynamic facilitation, clear presentation aids, and comfortable learning environments, these events become powerful platforms for empowerment. Most importantly, when students are exposed to honest narratives, practical insights, and guided self-reflection, they are better equipped to confront uncertainties, make informed decisions, and take proactive steps toward meaningful and purpose-driven careers. Career development events, when thoughtfully designed and continuously refined, serve not only as bridges between education and employment but as transformative experiences in each student’s evolving career journey.

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Growing Agricultural Minds Through Early Childhood Education Module

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Abstract

This study aims to develop an early childhood agricultural education module aligned with Science, Technology, Engineering and Mathematics (STEM) requirements outlined in Malaysia's National Preschool Standard-based Curriculum. The module called *Little Farmer* is structured into four thematic components: Introduction to Plants, Growing Our Plants, Harvest, and Marketing. Each component includes interactive and hands-on activities such, observation, role-playing, and garden exploration that relate agricultural themes to everyday life. This study involved a sample of 50 preschool and kindergarten children aged 4 to 6 years in Perak, Malaysia. Data were collected through pre- and post-intervention assessments from July until October 2024, which included structured questionnaires and observational checklists to evaluate children's knowledge, interest levels, and engagement during the activities with various types of plants such as spinach (*Spinacia oleracea*), water spinach (*Ipomoea aquatica*) and mustard greens (*Brassica juncea*). The *Little Farmer* module integrates STEM-based agricultural modules with structured, interactive activities in early childhood education can play an important role in fostering long-term interest in agriculture and promoting sustainable practices among children. Moreover, a significant correlation between increased knowledge and strengthened interest in agriculture following exposure to the module, underscores the positive impact of early engagement with the subject. By emphasizing the necessity for innovative curriculum development that combines STEM education with agricultural content, this study advocates for proactive strategies to encourage future generations to pursue careers in these essential fields, ultimately contributing to a more sustainable agricultural future.

Keywords: STEM, early childhood education, agriculture, sustainability

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Introduction

In today's rapidly evolving world, the intersection of agriculture and education is more important than ever. Early exposure to agricultural concepts in childhood can significantly influence future generations' understanding of food systems, natural resources, and sustainability. For preschool educators, nurturing an early comprehension of agriculture through structured educational frameworks is a critical step in fostering a long-term appreciation for these essential topics. As agriculture continues to play a key role in ensuring food security and environmental sustainability, integrating agricultural education within early childhood learning is an urgent need (Rymanowicz et al., 2020).

Despite the growing relevance of agricultural education, many preschool curriculums do not provide comprehensive, age-appropriate modules on this topic. This gap often results in children lacking a fundamental understanding of where food comes from, with many associating vegetables primarily with stores rather than farms. Such misconceptions highlight the significant need to introduce foundational agricultural knowledge to young learners (Kirwa & Singh, 2020). Addressing this gap, a dedicated early childhood agricultural module aligned with the STEM (Science, Technology, Engineering, and Mathematics) framework, as set out by Malaysia's Ministry of Education, offers a promising approach. By fostering an interest in agriculture from an early age, this module aims to contribute to children's understanding of plant life cycles, sustainable farming practices, and the broader significance of agriculture in daily life.

This study seeks to address the deficiency of continuous STEM-based programs focused on agriculture, especially in early childhood education. The proposed module aims to cultivate an interest in agriculture among preschool children by incorporating engaging, hands-on STEM elements. These elements will serve to introduce fundamental agricultural concepts such as plant life cycles, the significance of agriculture, and innovative farming practices in an accessible manner. Furthermore, the National Preschool Standard-based Curriculum and Assessment Document emphasizes the importance of early science education, particularly the investigation of living nature, which includes plant exploration in the Early Science (SA) category 3.4. However, current assessments have not been sufficient to enhance the learning experience beyond basic plant knowledge (Ministry of Education Malaysia, 2017). As such, there is a clear need for more engaging and interactive methods of teaching these concepts.

Project-based learning, an effective and dynamic pedagogical approach, has been proposed as a means to address this gap. This method allows children to investigate agricultural concepts in real-world contexts through collaborative, hands-on activities. By assessing the outcomes of such projects and analyzing the impact on children's abilities and interests in agriculture, this research will evaluate the effectiveness of this approach in preschool settings.

The importance of addressing agricultural awareness in early childhood education cannot be overstated. As Rymanowicz et al. (2020) suggest, cultivating a deeper understanding of agriculture at an early age has the potential to foster more sustainable attitudes toward food production and environmental stewardship. Moreover, incorporating agricultural education through a STEM lens aligns with global educational priorities and promotes a holistic, interdisciplinary learning experience for young children.

Problem Statement

Despite agriculture's growing importance in addressing global food security and environmental sustainability, children today often have limited exposure to agricultural concepts. In particular, preschool curriculums often lack sufficient content related to farming and food systems. As a result, many children grow up without understanding the basic processes that underpin food production. Studies indicate that children in urban areas, in particular, have limited knowledge of farming, with even rural children often unaware of modern agricultural practices and sustainability issues (Rymanowicz et al., 2020). This lack of agricultural awareness in early childhood is a significant issue that needs to be addressed through structured, engaging, and hands-on educational programs.

Research Objectives

This research aims to:

1. To develop an early childhood agricultural module according to the STEM requirements by Malaysia's National Preschool Standard-based Curriculum.
2. To examine children's knowledge and interest influenced by interactive activities provided in the agriculture module.
3. To compare the out-of-sample children's knowledge and interest in the agriculture field.

Through these objectives, the study will contribute to the understanding of how early childhood agricultural education can foster a deeper connection to food systems, promote sustainability, and enhance STEM learning outcomes for young learners.

Literature Review

Constructivist Learning Theory

Based on the identification of research literature, theory which is relevant and appropriate to this study is Theory Constructivist Learning Jean Piaget and Lev Vygotskyas well as Paul Torrance's closely related Theory of Creativity with studies. Apart from the guide and reference through constructivist learning theory and creativity, some relevant science teaching models are also identified through the 5E Teaching Model by Bybee and Landes (1990) and Paul Torrance's Incubation Model as a foundation and references to the focus of this study on implementation initial science exploration strategy with a systematic approach creativity among teachers and preschool children. Jean Piaget's constructivist learning theory is among important theories that cannot be separated in understanding cognitive development and acquisition knowledge by children (Amran, 2023). Among the popular figures often associated with constructivist learning is Jean Piaget and Lev Vygotsky (Semmar & Al-Thani, 2015). Both the famous figures in question have similarities and different ideas about process and experience learning by children (Stephen et al., 1998). Based on literature review, both theories emphasize to the acquisition process and learning experience students to build knowledge and skills which is Jean Piaget's constructivist learning theory Emphasizing the feeling of curiosity and motivation created individually by the child himself. Additionally, children's memory and knowledge retention can be enhanced through meaningful and contextual learning experiences, as highlighted by Maidin (2023) in a case study on early childhood memory and learning. In hence, Lev Vygotsky's theory is very famous for emphasizing the importance of social interaction through the environment and the

active involvement of children as the main factor in the learning process and Lev Vygotsky believes that learning through internal transfer does not happen (Bevin & Gareth, 2016; Maison et al., 2019; Semmar & Al-Thani, 2015; Zhou, 2010).

Early Childhood Science

Early science is one of the pillars of learning in National Preschool Standard-based Curriculum. The main aim and objective of early science learning is to give exposure to children about the living world, the material world and the physical world (KSPK, 2017). Early science is closely related to the constructivist theory of learning when children perform learning activities that build knowledge. Exposure to science can benefit children regardless of age (Vella-Brodrick & Gilowska, 2022). The literature review found that learning science through exploration has led to STEM skills through cause and effect skills and providing explanations in solving problems by children before entering formal schooling (Chin, 2006; Fusaro & Smith, 2018; Peterson & French, 2008). In relation to exploration, teachers and children are contributors to ideas in conversation activities by using open-ended questions by teachers so that children can give ideas and views from various perspectives (Peterson & French, 2008). However, the explanations and perspectives given by children depend on who they get help from, whether through friends or teachers who bring ideas and solutions to the problems that occur (Fusaro & Smith, 2018). Exploration activities that occur in science learning activities are a basic mechanism for children's cognitive development when they think to find answers and solve problems in activities and assignments through the teacher's questions and answers (Chin, 2006). At the same time, children's communication and language skills can be improved through explanation skills in the learning activities carried out (Chin, 2006; Fusaro & Smith, 2018; Hong & Diamond, 2012; Peterson & French, 2008). Therefore, children who are weak in language development are also affected by early science exploration activities and this benefit is obtained (Chin, 2006). According to Duran & Duran (2004), students who are weak in reading and writing activities will excel when each phase of learning includes all aspects of student development. They learn about basic science concepts such as sinking, rising, light, heavy, smooth, rough, etc. can improve vocabulary when the teacher also encourages children's interest and involvement by encouraging them through collaborative discussions with other children such as voicing perspectives, ideas and even not agree with ideas given to each other (Hong & Diamond, 2012; Peterson & French, 2008).

The existing research on the role of agricultural education in early childhood development highlights several key insights. Reference (Rymanowicz et al., 2020) emphasizes the importance of nature-based learning, which can be effectively facilitated through a farm- and nature-based early childhood education program. Furthermore, studies have shown that professional development opportunities for teachers can significantly enhance their ability to integrate agricultural content into their classrooms, thus increasing student exposure to the field of agriculture (Lindsey, 2020).

Vygotksy's theory of zone of proximal development suggests that early education of science, including agricultural concepts, should begin at an early stage to maximize learning potential (Wan et al., 2021). Hands-on experiences and practical application of agricultural knowledge are crucial in capturing children's attention and fostering a deeper understanding of the subject matter (NS & Adejoh, 2020). Additionally, research indicates that incorporating STEM elements into agricultural education can be highly effective in developing critical thinking skills and problem-solving abilities among young learners.

Nurturing Young Mind Through Agriculture

Early exposure to agriculture can play a pivotal role in nurturing young minds, fostering curiosity, and developing a deeper appreciation for the natural world. Research emphasizes the importance of integrating agriculture education in early childhood, as it not only cultivates interest in food systems and environmental stewardship but also enhances cognitive development (Lindsey, 2020; Rymanowicz et al., 2020). Nature-based learning and hands-on experiences, such as gardening or interacting with soil and plants, have been shown to improve children's engagement, creativity, and emotional well-being (Jiang & Hussain, 2023; Qayyum et al., 2024). Furthermore, embedding STEM (Science, Technology, Engineering, and Mathematics) concepts within agriculture education promotes critical thinking, problem-solving, and inquiry-based learning (NS & Adejoh, 2020). These interdisciplinary approaches provide a practical context for abstract STEM principles, helping children apply what they learn to real-world challenges. As such, agriculture serves as a dynamic platform for early learners to explore scientific concepts, environmental relationships, and technological innovation. Together, these findings suggest that integrating agriculture into early education can prepare children not only for academic success but also for active participation in sustainable practices and future global challenges.

Data and Methodology

This study uses an approach that combines qualitative and quantitative methods to provide a comprehensive analysis of the research problem. This approach allows for a more complete understanding of the research question by taking advantage of the advantages of both methods. Quantitative methods provide numerical data and statistical analysis, while qualitative methods provide in-depth insight and understanding of context. The advantages of mixed methods research design, such as its ability to overcome complex research questions and provide a stronger understanding of the research topic (Creswell & Plano Clark, 2017). "The growing acceptance and application of mixed methods approaches in educational research to capture the depth and diversity of educational phenomena" (Johnson et al., 2007). The research design of this module is divided into several main parts where the time of each part is broken down according to need.

The sample of this study consisted of 30 preschool and kindergarten children aged 4 to 6 years. children were selected using a simple sampling method from kindergartens and preschools who were willing to participate to use the modules that had been prepared. The sampling process involved communicating with the preschool to obtain permission to carry out the project, as well as providing an information letter to parents explaining the purpose, procedures, and benefits of the project. This study uses a questionnaire method. This method is used to collect information and evaluate children's achievements in kindergarten and preschool.

Result and Findings

This study aimed to assess the effectiveness of the *Little Farmer* module, developed to introduce preschool children to basic agricultural concepts through a STEM-based framework. The findings highlight the positive influence of interactive and engaging activities on children's knowledge and interest in agriculture. The module incorporated four main agricultural concepts—Preparing, Caring, Harvesting, and Marketing—aligned with the STEM curriculum requirements. These findings are detailed in three major aspects: the

development of the module, the influence of activities on children's knowledge and interest, and the overall impact on children's agricultural knowledge and interest.

Development of the Little Farmer Module

Figure 1
Components of the Little Farmer Module

The *Little Farmer* module in Figure 1 was developed to address the gap in early childhood agricultural education and was structured around four core concepts: Preparing, Caring, Harvesting, and Marketing. These concepts were chosen to provide children with a comprehensive understanding of the agricultural process, from initial planting to the sale of produce. Each concept was designed to be interactive, fostering both curiosity and understanding among children through hands-on activities such as planting seeds, caring for plants, harvesting crops, and discussing the marketing of farm products.

The module was designed to be both developmentally appropriate and aligned with the requirements of the STEM curriculum as outlined by Malaysia's Ministry of Education. The integration of science, technology, engineering, and mathematics within the agricultural context provided children with a structured approach to learning that enhanced their cognitive, motor, and social development. As supported by previous research (Kirwa & Singh, 2020; Rymanowicz et al., 2020), incorporating STEM principles in early childhood education has been shown to improve problem-solving abilities and foster curiosity, both of which were key objectives of the *Little Farmer* module.

Influence of Activities on Children's Knowledge and Interest in Agriculture

The second major finding of this study pertains to the significant role played by the interactive activities in shaping children's knowledge and interest in agriculture (Figure 2). These activities, which were designed to be both educational and enjoyable, encouraged children to actively engage with the agricultural process. According to the findings of Muhsain et al. (2022), the interactive nature of the activities fostered curiosity, enabling children to explore agricultural concepts in a way that felt natural and engaging. The activities spanned the four core concepts (Preparing, Caring, Harvesting, and Marketing) and

each activity was designed to allow children to explore the real-world applications of agricultural processes.

The module also capitalized on the constructivist learning principles advocated by Piaget and Vygotsky, which emphasize the importance of hands-on, experiential learning in children's cognitive development (Piaget, 1952; Vygotsky, 1978). By participating in activities like planting seeds, nurturing plants, and discussing the concept of harvesting and marketing, children were able to construct their knowledge through direct engagement with the material world. This approach facilitated not only a deeper understanding of agricultural processes but also encouraged children to develop a sense of ownership over their learning, a key element in fostering both knowledge and interest (Vygotsky, 1978).

Figure 2

Activities of the Little Farmer Module That Influence on Children's Knowledge and Interest

As a result, children demonstrated increased interest in the subject of agriculture. The findings suggest that by incorporating elements of play, hands-on learning, and exploration, the *Little Farmer* module successfully bridged the gap between abstract agricultural concepts and the children's lived experiences, highlighting the importance of interest, parental support, and teacher competency in fostering active participation (Micheal, 2023). According to Fadhillah et al. (2023), such an approach to learning is critical in sustaining young learners' engagement with scientific concepts and enhancing their intrinsic motivation to learn.

Impact of the Little Farmer Module on Knowledge and Interest

The third key finding of this study indicates a significant increase in both children's knowledge and interest in agriculture following their participation in the *Little Farmer* module. Pre- and post-assessments revealed a marked improvement in children's understanding of basic agricultural concepts. Children were able to better identify the steps involved in planting, caring for, and harvesting crops, as well as discuss the broader significance of agriculture in society.

The findings were supported by statistical analysis, as presented in Table 1, which outlines the relationship between knowledge and interest among children across the four main modules (Preparing, Caring, Harvesting, and Marketing). The results demonstrate a significant positive correlation between children's knowledge and interest in agriculture, suggesting that as children's knowledge of agriculture increased, so did their interest in the

subject. For example, a strong correlation was observed between children's knowledge of the "Preparing" module (K_M1) and their interest in the same module (I_M1) ($r = .630$, $p < 0.01$), indicating that the more children understood the process of preparing for agriculture, the more interested they became in it.

Table 1
The Relationship Between Knowledge and Interest Among Children

	K_M1	K_M2	K_M3	K_M4	I_M1	I_M2	I_M3	I_M4
K_M1	1	.577**	.560**	.556**	.630**	.301*	.609**	.566**
K_M2	.577**	1	.530**	.460**	.515**	.522**	.583**	.545**
K_M3	.560**	.530**	1	.733**	.808**	.326**	.716**	.589**
K_M4	.556**	.460**	.733**	1	.700**	.226*	.620**	.554**
I_M1	.630**	.515**	.808**	.700**	1	.311**	.690**	.666**
I_M2	.301*	.522**	.326**	.226*	.311**	1	.556**	.533**
I_M3	.609**	.583**	.716**	.620**	.690**	.556**	1	.771**
I_M4	.566**	.545**	.589**	.554**	.666**	.533**	.771**	1

Notes. **. Correlation is significant at the 0.01 level (1-tailed).
*. Correlation is significant at the 0.05 level (1-tailed). K represent knowledge, I represent interest.
M1 = Preparing, M2 = Caring, M3 = Harvesting, M4 = Marketing

Additionally, the analysis shows that children's interest in the "Harvesting" module (I_M3) was highly correlated with their knowledge of the "Harvesting" module (K_M3) ($r = .808$, $p < 0.01$). This finding aligns with the work of Peterson and French (2008), who found that active participation in hands-on science activities significantly increased both children's knowledge and interest in the subject matter.

Moreover, the relationship between the four modules indicates that the *Little Farmer* module had a cumulative effect on both knowledge and interest. As children progressed through the stages of the module, their understanding of agriculture deepened, and their engagement with the subject matter intensified. These findings align with earlier studies (Chin, 2006; Fusaro & Smith, 2018), which emphasize the importance of gradual and scaffolded learning in fostering sustained interest and knowledge retention among young learners.

The findings of this study have several important implications for early childhood education, particularly in the context of agricultural education. First, they underscore the effectiveness of hands-on, interactive learning in enhancing both children's knowledge and interest in complex subjects like agriculture. By integrating agricultural education into preschool curricula through engaging and developmentally appropriate activities, educators can lay the foundation for a deeper understanding of environmental and sustainability issues.

Furthermore, the positive relationship between knowledge and interest suggests that early exposure to agriculture can contribute not only to children's cognitive development but also to their emotional connection to the subject. As highlighted by Rymanowicz et al. (2020), developing an early appreciation for agriculture is critical in fostering long-term sustainability awareness and environmental stewardship among future generations.

In conclusion, the *Little Farmer* module proved to be an effective educational tool in enhancing preschool children's knowledge and interest in agriculture. The combination of

interactive, hands-on activities and STEM-based principles significantly contributed to children's understanding of agricultural processes and their engagement with the subject matter. The findings suggest that early childhood agricultural education, when delivered through a structured and engaging approach, has the potential to cultivate a generation of children who are not only knowledgeable about agriculture but also motivated to pursue further learning in related fields.

Conclusion

The findings of this study underscore the significant impact of early childhood agricultural education, particularly through the implementation of the "*Growing Agricultural Minds Through Early Childhood Education module*". By introducing agricultural concepts at a young age, this module has proven to foster an early understanding of key environmental and sustainability issues. Educating preschool children about agriculture helps them recognize the interconnectedness of food systems, nature, and the environment, establishing a foundation for environmentally conscious attitudes that can last a lifetime.

The introduction of agricultural education through a STEM-focused module aligns with Malaysia's educational priorities, offering young learners the opportunity to engage in hands-on, project-based learning. This approach not only enriches children's understanding of agricultural processes such as plant life cycles and sustainable farming techniques but also promotes critical thinking, problem-solving, and environmental stewardship. As the results of this study suggest, engaging children through interactive activities enhances their knowledge, attitudes, and interest in agricultural topics, providing a solid platform for further exploration of environmental sciences as they progress through their educational journey.

Ultimately, this research highlights the importance of integrating agriculture into early childhood education as a vital tool for fostering future generations that are not only knowledgeable about food production but also passionate about protecting and nurturing the environment. By creating a connection between children and the natural world through education, we can cultivate a generation that values sustainability, embraces innovative agricultural practices, and contributes to a more sustainable in the future.

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Teaching and Learning Languages Within the Framework of the Universal Design for Learning: The Need to "Reflect"

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Abstract

In recent years, the terms "accessibility" and "inclusion" have become increasingly important in the field of education and language teaching. The application of guidelines such as those from the Universal Design for Learning (UDL) helps to remove barriers to learning difficulties in the language classroom by designing inclusive and *glocal* educational interventions, based on the linguistic and cognitive profiles of students. To do that, special attention should be given to the reflective practice (Dewey, 1933; Farrell, 2022; Schön, 1983; Wallace, 1991), including its emotional affective aspects. In this paper we would like to highlight the importance of the practice of reflection as a primary tool for ensuring inclusion and accessibility when teaching and learning a foreign language, and to stress the power of observation and reflection cycles as an educational device oriented to future action: an action that is new, justified, effective, just, and motivating. We will illustrate this by drawing on my experience teaching foreign languages (FL) at the University of Cape Town, moving as "teacher-researcher", and utilizing the reflection practice firstly as a primary tool for the creation of the content to be used in class, and secondly to observe the interaction between the learners and the new inputs that are gradually experimented. Guaranteeing equality and real access in the FL classroom can, in addition to preventing loss of motivation, stimulate greater interest in the language and, in the long term, produce lasting *trans-formations* for the individuals and their society, in the logic of *No one left behind*.

Keywords: inclusion, accessibility of language teaching, reflective practitioner, reflection-for-action, engagement

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Introduction

This paper highlights the importance of the practice of reflection as a primary tool for ensuring inclusion and accessibility when teaching and learning a foreign language, and it remarks the power of observation cycles with an informed eye as an educational device oriented to future action: an action that is new, justified, effective, just, and motivating. In this respect, a reference point is the model of the evolution of the teacher profile (Bujol et al., 2000, p. 43), including six stages and the pivotal moment of professional growth in the transition between the fourth and fifth, when the professionals begin to observe themselves critically in order to contribute to growth outside themselves.

Our research was conducted in the foreign language classroom at the University of Cape Town (UCT), with an Action Research approach (Barber, 2006; Burns, 1999), moving as a "teacher-researcher" (Bissex, 1986, p. 482), that is with the first round of observation understood as a focused gaze, with the aim of collecting data to be interpreted and evaluated later, and followed by the first cycle of self-reflection and by the analysis of the educational, and especially linguistic, needs of our learners' profile. The choice fell on the Participatory Action Research because of its dual speculative and operational nature, as well as the fact that it is a research project on possible and alternative ways of working within the foreign language classroom, co-constructed by teachers and students. In fact, the object of the research and the method of collecting and analysing unstructured data allow us to observe a heterogeneous and highly diversified phenomenon, such as the nature of the (language) classroom in the South African university context. In the Action Research perspective, our own research involves cycles of self-reflection which arise from the idea to plan a change, and then pivot from action to the observation of the process and the consequences of change, to reflection, and so on. This research therefore starts from the classroom group and teaching techniques, and it follows a down-top trend, i.e., it stems from the observation of the (linguistic) teaching environment and learners' interaction with the activities, to arrive at designing and/or adapting effective learning materials. It is intended to inform teaching planning and to make itself known at higher levels and in an interdisciplinary or transdisciplinary perspective (primarily among related foreign language courses), suggesting the adoption of particular devices and with the ultimate goal already stated, namely the self-determination of learners, and the sustainable and long-lasting transformation of the society of which they are the main actors.

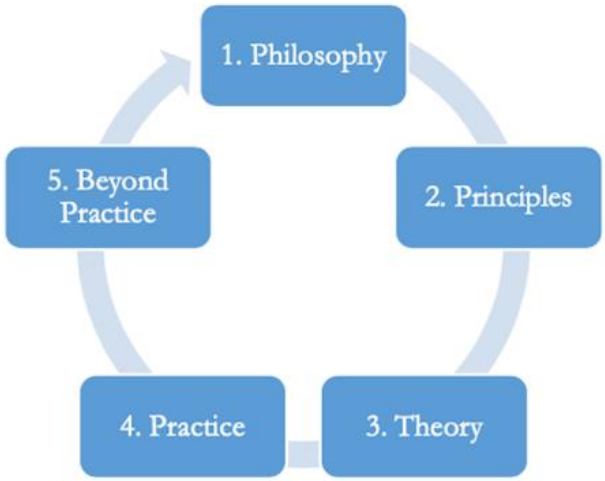
The Reflective Teacher

The first major philosopher associated with the concept of reflection is Dewey (1933): he maintained that reflection should be systematic and intentional and that teachers can become slaves to routine decision-making if they do not engage in reflection. Another important reference is the concept of the reflective teacher, found in the literature since 1983 with Schön's "reflective practitioner" and Wallace's "reflective approach" (1991, p. 56): critical reflection stems from the fact that one is concerned with a certain context that one knows well and for which one wants to implement systematic and conscious interventions, underpinned by theoretical and experiential knowledge and by one's own research and that of others. For Schön, professional knowledge is developed within action, as it has been articulated within action. When new knowing-in-action is developed, we are "reflecting-in-action", actively and non-propositionally processing our experiences. Later, in his second book, Schön gives special attention to what he refers to as "the reflective practicum" (1987), since he believes that with the help of expert teachers, students can gain their knowing-in-

action. Further on, Schön[1] (1988) defines what he means with "reflective teaching" – "giving the kids reasons to listen to what teachers say" and invokes a reflective supervision to support practitioners in becoming more reflective-in-action.

In addition to reflection-on-action (reflecting on one's own experience) and reflection-in-action (reflecting on and implementing the changes underway), Farrell recently proposed reflection-for-action, a circular holistic model consisting of five progressive stages with a view to making coherent didactic choices in relation to the context (2022, p. 17). According to him: "the act of reflective practice has become 'routinised', as teachers are encouraged to only answer retrospective questions about their practice (such as what happened, why did this happen, what comes next) in order to 'improve' their teaching" (Farrell, 2024, p. 10), therefore he added to this by prompting teachers to reflect on their philosophy, principles, theory, practice and critically reflect beyond practice.

Figure 1
Framework for Reflecting on Practice



Source: Farrell (2022, p. 21)

The Reflective Learner

With our research, we place ourselves in the wake of works which realised the critical role of the environment in disabling or enabling the learning process, a shift of focus that led the Center for Applied Special Technology[2] (CAST)[3] to develop and articulate the principles and practices of the Universal Design for Learning (UDL), a term taken from product-design and architecture field,[4] which acquires here a new orientation on access to all aspects of learning.

[1] "Schön, in our view is not making the claim that reflection-in-action is a frequent event. But he does argue that it is a process outside of our control: it is not the sort of thing one can switch on or off. For school administrators, the important question is whether the school environment encourages teachers to explore new frames, or to ignore them." (Munby, 1989, p. 36).
[2] CAST is a non-profit education research and development organization that created the Universal Design for Learning framework and UDL Guidelines, now used all over the world to make learning more inclusive. The acronym "CAST" derives from the original name of the organization, Center for Applied Special Technology. Now they are simply CAST (cast.org/about/about-cast).
[3] The Center for Applied Special Technology (CAST) researched, developed, and articulated the principles and practices of Universal Design for Learning (CAST, 2011, p. 3).
[4] The term's origin comes from Ron Mace, North Carolina State University.

When designing this framework, they conceptualised a customizable design, as opposed to the previous inflexible, "one-size-fits-all" curriculum, which leaves learners who are "in the margin" in a condition of vulnerability, and unintentionally raises barriers to their learning. Also, it may at the same time not even cater for the imaginary "average" learner (Rose & Meyer, 2002). This goal can be achieved through the implementation of accessibility principles to language teaching from the very initial planning phases of a course, in the spirit of the recommendations made by the Universal Design for Learning and on the basis of evidence-based teaching strategies (Hattie, 2008, 2012; Mitchell, 2014).

This philosophy states that materials and learning activities should make the learning goals reachable for learners who are different from one another in terms of visual, listening, movement, reading, and writing skills. Educators should apply these accessibility principles in their classes in a wide-reaching way, without limiting their actions to restructuring learning materials or adjusting the means of presentation, but also extending them to methodologies, strategies, and classroom climate. If we want to understand the characteristics of a student with language learning difficulties, we need models that not only focus on the learner, listing "problems", but also help us to understand the extent to which the characteristics of the context in which they are placed affect their performance, since these barriers can represent a big hurdle, and thus recognising and removing them is a first step towards an accessible classroom (Rose & Meyer, 2006).

Recently, the UDL framework has been carefully reviewed by education researchers, neuroscientists, practitioners, teachers, instructional coaches, professional development leaders, faculty members, so that now all used verbs signal that the UDL Guidelines 3.0[5] are a tool that can be used by learners as well as educators, for example they changed the "provide" language to "design" for all three principles and all nine guidelines and replaced the term "checkpoints" with the term "considerations" as they are not meant to be a "checklist," but they are a set of research-based prompts that can be mixed and matched according to specific learning goals. The aim is to achieve the young learner's autonomy, which at university level is particularly significant, since the development of conscious study techniques and knowledge of oneself and one's own learning style go hand in hand with linguistic acquisition.

In the updated version the overarching goal itself contains a reference to *reflective learner agency,*[6] as explained in the Rationale (CAST, 2024b), and Guideline 9.3 refers to the *promotion of individual and collective reflection.*[7] Knowing *how to learn* represents one of the central aspects of didactics in a university context where the short duration of courses that are often intensive and concentrated in a limited number of hours as in the case of the foreign languages courses makes one lean more towards the use of cognitive, metacognitive, and communicative strategies oriented in this sense. Looking at learning through the UDL lens means considering that the notable differences among learners particularly in terms of metacognition are significant: some students are more aware of their progress toward goals and can learn from their mistakes, while others may need more direct instruction and modelling. It is crucial for learners to have access to various models and supports for self-

[5] The graphic organizer of the UDL Guidelines 3.0 can be found at https://udlguidelines.cast.org/
[6] The goal of UDL is learner agency that is purposeful & reflective, resourceful & authentic, strategic & action-oriented (CAST, 2024a).
[7] The Rationale states that the changes address feedback that the previous checkpoint ("Develop self-assessment and reflection") was too teacher-centric and the update attempts to create space to develop both individual and collective reflection (CAST, 2024b).

and group-assessment techniques so they can identify and select the ones that work best for them. During these moments, they may have the opportunity to realize that they are making progress toward a goal, which could act as a powerful motivator itself, since, on the other hand, a major factor in a decline of motivation occurs when students are not guided in recognizing either their own or the group's progress.

Conclusion and Reflection for Accessibility

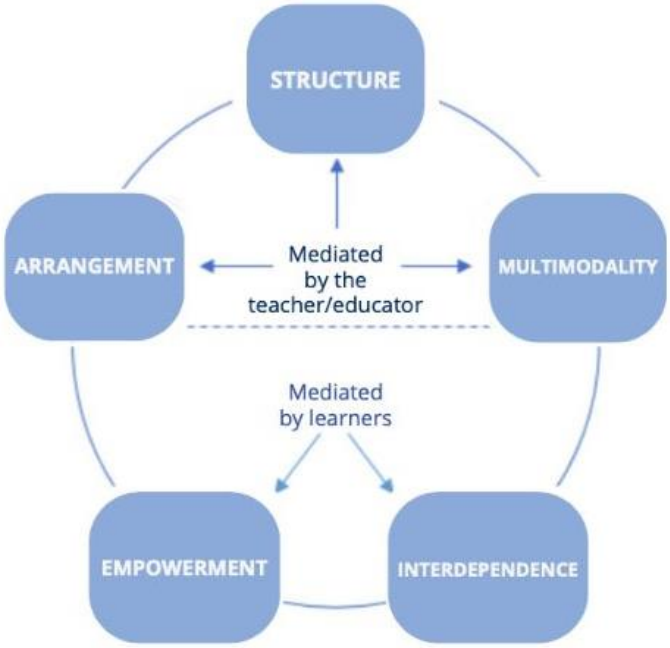
As far as the foreign language classroom is concerned, a reference point is the teaching procedure named *Language Teaching Cycle.*[8] This is derived from the key principles of traditional models but integrates them with new insights in the psycholinguistic processes proper of language learning which should be considered when wanting to promote the inclusion in the class of Foreign Language. This evidence-based procedure, which is in line with the UDL and with its theoretical background, could be summarised as follows:

- *Learners* cannot be separated from the educational and social environments in which they find themselves,
- *Education* has always also a linguistic form (Halliday & Matthiessen, 1999). Almost everything that is learned in an educational context passes through language, which conveys knowledge and in the case of language education is also the substance of learning,
- *Language, mind, and body* are closely interconnected: language has a functional value, aimed at action as well as at the transmission of thought, and each person is a social agent, engaged in activities that require the joint and integrated use of several skills, and
- *Language proficiency* means activating a network of existential, linguistic, and strategic competences.

The Theory of Language Teaching Accessibility is core and guides us as a compass: it is structured around five poles, called principles, which in turn dictate the set of methodological choices and didactic actions that promote equal learning opportunities: its graphic representation is particularly clear because it highlights the supporting role of the teacher, who plays a mediating function in the case of the first three principles, while the other two principles are implemented through collaboration between the teacher and learners and between peers.

[8] Daloiso (2012, 2023a).

Figure 2
Principles of the Language Accessibility Theory



Source: Daloiso (2023b, p. 171)

Structure refers to the creation of lessons plans and activities that are sustainable and understandable, starting with clear steps and objectives, to conclude with recap moments and summaries.

Multimodality, as in the UDL Guidelines, includes the use of both multisensory and multimedia supports, to be carefully diversified and graded depending on the learners' profiles and progression in the language acquisition.

Arrangement means the adaptation of the input for the promotion of the reception skills (listening and reading) and of the output for the production and interaction skills (speaking and writing) in order to meet the students' needs.

Interdependence, or cooperative learning, consists in the collaboration which stimulates a language learning mediated by peers.

Empowerment is based on the learner's self-regulation and self-determination and it includes the "beyond-the-classroom" opportunities linked to language learning.

As lecturers, we are encouraged to adopt protocols that promote individual and collective reflections, and to incorporate activities that provide learners with feedback and offer alternative supports (such as tables, charts, templates, or feedback displays) to help them understand their progress in a clear and timely manner. When self-questioning on what the strengths and weaknesses of our lesson plans are in due course, we have the means and the time to work upon some areas and implement some changes: actions like these are aimed at enhancing the accessibility levels of our courses, providing alternative scaffolds, including all learners by engaging, representing, and expressing them and their multiple identities. Hence, we can see that language teaching accessibility does not lie so much in the way content is presented, but rather in its foundation, it is an educational philosophy with a theory structured

in principles and usable through a didactic device. As we have also seen in the graphic representation of the principles (three involve the intervention of the educator and two are peer-to-peer), accessibility is neither given, nor imposed, nor standardised, but constructed in sharing with the learners with the aim of improving their language skills, without leaving anyone behind. By doing so, the language teacher assumes the role of one who grasps different styles, assigns complementary roles, manages diversity in order to pursue harmony, like an orchestra conductor.[9]

As we have said in fact, UDL Guidelines recommend designing a reflection tool for our students as well, to use at the end of each unit or during a module: aids or charts to help individuals and groups gather, organize, and visualize data about their progress, enabling reflection and progress tracking,[10] bearing in mind that the aim of the teaching is to build learners' progressive autonomy so that they are equipped to face their university studies with confidence, thanks to a wide and varied baggage of (linguistic) learning and existential strategies. This is particularly valid because we consider the FL classroom as a fertile linguistic "field" where to reflect on teaching practices and redefine the learning environment in light of these theoretical assumptions, a space which goes beyond the mere foreign language(s) learning: "Since much teaching and learning occurs through language, difficulties in school learning often have linguistic roots. Therefore, it is essential to underline that when we refer to the Theory of Language Teaching Accessibility, we are referring to the removal of barriers in learning not only for the study of a language (HL, 2ndL, FL, classical), but also as a fundamental tool for learning itself" (Daloiso, 2023a, p. 29, our translation).

From the perspective of Critical Applied Linguistics, it should also be remembered that the line of research on teaching procedures, although it attempts to develop teaching devices based on "universal" principles, is still the product of a specific cultural perspective (Daloiso, 2023c, p. 297), therefore every empirical research, like ours, admits the fact that it will have to vary its experimental conditions, promoting the *glocalization* of the procedure as the result of negotiation with local educational traditions, different political-educational visions, which determine various organizational systems. Therefore, in order to prove the validity of the application of any teaching procedure to any context, one should also carefully consider the school system, the educational reality and the transcultural positioning of their proposal, in a "glocalised" perspective, where personal, local and global levels interplay and contribute to sustainability and well-being on a single, societal and overall extent.

Orienting the education to the principle of inclusion, equality, and accessibility, brings us to the recognition of the transformative character of education which requires a constant critical reflection in the direction of improvement. Thinking of inclusion as a continuous attempt to eliminate barriers, in fact, implies thinking of education as transformative for society – the commitment to reducing injustices, overcoming categorizations, and promoting the valorisation of differences consider the educational context as a place where a transformation can take place, one that aims to transfer these values to the world outside the school or university reality. By orienting educational action to the principle of equality, we recognize the political character of education and entrust inclusion with the role of changemaker.

[9] In this regard, we find the following quote relevant: "Each student plays their instrument; it's no use going against that. The delicate part is to really know our musicians and find the harmony. A good class isn't a regiment marching in step; it's an orchestra working on the same symphony." (Pennac, 2007).
[10] As examples, there are "The Reflective Cycle" (Gibbs, 1988) and "The 5R Framework for Reflection" (Bain *et al*., 2002).

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Exploring the Reasons Why Higher Education ESL Teachers in Vietnam Hesitate to Adopt AI-Driven Technology Into Their Teaching

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Abstract

The rapid advancement of artificial intelligence (AI) has introduced transformative tools for language teaching, offering personalized learning pathways, automated feedback, and enhanced engagement. Despite these benefits, it is noticeable that Vietnamese higher education ESL teachers often hesitate to integrate AI-powered tools into different phases of their pedagogy. This study investigates the barriers that deter ESL instructors from adopting AI-driven technologies. Drawing on an anonymous survey with participants from universities in Vietnam, and a review of existing literature, the findings reveal key challenges, including limited familiarity with AI tools (1), concerns over reliability (2), perceived threats to teaching autonomy (3), and uncertainty about pedagogical alignment (4). Additionally, the study explores how institutional support and professional development opportunities influence adoption rates. It emphasizes the need for tailored professional development programs and robust departmental support systems to encourage the use of technology in ESL teaching. By addressing these barriers, this paper lays a foundation for future research on actionable strategies to promote the effective integration of AI-powered tools in ESL education. The study contributes to the growing discourse on educational AI by offering actionable insights for educators to enhance teaching practices, policymakers to design supportive policies, and technology developers to create user-friendly tools tailored to ESL contexts.

Keywords: artificial intelligence, ESL education, teacher education

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Introduction

The integration of Artificial Intelligence (AI) in education is no longer a futuristic concept but a present-day reality, reshaping how teaching and learning take place across disciplines. In English as a Second Language (ESL) instruction, AI-powered tools such as intelligent tutoring systems, automated writing evaluators, and voice recognition technologies are increasingly seen as valuable resources to personalize learning, provide instant feedback, and enhance student engagement. These innovations hold particular promise in higher education, where class sizes, varied learner needs, and demands for outcome-based teaching place considerable pressure on instructors. However, while global interest in educational AI continues to grow, its adoption remains uneven—especially in developing contexts where systemic, pedagogical, and cultural factors intersect in complex ways.

In Vietnam, where English proficiency is often viewed as a key driver of academic and economic mobility, ESL education plays a pivotal role. Yet, despite national efforts to promote digital transformation in teaching, the uptake of AI-powered tools among ESL instructors at the university level remains hesitant. Anecdotal accounts and early observations suggest that many Vietnamese higher education ESL teachers approach AI with caution or uncertainty. This paradox—of high potential but low adoption—raises important questions about what might be holding educators back.

Rather than attributing this hesitation to a simple lack of interest or resistance to change, it is essential to explore the deeper, multifaceted barriers that shape teachers' decisions. Concerns over tool reliability, unfamiliarity with how AI integrates into existing pedagogy, and fears about losing control over the teaching process are often cited. At the same time, institutional readiness, access to professional development, and peer support also appear to play a role in influencing whether teachers feel empowered to experiment with new technologies.

This study aims to examine the underlying reasons behind ESL higher education teachers' reluctance to adopt AI-powered tools in Vietnam. It draws on both a review of the current literature and original data collected through an anonymous survey of university instructors based in Vietnam. Specifically, the research investigates how teachers are currently using (or not using) AI in their teaching, the specific challenges they encounter in the process, and the kinds of support they believe would enable more confident and effective adoption. In doing so, the study seeks to contribute to the growing discourse on educational AI by offering practical insights into how technological innovations can be introduced in ways that are not only efficient but also pedagogically meaningful and contextually appropriate.

Literature Review

The integration of Artificial Intelligence (AI) into education has generated considerable scholarly attention due to its potential to personalize learning, enhance feedback mechanisms, and automate routine tasks (Almasri, 2024). In the field of English as a Second Language (ESL) instruction, particularly at the higher education level, AI-powered tools such as automated writing assessment (AWA), speech recognition apps, and adaptive learning platforms are being positioned as solutions to persistent challenges in large, diverse classrooms (Almurauri et al., 2020). Despite this promise, global studies have consistently reported that teachers, specifically language instructors, tend to be more cautious in their adoption of AI than educators in other disciplines (Mah and Groß., 2024). This hesitancy is particularly notable in developing countries like Vietnam, where policy ambitions for digital

transformation often outpace the support systems and cultural readiness required for effective implementation.

AI in Higher Education ESL Teaching: Untapped Potential

AI offers a number of affordances specific to ESL teaching. Automated tools can assist in diagnosing learner needs, analyzing linguistic performance, and offering tailored feedback in areas such as grammar, pronunciation, and writing coherence. AI-driven chatbots, for example, allow learners to engage in language practice beyond the classroom, while writing tools like Grammarly or Criterion provide instant, criterion-based feedback that would be time-consuming for teachers to generate manually (El Shazly, 2021). For instructors teaching large classes, such tools could potentially reduce grading load, free up time for higher-order instructional planning, and support students' independent learning (Wilcox, 2015). However, studies show that ESL teachers often remain skeptical of these tools' pedagogical alignment with communicative language teaching (CLT) approaches, which emphasize interaction, meaning-making, and human mediation (Ding et al., 2019).

Perceived Barriers: Knowledge Gaps, Trust Issues, and Autonomy Concerns

One of the most cited reasons for teachers' reluctance is a lack of familiarity with how AI tools function and how to integrate them meaningfully into instruction (Baig & Yadegaridehkordi, 2025). Many ESL instructors are unsure of what counts as an AI tool, how such tools collect and process learner data, and what implications this might have for instructional design. This is especially pronounced in Vietnamese universities, where teacher training programs rarely include modules on educational technologies, much less AI (Dinh, 2021). Without foundational knowledge, teachers often perceive AI tools as "black boxes," leading to mistrust about their accuracy and appropriateness (Gillani et al., 2023). For instance, if an AI writing tool misidentifies a sentence as incorrect or offers rigid, decontextualized suggestions, teachers may view it as unreliable or even counterproductive (Gustilo et al., 2024).

Furthermore, concerns about autonomy and professional identity also contribute to resistance. Language teaching is often seen as a highly interpersonal, context-sensitive practice, where teachers take pride in their judgment and flexibility (Godwin-Jones, 2024). When AI tools are perceived as replacing core tasks like error correction, scaffolding, or assessment, some educators feel that their expertise is being undermined (Mah, and Groß, 2024). In the Vietnamese context, where teaching is also closely tied to personal reputation and hierarchical respect within institutions, any perception of reduced teacher control may be particularly discouraging (Nghia et al., 2018).

Institutional and Infrastructural Limitations in the Vietnamese Context

The readiness of institutions plays a crucial role in technology adoption. In Vietnam, while the Ministry of Education and Training (MOET) has introduced policies encouraging digital transformation, the practical implementation is uneven. Many universities lack the infrastructure, financial resources, or administrative clarity needed to support AI integration (Tri & Moskovsky, 2021). Instructors are often left to explore new tools independently, with little technical guidance or pedagogical mentoring (West et al., 2007). Moreover, there is a shortage of localized AI tools tailored to the Vietnamese learning environment (Tran et al.,

2024). This limits the perceived relevance and accessibility of global AI solutions, which may not align with students' linguistic challenges or the national curriculum standards.

In addition, institutional culture can either encourage or stifle innovation. In universities where professional development is optional, fragmented, or surface-level, educators are unlikely to experiment with unfamiliar technologies (Blakely, 2015). Vietnamese higher education is still largely exam-oriented, and ESL instruction often focuses on preparing students for standardized tests such as IELTS or TOEIC. This emphasis can overshadow the potential of AI to foster creativity, critical thinking, and personalized learning experiences. A shift towards valuing innovative teaching methods is needed in such contexts. In other words, the use of AI tools that do not directly contribute to exam results may be seen as a diversion rather than a pedagogical enhancement (Crawford et al., 2024).

The Need for Targeted Professional Development and Peer Support

Effective professional development plays a major role in whether new technologies are successfully adopted in classrooms (Lawless & Pellegrino, 2007). Yet in many Vietnamese institutions, such training often feels too broad or generic to meet the specific needs of ESL teachers (Nguyen & Newton, 2020). A one-off workshop might briefly introduce a dozen digital platforms, but it rarely dives into practical applications—like how AI-based grammar tools could support formative assessment, or how chatbots might be used to build vocabulary through task-based tasks. Without subject-specific examples and ongoing support, many teachers find themselves unsure of how to move forward and end up falling back on traditional methods (Reynolds et al., 2022).

At the same time, teachers consistently point to the importance of peer support and leadership encouragement when trying out new tools or approaches (Thurlings et al., 2015). When technology integration is seen as something each teacher has to figure out alone, ESL educators can feel isolated and hesitant to experiment. This sense of being on their own can lead to reluctance and reinforce doubts (Ito, 2023). On the other hand, when teachers are part of a collaborative community where ideas are shared and risks are supported, they're much more likely to explore new methods and grow more confident in using digital tools (Barton & Dexter, 2019).

Methodology

This study employs a qualitative research design to explore the barriers to AI adoption among ESL teachers in higher education institutions in Vietnam. The goal is to understand teachers' experiences, perceptions, and concerns about integrating AI-powered tools into their pedagogy. A combination of surveys and qualitative interviews provides a comprehensive approach to capture the nuanced perspectives of ESL educators.

A qualitative design was chosen to allow for an in-depth exploration of the subjective experiences and perceptions of ESL teachers, focusing on their attitudes toward AI technologies, challenges they face, and the support structures they need. This design is particularly suitable for uncovering the underlying reasons for teachers' hesitation and understanding the broader context within which these barriers exist.

Participants

The participants for this study are ESL instructors from universities in Vietnam. This location was selected for its representation of urban centers where technological initiatives in education are more likely to be underway. A purposive sampling method was employed to select participants with varied years of teaching experience and varying familiarity with technology use in education. The sample includes 36 teachers from different universities, which allows for a diversity of insights regarding institutional cultures and teaching contexts.

The participants were recruited via email invitations sent to ESL department heads at universities in Vietnam. The recruitment email included a brief description of the study and a request for volunteer participation. To ensure anonymity and confidentiality, all participants were informed that their responses would be anonymized and used only for research purposes.

Data Collection Methods

An anonymous online survey was distributed to gather quantitative data on the general trends and patterns in AI adoption among ESL teachers. The survey included closed-ended questions on the frequency of AI tool usage, familiarity with specific AI-powered platforms, and general attitudes toward AI in teaching. Questions also explored the perceived benefits and barriers to using AI. The survey was designed to gather broad insights across a larger group of ESL teachers and to identify common challenges faced by instructors. It consisted of both Likert-scale items (measuring attitudes toward AI adoption) and multiple-choice questions.

Limitations

This study is limited by its sample size and geographic focus, which may not fully represent the experiences of ESL teachers in other regions of Vietnam or in other Asian contexts. Furthermore, the reliance on self-reported data through surveys and interviews means that teachers' perceptions of AI may not reflect their actual usage or classroom behaviors. Future research could employ a more longitudinal design to track the adoption process over time or use classroom observations to provide a more direct assessment of AI tool integration.

Findings and Discussion

Limited Familiarity With AI

Difficulty Navigating User Interfaces

It is reported that limited familiarity with AI tools among higher education ESL teachers in Vietnam university lies in their difficulty navigating user interfaces. While all of the participants claimed that they widely used AI applications namely ChatGPT, Quillbot, or AI-powered assessment tools, 64% of them found user experience (UX) and interface (UI) designs so complex, assuming a level of digital fluency not all educators possess. 32% of those teachers frequently reported confusion regarding which interface elements were interactive, where to input data, and how to retrieve outputs. Being asked deeper, a respondent shared that multistep processes, such as selecting modes or toggling between input/output windows, were often perceived as unintuitive. This led to 47% claimed to at least once experienced frustration and abandonment of the tool in some cases. These

challenges suggest that even when access to AI tools is available, usability barriers can substantially inhibit adoption and experimentation.

Challenges in Prompt Formulation

Another key aspect of limited familiarity was evident in the teachers' difficulties with prompt formulation. Although many educators (80%) had been introduced to general-purpose AI tools, such as ChatGPT, their capacity to effectively communicate instructional intentions through prompts was often underdeveloped. Around three-quarters of participants reported struggling to articulate detailed, context-specific prompts, resulting in irrelevant or overly generic outputs. To be specific, this happened mostly when teachers applied AI to design assignments and prepare lesson materials. Approximately 60% reported to be disappointed at the responses by generative AI despite making great effort in trying to adjust prompt content to align to their output desire. The process of trial and error, often required to iteratively refine prompts, was not intuitive for users unfamiliar with the affordances of AI language models (Zamfirescu-Pereira et al., 2023). For instance, teachers often expected AI to infer educational goals from minimal input, without providing sufficient contextual cues (Harvey et al., 2025). This indicates not only a knowledge gap in how AI models operate but also a broader unfamiliarity with the strategies required for productive human-AI interaction in pedagogical settings.

Concern Over Content Reliability of AI Tools

A prominent theme from the survey was a lack of trust in the reliability and pedagogical soundness of AI-powered tools used for language teaching. A significant proportion of respondents (68%) reported feeling "not confident" or only "slightly confident" in the ability of AI tools to provide accurate and meaningful feedback to students. In particular, respondents expressed concerns that AI-driven applications, such as grammar checkers, writing assistants, and automated speaking evaluators, often fail to account for the complexities of second language acquisition. Tools were described as inconsistent, context-insensitive, and lacking the ability to interpret nuanced or idiomatic language—key elements in ESL instruction. For example, participants indicated that AI frequently miscorrects student input or provides feedback that contradicts the communicative goals of an assignment.

These findings align with previous research indicating that AI tools, while promising in automation and scale, may oversimplify language learning by focusing on surface-level features (Xiao-hong, and Yanzheng, 2021). 85% of instructors reported frustration with the lack of contextual understanding in AI-generated feedback, which occasionally led to student confusion or reliance on incorrect suggestions (Hsu et al., 2021). Moreover, the "black-box" nature of AI systems, where the underlying decision-making process is not visible to users, was noted as a significant barrier to trust (Schmidt et al., 2020).

Concerns about the reliability of AI tools directly influenced instructors' willingness to incorporate them into their teaching practices (Zhang et al., 2023). Over 60% of survey respondents indicated that they "rarely" or "never" used AI-powered tools in the classroom or in-class time. The most cited reasons included a perceived lack of alignment between AI-generated feedback and pedagogical intentions, as well as the fear that relying on flawed outputs could negatively affect student self-regulated learning.

Perceived Threats to Teaching Autonomy

Almost all of the responses revealed a strong perception among ESL instructors that AI-powered tools may compromise their professional autonomy. A notable 65% of participants expressed concern that such technologies could diminish their control over key instructional processes. Rather than viewing AI as an assistant, many saw it as an intrusion which is capable of standardizing decisions traditionally guided by human judgment. In particular, questioned about AI's growing role in assessment and feedback, 45% feared that students might prioritize algorithmic suggestions over teacher input, thereby undermining their authority in the classroom. This concern was not simply about control but about the value of pedagogical expertise, especially in language teaching contexts that demand interpretive, culturally responsive, and situational decision-making.

While some participants acknowledged the efficiency of AI, most resisted its use in tasks that influence the core of teaching. They emphasized the importance of retaining discretion over instructional choices and expressed skepticism toward institutional pressures that might encourage AI use without preserving teacher agency. These concerns suggest that resistance is less about opposition to technology and more about preserving professional identity. Supporting teachers' roles as decision-makers will be essential to meaningful AI integration in higher education ESL contexts.

Uncertainty About Pedagogical Alignment

Lastly, what contributes to ESL higher education teachers' hesitancy toward adopting AI-powered technologies is the uncertainty surrounding their pedagogical alignment. While the technical functions of AI tools such as automated feedback generation, text summarization, or pronunciation evaluation are increasingly accessible, many ESL instructors remain unconvinced of their relevance to the nuanced demands of language pedagogy. About 75% of respondents reported being uncertain about how AI tools could be effectively integrated into instructional models that prioritize communicative competence, learner agency, and formative assessment. This uncertainty is not simply a knowledge gap; it reflects a deeper misalignment between what AI tools are currently designed to do and the pedagogical values that ESL educators are committed to upholding.

The absence of clear, contextualized examples demonstrating how AI can support pedagogical goals such as fostering authentic interaction, scaffolding student output, or facilitating differentiated instruction, contributes to a perception of AI as pedagogically incompatible. Teachers often face a dilemma: adopting AI may streamline certain tasks, but it may also risk oversimplifying or even undermining the learning process if not carefully aligned with sound instructional principles. Using AI to auto-generate essay feedback might save time, but it could also bypass opportunities for dialogic feedback and critical thinking—essential components in many ESL writing classrooms. Pedagogical ambiguity cultivates a sense of caution among teachers, where the perceived instructional risk of misapplication outweighs the potential benefits of technological integration (Honan, 2008). As a result, even teachers who express interest in AI often confine its use to peripheral functions such as translation assistance or syllabus design, rather than embedding it in core teaching activities.

Institutional Support and Professional Development

Survey responses suggest that institutional support and targeted professional development play a key role in ESL teachers' adoption of AI tools in higher education. Interestingly, only 29% of participants reported receiving any AI-related training; however, of those, 76% had experimented with integrating AI into their teaching practices. Among teachers without such training, the adoption rate dropped sharply to 23%, pointing to the potential influence of structured learning opportunities.

Training appeared to impact not just technical competence but also teachers' confidence (Yang, 2019). Participants who had attended workshops often described feeling more equipped to apply AI in specific tasks, such as providing automated feedback on writing or enhancing speaking practice. Some even referred to these sessions as the moment when curiosity shifted into action. In contrast, teachers without access to support often reported uncertainty. That is, many said they did not know where to start or which tools were suitable for language teaching.

The broader institutional environment also seemed to matter. Those working in cultures (about 58%) that encouraged experimentation whether formally or informally were more likely to engage with AI tools. Meanwhile, teachers in more rigid or indifferent settings tended to hesitate, expressing concern about wasting effort or receiving little recognition for innovation. When asked what kind of support would be most helpful, a large majority of respondents emphasized hands-on, ESL-specific training (85%), regular updates on AI developments (72%), and clearer institutional guidance (61%).

Overall, the findings point to a clear takeaway: while many teachers are open to exploring AI, a lack of support can hold them back. With the right scaffolding, both technical and cultural, they are more prepared to align these tools with their students' needs and their own teaching goals.

Conclusion

This study set out to explore the reasons why ESL teachers in higher education in Vietnam remain hesitant to adopt AI-powered technologies in their teaching. Drawing on data from surveys with instructors at universities in Vietnam, the findings point to a complex interplay of individual and institutional barriers that hinder the integration of AI into ESL classrooms.

Four key factors emerged as particularly influential in shaping teachers' reluctance. These include limited familiarity with AI tools, skepticism about their reliability and pedagogical relevance, concerns over reduced teaching autonomy, and a lack of institutional support and infrastructure. Although many educators expressed genuine curiosity about AI's potential to enhance language learning, most felt underprepared to use these tools meaningfully whether in lesson planning, classroom delivery, assessment, or student feedback. Notably, many called for professional development opportunities that are not only hands-on but also tailored to the specific demands of language instruction, particularly in bridging the gap between technological possibilities and pedagogical goals.

That said, this study has several limitations. First, the sample size is relatively small and confined to Hanoi-based institutions, which may not capture the full diversity of experiences or support structures across Vietnam. Second, the research considers AI as a broad category,

without differentiating between specific tools or applications, something that could affect how adoption barriers are perceived. Finally, ESL instruction itself is a varied field, encompassing everything from academic writing and speaking to test preparation and general communication. This study does not fully distinguish how AI might play different roles across these subdomains.

Despite these constraints, the research offers timely and context-specific insights into the challenges of adopting AI in ESL teaching within Vietnam's higher education sector. It provides a useful starting point for more targeted future studies and suggests practical steps for stakeholders, including policymakers, university leaders, and edtech developers—to create more supportive conditions for AI integration. By centering teachers' voices and needs, this study contributes to a more grounded understanding of how AI can be thoughtfully and sustainably embedded in language education.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

In the writing process, I used generative AI tools to enhance clarity and improve expression. Specifically, I used QuillBot to polish wording, refine sentence structure, and ensure more concise and effective communication. The core ideas, arguments, and original content remain my own.

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Development of an Instructional Process Using Design Thinking and Community-Based Context to Enhance Creative Thinking for Elementary Education Pre-service Teachers

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Abstract

This research aimed to develop an instructional process by integrating design thinking concepts with community-based context to promote creativity in school activities provision course. For the study, sample consisted of 28 third-year elementary education pre-service teachers at Phuket Rajabhat University who were selected by purposive sampling. This research applied the d.school design thinking process, which consists of five steps: empathize, define, ideate, prototype, and test. The research instruments were (1) an expert assessment form, (2) A creativity test, and (3) self-reflection form. Data were analysed by both quantitative methods and qualitative content analysis. The results of the study found that 1) the developed instructional process consisted of four steps: (1) problem exploration and issue identification, (2) discovery of multiple perspectives, (3) activity selection and creation, and (4) presentation of ideas, and we did it through storytelling, which had the highest level of accuracy and appropriateness. 2) after studying with an instructional process using design thinking with a community-based context was found that students had overall creativity scores (fluency, flexibility, originality, and elaboration) more than before and that were significantly different at the 0.05 level. and 3) The pre-service teacher reflection found that they are reflected in 4 mains: 1) learning experience 2) creativity and design thinking 3) group work and communication and 4) self-development.

Keywords: design thinking, community-based learning, creative thinking, pre-service teachers, elementary education

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Introduction

Currently, developing learners at all levels to have skills in thinking, problem-solving, and working effectively with others is an important goal of the Thai and international education systems. In particular, molding learners into creative thinkers has become a necessary skill for learners to live and develop their careers in a rapidly changing world. However, the approach to teaching and learning at the higher education level in teacher production still focuses more on conveying content than creating experiences that are connected to the real context of the community, which may result in student teachers lacking design thinking skills and creating activities that meet the needs of learners and society. As can be seen from the teaching and learning process of the subject of school activities provision course for elementary education majors; the aim is to enable students majoring in primary education to design primary education learning activities and apply theoretical knowledge to real situations. However, from past teaching and learning, the teacher himself found that the design of the teaching and learning process did not respond to students' learning because it focused mainly on classroom lectures, which was not enough to help students understand the process of designing learning activities in primary schools. In addition, students lacked the opportunity to learn from real contexts, resulting in the design of learning activities that were not consistent with the real needs of primary school students and the context of the school. It is necessary to have a process that allows students to practice thinking, analyzing, and doing real work. To design appropriate learning activities, student teachers need to use a systematic thinking process, analyze user needs, brainstorm creative ideas, and experiment to make improvements. The application of design thinking to teaching management is an appropriate approach because it is a process that emphasizes a deep understanding of the problems and needs of users, brainstorming to find creative solutions, creating prototypes and testing them, which will help students design and create learning activities that truly meet the needs of elementary school students. The application of design thinking to teaching management, along with integration with the community context, is in line with the vision of Phuket Rajabhat University as an institution for producing teachers for local development. Therefore, the teaching and learning process should be designed to promote learning through practice experiential learning and emphasize the systematic use of creativity so that graduate teachers have the ability to organize quality learning activities that are truly connected to the context of learners and communities. The context of Phuket Province has many outstanding characteristics, including cultural diversity and ways of life. It is considered a learning resource with the potential to promote the learning process of student teachers very well. The organization of learning that is connected to the community or uses the community as a base (community-based learning) can therefore stimulate students to understand real situations, develop communication skills, analyze data, and create valuable and practical activities in specific situations of each community, leading to teaching and learning that promotes intellectual processes, such as creativity. Design thinking with the community as a base stimulates learners to practice in all dimensions. To develop creative problem-solving skills (Rotsangrat et al., 2020), which is consistent with (Lertchanadecha, 2023) the process was applied to manage learning using design thinking. Teachers encouraged them to study and research from various sources of learning, exchanged knowledge with each other until they truly understood, and allowed learners to gain a deeper understanding. They exchanged perspectives from many people to find solutions and tested until they obtained a solution or innovation that met the needs of the situation, which was consistent with Dumidae and Awae (2022), who applied the concept to design teaching and learning, allowing learners to think analytically and solve problems in a variety of ways, resulting in new forms of creativity that could create educational innovations. Therefore, it can be considered that the use of design

thinking with the community as a base is an important tool in promoting creative thinking skills, where learners can learn from real problems, have the opportunity to communicate, work together, and lead to the design of valuable and feasible activities in the school or community situation. For this reason, the research team is interested in developing a teaching and learning process using the design thinking process with the community as a base to promote creativity in designing learning activities for primary education major students so that students can design and develop learning activities that meet the needs of the learners effectively. and to prepare students to have design thinking skills that are essential for future educational development.

Objective of Study

This research aimed to develop an instructional process using design thinking with a community-based context to promote creative thinking in a school activities provision course for pre-service teachers in elementary education.

Literature Review

Design Thinking Process

Design thinking is a thinking and development process that consists of many steps, in which designers try to understand the needs and perspectives of users until they can create and develop many possible approaches to solve certain problems caused by groups of people in various disciplines. The aim is to create innovations or creative works and believe that creating these things cannot happen using only one knowledge. It comes from practices related to thinking and the process of practice. The teaching model that is consistent with design thinking is a teaching model that emphasizes the development of process skills, which are skills related to various methods of operation, which may be intellectual processes or social processes, leading to learning from groups of people of various subjects, allowing them to see problems in many dimensions and truly understand the problems through scientific principles, reasoning, and understanding the feelings of others. Design thinking has a step-by-step process. The process will show the reflection of the thinking method. The work that comes from the design thinking method shows the value in terms of society, communication, and feelings (Atichartchayakorn, 2022; Chaichaowarat, 2023; Eamcharoen, 2024; Khammanee, 2016). In conclusion, design thinking is a thinking process. It arises from the practice that involves thoughts and processes in practice that emphasize cooperation and integration of diverse knowledge and focus on creating innovations to meet the needs of users.

Forms of Design Thinking

Currently, there are 3 popular forms of design thinking that are applied: (Chaichaowarat, 2023) 1. Design thinking of the Massachusetts Institute of Technology (MIT) is a process that focuses on people, emphasizing the integration of design, business management, and engineering processes to create innovations that enhance the quality of the organization. 2. Design thinking of the Hasso-Plattner Institute of Design of Stanford (d.school) is a process that emphasizes understanding users and their real needs before designing solutions. It consists of 5 steps:1) Deeply understanding the problem (Empathize) is studying and deeply understanding the needs and perspectives of users. 2) Clearly defining the problem (Define) is defining a clear problem. To see the scope and challenges of design3) Brainstorming for

solutions (Ideate) is brainstorming and generating many possible ideas to solve problems. 4) Prototype is creating representatives of various ideas to test. 5) Test is testing prototypes to receive feedback and improve. Each step will help designers develop and improve their ideas or innovations more effectively by increasing their understanding of user needs, clearly defining the problem, being open to brainstorming, and receiving feedback from prototype testing. And 3. Design thinking of the Singapore University of Technology and Design (SUTD) or Design 4Ds is a process that emphasizes research and problem framing. It consists of 4 steps: Discovery, Define, Development, and Deliver. All 3 forms of design thinking have a process step that is ordered in order, but it is still flexible and has a non-linear process nature. This means that the steps may not be carried out in strict order, but the process steps can be repeated, and feedback is given or used continuously, including adjustments at each step, which allows the process to be flexible and able to develop innovations or products that best meet the needs or problems. The author has seen the importance of design thinking from the Hasso-Plattner Institute of Design of Stanford (d.school), which is a process that emphasises understanding users and their real needs before designing solutions. Students can study and access learning experiences, which will lead to designing instruction that meets real needs and contexts. In addition, the user-focused design concept and participatory process allow teachers and student teachers to jointly plan and continuously improve instruction.

Community-Based Learning (CBL)

Community-based learning (CBL) integrates classroom learning and community learning as a pedagogical strategy, equipping students with the skills needed, especially personal and soft skills. CBL also promotes student volunteerism and experiential learning. Community-based learning (CBL) integrates classroom learning and community learning as a pedagogical strategy, equipping students with the skills needed, especially personal and soft skills. CBL also promotes student volunteerism and experiential learning (Hamzah et al., 2023). Context-based learning is a learning process that encourages students to connect their learning knowledge to real-life situations. Context-based teaching is teaching that comes from the context of students (Taohom & Panawong, 2024). Teachers should carefully consider the correspondence between the targeted content to be conveyed to the learners and the focus context. CBL should focus on students' creative thinking. (Simswat, 2022). The development of learning processes and education in primary school by learning and gaining experiences from local communities as a foundation for students' learning, it promotes holistic and experiential learning that allows learners to learn from real experiences and various situations within the community. Using communities as a source of knowledge can enhance learners' learning experiences and create more connections to the real lives of learners and local communities (Thasook et al., 2023).

Creative Thinking

Creative Thinking refers to the skills used to explore novel ideas or generate solutions while problem-solving. This definition builds on Guilford’s division of creativity into eight constructs: flexibility, fluency, novelty, analysis, reorganization, redefinition, synthesis, complexity, and elaboration (Guilford, 1967, as cited in Suherman & Vid´akovich, 2022).

Methodology

Population and Sample

The sample group in this study comprised 28 third-year undergraduate students who were purposively selected based on their enrolment in the education programme, majoring in elementary education at Phuket Rajabhat University, specifically in the school activities provision course, and who voluntarily participated in this research.

Research Instruments

The instruments used in this research were 1) an expert assessment form, aimed at evaluating the validity and appropriateness of the teaching management using the Design Thinking Process with a community-based context, 5 persons 2) A creativity test (pre and post-test) aimed to assess the creativity abilities of student teachers before and after the implementation of the Design Thinking Process in a community-based context, which was assessed by experts. The creativity test consisted of fluency, flexibility, originality, and elaboration. 3) The self-reflection form aimed to have students reflect on their learning experiences and creativity in the design of learning activities.

Data and Analysis

1. The results of the development of the instructional process using design thinking with a community-based. The researchers studied and designed it to consist of 4 steps as follows: 1) problem exploration and issue identification, 2) discovery of multiple perspectives 3) activity selection and creation, and 4) presentation of ideas, and we did it through storytelling. And brought it to the person who evaluated the correctness and appropriateness. The evaluation results are shown in Table 1.

Table 1
Evaluation of the Developed Instructional Process

Dimension	Mean	S.D.
1. Problem exploration and issue identification	4.60	0.51
2. Discovery of multiple perspectives	4.47	0.52
3. Activity selection and creation	4.33	0.49
4. Presentation of ideas and we did through storytelling	4.60	0.51
Overall	4.50	0.50

Based on the above Table 1, it was found that overall, the instructional process using design thinking with a community-based context developed by the researchers had the highest level of accuracy and appropriateness (mean = 4.50, S.D. = 0.50).

2. Results of using the instructional process using design thinking with a community-based context to promote creative thinking in a school activities provision course for pre-service teachers in elementary education, as shown in Table 2.

Table 2
The Comparison Score of the Creative Thinking Scores Before and After Learning

Creative thinking	Test	N	Score	Mean	S.D.	t-test
Overall, 4 components	Pre-test	27	24	9.74	1.84	18.98*
	Post-test			17.89	1.64	

* Significant level .05

Based on the above Table 2, it was found that students had overall creativity scores (fluency, flexibility, originality, and elaboration) before and after studying with an instructional process using design thinking with a community-based context that were significantly different at the 0.05 level, with the average score after studying (mean = 17.89, S.D. = 1.64) being higher than before studying (mean = 9.74, S.D. = 1.84).

3. The of student reflection analysis data from student reflection found that students gained real experiences to design learning activities from the beginning to the end of the learning process. The reflection points can be summarized into 4 main areas: 1) Learning experience; It was found that students gained perspectives from the community context to design learning activities that were consistent with the needs of primary school students. These activities focused on meaning for learning, allowing them to understand the content deeply and see the importance of learning in real life. 2) Creativity and design thinking; It was found that many students reflected that the activities encouraged them to think outside the box, dare to think, dare to present, and look for new ways to solve problems or design learning activities. 3) Group work and communication. It was found that students worked together in groups and practiced reflecting and giving advice both in groups and between groups to further develop learning activities. 4) Self-development; It was found that students gained guidelines for designing diverse learning activities and dared to express their opinions more. The results of the reflection show that organizing activities that integrate the community context with the design thinking process helps promote meaningful learning for students. It also develops skills in creativity, communication and collaboration, which is consistent with the research objective of promoting creative thinking competencies of student teachers in real community contexts.

Conclusion

This research focuses on developing a teaching and learning process using the design thinking process with the community as a base to promote creativity in designing learning activities for primary education students. The developed teaching and learning process consists of 4 steps: 1. Problem exploration and issue identification 2. Discovery of multiple perspectives 3. Selection and creation and 4. Presentation of ideas, and we did it through storytelling. The results of the research show that this learning process can significantly promote students' creativity. In addition, self-reflection found that students developed creative thinking skills, systematic problem solving, and logical presentation of ideas and were able to work with others. They were also able to design learning activities that were appropriately and creatively linked to real life and the community context. This study therefore reflects the results of applying the design thinking concept to learning management for student teachers, which is in line with the current direction of teacher development, which emphasizes producing teachers with the ability to think creatively, solve problems, and design quality learning, along with learning from real areas. In particular, using the

community context as a living learning resource makes the learning process more meaningful and encourages student teachers to see the value of further professional development.

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Analysis of Language and Cultural Content in Thai Conversation Textbooks for Learners of Thai as a Foreign Language

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Abstract

This research aims to analyze the language and cultural content presented in Thai conversation textbooks designed for learners of Thai as a foreign language. The research population comprised 12 graduate-level theses, dissertations, and independent studies, selected through purposive sampling from higher education institutions in Thailand. The research instrument was a language and cultural content analysis form, which calculated the percentage frequency of language and cultural content categories appearing in basic Thai conversation textbooks for learners of Thai as a foreign language. The data analysis revealed that the Thai conversation textbooks for learners of Thai as a foreign language presented content with the following frequency distributions: informational cultural category at 39.54 percent, behavioral cultural category at 42.36 percent, and relational cultural category at 8.19 percent, respectively.

Keywords: language and cultural content, Thai conversation textbooks, learners of Thai as a foreign language

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Introduction

Nowadays, more foreigners want to learn Thai. The expansion of the demand for learning the Thai language is in line with the expansion of politics. Marketing, trade, and global industry, which Thai language teaching for foreign learners avoids. Teaching cannot be cross-cultural, both in terms of ideas, beliefs, values, Practices, and Traditionalism (Ponmanee, 2002). It has long been recognized that learning the culture of a native country is important in terms of facilitating language learning. Second Language Learners as Individuals and Learning Motivation In conclusion, the more a learner appreciates the culture of the target language, such as reading literature, traveling on vacation, looking for opportunities to practice the language, etc., the more successful he will be in learning a second language. In the classroom as well, in addition, those who are deeply interested in learning Thai will learn with great dedication. Look for a place with a Thai language curriculum and teaching that provides a valuable benefit, which is more important than language teaching, because the interest and purpose of learning Thai often does not start and end in the language itself, but also focuses on the Thai people.

Learning Thai Culture for Foreigners Who Learn Thai as a Foreign Language. It is equally necessary and important to teach language skills, as language and culture go hand in hand. The ability to use language takes into account the accuracy of the principles of language use. It also includes the ability to use language that is appropriate to the situation. As with language skills teaching, the instructor must clearly identify the learning behavior of the learners and what kind of learning they want the learners to learn. However, the instructor should also study the main purpose of teaching the culture. To stimulate the interest of learners in learning foreign languages. To develop the ability of learners to behave in the society and culture of native speakers. To create an understanding of the values and attitudes of native language culture for learners. To develop an understanding for learners in the sense that culture determines people's behavior or expression. Age, gender, social status, and residence will also influence people's speech or behavior so that learners can understand people's expressions in normal situations and crises in their native language culture so that learners can be aware of the image, and ideas transmitted from culture, even the most ordinary words or phrases so that learners can evaluate and draw conclusions about native language culture from the evidence that appears. So when language is part of a culture and is inextricably interrelated, it is necessary. Linguists should encourage learners to have the opportunity to acquire and absorb the target culture, to acquire the skills to understand the meaning of the culture. However, the culture of the people who use the language as well as the culture of the language must be learned, and cultural knowledge should not be taught separately or supplemented.

Cultural learning is an important part of learning a second language. Therefore, the instructor must choose the cultural topics that should be taught to the learners so that they can use them. Language in society is used correctly. Teachers should be aware of cultural teaching. It is important in language teaching and learning because it not only helps learners understand the language better but also helps to make studying more enjoyable. Instructors should choose cultural content that is beneficial to learners. Culture can be divided into many different topics, such as culture, history, culture, Politics Culture about important places and important people, and Customary Culture.

Attitudes and values, including culture about life and daily life, etc. Instructors should also take into account the age appropriateness and interests of the learners. It should also be

considered. The level of difficulty in using the language is appropriate to the learner's ability. Therefore, having a lesson about Thai culture will help foreigners understand Thai culture. One of the problems in learning Thai for foreigners is that when foreign learners have to converse with Thai people, they feel frustrated because they lack conversation practice and do not know the language used for conversation. Although it is just a simple basic sentence or a sentence that uses simple words, it is an expression that learners may say that the study style is an important tool for developing learners.

For this reason, the researcher is interested in studying language and culture textbooks for foreign learners. The objective is to analyze the language and cultural content that appears in the Thai conversation lesson for Thai as a foreign language learners. Increasing language skills and adapting to live with Thai people means knowing how to build good relationships in Thai society.

Objective of the Study

Analyze the language and cultural content depicted in the Thai Conversation Lesson for Thai as a Foreign Language Learner.

Methodology

The population groups used in the research included dissertations, dissertations/dissertations, and independent research at the graduate level, totaling 12 subjects by a specific selection method from higher education institutions in Thailand.

The tool used in the research is the analysis of language and cultural content. By determining the percentage of frequency of language and cultural content in each category that appears in the introductory Thai conversation lesson for Thai foreign language learners.

Literature Review

Cultural Concepts and Languages for Communication for Foreigners

The authorities have inserted Thai culture in teaching listening and speaking skills in Thai as a foreign language. by It can be divided into 6 major issues: Thai culture and Thai language teaching. Learning Thai culture of Foreigners who learn Thai as a foreign language. Organizing activities to learn about Thai culture for learners. Foreigners: The topic of Thai culture that Thai as a foreign language teacher should explain to learners who are foreigners understand Thai cultural content that Thai as a foreign language teacher should insert in teaching. And what should be considered in inserting culture in teaching Thai to foreigners. As detailed from now on. (Permkesorn, 2004; Ponmanee, 2002; Wongpinunwatana, 2006)

Thai Culture and Language Teaching

The teaching and learning of the Thai language. If the instructor interjects, Thai culture will bring many benefits to learners. In other words, it helps learners to It can be interpreted correctly because when learners understand Thai culture, such as customs, Traditions, and beliefs. The attitudes and values of Thai people will also understand the way Thai people think, act, and use words in communication (Permkesorn, 2004). In addition, intercultural teaching will help learners have fun learning. In addition, encourage learners to have a

positive attitude towards Thai culture because when learners learn Thai culture while learning the language, they will be able to learn about Thai culture. Then, he will understand the cultural differences between Thai culture and the culture of his nation. 19 Teachers and learners have a good feeling for each other.

Thai language teaching that emphasizes the actual learning conditions of culture. In each period of teaching and learning, the four skills will be integrated, namely listening, speaking, reading, and it is written by inserting the principles of using the Thai language and Thai culture that emphasize learning according to real conditions, such as praying. Works, greetings, and shows respect. The use of polite words, etiquette when receiving things from adults, and etiquette for sitting. Standing, walking, and eating etiquette, Speech etiquette, Ordination, Weddings, funerals, Merit making, dress culture, begging, helping, and sharing, etc (Wongpinunwatana, 2006).

Permkesorn (2004) also discusses the culture that should be taught as follows: Meeting others, speaking, Greetings, how to introduce yourself, housing The condition of the house and beliefs, the family and the relationship of the Family, food, type of food, taste of food, etiquette of eating. Composition Physical: Manners of expression and conduct on important occasions such as weddings and funerals. Legacy Culture is about festivals and traditions, communication, and transportation. Weather and Seasons, Cultural Inserts. In teaching the Thai language, teachers may initially arrange teaching and learning to let students know the characteristics of Thai society. By using various media to help, such as photos or videos. In addition, in the early stages of teaching, learners may not have enough knowledge and listening skills in Thai. Therefore, the instructor should use English as a medium and should explain the subject. Thai culture that learners should know at the same time as teaching Thai. Teachers should study the socio-cultural aspects of learners to understand learners as well as understand the differences between the Society and Culture of Instructors and Learners. Learning the differences between foreign languages and cultures will reduce conflicts and problems due to communication between teachers and learners, and also reduce prejudice. caused by cultural differences. When learners learn, Thai culture while studying, they will understand the cultural differences between Thai culture, and this results in teachers and learners having a good feeling for each other.

Learning Thai Culture for Foreigners

Who Learn Thai as a Foreign Language There is It is equally necessary and important to teach language skills, as language and culture go hand in hand. Capabilities in the use of language not only take into account the accuracy of the principles of language use. Also includes the ability to use the language that is suitable for the situation, popularity, and culture of native speakers, as well as teaching skills in the language. Language means that the instructor must clearly state the learning behavior of the learner that he wants the learner to learn in the What are the characteristics? However, the instructor should also study the main purpose of teaching the culture. It should have the following objectives: To create cultural awareness of native speakers for learners, develop learners' ability to behave in native societies and cultures, and develop learners' understanding of culture in the sense that culture determines behavior At the same time, social variables such as age, gender, social status, and residence will inevitably It also influences people's speech or behavior.

It is necessary when language is part of a culture and is inextricably interrelated. In particular, language teachers should encourage learners to have the opportunity to receive and absorb

the target culture to acquire skills in understanding the meaning of culture, because learning a language is not about learning about linguistic symbols. 21 only. But the culture of the people who use the language, as well as the culture of the language, must be understood, and it should not be taught separately. Additional cultural knowledge.

Data Collection and Analysis

Table 1

Shows the Frequency and Percentage of Linguistic and Cultural Content Depicted in the Thesis.

Textbook	Informational Culture		Behavioral Culture		Achievement Culture		Total	
	frequency	Percentage	frequency	Percentage	frequency	Percentage	frequency	Percentage
Textbook No.1	53	3.67	38	2.48	21	1.15	112	7.30
Textbook No.2	49	3.18	54	3.89	22	1.12	125	8.19
Textbook No.3	61	4.21	45	2.99	16	1.01	122	8.21
Textbook No.4	57	3.98	53	3.65	37	1.79	147	9.42
Textbook No.5	63	4.75	52	3.29	25	1.23	140	9.27
Textbook No.6	51	3.20	62	4.22	35	1.76	148	9.18
Textbook No.7	43	2.94	47	2.90	38	1.93	118	7.77
Textbook No.8	55	3.77	60	4.17	29	1.38	144	9.32
Textbook No.9	30	1.50	55	3.76	36	1.77	121	7.03
Textbook No.10	40	2.56	50	3.18	17	1.02	107	6.76
Textbook No.11	32	1.56	54	3.64	35	1.76	121	6.96
Textbook No.12	39	2.16	60	4.19	32	1.66	131	8.01
Total	**573**	**39.54**	**630**	**42.36**	**343**	**18.10**	**1546**	**100**

When comparing the Thai language and cultural content appearing in the textbook, the study found that the most frequent presentation of behavioral culture category (42.36%) content was the highest. This was followed by the presentation of content in the informational culture category (39.54%) and the content in the achievement culture category (18.10%).

Results

From the results of the analysis, the research results can be summarized as follows:

1. Presentation of Thai language and culture content. The 12 textbooks have the most frequent presentation of behavioral culture category (42.36%) content was the highest. This was followed by the presentation of content in the informational culture category (39.54%) and the content in the achievement culture category (18.10%).
2. Presentation of informational culture content in 12 textbooks in descending order of frequency: Textbook No.5 is 4.75%, Textbook No.3 is 4.21%, and Textbook No.8 is 3.77%.
3. Presentation of behavioral culture content in 12 textbooks in descending order of frequency: Textbook No.6 is 4.22%, Textbook No.12 is 4.19%, and Textbook No.8 is 4.17%.

4. Presentation of achievement culture category in 12 textbooks in descending order: Textbook No.7 is 1.93%, Textbook No.4 is 1.79%, and Textbook No.9 is 1.77%.

Conclusion

According to the analysis of the presentation of language and cultural content in the 12 textbooks, it was found that the most prominent was behavioral cultural content, accounting for an average of 42.36%, followed by informational cultural content at 39.54%, and presentation of achievement cultural content at 18.10%. When considering the presentation of language and cultural content of each textbook, different weights were given, which can be divided into two groups: the first group gives more weight to presenting informational cultural content than behavioral cultural content, which is how most textbooks are weighted, and the second group gives more weight to presenting behavioral cultural content than informational, including textbooks No. 1, No. 4, and no. 5. As for the cultural content of achievement, it was found that all textbooks gave weight to the least content is the last.

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Effects of Group Process-Based Instruction Through Paper Toys Making on Enhancing Holistic Learning of Fourth Grade Students

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Abstract

Holistic development helps elementary school students develop their full potential by focusing on formulating them to grow into complete human beings in all aspects and can adapt to various situations and develop lifelong learning. This research aims to study the results of teaching and learning using group process through paper toy making to promote holistic learning of primary school students in grade 4. The sample group consisted of 16 primary school students in grade 4 who were selected by purposive sampling. The instruments used consisted of 1) a holistic learning assessment form and 2) a satisfaction assessment form. The statistics used are the descriptive statistics. The results of the research found that 1) the holistic learning of students after learning was significantly higher than before learning at a level of 0.05 and 2) the satisfaction of students after learning by organising learning using group processes through paper toy making was at the highest level, indicating that the results of teaching and learning using group processes through paper toy making on promoting holistic learning development of primary school students in grade 4.

Keywords: group process-based instruction, paper toys making, holistic learning, elementary student

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Introduction

Current studies emphasise the holistic development of learners as a foundation that promotes learners to learn and develop their potential to the fullest. The effective process of potential development must be continuous and comprehensive. The ultimate goal is to help each individual discover and fully utilise their abilities, taking into account individual differences. Holistic development of learners must promote learners in various aspects: physical, such as having good physical skills; mental, such as appropriate emotional management, self-control, understanding their mental state, and appropriate expression; social, such as practicing social skills, teamwork, and having a role that is appropriate for oneself; and intellectual, such as learning to live happily, developing oneself through education, improving oneself according to one's needs, continuous learning, and careful reflection before making decisions (Chanprasit, 2023). In addition, Mahmudulhassan et al. (2024) stated that effective primary education should emphasise the holistic development of learners because students at this level are in a period of continuous development and change. Therefore, development should be continuous to be appropriate for their age and should develop in all dimensions: physical, mental, emotional, social, and intellectual, integrated with the context of students' lives. Both in terms of economics, society, culture, politics and the environment of the family, community and society (Sawasphon, 2020), the learning management process that is consistent with the holistic development of learners is active learning, which is an important tool in developing the education system to keep up with social changes. It not only adds value to the learning process but also promotes skills in attitude, problem-solving and the ability to work with others by using various tools such as self-assessment, mind maps and peer assessment (Phuwanna et al., 2023), which occurs through group processes that promote social skills and cooperation, giving students the opportunity to practice thinking, communicating, solving problems and making decisions together. It is consistent with the concept of participative learning that emphasises the real role of students in the learning process. Therefore, organising a learning process that is suitable for elementary school students should emphasise participation, group work and hands-on practice to promote social skills, creativity and collaborative learning. It is consistent with the Basic Education Core Curriculum B.E. 2551, which states that after completing elementary school, students should understand the work process and be able to develop every step, have management skills, teamwork, and be systematic and creative. And have good working habits such as diligence, patience, responsibility, honesty and work etiquette. Which primary education that emphasises group processes can promote the development of students' essential skills? Comprehensive learning in physical, emotional, social and intellectual aspects (Komala et al., 2024). The use of paper toys as a learning medium has a meaning to life and is an important part of culture. It helps stimulate interest and motivation and promotes effective learning processes (Jarrett et al., 2020). Wilson (2021) pointed out that making paper toys is an interesting and valuable activity. Because it can stimulate students' thinking processes, intentions and emotional expressions very well. Allowing primary school students to grow with potential by developing in all three elements of humanity: thinking, feeling and willing at the same time. Promote adaptability and lay a foundation for lifelong learning. For all these reasons, the research team is interested in studying group-focused learning management through paper toy-making activities. To promote holistic learning in grade 4 primary school students with the aim of filling the academic gap and presenting a learning management approach that promotes all-round development of learners. It is expected that the results of this research will lead to the effective development of the quality of primary education.

Objective of Study

This research aimed to study the effects of group process-based instruction through paper toy making on promoting holistic development among fourth-grade students.

Methodology

The sample group consisted of 16 fourth grade students from a school in Phuket Province, selected by purposive sampling. The statistics used were the descriptive statistics. The research instruments were 1) a holistic learning assessment form, consisting of 3 dimensions: thinking, feeling, and willingness, and 2) a satisfaction assessment form, consisting of 5 items. The assessment used a scale with the following scoring levels: 4 is the highest, 3 is moderate, 2 is low, and 1 is the lowest. The interpretation of the average score of appropriateness is as follows: Average score ≥ 3.20 is the highest; Average score between 2.40 - 3.19 is moderate; Average score between 1.60 - 2.39 is low; Average score < 1.60 is the lowest.

Group Process-Based Instruction Through Paper Toy Making

The teacher divides students into groups of good, medium, moderate and weak. Then, students brainstorm, exchange ideas and reflect within the group. Students are assigned roles to help each other within the group. Then, each group jointly designs and creates paper toys using various learning resources, such as books, searching the Internet, and asking knowledgeable friends. The teacher controls the time for 20 minutes. Every student in the group receives one paper toy. Then, each group takes turns sharing knowledge with friends from other groups.

Conclusion

1. Results of *the Holistic Learning* in Table 1

Table 1
The Comparison Score of the Holistic Learning Scores Before and After Learning

Holistic Learning	N	Score	test	$\bar{X}$	S.D.	t - test
3-dimensional	16	48	Pre-test	33.19	5.40	8.90*
			Post-test	44.88	1.58	

* Significant level .05

Based on the above Table 1, The result was shown that effects of group process-based instruction through paper toy making had overall the holistic learning (thinking, feeling, and willing) before and after that were significantly different at the 0.05 level, with the average score after studying (mean = 33.19, S.D. = 5.40) being higher than before studying (mean = 44.88, S.D. = 1.58).

2. The Satisfaction of Students After Learning by Organizing Learning Using Group Processes Through Making Toys

Table 2
The Student's Satisfaction After Learning With Group Process-Based Instruction Through Paper Toy Making

Item	M	S.D.
I enjoyed learning this subject.	4.9	0.34
I enjoyed learning this subject.	4.9	0.25
I felt fully involved in the group work.	4.9	0.34
I planned the toy-making activity.	4.3	0.48
I applied the knowledge I gained from this activity to my daily life.	4.9	0.25
I expressed my opinions more.	4.6	0.51
I felt proud of my work and the group's work.	4.7	0.48
Overall	4.7	0.38

Based on the above Table 2, The satisfaction of students after learning by organizing learning using group processes through making toys from paper was at the highest level (mean = 4.7, S.D. = 0.38), indicating that the results of organizing learning using group processes through making toys from paper promote the development of holistic learning for Grade 4 students. The results of the research found that group learning management with paper toy making can effectively promote students' holistic development. By integrating design, collaboration, and reflection, it creates a learning environment that stimulates meaningful and enjoyable learning. These results are consistent with previous research that supports participatory and hands-on learning in primary school. Student satisfaction also demonstrates the potential of this approach to create quality learning experiences and can be applied in other learning contexts in the future. Therefore, group learning management through paper toy making is effective in promoting holistic learning, which is consistent with the concepts of Miller (2007) and Komala et al. (2024) who indicated that holistic development requires processes that integrate intelligence, emotion, and attitude. In addition, using paper toy making activities in groups helps to enhance cooperation among students, promote social skills, and help learners be more motivated to learn, which is consistent with the results of the studies of Fauzi et al. (2023) and Wilson (2021) who emphasized the importance of hands-on learning in primary school.

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Investigating the Influences of Linguistic Insecurity on Pre-service English Language Teachers' Teaching Performance in Thai EFL Classrooms

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Abstract

Speaking anxiety is a crucial difficulty experienced by pre-service English language teachers in the Thai context. Therefore, this study investigated the influence of linguistic insecurity on the teaching performance of Thai EFL pre-service teachers majoring in English education programs at six Rajabhat universities in Thailand. The questionnaire was adapted from Jantri and Phusawisot (2021) and the professional standard for Thai pre-service teachers by the Teachers' Council of Thailand (2021), which included three factors: Lack of Confidence (LC), Poor Performance (PP), and Negative Self-Concept (NSC). A quantitative approach was adopted in this study; thus, 100 participants were selected through convenience sampling due to their teaching experience. The data were collected using a questionnaire. Descriptive statistics and multiple regression techniques were employed, using SPSS Statistics version 29, to examine factors affecting the teaching performance of Thai EFL pre-service teachers. The results revealed that the correlation coefficient (R) is .649, and the coefficient of prediction (R square) is 42.20 percent, indicating that one of those factors predicted the teaching performance of Thai EFL pre-service English teachers. The adjusted coefficient of prediction (Adjusted R square) is 0.403. Consequently, a Negative Self-Concept (NSC) significantly influenced the teaching performance of all Thai EFL pre-service teachers from Rajabhat Universities ($P < 0.05$).

Keywords: linguistic insecurity, teaching performance, pre-service English language teachers

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Introduction

In the era of globalization, English has progressively established itself as the primary medium of communication across all domains. Consequently, the ability to use English proficiently has become an essential requirement in every country. Teaching and learning of English are essential for effective communication, meeting the demands of the global economy, and responding to the growing need for English proficiency at local, national, and international levels. Thailand is one of the countries where English is used as a foreign language (Khamkhien, 2010). Apart from Thai, English is the most widely instructed language in Thai schools as it is regarded as essential to Thailand's development, particularly in education, business, science, and technological advancements, all of which necessitate proficiency in the language (Phothongsunan, 2018).

Mastering English is vital for effective communication among Thai students. Although the majority of Thai students have dedicated over 10 years learning English from kindergarten to university, it was found that the English language proficiency of Thai students is relatively low (Tantiwich & Sinwongsuwat, 2021). This finding was repeatedly substantiated by more recent studies (e.g., Santiwatthanasiri, 2018; Yuh & Kaewurai, 2021), indicating that Thai students face significant challenges in speaking English due to both linguistic and psychological barriers. Research has shown that fear of making mistakes and speaking anxiety are major obstacles preventing students from confidently using English in communicative contexts. It also found that despite years of instruction, many students lack the confidence to speak due to high levels of anxiety and limited exposure to real-life speaking practice. Additionally, it revealed that grammatical errors, restricted vocabulary, and pronunciation difficulties further hinder their ability to communicate effectively.

This challenge in English proficiency not only affects students, but also influences Thai EFL pre-service English teachers. As future educators, these teachers must guide students in developing English proficiency, but their own experiences with English learning often mirror the struggles faced by their students. Many pre-service teachers experience anxiety and insecurity in using English, particularly in pronunciation and spontaneous communication, which can negatively affect their confidence in teaching, ability to concentrate, and student engagement (Kenoh III, 2021). This anxiety is especially evident during the teaching practicum, a crucial phase in pre-service teacher development where they encounter real classroom situations for the first time (Damnet, 2021). At this stage, linguistic insecurity becomes even more apparent, as pre-service teachers find themselves facing the same struggles they observed in their students. Furthermore, linguistic insecurity among Thai EFL pre-service teachers is often tied to the same difficulties their students encounter. Since pronunciation and accents significantly impact student learning, pre-service teachers may fear being judged on their own pronunciation, which leads to self-doubt and reluctance to engage in spoken English instruction. In Thailand, where English is taught as a foreign language, linguistic insecurity can significantly impact pre-service teachers' confidence, limiting their ability to engage in classroom discussions, provide effective instruction, and foster communicative learning environments. Addressing these challenges is essential to ensuring that future English educators can teach with confidence and competence (Patomchaiwat, 2019).

Linguistic insecurity refers to feelings of anxiety, self-consciousness, or lack of confidence that individuals experience regarding their language use, particularly when they perceive their speech diverges from a standard or socially accepted norm. This concept was first introduced

by sociolinguist William Labov in 1972, this concept explains how speakers may perceive their language abilities as inadequate, often leading to hypercorrection or adjustments in their speech to conform to prestigious linguistic forms. Scholars from various fields have explored linguistic insecurity in different contexts. Baron (1976) suggested that linguistic insecurity arises from negative attitudes toward one's own language use, causing individuals to doubt their proficiency and perceive their speech as error-prone. Bucci and Baxter (1984) examined how linguistic insecurity can lead to communication challenges in multicultural environments, particularly in professional settings such as healthcare, where dialectal differences may result in miscommunication. Meyerhoff (2006) described linguistic insecurity as the belief that one's language variety is inferior or substandard, which can affect speakers' confidence and limit their ability to engage effectively in social interactions. Although there are some differences in the core elements of linguistic insecurity, most scholars are in favour of the term linguistic insecurity, representing the idea of an individual's negative self-perception regarding their language and how they use it. In other words, linguistic insecurity refers to the situational anxiety and self-consciousness experienced when using their own language. This differs from foreign language anxiety, which stems from the challenges of acquiring a language.

Several studies have been conducted on linguistic insecurity (Ashari et al., 2023; Daftari, 2016; Daftari & Tavil, 2017; Jantri & Phusawisot, 2021). For example, in an educational context, Daftari (2016) investigated some aspects of the linguistic insecurity of Turkish EFL teachers. The findings revealed that Turkish EFL teachers experienced a low level of linguistic insecurity in their classrooms. The specific factors such as teaching pronunciation, low proficiency in the target language, and limited knowledge of the target language's culture were identified as contributors to linguistic insecurity among these teachers. Moreover, Daftari and Tavil (2017) examined the linguistic insecurity of non-native English speaking teachers (NNESTs) and investigated its influence on learners' productive skills. The results indicated that linguistic insecurity among NNESTs, regardless of gender, has no significant correlation with learners' writing and speaking scores. Jantri and Phusawisot (2021) explored how linguistic insecurity affects Thai EFL teachers' teaching performance. The analysis revealed that linguistic insecurity negatively impacted teaching performance in three key areas: lack of confidence in English knowledge, poor performance in English language teaching and negative self-concept toward English language ability. Another study on pre-service English teachers' anxiety in speaking English in the Indonesian Islamic College. The results revealed that pre-service English teachers in an Indonesian Islamic college experience significant speaking anxiety due to factors such as fear of making mistakes, lack of confidence, nervousness, and limited speaking practice. This anxiety negatively impacts their ability to communicate effectively in English (Ashari et al., 2023).

However, research on linguistic insecurity among Thai EFL pre-service English teachers in the context of English as a Foreign Language (EFL) remains limited. While several studies have examined linguistic insecurity among in-service teachers, no research has specifically focused on Thai EFL pre-service teachers or its impact on their teaching performance. Therefore, this study seeks to explore linguistic insecurity among pre-service English teachers, with a particular emphasis on Thai EFL pre-service English teachers in EFL contexts. The main objective of this study is to investigate the influences of Thai EFL pre-service English teachers' linguistic insecurity on teaching performance in EFL classrooms and the research question is how linguistic insecurity influences the teaching performance of Thai EFL pre-service English teachers in EFL classrooms.

Literature Review

Linguistic Insecurity

Feelings of anxiety, self-consciousness, or lack of confidence experienced by people in their language use are called linguistic insecurity. Linguistic insecurity is a phenomenon that affects individuals' confidence in their language use, often arising from perceived deficiencies in pronunciation, grammar, or fluency. It is commonly experienced by speakers who feel their language skills do not align with linguistic standards or conventions, leading to anxiety and self-consciousness in communication. This issue is particularly relevant in multilingual and educational contexts, where language proficiency is closely tied to social and professional identity.

Linguistic insecurity was first introduced by William Labov in the 1970s. According to Labov (1972), it refers to the anxiety or lack of confidence experienced by language users, particularly non-native speakers, when they perceive their language use as deviating from the standards of the dominant or "correct" language variety. Similarly, Baron (1976) described linguistic insecurity as the awareness of errors among non-native English speakers, leading to feelings of self-doubt in their language proficiency. Bucci and Baxter (1984) defined linguistic insecurity as a speaker's negative perception of their own language or speech variety. This could happen when individuals compare their phonetic and syntactic features to those of what is considered the 'correct' form of the spoken language.

It can be concluded that linguistic insecurity is the negative self-perception of language users, regarding their own pronunciation, grammar, or fluency that they use. Furthermore, in this present study, linguistic insecurity also refers to the feeling of having inadequate language skills, not being good enough, and lacking confidence experienced by Thai pre-service English language teachers.

Linguistic Insecurity and Its Impact on Thai Pre-service English Teachers

Linguistic insecurity, a phenomenon where individuals feel inadequate in their language abilities, has been widely observed among non-native English-speaking teachers (NNESTs) (Horwitz et al., 1986). This issue is particularly prevalent in Thai EFL classrooms, where English proficiency is often viewed as a key determinant of teacher credibility (Wernicke, 2017). Three major factors contribute to linguistic insecurity: lack of confidence, poor performance, and negative self-concept. They have been shown to significantly impact pre-service English teachers in Thailand, shaping their teaching practices and professional development.

Lack of confidence is common among Thai pre-service teachers, many of whom perceive their English proficiency as inferior to native English-speaking teachers (NESTs) (Kamhi-Stein, 2014). This perception leads to hesitation in classroom interactions, reduced participation in communicative activities, and an overreliance on scripted lesson plans (Tschannen-Moran & Hoy, 2001). Additionally, poor performance resulting from linguistic insecurity is another critical issue affecting Thai EFL teachers. Teachers with low confidence in their language abilities often adopt rigid, textbook-based teaching methods rather than engaging in student-centered approaches (Richards & Farrell, 2005). This pattern reinforces their negative self-concept as they begin to internalize the belief that their English proficiency is inadequate, leading to heightened anxiety in the classroom. Lastly, negative self-concept,

the internalized belief that one's English ability is inadequate, further exacerbates linguistic insecurity among Thai pre-service teachers. According to Wernicke (2017), NNESTs who struggle with self-perception issues frequently question their teaching effectiveness and experience heightened anxiety in the classroom.

To conclude, the mentioned factors can create a cycle of linguistic insecurity that significantly impacts pre-service teachers' ability to engage in effective classroom instruction and professional growth.

The Performance of Pre-service Teachers During the Teaching Internship

Teaching performance for pre-service English teachers refers to their ability to effectively apply knowledge, skills, and attitudes in the classroom during their training (Teachers' Council of Thailand, 2021). Since they are still refining teaching strategies and language proficiency, their performance varies more than that of in-service teachers. Linguistic insecurity and low confidence, particularly in pronunciation, grammar, and vocabulary, can significantly impact their effectiveness, especially for Thai EFL pre-service teachers.

A teaching internship is crucial for professional growth, helping pre-service teachers develop essential competencies in curriculum design, classroom management, and student engagement (Teachers' Council of Thailand, 2021). These competencies involve analyzing curricula, implementing learning strategies, integrating digital tools, and fostering critical thinking and innovation among students. Effective lesson planning, classroom management, and mentorship enable pre-service teachers to create a supportive learning environment that enhances student well-being and academic success.

Additionally, pre-service teachers must incorporate technology such as Computer-Assisted Instruction (CAI), Google Classroom, and Kahoot to improve student engagement. Collaboration with colleagues and stakeholders is also key in developing teaching effectiveness and ensuring continuous professional growth (Teachers' Council of Thailand, 2021).

To conclude, the teaching internship is a crucial stage in the development of pre-service English teachers, equipping them with essential skills in curriculum planning, classroom management, and student engagement. Their teaching performance is influenced by linguistic confidence, professional competencies, and the ability to create an engaging learning environment. By integrating effective teaching strategies and digital tools, pre-service teachers can enhance student learning and refine their instructional methods. Ultimately, these experiences prepare them to transition into competent in-service educators who can effectively support student development and academic success.

Methodology

Participants

This research was a quantitative research design. The participants were a hundred of the forth year students or pre-service teachers, majoring in English education from six Rajabhat universities located in northern and southern parts of Thailand. All the participants had roughly upper intermediate to proficiency in English, as defined by the Common European Framework of Reference for Languages (CEFR). These pre-service teachers were selected

through convenience sampling according to their teaching experience from the first semester and their roles in both primary and secondary schools in EFL classrooms.

Research Instrument

A quantitative approach was adopted in this study; thus, the quantitative data was gathered through a questionnaire. The questionnaire was adapted from Jantri and Phusawisot (2021) and the professional standard for Thai pre-service teachers by the Teachers' Council of Thailand (2021), which included three factors: Lack of Confidence (LC), Poor Performance (PP), and Negative Self-Concept (NSC). This questionnaire was divided into three sections, consisting of 39 items. Each item was designed to collect specific types of information relevant to the study. Furthermore, a 5-point Likert scale was employed to ask the participants to rate themselves.

To ascertain the validity of the research instruments, the research instrument was assessed by three experts who are familiar with this field. The experts were asked to indicate their opinion using a three-point rating scale for each statement. The Index of Item-Objective Congruence (IOC) was used to summarize the expert's opinions. The validity of the instrument was found to be 0.95. It was acceptable to be used as the research instrument of this study. To validate the research instruments, a questionnaire was piloted to identify the weaknesses of the instrument, check for clarity of language and content, and establish an appropriate time for completion. Furthermore, a questionnaire was piloted with a small group of fourth-year students who shared similar characteristics to the participants and who were not part of the actual participants.

Data Collection

The data of this research was gathered using an online questionnaire. Data collection was conducted in September 2024. Participants were given a week to complete the questionnaire. Google Forms was selected for its ease of use and its ability to protect participants' privacy, ensuring that the data collection process was both efficient and ethically sound. Therefore, the link of the questionnaire was distributed to Thai EFL Pre-Service English Teachers from 6 Rajabhat Universities in Thailand. Prior to participation, a letter of consent was provided to inform participants about the study. Additionally, they were assured that all information collected would be used exclusively for research purposes and treated with the strictest confidentiality. Furthermore, they were guaranteed that no personal details would be disclosed in any reports or publications derived from the study.

Data Analysis

The data obtained from the questionnaire were used to address the research question which aimed to investigate the influences of Thai EFL pre-service English teachers' linguistic insecurity on teaching performance in ELT classrooms. Descriptive statistics and multiple regression techniques were employed, using SPSS Statistics version 29, to investigate the influence of linguistic factors that affect the teaching performance of Thai EFL pre-service teachers.

Descriptive statistics were used to analyze the demographic information of the participants. The data were analyzed using percentages to provide an overview of demographic

characteristics. To determine the proportion of each demographic characteristic, the following formula was employed to calculate percentages:

$$Percentage = \frac{f}{N} \times 100 \quad (1)$$

Where; **f** = The number of respondents in each category.
N = The total number of respondents.

Furthermore, multiple linear regression was utilized as the most appropriate method to assess the relationships between the factors contributing to linguistic insecurity and teaching performance. It also identified significant relationships between several factors, such as lack of confidence in grammar, pronunciation, vocabulary, and overall teaching performance in EFL classrooms. Therefore, multiple linear regression was applied to evaluate how these factors affect the dependent variable: teaching performance, reported by the participants in the third section of the questionnaire. The multiple regression equation used to predict teaching performance based on linguistic insecurity factors is given by the following formula:

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n + \epsilon \quad (2)$$

Where; $\boldsymbol{\beta_0}$ = the y-intercept
$\boldsymbol{x_1 + x_2 + \ldots + x_n}$= The independent variables
$\boldsymbol{\beta_1 + \beta_2 + \ldots + \beta_n}$ = The regression coefficients
$\boldsymbol{\epsilon}$ = The error term

Results

As mentioned earlier, there were a hundred participants in this study. 70 percent of the participants were female, 29 percent were male, and 1 percent were identified as other. Participants were involved in teaching at both the primary and secondary levels. However, the participants were grouped according to the region and the university they were studying; moreover, each university was labeled based on the region or location of the university.

Table 1 shows that the participants were from six Rajabhat Universities in Thailand, located in the Northern part and the Southern part of Thailand. 44 participants were from Northern Rajabhat University: 25 percent of the participants were fourth-year students at N1 University, and 19 percent of the participants were from N2 University. On the other hand, the rest of the participants were from Southern Rajabhat University: 19 percent of the participants were from S1 University, 23 percent were from S2 University, 11 percent were from S3 University, and 3 percent were from S4 University.

Table 1
Distribution of Participants by University

University	Percent
Northern Rajabhat University	
N1 University	25
N2 University	19
Southern Rajabhat University	
S1 University	19
S2 University	23
S3 University	11
S4 University	3
Total	**100**

The Results of the Influences of Linguistic Insecurity on Pre-service English Language Teachers' Teaching Performance in Thai EFL Classrooms

This study aimed to investigate the influences of Thai EFL pre-service English teachers' linguistic insecurity on teaching performance in EFL classrooms. To address this, a multiple regression analysis was conducted, including three independent variables: Lack of Confidence (LC), Poor Performance (PP), and Negative Self-Concept (NSC), and one dependent variable included Teaching Performance (TP). The regression analysis was performed at a 0.05 significance level, with all independent variables entered the model simultaneously. Regression coefficients and significance (Sig.) values were examined and compared to the alpha level ($\alpha = 0.05$) to determine the statistical significance of each predictor. The results of the analysis are presented below.

Table 2 shows a multiple regression analysis of linguistic insecurity's impact on pre-service English teachers' performance in Thai EFL classrooms among a group of northern-Thai pre-service English teachers. The findings show that the model has a coefficient of prediction (R Square) of 0.384, and an Adjusted R Square of 0.338, indicating that 33.8% of the teaching performance can be explained by the independent variables from Northern Rajabhat University in Thailand, demonstrating the reliability of the regression equation in predicting teaching performance. Among the three independent variables, none reached statistical significance at the 0.05 level. The multiple regression equation can be expressed as follows:

$$Y = 0.433 + 0.191 + 0.413 + 0.271 \quad (3)$$

It indicated that while the independent variables are relevant, the findings show that linguistic insecurity may have an indirect or contextual influence on teaching performance. It can be concluded that the alternative hypothesis was rejected.

Table 2
A Multiple Regression Analysis of Linguistic Insecurity's Impact on Pre-service English Teachers' Performance in Thai EFL Classrooms at Northern Rajabhat University

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	11.689	3	3.896	8.322	<.001[b]
Residual	18.727	40	0.468		
Total	30.416	43			

a. Dependent Variable: Overall Teaching Performance (TP)

b. Predictors: (Constant), Overall NSC, Overall LC, Overall PP

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.433	0.775		0.559	0.580
Overall LC	0.191	0.324	0.095	0.590	0.558
Overall PP	0.413	0.220	0.353	1.880	0.067
Overall NSC	0.271	0.145	0.284	1.871	0.069

a. Dependent Variable: Overall Teaching Performance (TP)

Model	R	R^2 Square	Adjusted R Square	Std. Error of the Estimate
1	.620[a]	0.384	0.338	0.68424

a. Predictors: (Constant), Overall NSC, Overall LC, Overall PP

Table 3 demonstrates a multiple regression analysis of linguistic insecurity's impact on pre-service English teachers' performance in Thai EFL classrooms among a group of southern-Thai pre-service English teachers. The results reveal that the model has a coefficient of prediction (R Square) of 0.514 and an Adjusted R Square of 0.486, indicating that 48.6% of the teaching performance can be explained by the independent variables from Southern Rajabhat University in Thailand, demonstrating the reliability of the regression equation in predicting teaching performance. Among the three independent variables, only Overall Negative Self-Concept (NSC) reached statistical significance at the 0.05 level, while Overall Lack of Confidence (LC) and Overall Poor Performance (PP) showed no significance. The multiple regression equation can be expressed as follows:

$$Y = 1.418 + 0.026 + (-0.101) + 0.689 \quad (4)$$

The results suggest that although the independent variables are relevant, linguistic insecurity, particularly Negative Self-Concept, has a significant impact on teaching performance. Consequently, the null hypothesis was rejected, while the alternative hypothesis was accepted.

Table 3
A Multiple Regression Analysis of Linguistic Insecurity's Impact on Pre-service English Teachers' Performance in Thai EFL Classrooms at Southern Rajabhat University

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	20.968	3	6.989	18.307	<.001[b]
Residual	19.853	52	0.382		
Total	40.820	55			

a. Dependent Variable: Overall Teaching Performance (TP)

b. Predictors: (Constant), Overall NSC, Overall LC, Overall PP

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.418	0.588		2.409	0.020
Overall LC	0.026	0.198	0.014	0.129	0.897
Overall PP	-0.101	0.193	-0.070	-0.524	0.602
Overall NSC	0.689	0.118	0.755	5.835	0.000

a. Dependent Variable: Overall Teaching Performance (TP)

Model	R	R^2 Square	Adjusted R Square	Std. Error of the Estimate
1	.717[a]	0.514	0.486	0.61788

a. Predictors: (Constant), Overall NSC, Overall LC, Overall PP

According to Table 4 it shows a multiple regression analysis of linguistic insecurity's impact on both northern and southern pre-service English teachers' performance in EFL classrooms. The results show that, out of the three independent variables, Negative Self-Concept (NSC) is the only factor that entered the multiple regression equation. The coefficient of prediction (R square) is 0.422, and the adjusted coefficient of prediction (Adjusted R square) is 0.403, indicating that only one independent variable can be used to predict 40.3% of the teaching performance of Thai EFL pre-service English teachers from Northern Rajabhat and Southern Rajabhat Universities in Thailand and shows statistical significance at the 0.05 significance level. The multiple regression analysis equation can be written as follows:

$$Y = 0.676 + 0.128 + 0.214 + 0.468 \quad (5)$$

The analysis reveals that while the independent variables are relevant, linguistic insecurity, particularly Negative Self-Concept among pre-service teachers from Northern and Southern Rajabhat Universities in Thailand, significantly affects teaching performance. As a result, the null hypothesis was rejected, and the alternative hypothesis was accepted.

Table 4
A Multiple Regression Analysis of Linguistic Insecurity's Impact on Both Northern and Southern Pre-service English Teachers' Performance in EFL Classrooms

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	30.241	3	10.080	23.318	<.001[b]
Residual	41.499	96	0.432		
Total	71.740	99			

a. Dependent Variable: Overall Teaching Performance (TP)

b. Predictors: (Constant), Overall NSC, Overall LC, Overall PP

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.676	0.448		1.509	0.135
Overall LC	0.128	0.173	0.069	0.743	0.459
Overall PP	0.214	0.136	0.169	1.577	0.118
Overall NSC	0.468	0.089	0.502	5.241	0.000

a. Dependent Variable: Overall Teaching Performance (TP)

Model	R	R^2 Square	Adjusted R Square	Std. Error of the Estimate
1	.649[a]	0.422	0.403	0.65748

a. Predictors: (Constant), Overall NSC, Overall LC, Overall PP

In conclusion, the findings indicate that Negative Self-Concept (NSC) is the primary predictor of teaching performance, whereas Lack of Confidence (LC) and Poor Performance (PP) were not statistically significant. A comparison between the two regions revealed a notable difference in how linguistic insecurity influences teaching performance. At Northern Rajabhat University, linguistic insecurity did not have a statistically significant impact on teaching performance. In contrast, at Southern Rajabhat University, the Negative Self-Concept (NSC) significantly influenced teaching performance, with an adjusted R^2 of 0.486, indicating a stronger explanatory power.

Discussion

The findings of this study provide significant insights into the relationship between factors of linguistic insecurity and their impact on teaching performance among Thai EFL pre-service English teachers. Specifically, the results in Table 4 highlight that Negative Self-Concept (NSC) has a significant influence on teaching performance. The analysis indicates that NSC is the only factor with a statistically significant effect, whereas Lack of Confidence (LC) and Poor Performance (PP) did not significantly impact Thai EFL pre-service English teachers.

The analysis of these findings confirms the significance of Negative Self-Concept (NSC) as a key factor influencing teaching performance among Thai EFL pre-service English teachers, aligning with previous studies. These results are consistent with the research by Jantri and

Phusawisot (2021), which found that a negative self-concept directly affects teaching performance by reducing confidence and increasing anxiety in ELT classrooms. Furthermore, these findings are supported by Jantri and Phusawisot (2021) in conjunction with Tonelson (1981), Burns (1982), and Tabassum (2014), who stated that teachers' self-concept is positively related to their classroom performance and student achievement. Their research also indicated that apprehension about their teaching abilities leads to decreased confidence in using English and heightened anxiety. Additionally, Wernicke (2017) found that a negative self-concept causes teachers to frequently question their own English proficiency, further increasing anxiety and insecurity while teaching.

Therefore, among Thai pre-service English teachers from Southern Rajabhat University, Negative Self-Concept (NSC) emerged as a significant predictor, accounting for 48.6% of the variance in teaching performance. This finding supports the literature's assertion that negative self-concept strongly influences teachers' performance in ELT classrooms (Bucci & Baxter, 1984). Pre-service teachers with a higher NSC struggle with classroom interactions, avoid complex language tasks due to fear of making errors that may seem unprofessional to students, compare their English skills with other English teachers, and feel uncomfortable giving feedback in EFL classrooms. Consequently, their Negative Self-Concept (NSC) affects key teaching elements such as lesson planning, classroom management, teaching techniques, and student engagement, as emphasized by the Teachers' Council of Thailand (2021).

The contrasting results between Northern and Southern Rajabhat Universities indicate that different factors influence how linguistic insecurity affects teaching performance. Several sociolinguistic and cultural factors contribute to these differences.

Firstly, Sociolinguistic Environment and Exposure to English, Northern Thailand has a relatively lower level of exposure to English compared to the South. The Northern region mainly uses Thai dialects, and there is limited interaction with English speakers. Consequently, Northern pre-service English teachers may experience linguistic insecurity but do not necessarily translate this into lower teaching performance. Their self-perception may be influenced by local linguistic norms, leading to a more accepting attitude toward non-native English proficiency (Baker, 2012; Kosonen, 2008). Unlike the north, southern Thailand has more interaction with international communities, particularly in tourism-driven provinces like Phuket and Surat Thani (Keyuravong, 2010). Southern pre-service English teachers may face higher expectations regarding English proficiency, leading to increased self-doubt and anxiety when teaching. This aligns with previous research suggesting that greater exposure to English-speaking environments can increase linguistic insecurity among non-native speakers due to heightened self-comparison with native speakers (Labov, 1972; Wernicke, 2017).

Another factor might be the cultural and psychological factors. Thai culture is highly collectivist, meaning that students and teachers are often reluctant to stand out or challenge authority (Hofstede, 2011). However, Southern Thailand has a stronger Malay-Muslim influence, which may foster different cultural attitudes towards education and self-perception (Jindapon, 2018). If pre-service teachers in the South are more self-critical due to cultural norms, this could explain why Negative Self-Concept NSC plays a stronger role in their teaching performance. Moreover, pre-service English teachers in the South may experience stronger internalized pressure to conform to a "native-like" English standard, particularly in regions where foreign tourism creates a demand for high English proficiency (Hiranburana,

2017). This pressure could contribute to a heightened negative self-concept, negatively affecting their teaching confidence.

Conclusion

The study highlights significant regional variations in how linguistic insecurity affects teaching performance among Thai EFL pre-service English teachers. While Northern pre-service English teachers were not significantly affected by linguistic insecurity, their Southern counterparts experienced a strong correlation between Negative Self-Concept (NSC) and poor teaching performance. These differences are likely shaped by sociolinguistic exposure and cultural attitudes toward English proficiency.

Addressing linguistic insecurity requires context-specific strategies to ensure that all Thai pre-service English teachers can develop the confidence necessary to succeed in the classroom. Future research should explore longitudinal data to track how these perceptions evolve over time and whether interventions can mitigate their effects on teaching performance.

According to the findings, tailored interventions are essential to address regional differences in linguistic insecurity. For Northern Rajabhat Universities, where insecurity shows no significant impact on teaching performance, the focus should be on enhancing English communication skills through authentic practice such as role-playing and classroom immersion. In contrast, for Southern Rajabhat Universities, where Negative Self-Concept (NSC) significantly affects performance, confidence-building initiatives like peer mentoring, pronunciation workshops, and self-efficacy training should be prioritized. At the national level, Thai teacher education programs should emphasize pedagogical confidence and intelligibility over native-like proficiency to help pre-service English teachers develop a more positive self-concept and reduce linguistic insecurity.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

To enhance the writing process, especially in improving academic tone and readability, AI-assisted programs such as Grammarly and ChatGPT were utilized in this study. These tools assisted in refining language, ensuring clarity, and maintaining a formal writing style. However, the interpretations, conclusions, and analyses remain the responsibility of the authors.

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Gamification in Action: Effective Practices in Virtual Classrooms

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Abstract

Gamification in the virtual classroom is a pedagogical strategy that transforms the dynamics of traditional learning by incorporating games to motivate and engage students with course content. It fosters dynamic and participatory learning while developing creative thinking, problem-solving, and teamwork competencies. The challenges to overcome include capturing students' attention and maintaining their engagement, which is why gamification is one solution to promote active and memorable learning. This work shares effective practices for distance learning by integrating gamification strategies with various digital tools that enhance students' learning experiences. It highlights the impact achieved in the classroom through dynamic approaches in the course "Innovation and Creative Processes" at the higher education level during the August–December 2024 semester with a total of 27 students, compared to the group taught during the February–June 2024 semester with 25 students. The results were highly positive; the group's average grades were higher, motivation to engage with course content increased, and the digital tools proved valuable in preparing the final project. The guiding questions for this work are: What tactics and methods can improve skills development through gamification? What are the students' perceptions and experiences regarding skills development in this course? What are the outcomes of this research and its contribution to knowledge?

Keywords: gamification, e-learning, educational apps

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Introduction

Teachers operate under the premise of leaving a lasting impression on their students, serving as sources of inspiration and conveying knowledge across any mode of instruction while also adapting to learners' needs. In a distance teaching-learning process, educators must compete with many distractions available to students; therefore, it is essential to become familiar with tools that offer added value and integrate them into the educational environment with a clear objective to capture their interest. Gamification in the classroom has established itself as an innovative strategy to foster motivation, engagement, and meaningful learning among students. In an educational context where digital tools are increasingly accessible, gamification leverages game elements to transform teaching-learning processes into interactive and dynamic experiences. "Shifts in the focus of educational technologies have created new opportunities for students to study in unsupervised settings, where they must make active decisions about their learning" (Carvalho et al., 2016).

Theoretical Framework

In recent years, education has undergone rapid transformation driven by technological advancements and the evolving demands of the marketplace. Educational institutions have adapted to the growing need for digitally-delivered courses, affecting a variety of student profiles. Communication has shifted into digital environments via mobile devices, making interactivity and mobility essential components. New generations possess different expectations and learning styles, challenging educators to design innovative strategies and deliver educational experiences that sustain students' interest and motivation. Traditional education has fallen behind, and today's challenge is to create engaging dynamics that add value and encourage active participation in the learning process. This shift allows educators to assess how technology can support human interaction—and where it falls short as a medium for communication, belonging, connection, and learning (O'Regan, 2020).

Gamification is the use of game-design elements in non-game contexts. It is defined as applying game elements, mechanics, and dynamics in non-playful settings—such as education—to encourage desired behaviors, boost motivation, and facilitate learning (Deterding et al., 2011). According to Kapp (2012), educational gamification involves integrating components like points, badges, leaderboards, challenges, and narratives to capture students' attention and foster active participation. Today, gamification offers the opportunity to tailor strategies to students' profiles, addressing the difficulty of maintaining focus amid numerous environmental distractions. It is necessary to keep learners engaged; they prefer more interactive lessons where play helps them develop and acquire skills, viewing mistakes not as penalties but as opportunities for improvement. According to Cortizo et al. (2011), gamification can also serve as a tool for student retention through achievements or challenges, transforming dull tasks into appealing activities that promote participation and help individuals stand out from their peers.

Gamification in the classroom, especially when combined with digital tools, offers multiple benefits that positively impact the learning process, including:

Increased Motivation and Engagement: Gamification boosts students' intrinsic and extrinsic motivation. According to Hamari et al. (2014), game elements such as rewards and recognition stimulate interest in educational activities.

Promotion of Active Learning: Gamification encourages active learning by involving students in problem-solving, decision-making, and collaboration. A study by Domínguez et al. (2013) found that students who participated in gamified activities showed higher engagement and knowledge retention levels than traditional methods.

Development of Socio-Emotional Skills: Game dynamics in the classroom, such as teamwork and competition, strengthen skills like communication, empathy, and conflict resolution. According to Lee and Hammer (2011), gamification fosters environments where students learn to collaborate and manage emotions in competitive and cooperative contexts.

Personalization of Learning: Gamified digital tools allow challenges and activities to be tailored to each student's level, facilitating personalized learning. Platforms like Classcraft offer options for teachers to design missions adapted to individual needs, enhancing the educational experience (Nicholson, 2015).

Improved Academic Outcomes: Numerous studies have shown that gamification can enhance academic performance. For example, Sailer et al. (2017) meta-analysis found that students exposed to gamified environments achieved higher evaluation scores and demonstrated greater persistence in complex tasks.

As demonstrated, previous research has shown that actively engaged students absorb and retain more content (Moredich & Moore, 2007); therefore, gamification and learning become highly relevant and adapt to the needs of technology-native learners.

Description of Innovation and Research Methodology

Delivering a course through a distance-learning model via videoconference poses a significant challenge in achieving student interactivity and engagement. This exploratory study aims to compare two cohorts of professionals enrolled in the "Innovation and Creative Processes" course during the August–December 2024 and February–June 2024 semesters, with their compositions presented as follows:

Table 1
Group Information

Semester: August–December 2024	Semester: February–June 2024
Flexible Interactive and Technology-driven (FIT) Classes (Videoconference: Zoom) + Gamification	Flexible Interactive and Technology-driven (FIT) Classes (Videoconference: Zoom)
Duration: 15 Weeks / 30 Sessions	Duration: 15 Weeks / 30 Sessions
Teacher: Rocío Cortez	Teacher: Rocío Cortez
27 students (Campus Monterrey, Puebla) 13 male / 15 female 12 business students 4 architecture, art, and design students 11 engineering and science students	25 students (Campus Ciudad de México, Monterrey, León) 8 male/ 17 female 19 business students 3 architecture, art, and design students 2 engineering and science students 1 humanities and education student

The “Innovation and Creative Processes” course is an introductory-level course designed for students to learn and apply methodologies and technologies related to conceptualization and creating audiovisual, spatial, musical, sound, textual, and visual content. The goal is to enable them to design and produce projects and multidisciplinary solutions for various professional fields.

The students connect via videoconference (Zoom) to attend the class, where there is no physical presence of the professor, which might hinder participation and class dynamics. However, implementing a gamification strategy to engage students in their teaching-learning process will make it an excellent educational experience supported by digital tools. This requires preparation, creating content differently from a face-to-face course, designing activities with various stimuli, and capturing students' attention.

A table was created specifying how students can earn points throughout the semester:

Table 2
Requirements To Earn Points

Activity	How is it accumulated?	Individual value
Scoring 90 or more on any team task (except for evidence progress)	Team	100 points
Scoring 90 or more on any individual activity (except for evidence)	Individual	100 points
Placing in the top 3 in a trivia (quiz)	Individual	100 points

In addition, students can earn points by participating in live game dynamics, where they prepare in advance using shared resources on the platform and electronic media.

Process of Innovation Implementation

The implementation was carried out according to the following model:

Figure 1
Distance Learning Class Diagram

The student reviews the resources available on the Canvas platform and attends the class via videoconference twice a week, which is interactive through games, dynamics, and discussions. Afterward, the student applies the knowledge gained to solve the course's problem scenario, which is finding a solution to physical inactivity, by using the creative process learned in class.

Throughout the semester, students complete various learning activities and, at the end, submit final evidence as part of their final project. First, they compile a document with all the activities completed during the creative process. They must update and improve each activity and organize them into an interactive publication format. They also create a project presentation in the form of a video, lasting up to three minutes, showcasing the creative process and their response to the challenge, including the 3D prototype.

The competencies students develop throughout the course are innovation, systemic thinking, and oral communication.

Tools Used for Engagement Strategy and Gamification

Various tools are presented that are highly useful for creating an engaging and dynamic class, changing the learning stimulus.

Table 3

Tools used in Gamification and Personalization of Learning

Pedagogical Strategy	Objective	Technology Tool	Type of Interaction
Gamification	Active participation and fostering engagement through play	100 Mexicanos dijeron game	Group / Gamified
Gamification	Reinforcement of acquired knowledge	Jeopardy (Jeopardy Labs y Factile)	Group / Competitive
Diagnostic / Formative Assessment	Evaluate comprehension, personalized tracking	Quizalize	Individual / Gamified / Adaptive
Collaborative Learning	Brainstorming, asynchronous collaboration	Padlet	Collaborative / Visual
Visual Thinking / Collaboration	Organize ideas, co-create maps, brainstorming	Miro	Collaborative / Visual
Formative Assessment	Reinforce content through interactive games	Wordwall	Individual or Group / Gamified

100 Mexicanos Dijeron Game

It's a television contest adapted to an educational context through a gamified digital tool. Students guess the most common survey responses to a specific question. The contest is used to review content, foster teamwork, and develop critical-thinking skills. Students are encouraged to participate, recall concepts, express ideas, and collectively earn points, creating a dynamic and fun learning environment.

Figure 2

100 Mexicanos Dijeron Game

Jeopardy Labs / Factile

It emulates the dynamic of Jeopardy! Game shows can be set up very easily to maximize group engagement. They consist of boards with categories, and participants select a category

and a board square with a certain point value. It's important to note that the higher the point value on the square, the more difficult the question. The teacher's role is to develop the questions and answers to populate the board.

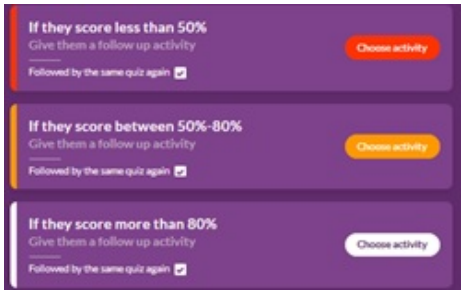
Figure 3
Factile

Quizalize

It's an app that helps you turn quick quizzes into fun games, individually or in teams. The teacher creates the quiz based on topics covered in class.

What sets this app apart is its ability to personalize student learning: the teacher can upload different support resources (curated or created by them) depending on whether a student scores below 50%, between 50% and 80%, or above 80% on the quiz.

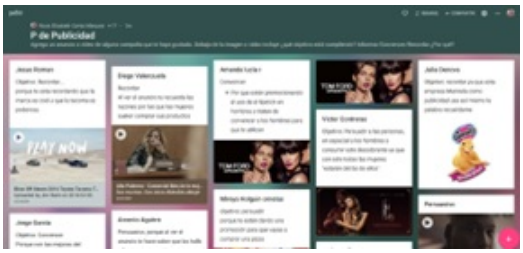
Figure 4
Quizalize



Padlet

It's a collaborative digital whiteboard where students can share files, videos, audio, and more in real-time. In class, it was used for a lesson on advertising and to solve an exercise on pricing, enabling interactive, collaborative work in the virtual classroom. Correctly solved exercises received a reaction, such as a "Like."

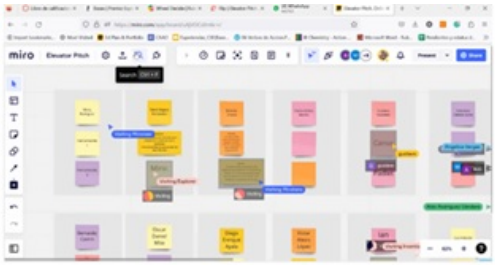
Figure 5
Padlet



Miro

It's a digital collaboration platform that facilitates teamwork. Essentially, it is a blank canvas that supports creativity-driven activities such as brainstorming, project planning, mind mapping, and outlining. It allows students to organize generated ideas, solve problems in real-time or asynchronously, and develop projects in a highly creative way. This flexible, versatile digital tool is effective in in-person and online classes.

Figure 6
Miro



Wordwall

It's a digital tool for creating interactive, personalized activities that reinforce learning playfully. You can design games like spinners, quizzes, word searches, and many others that can be tailored to the teacher's database. It promotes active participation, facilitates formative assessment, and provides engaging, motivating practice for students.

Figure 7
Wordwall

Point Redemption

Points can be redeemed individually or collected as a team. Throughout the semester, students accumulate "points" from both activities and in-class games and can exchange them for the following coupons:

Table 4
Coupons by Points

Prize	Redemption Method	Value
2-for-1 on Team Task Second chance to submit a team task	Team	4,000 points
SUPER COUPON 1 Valid for 5 extra points on an individual activity grade	Individual	2,500 points
SUPER COUPON 2 Valid 1 extra point on the final course grade	Individual	2,500 points

You can incorporate theme-related concepts into the game and incentivize students to continue learning inside and outside the virtual classroom.

Results

A pre-experimental study compared the group taught from February to June 2024 with those from August to December 2024. The findings showed no significant difference in the final grade or evidence based on the results of the Mann-Whitney U test.

Table 5
Results for Final Grade and Final Evidence

Comparison	Median (Gamification)	Median (w/o Gamification)	Significant difference?	P-Value
Final Grade	92.6	91.7	No	.574
Evidence	94	93.5	No	.327

A final review exam was implemented, showing that the August–December 2024 group achieved an average score of 85.20, compared to the previous semester's average of 82.38.

Table 6

Final Review Exam

Final Review Exam Semester: February – June 2024	Final Review Exam Semester: August – December 2024
100	100
0	96.67
100	80
100	100
93.33	96.67
93.33	83.33
96.67	0
86.67	100
73.33	86.67
60	100
100	96.67
86.67	100
83.33	70
96.67	73.33
100	73.33
90	96.67
96.67	100
100	96.67
96.67	90
0	96.67
96.67	0
86.67	96.67
100	100
100	96.67
90	100
0	
83.33	
96.67	
82.38	85.20

The Mann-Whitney test was used to compare the results, and since the p-value is greater than 0.05, there are no statistically significant differences between the grades of the two semesters. This suggests that, although the August–December 2024 group had a slightly higher average, the difference is not statistically significant.

Table 7
Statistical Analysis Results of the Final Review Exam

Comparison	Descriptive Statistics: (Gamification)	Descriptive Statistics (w/o Gamification)	Significant difference?	P-Value
Final Review Exam	Mean: 85.20 Standard desviation: 27.30	Mean: 82.38 Standard desviation: 30.47	No	0.661

We reviewed the average score of learning activities, such as exercises and assignments, throughout the 15-week course. In February–June 2024, the average was 94.06, while in August–December 2024, it was 87.41. However, as we can see in the portfolio of activities for improvement, the August–December 2024 group showed recovery.

Table 8
Learning Activities

Learning Activities Semester: February – June 2024	Learning Activities Semester: August – December 2024
88.62	100
97.59	95.65
95.44	100
88.7	100
88.75	88.02
95.8	30.88
95.22	83.79
87.02	96.69
84.29	100
86.47	100
83.01	100
82.08	90.15
85.13	92.28
91.76	87.28

97.65	97.16
98.07	96.82
95.74	79.45
68.04	97.82
82.91	82.92
99.33	85.79
55.1	102.6
84.5	99.53
97.35	100
96.76	100
59.71	
90.08	
85.1	
87.42	91.95

According to the Mann-Whitney test, there is a statistically significant difference between the grades of both semesters. This indicates that the grades from the August–December 2024 semester are significantly higher than those from the February–June 2024 semester.

Table 9

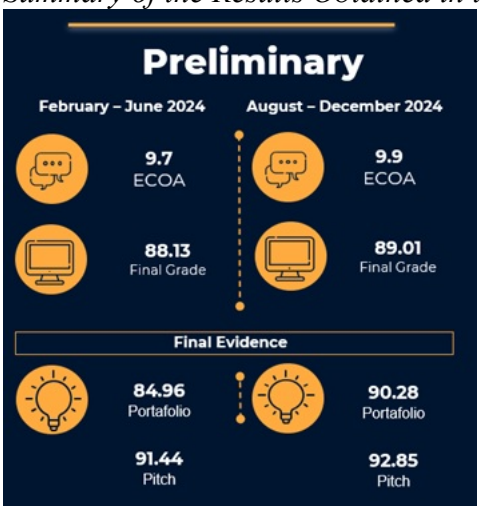
Statistical Analysis Results of Learning Activities

Comparison	Descriptive Statistics: (Gamification)	Descriptive Statistics (w/o Gamification)	Significant difference?	P-Value
Learning Activities	Mean: 91.95 Standard desviation: 14.63 Median: 96.99	Mean: 87.42 Standard desviation: 11.15 Median: 88.7	Yes	0.01

A general summary of the relevant data from both groups is shared, which includes the evaluation of the ECOA Survey, the average final grade, and the results of the two required evidence.

Figure 8

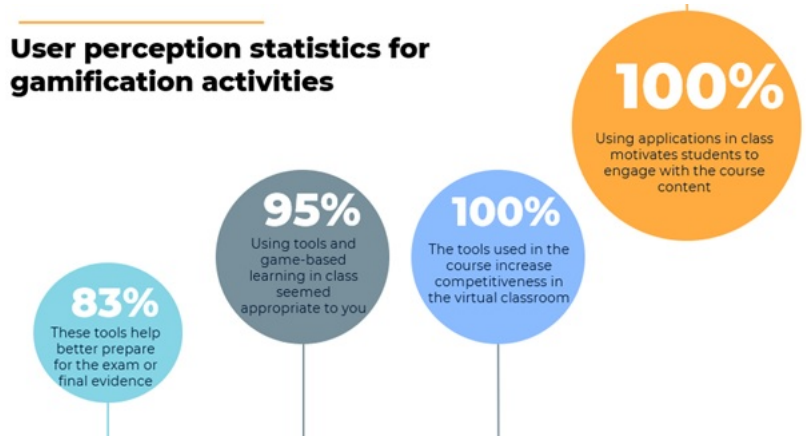
Summary of the Results Obtained in the Comparisons of the Activities Carried Out



At the end of the course, students from the group where gamification was implemented were asked to complete a survey using the Qualtrics tool to gather their perceptions of the tools and games developed during class. The most relevant results are presented below in Figure 9.

Figure 9

Results on Students' Perception of Their Activities With Gamification



The results indicate that more than half of the group found using digital tools highly beneficial. Specifically, 100% of the students indicated that using applications in class that promote gameplay, and participation motivates them to engage with the course content and explore the topics covered. Additionally, 100% of the respondents stated that the tools used in class increased the group's competitive spirit. Furthermore, 95% of the class felt that using game-based tools during content review was appropriate. Lastly, 83% of the students reported that digital tools helped them better prepare for the final exam and complete the required course assignments.

Below are comments from students who took the course, taken from the instructor's evaluation:

- "She is an excellent teacher; she is very kind to everyone and makes the classroom interactive. I highly recommend her"

- "I think having a class with Professor Rocío has been excellent. I don't think I've ever felt this way about a class. Her lessons are very dynamic, and the incredible energy she brings is genuinely impactful"
- "She is an excellent teacher. She loves her job. She kept us engaged, and her activities were very dynamic"
- "Excellent teacher. She makes her classes dynamic and encourages participation and individual creativity"
- "She makes the topics more interesting and the class more engaging and easy to follow, even though it is online"

Conclusion

As an educator, you must be prepared to face emerging challenges and adapt to new ways of sharing knowledge through various digital options that can succeed in the virtual classroom. Staying up to date with your subject matter, exploring alternatives, organizing the virtual class effectively, maintaining clear communication, and fostering a positive attitude are essential for providing students an excellent learning experience.

Gamification in the classroom, supported by digital tools, represents a powerful strategy for transforming education. By integrating game elements, you capture students' attention, motivate them, and encourage meaningful learning. Prior research supports the benefits, including increased motivation, the development of socio-emotional skills, and improved academic outcomes. However, its success depends on careful planning to ensure that game dynamics align with educational objectives.

Successful implementation requires enthusiastic teachers who embrace new technologies, commit to innovation, and continuously update their skills to engage an increasingly informed and prepared audience. Educators must stay ahead of new developments, using these tools to convey or reinforce acquired knowledge so that students can later apply it in real-world contexts.

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A Case Study of Concept-Based Inquiry Learning Through Community Collaboration: Fostering Student Agency in Biodiversity Education for Japanese Elementary School

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Abstract

The purpose of this study is to examine the educational effectiveness of an inquiry-based learning program on biodiversity in a Japanese public elementary school. The program utilized the conceptual inquiry approach from the International Baccalaureate (IB) Primary Years Programme (PYP) and was implemented for 108 third-grade students (aged 8-9) in Ashiya City, Hyogo Prefecture. The local natural environment, along with collaboration from experts and environmental organizations, played a key role. The program included three inquiry steps (Lines), focusing on the central concepts of connection and change. In Line 1, students explored living organisms and the natural environment through research and expert lectures. In Line 2, they investigated the effects of ecosystems and human activities on the environment. In Line 3, students proposed actions for nature conservation through interactions with environmental groups and observing wildlife in the Ashiya River. The results showed many students enjoyed acquiring new knowledge and developed a greater interest in nature. In a questionnaire, about 80% reported making new discoveries during the Ashiya River exploration and recognized local conservation efforts. Additionally, 45% suggested actions like picking up trash or participating in environmental activities, demonstrating awareness of conservation and a willingness to act. These findings suggest that IB's concept-based inquiry, combined with local resources and expert collaboration, effectively promotes independent learning and environmental awareness. Integrating cross-curricular learning into instruction, beyond the Period for Integrated Studies, can further deepen conceptual understanding. This study offers a potential model for environmental education aimed at fostering future leaders of a sustainable society.

Keywords: Japanese elementary school, concept-based inquiry, biodiversity education, student agency, community collaboration

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Introduction

Ashiya City, located in Hyogo Prefecture, Japan, is surrounded by abundant natural environments such as Mt. Rokko, Ashiya River, and Ashiya Beach. These rich ecosystems are further supported by the presence of various local organizations and experts actively engaged in environmental conservation. This unique combination of natural and human resources provides an ideal setting for environmental education, especially for elementary school students.

In this study, the authors report on a lesson practice implemented during the Period of Integrated Studies at a public elementary school in Ashiya City. The practice aimed to foster students' autonomy and a sense of responsibility toward building a sustainable society. Based on prior teaching experience and reflecting the importance of environmental education in the national curriculum (Ministry of Education, Culture, Sports, Science and Technology [MEXT], 2017), the authors adopted the "Conceptual Inquiry" approach, a key element of the International Baccalaureate (IB) Primary Years Programme (PYP) (International Baccalaureate Organization, 2018). This approach is designed not only to enhance knowledge acquisition but also to promote deeper thinking, interdisciplinary connections, and reflective learning through the formulation of a Central Idea that guides student inquiry.

The decision to apply this method in a public school setting aligns with Japan's national curriculum guidelines and holds significance for promoting inquiry-based environmental learning. The unit, titled "The survival of diverse living things is our responsibility," was conducted with third-grade students over a two-and-a-half-month period and focused on biodiversity and environmental stewardship.

In the following sections, the authors outline the conceptual framework of the unit, provide an overview of the learning process, present student outcomes and reflections, and conclude with a discussion on the effectiveness and future directions of this practice.

Conceptual Framework and Central Idea

This practice was grounded in the International Baccalaureate (IB) Primary Years Programme (PYP) approach, particularly the method of Conceptual Inquiry. Conceptual Inquiry encourages learners to construct understanding through questions that transcend factual knowledge and foster cross-disciplinary thinking. Central to this method is the "Central Idea," a thematic statement that underpins the unit and guides student inquiry.

The Central Idea for this unit was: "The survival of diverse living things is our responsibility." This idea emerged from the belief that all living organisms, including humans, exist within a web of interconnected relationships. As students explored environmental issues such as biodiversity loss and climate change, they were encouraged to consider their roles and responsibilities within these systems.

Two instructional principles guided the implementation:

(1) Reinforcing the Central Idea throughout the unit by connecting each activity and discussion to it.
(2) Posing guiding questions that challenged students to think critically about their learning and its implications.

By focusing on processes rather than merely outcomes, the practice aimed to promote sustained engagement and deeper reflection.

Practice Design and Implementation

The unit was implemented over the course of 32 hours during the second semester's integrated studies period, involving 107 third-grade students across four classes. The instructional design took into account the characteristics of third-grade students, who showed a high interest in living creatures. As such, the theme of biodiversity was chosen as the core focus.

The unit was divided into three phases (Lines of Inquiry), each aligned with a specific guiding question:

Line 1: The Current State of Living Creatures (10 hours)

Students explored local biodiversity through self-directed research and interactions with environmental experts. They investigated seasonal changes and species characteristics, culminating in group presentations and reflections.

Figure 1

Sharing Findings About a Selected Animal as Part of the Biodiversity Inquiry Project

Line 2: Human Activities and Their Impact (11 hours)

This phase focused on the threats that human activities pose to biodiversity. Students conducted research on endangered species, attended a video lesson, and participated in a five-hour field trip to the Museum of Nature and Human Activities. The fieldwork stimulated curiosity and helped them understand how species adapt and survive in changing environments.

Figure 2

Students Discussing and Summarizing Their Learning During the Final Activity of Line 2

Line 3: Responsibility for the Future (11 hours)

The final phase emphasized proactive thinking and action. Through guest talks by local environmental organizations and experiential learning at the Ashiya River, students explored their roles in environmental conservation and reflected on concrete actions they could take to protect biodiversity.

Three local environmental groups collaborated in this phase, offering students authentic insights into real-world conservation efforts:

(1) Ashiya Forest Association 2001 (Ashiya Mori no Kai): This group is dedicated to maintaining hiking trails and organizing seasonal nature events for community members, including children. Their activities promote a deep connection with local forests and ecological awareness.

(2) Sun-peace: A community-based organization that conducts nature experience programs for elementary school students. Their mission includes revitalizing the local area and promoting intergenerational learning through nature-based activities.

(3) Let's Increase Fish in the Ashiya River: This group is committed to river ecosystem conservation through initiatives such as waterway cleanups and the release of sweetfish (*ayu*) to restore biodiversity and engage the public in environmental stewardship.

These partnerships not only enhanced the authenticity of the learning experience but also helped students understand how individuals and communities can take tangible actions to support sustainability.

Figure 3
Students Exploring Ashiya River to Observe and Identify Local Wildlife

Each phase was supported by customized worksheets that allowed for differentiated instruction, accommodating varying levels of interest and academic ability.

Student Reflections and Findings

Before presenting the findings, it is important to note that the number of student respondents varied across the three phases of inquiry learning (Line 1: n = 98, Line 2: n = 76, Line 3: n = 102). This variation was due to differences in class schedules, student absences, and the availability of reflection sessions at the time of data collection. Despite this, the responses analyzed provide meaningful insights into students' engagement, learning progress, and conceptual understanding throughout the unit.

Reflection surveys were conducted at the end of each phase to assess student learning outcomes in four categories: knowledge acquisition, skill development, new insights, and conceptual understanding. Students responded using a three-point scale: "Strongly agree," "Agree," and "Disagree."

Line 1 Findings – The Current State of Living Creatures (N = 98)

Students showed strong growth in knowledge (83.67% "Strongly agree") and new insight (76.53%). Many reported discovering new facts about living creatures in Ashiya and understanding biodiversity through research and expert lectures.

In contrast, conceptual understanding remained relatively low (29.59% "Strongly agree"), suggesting limited reflection on human responsibility in nature at this early stage.

In terms of skills, 58.16% felt confident recording findings through drawings and writing, though some students (17.35%) indicated difficulty, reflecting varied literacy levels in scientific communication.

Line 2 Findings– Human Activities and Their Impact (N = 76)

Knowledge acquisition remained high, with 82.89% strongly agreeing they learned how human actions threaten biodiversity.

Two skill domains were measured:

(1) Skill A (listening to peers): 55.26% "Strongly agree"
(2) Skill B (expressing personal thoughts): 71.05% "Strongly agree"

These results show growing confidence in discussions, though listening and perspective-sharing may require further support.

Conceptual understanding improved significantly (68.42%), as students began reflecting on human responsibility toward endangered species.

Line 3 Findings – Responsibility for the Future (N = 102)

This phase demonstrated the highest level of student engagement and learning.

Knowledge scores peaked, with 85.29% and 93.14% (for two knowledge items) strongly agreeing that they gained new understanding about local biodiversity and the roles of citizens in conservation.

Skill development also improved, with 58.82% reporting increased focus and attention during talks.

New insights (80.39%) and conceptual understanding (61.76%) were reinforced by fieldwork and interactions with environmental groups. Students began considering specific actions they could take as part of a responsible community.

Additionally, library data showed a notable increase in science-related book borrowing among third graders during the unit. Qualitative data, including student reflections and behavior changes, indicated improved motivation and autonomous learning.

Conclusion

This case study illustrates the potential of concept-based inquiry learning, rooted in the International Baccalaureate (IB) Primary Years Programme (PYP), to cultivate environmental awareness, student agency, and deep learning among Japanese elementary school students. By integrating community collaboration and local field-based learning within the Period of Integrated Studies, the unit fostered meaningful engagement with biodiversity and sustainability issues.

Throughout the unit, students demonstrated increased motivation and curiosity, particularly through direct interactions with local environmental organizations and hands-on experiences at the Ashiya River. The approach encouraged them to recognize the interconnectedness

between humans and nature and to reflect on their own responsibilities. Approximately 45% of students proposed concrete conservation actions, indicating the development of both awareness and a willingness to act—key indicators of agency.

However, the practice also revealed certain challenges. Time constraints limited students' opportunities for more individualized and cross-curricular inquiry. In future iterations, it is essential to provide more flexible structures and extended timeframes to support diverse learning styles and deeper investigation.

To further enhance student learning and application, the authors propose the inclusion of performance tasks in future implementations. These tasks, such as creating newspapers and posters to advocate for biodiversity conservation, will enable students to apply their knowledge, skills, and conceptual understanding in authentic, real-world contexts. Performance tasks serve not only to assess learning outcomes but also to reinforce the relevance of inquiry in everyday life.

Ultimately, by continuing to refine and expand this model, educators can contribute to the development of young learners who are not only informed but also empowered to act as responsible and reflective members of a sustainable society.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

AI-assisted technologies, including DeepL for translation, were used to support the writing process. All translations were reviewed and revised by the authors to ensure accuracy and appropriateness.

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Development of an Exercise Program Based on Thai Traditional Wisdom Integration for Physical Education Undergraduate Students in Elderly Exercise Course

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Abstract

The objectives of this research were: 1) to develop an exercise program based on Thai traditional wisdom integration for physical education undergraduate students in elderly exercise course, and 2) to evaluate the appropriateness of the exercise program. The sample consisted of five experts who possessed knowledge and expertise in physical education or related fields studies. The research instruments were: 1) the developed exercise program, and 2) a program appropriateness assessment form. Data were analyzed by calculating the mean scores of program appropriateness ratings. The research findings revealed that: 1) the developed exercise program based on Thai traditional wisdom integration for physical education undergraduate students in elderly exercise course consisted of three activities: Activity 1 consisted of 22 warm-up, cool-down, and stretching integrating Thai traditional wisdom through the use of Pha Khao Ma; Activity 2 included 18 individual exercises integrating Thai traditional wisdom through the use of Pha Khao Ma; and Activity 3 contained 10 partner exercises integrating Thai traditional wisdom through the use of Pha Khao Ma. The program followed four steps, all integrating Thai traditional wisdom through the use of Pha Khao Ma: Step 1 warm-up and stretching; Step 2 individual exercises; Step 3 partner exercises; and Step 4 cool-down and stretching. 2) The evaluation of the developed program's appropriateness yielded the highest level of appropriateness with a mean score of 4.60. Consequently, physical education undergraduate students can implement this exercise program integrating Thai traditional wisdom in the exercise for the elderly course to promote better health behaviors among elderly individuals.

Keywords: Thai traditional wisdom, elderly exercise course, physical education program

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Introduction

In 2022, Thailand had a population of 66 million people, according to the Ministry of Interior's civil registration data. Within this population, there were 13 million people aged 60 years or older, accounting for 19% of the total population. The three provinces with the highest proportion of older persons were Lampang, Phrae, and Lamphun accordingly. All located in the Northern region, where the rate of older persons people exceeds one-fourth (26%) of the total population. On the other hand, the three provinces with the lowest proportion of older persons were Narathiwat, Yala, and Pattani accordingly. All situated in the southern border region, where the proportion of people aged 60 years or older was below 13% of the total population. Interesting statistics about older persons in Thailand: Despite the overall population declining (negative population growth) in Thailand, the number and proportion of older population are increasing rapidly. In the next 20 years, while the total population of Thailand is projected to decrease from 66 million to 60 million, older persons (aged 60 years or older) is expected to increase from 13 million to 19 million, accounting for 19% of the total population in 2022 to be 31.4% in 2042 (Department of Older Persons, 2023).

A significant concern for the elderly population is health issues stemming from physiological changes that affect various organ systems' functionality, including muscular strength capacity, cardiovascular and respiratory endurance, and decreased flexibility. As individuals age, the rate of physical deterioration increases proportionally with advancing years. While this decline in physical fitness during elderly years is inevitable, numerous research studies have concluded that regular exercise at appropriate intensity levels can effectively reduce the risk of age-related diseases and result in satisfactory improvements in physical fitness. These findings are applicable to the elderly population in general, demonstrating that seniors who engage in regular physical exercise maintain better physical fitness, as evidenced in their daily living activities. This enhanced physical fitness, characterized by improved strength and endurance, leads to better functional performance in daily activities. For instance, some elderly individuals who are new to exercise programs and initially lack strength gradually develop the ability to walk independently without assistive devices, perform self-care activities, or engage in various tasks with increased agility (Boonprakorn et al., 2023).

Physical exercise encompasses more than conventional sporting activities; it can incorporate traditional Thai wisdom-based body movements integrated into daily lifestyle practices and routine activities, including household tasks such as sweeping, mopping, water carrying, soil cultivation, and weed removal. Additionally, the implementation of the Pa Kao Ma (traditional Thai multipurpose cloth) can facilitate physical movement and bodily exercises. The utilization of Pa Kao Ma presents several advantages, particularly its exercise simplicity and adaptability across various environments and physical postures. The Pa Kao Ma, a historically significant artifact in Thai cultural heritage, serves as a multifunctional textile implement. Its applications extend beyond conventional attire and personal hygiene to include utilitarian functions such as: bedding material, hammock construction, solar protection headwear, hair covering, perspiration management, waist support, alternative carrying solution, infant transportation apparatus, and moisture absorption. In medical emergencies, it demonstrates therapeutic utility for first aid applications, including hemorrhage control, wound dressing, and injured appendage support. Historically, it also served tactical purposes in warfare for prisoner restraint. The integration of Pa Kao Ma in physical exercise methodology involves systematic muscular engagement through controlled pulling, pushing, lifting, and stretching movements. These movements follow a progressive

intensity pattern, transitioning from low to moderate velocity, while maintaining minimal impact stress. The textile provides essential functions including balance maintenance, muscular support, and injury prevention mechanisms. This exercise methodology demonstrates universal applicability across age demographics, from pediatric to geriatric populations. The exercise protocol can be implemented either as standalone physical activity or synchronized with musical accompaniment in standardized eight-count rhythmic patterns, promoting both physiological and psychological benefits through enjoyable engagement and systematic relaxation. The methodology employs a structured progression, initiating with fine motor muscle activation and advancing to comprehensive muscular engagement, ensuring systematic and holistic physical development (Thai Health Promotion Foundation, 2010).

Based on these findings, the researcher proposed the development of an exercise program incorporating Thai traditional wisdom for physical education undergraduate students in elderly exercise course. This program aims to create age-appropriate exercise interventions for the aforementioned elderly population, with the objective of improving their self-perceived quality of life.

Objectives of Study

1. To develop an exercise program based on Thai traditional wisdom integration for physical education undergraduate students in elderly exercise course.
2. To evaluate the appropriateness of the exercise program based on Thai traditional wisdom integration for physical education undergraduate students in elderly exercise course.

Methodology

The sample consisted of five experts who possessed knowledge and expertise in physical education or related fields studies. The research instruments were: 1) the developed exercise program based on Thai traditional wisdom integration for physical education undergraduate students in elderly exercise course, and 2) a program appropriateness assessment form. Data were analyzed by calculating the mean scores of program appropriateness ratings.

The evaluation was conducted using a 5-point Likert scale, with the following rating system: 5-highest, 4-high, 3-moderate, 2-low, 1-least. The interpretation of the mean appropriateness scores was as follows: mean score $\geq$ 4.20: highest, mean score between 3.40 - 4.19: high, mean score between 2.60 - 3.39: moderate, mean score between 1.80 - 2.59: low, mean score $<$ 1.80: least.

Conclusion

Section 1: Developing an Exercise Program Based on Thai Traditional Wisdom Integration for Physical Education Undergraduate Students in Elderly Exercise Course

The developed exercise program based on Thai traditional wisdom integration for physical education undergraduate students in elderly exercise course consisted of three activities:

Activity 1: Consisted of 22 warm-up, cool-down, and stretching integrating Thai traditional wisdom through the use of Pha Khao Ma.

Position 1: Wrist Circumduction Exercise
Position 2: Elbow Joint Flexion Exercise
Position 3: Shoulder Girdle Elevation Exercise
Position 4: Cervical Spine Flexion-Extension Exercise
Position 5: Cervical Spine Bilateral Rotation Exercise
Position 6: Cervical Spine Lateral Flexion Exercise
Position 7: Combined Upper Extremity Abduction with Axial Rotation Exercise
Position 8: Combined Upper Extremity Abduction with Lateral Trunk Flexion Exercise
Position 9: Upper-Lower Extremity Coordination Exercise
Position 10: Multi-joint Extension and Elevation Exercise
Position 11: Cervical Spine Anterior-Posterior Static Stretching Exercise
Position 12: Cervical Musculature Static Stretching Exercise
Position 13: Shoulder Complex Static Stretching Exercise
Position 14: Thoracolumbar Paraspinal Muscle Stretching Exercise
Position 15: Lumbar Erector Spinae Stretching Exercise
Position 16: Anterior Abdominal Musculature Stretching Exercise
Position 17: Hip Complex Static Stretching Exercise
Position 18: Femoral Musculature Static Stretching Exercise
Position 19: Comprehensive Multi-joint Stretching Exercise
Position 20: Multi-regional Dynamic Stretching Exercise
Position 21: Comprehensive Multi-joint Mobility and Balance Exercise
Position 22: Traditional Archery Simulation Exercise

Activity 2: Included 18 individual exercises integrating Thai traditional wisdom through the use of Pha Khao Ma.

Position 1: Integrated Upper-Lower Extremity Exercise

This mindfulness-based neuromuscular integration protocol emphasizes coordinated upper and lower extremity synchronization through conscious movement patterns. The exercise sequence begins with participants establishing a standardized shoulder-width stance, facilitating vertical cloth manipulation through superior-inferior trajectories coordinated with stationary bilateral lower extremity rhythmic movements. This sophisticated pattern integrates proprioceptive awareness between manual control and pedal rhythmic coordination, promoting enhanced neuromuscular integration throughout the kinetic chain. The protocol comprises two complete sets of eight repetitive cycles, emphasizing mindful movement awareness while maintaining temporal precision in the synchronized upper and lower extremity movement patterns. This integrated sequence promotes the development of enhanced motor control, spatial awareness, and bilateral coordination through conscious engagement of multiple muscle groups in both the upper and lower extremities.

Position 2: Combined Upper-Lower Extremity Dynamic Exercise

The dynamic movement pattern progresses through controlled anterior trunk flexion with maintained upper extremity extension, facilitating alternating contact between the cloth implement and contralateral knee joints. This rhythmically synchronized sequence incorporates mild knee flexion to enhance postural stability and dynamic equilibrium throughout the movement cycle. The protocol is executed in accordance with musical temporal cues, comprising two complete sets of eight repetitions, promoting enhanced

proprioceptive awareness, neuromuscular coordination, and core engagement while maintaining dynamic stabilization through controlled movement patterns.

Position 3: Integrated Cross-Body Movement Exercise

The dynamic sequence integrates controlled anterior trunk flexion synchronized with diagonal knee elevation patterns, incorporating plantar flexion of the elevated extremity. This sophisticated movement pattern emphasizes oblique muscle activation through rotational components while maintaining dynamic stabilization throughout the kinetic chain. The exercise sequence promotes enhanced neuromuscular coordination through alternating sinistral and dextral patterns, comprising two complete sets of eight bilateral repetitions. The diagonal trajectory of the movement facilitates increased activation of the lateral trunk musculature, specifically targeting the external and internal oblique muscle groups, while promoting enhanced core stability and waist reduction benefits compared to the sagittal plane movement pattern of Position 2.

Position 4: Upper Extremity Elevation with Straight Leg Extension Exercise

The dynamic movement pattern progresses through controlled anterior trunk flexion with maintained upper extremity extension, synchronized with alternating unilateral lower extremity elevation through sagittal plane trajectory. This sophisticated sequence emphasizes coordinated neuromuscular control through reciprocal movement patterns, comprising two complete sets of eight alternating bilateral repetitions. The integrated movement promotes enhanced proprioceptive awareness, dynamic stabilization, and temporal precision while engaging multiple muscle groups throughout both the anterior and posterior kinetic chains.

Position 5: Integrated Shoulder-Lower Extremity Exercise

The dynamic movement pattern incorporates stationary marching mechanics synchronized with reciprocal upper extremity pendulum motion, simulating natural gait-associated arm swing patterns. This sophisticated sequence facilitates enhanced neuromuscular coordination through rhythmic integration of upper and lower extremity movement patterns, comprising two complete sets of eight repetitive cycles. The protocol promotes improved joint mobility, dynamic stabilization, and temporal coordination while maintaining optimal postural alignment throughout the movement sequence.

Position 6: Shoulder Complex Mobilization with Dynamic Knee Elevation Exercise

The dynamic movement pattern encompasses plyometric ankle articulation through springlike mechanics, coordinated with elevated knee drive patterns and reciprocal upper extremity oscillation. This sophisticated sequence emphasizes enhanced neuromuscular coordination through integrated movement patterns, comprising two complete sets of eight unilateral repetitions. The protocol promotes improved cardiovascular conditioning while simultaneously engaging multiple muscle groups through dynamic stabilization and rhythmic coordination patterns, with particular emphasis on core activation through high-knee mechanics and sustained upper body engagement.

Position 7: Upper Extremity Abduction with Lateral Step Pattern Exercise

The dynamic movement pattern encompasses plyometric ankle articulation through springlike mechanics, coordinated with elevated knee drive patterns and reciprocal upper extremity oscillation. This sophisticated sequence emphasizes enhanced neuromuscular coordination through integrated movement patterns, comprising two complete sets of eight unilateral repetitions. The protocol promotes improved cardiovascular conditioning while simultaneously engaging multiple muscle groups through dynamic stabilization and rhythmic coordination patterns, with particular emphasis on core activation through high-knee mechanics and sustained upper body engagement.

Position 8: Combined Upper Extremity Abduction with Rotational Stepping Pattern Exercise

The dynamic movement pattern encompasses alternating rotational trunk movements synchronized with posterior heel elevation through coordinated weight shifting mechanics. This sophisticated sequence emphasizes enhanced neuromuscular coordination through bilateral rotational patterns, comprising two complete sets of eight repetitive cycles. The protocol promotes improved joint mobility and muscular flexibility while maintaining dynamic stabilization throughout the kinetic chain, with particular emphasis on thoracolumbar rotation and hip complex mobility through coordinated movement patterns.

Position 9: Combined Upper Extremity Abduction with Full Body Extension Exercise

The dynamic movement pattern promotes enhanced proprioceptive awareness and neuromuscular coordination through alternating bilateral rotational sequences, comprising two complete sets of eight repetitive cycles. The protocol facilitates improved multi-planar mobility while maintaining dynamic stabilization throughout the kinetic chain, with particular emphasis on thoracolumbar rotation and diagonal force vectors through integrated movement patterns.

Position 10: Upper Extremity Elevation with Lateral Dynamic Movement Exercise

The dynamic movement pattern incorporates elevated upper extremity oscillation with maximal vertical extension, synchronized with alternating unilateral weight transfer patterns and contralateral heel elevation. This advanced sequence emphasizes full-body elongation through coordinated movement patterns, promoting enhanced proprioceptive awareness and dynamic stabilization throughout the kinetic chain. The protocol comprises two complete sets of eight bilateral repetitions, facilitating improved neuromuscular coordination while maintaining rhythmic precision in the alternating lateral weight shift patterns.

Position 11: Combined Lower Extremity Flexion with Bilateral Cloth Movement Exercise

The dynamic movement pattern incorporates eccentric lowering phases synchronized with posterior cloth trajectory, followed by concentric extension to maximal vertical elongation accompanied by alternating heel elevation patterns. This sophisticated sequence emphasizes enhanced neuromuscular coordination through bilateral movement patterns, comprising two complete sets of eight repetitive cycles. The protocol promotes improved dynamic stabilization and mobility throughout the kinetic chain while maintaining rhythmic precision in the alternating movement patterns.

Position 12: Dynamic Circular Movement with Cloth-Assisted Upper Extremity Exercise

The dynamic movement pattern encompasses circumferential superior trajectory with maximal upper extremity extension, executing two complete sinistral rotations followed by two dextral rotations above the cranial vertex. This sophisticated sequence incorporates synchronized pedal advancement patterns corresponding to the directional circular movements. The protocol comprises two complete sets of eight repetitive cycles, promoting enhanced neuromuscular coordination and spatial awareness while maintaining dynamic stabilization throughout the integrated movement pattern.

Position 13: Bilateral Upper Extremity Coordination with Dynamic Cloth Transfer Exercise

The dynamic movement pattern encompasses maximal vertical elongation facilitated by bilateral plantar flexion, promoting optimal muscular extension throughout the kinetic chain. This sophisticated sequence incorporates contralateral lower extremity elevation synchronized with cloth trajectory, enhancing dynamic equilibrium control. The protocol emphasizes conscious movement awareness through rhythmic bilateral transitions, comprising two complete sets of eight repetitive cycles. The integrated movement pattern promotes enhanced proprioceptive awareness, neuromuscular coordination, and postural stability while maintaining temporal precision throughout the alternating movement sequences.

Position 14: Combined Upper Extremity Elevation with Dynamic Knee Flexion Exercise

The dynamic movement pattern encompasses superior cloth trajectory above the cranial vertex followed by controlled descent synchronized with alternating knee elevation patterns. This sophisticated sequence promotes enhanced core activation through coordinated upper and lower extremity movements while maintaining postural stability throughout the kinetic chain. The protocol comprises two complete sets of eight bilateral repetitions, facilitating improved neuromuscular coordination and dynamic stabilization through the integrated movement patterns.

Position 15: Upper Extremity Elevation with Posterior Trunk Movement Exercise

The dynamic movement pattern encompasses superior cloth trajectory above the cranial vertex followed by posterior descent, synchronized with posterior lower extremity elevation and rhythmic plantar flexion through spring-like mechanics. This advanced sequence promotes enhanced neuromuscular coordination through integrated upper and lower extremity movements, comprising two complete sets of eight alternating unilateral repetitions. The protocol facilitates improved dynamic stabilization and proprioceptive awareness while maintaining temporal precision throughout the coordinated movement patterns.

Position 16: Dynamic Under-knee Forward Transfer with Alternating Pattern Exercise

The dynamic movement pattern encompasses lateral upper extremity oscillation facilitating alternating transfer patterns beneath elevated lower extremities through coordinated unilateral movements. This sophisticated sequence incorporates plyometric vertical displacement mechanics synchronized with rhythmic temporal patterns to enhance dynamic equilibrium control. The protocol emphasizes integrated neuromuscular coordination through complex

movement patterns, requiring precise proprioceptive awareness and spatial orientation. The sequence comprises two complete sets of eight alternating bilateral repetitions, promoting enhanced dynamic stabilization while maintaining coordinated movement precision throughout the integrated patterns.

Position 17: Dynamic Posterior Alternating Movement Pattern Exercise

The dynamic movement pattern simulates wing-flapping kinematics while integrating lateral stepping sequences with subtle plyometric elements for rhythmic enhancement. This complex sequence emphasizes coordinated neuromuscular control through bilateral upper extremity movements in the posterior plane, synchronized with lateral weight shifting patterns. The protocol promotes enhanced proprioceptive awareness and dynamic stabilization while maintaining temporal precision throughout the integrated movement sequence.

Position 18: Multi-directional Dynamic Movement Exercise with Cloth Wave Pattern

The dynamic movement pattern incorporates wide-based stance with sustained plantar flexion while executing complete rotational sequences through all four cardinal directions. This sophisticated protocol emphasizes enhanced neuromuscular coordination through integrated movement patterns, comprising two complete circumferential cycles. The sequence promotes improved spatial awareness and dynamic stabilization while maintaining multi-directional proprioceptive control throughout the rotational movement pattern.

Activity 3: Contained 10 partner exercises integrating Thai traditional wisdom through the use of Pha Khao Ma.

Position 1: Bilateral Hand Coordination with Dynamic Transfer Exercise

The dynamic movement pattern simulates natural gait-associated upper extremity reciprocation, incorporating alternating sinistral and dextral object transfer through coordinated temporal sequences. This sophisticated protocol employs discrete roles for each upper extremity, with one hand engaged in object projection while the contralateral extremity performs simultaneous object reception, creating a continuous, rhythmic exchange pattern. The movement sequence comprises eight complete bilateral cycles, promoting enhanced neuromuscular coordination, spatial awareness, and temporal precision while maintaining dynamic stabilization through asymmetric lower extremity positioning.

Position 2: Unilateral Upper Extremity Coordination Exercise

The dynamic sequence incorporates axial rotation with posterior momentum transfer, accompanied by posterior weight shift and maximal upper extremity extension, followed by anterior reorientation for reciprocal exchange. The protocol emphasizes integrated neuromuscular coordination through alternating bilateral movement patterns, incorporating weight transfer, rotational mobility, and temporal precision throughout the kinetic chain. This sophisticated movement sequence comprises eight complete bilateral repetitions, promoting enhanced proprioceptive awareness, dynamic stabilization, and multi-planar coordination while maintaining rhythmic precision in object transfer patterns.

Position 3: Bilateral Alternating Upper Extremity Pull Exercise

The dynamic movement pattern encompasses alternating sinistral and dextral force production and attenuation cycles through precise temporal coordination. The comprehensive protocol comprises eight complete bilateral cycles, promoting enhanced proprioceptive awareness of force modulation, rhythmic precision, and coordinated neuromuscular control throughout the upper extremity kinetic chain while maintaining dynamic stabilization through asymmetric lower extremity positioning.

Position 4: Posterior-Facing Upper Extremity Alternating Overhead Pull Exercise

The dynamic movement pattern incorporates alternating sinistral and dextral force production cycles through rhythmic temporal coordination. The protocol comprises four complete bilateral cycles, followed by a transition phase involving contralateral forward limb advancement, culminating in an additional four cycles of alternating lateral force production. This integrated sequence promotes enhanced proprioceptive awareness of force modulation, temporal precision, and bilateral coordination throughout the upper extremity kinetic chain while maintaining dynamic stabilization through asymmetric lower extremity positioning.

Position 5: Isolated Upper Extremity Extension and Elevation Exercise

The dynamic movement pattern progresses through coordinated bilateral upper extremity abduction to maximal extension, synchronized with bilateral plantar flexion, facilitating optimal stretching through partner-assisted reciprocal facilitation. The protocol requires eight sequential repetitions of this integrated movement pattern, promoting enhanced kinesthetic awareness, dynamic mobility, and bilateral coordination throughout the kinetic chain. An advanced variation incorporates a rhythmic sequence of dual-tempo anterior trunk flexion followed by single-tempo extension, further enhancing neuromuscular control and temporal coordination. This comprehensive sequence promotes the development of enhanced flexibility, agility, and mindful movement awareness while maintaining synchronized partner dynamics throughout the movement cycle.

Position 6: Dynamic Rotational Movement with Directional Reversal Exercise

The dynamic movement pattern incorporates a complete axial rotation with synchronized momentum transfer, followed by counter-rotational movement while maintaining continuous bilateral manual contact. This complex motor sequence integrates conscious proprioceptive awareness of force application, force attenuation, and directional force transitions throughout the movement cycle. The protocol encompasses eight complete bilateral repetitions, facilitating enhanced neuromuscular coordination, dynamic stabilization, and spatial awareness while promoting mindful engagement of the core musculature and thoracolumbar mobility. The integrated movement pattern emphasizes the development of controlled force modulation and spatial orientation through sustained partner-assisted rotational sequences.

Position 7: Bilateral Synchronized Hand Transfer Exercise

The dynamic movement pattern progresses through a coordinated sequence incorporating anterior bilateral exchange, followed by posterior momentum transfer with integrated rotational components, culminating in reciprocal object exchange. This complex motor sequence emphasizes the development of multi-segmental coordination while maintaining

temporal precision throughout the movement cycle. The protocol requires eight complete bilateral repetitions, promoting enhanced proprioceptive awareness, dynamic stabilization, and multi-planar coordination throughout the kinetic chain, while simultaneously engaging the core musculature and promoting thoracolumbar mobility. The integrated movement pattern facilitates the development of advanced neuromuscular coordination, incorporating dynamic balance control and rhythmic timing precision through alternating movement phases.

Position 8: Posterior Upper Extremity Transfer Exercise

A dynamic neuromuscular integration protocol incorporating coordinated axial rotation with alternating lateral object manipulation. The exercise sequence requires participants to maintain posterior orientation relative to each other, establishing a standardized shoulder-width base of support for optimal biomechanical stability. The protocol employs unilateral grip control of a cloth implement, facilitating controlled rotational movements of the vertebral column through transverse plane motion. This bilateral exchange sequence integrates reciprocal trunk rotation with coordinated object transfer between participants, alternating between sinistral and dextral orientations. The complete movement cycle comprises eight sequential bilateral repetitions, promoting enhanced thoracolumbar mobility, rotational core stability, and proprioceptive awareness throughout the kinetic chain.

Position 9: Bilateral Upper-Lower Extremity Coordination Through Synchronized Hand Placement Exercise

This dynamic movement pattern integrates multi-joint coordination through the anterior and posterior kinetic chains, requiring precise proprioceptive awareness and spatial orientation. The complete movement cycle is executed through eight sequential repetitions, promoting enhanced neuromuscular coordination, spinal mobility, and dynamic stabilization of the core musculature while maintaining bilateral symmetry throughout the range of motion.

Position 10: Reciprocal Object Manipulation Through Projectile Reception and Release

The dynamic component involves coordinated flexion-extension movements of the lower extremities, synchronized with a reciprocal cloth projectile exchange between participants. This bilateral exchange protocol is executed through eight repetitive cycles, completed in two comprehensive sets, facilitating the enhancement of proprioceptive awareness, spatial orientation, and temporal precision. The integrated movement pattern promotes the development of advanced neuromuscular coordination, incorporating visual tracking accuracy, dynamic balance control, and rhythmic timing precision, while simultaneously engaging multiple muscle groups in both the upper and lower kinetic chains.

Section 2: Evaluating the Appropriateness of the Exercise Program Based on Thai Traditional Wisdom Integration for Physical Education Undergraduate Students in Elderly Exercise Course

The program followed four steps, all integrating Thai traditional wisdom through the use of Pha Khao Ma: Step-1 warm-up and stretching; Step-2 individual exercises; Step-3 partner exercises; and Step-4 cool-down and stretching.

The evaluation of the developed program's appropriateness yielded the highest level of appropriateness with a mean score of 4.60. Consequently, physical education undergraduate students can implement this exercise program integrating Thai traditional wisdom in the exercise for the elderly course to promote better health behaviors among elderly individuals.

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Investigating the Connection Between Motivation and Anxiety in English Learning Among Junior High School Students in Rural Northern Jiangsu Province

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Abstract

This study focuses on the English learning motivation of 7th-grade students in a rural junior high school in northern Jiangsu, China. Using the English Learning Motivation Scale and the Foreign Language Classroom Anxiety Scale (FLCAS), the research analyzed 99 students from two classes: Class A (50 students) and Class B (49 students), which differed in achievement levels. The findings revealed that Class A experienced higher anxiety (mean FLCAS score of 79.5) and moderate motivation (mean score of 65.2). In contrast, Class B reported lower anxiety (mean score of 62.3) and higher motivation (mean 74.8). A significant negative correlation between motivation and anxiety was observed ($r = -0.56$, $p < 0.01$), indicating that anxiety accounted for 31% of the variance in motivation scores. These results highlight the importance of educational interventions to manage anxiety and offer valuable insights for language education professionals.

Keywords: anxiety, motivation, rural, FLCAS

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Introduction

This study stands out for integrating the English Learning Motivation Scale with the Foreign Language Classroom Anxiety Scale, allowing for a thorough examination of what influences English language acquisition among 7th-grade students. Conducted in a rural junior high school in northern Jiangsu, China, the research aims to reveal the motivations driving students to learn English and the anxieties that arise in a foreign language classroom. This combination makes the findings particularly relevant for language education.

Understanding varying motivations, such as personal interest or external pressures like parental expectations, can help educators adjust their teaching methods to engage students more effectively. Additionally, recognizing anxiety sources, including the fear of making mistakes or performance concerns, is vital for fostering a supportive environment.

The study analyzes survey data to uncover the connection between motivation and anxiety, offering valuable insights for teaching strategies and curriculum development. These findings contribute to the ongoing conversation about language education, especially in rural areas with limited resources and English exposure. Overall, this research emphasizes the need for a positive learning atmosphere and provides practical guidance for educators and policymakers to enhance student language acquisition outcomes.

Literature Review

This study delved into the intriguing dynamics of foreign language learning anxiety and its connection to motivation. Anxiety is mainly a psychological experience characterized by feelings of tension, worry, and apprehension. It is closely tied to the autonomic nervous system, which controls involuntary bodily functions. This connection can lead to physical symptoms like a rapid heartbeat, sweating, and muscle tension, illustrating how mental health and physical responses are intertwined. High anxiety levels can significantly hinder foreign language learning, making it harder for students to understand new concepts and communicate. This mental barrier often results in decreased motivation and success, ultimately affecting their confidence and progress in real-life language use (Önem, 2012).

Students in secondary vocational schools often struggle with higher levels of anxiety when learning foreign languages. Addressing this issue is essential for fostering a more effective and confident learning environment (Song, 2022). Research on anxiety indicates that it encompasses both beneficial and detrimental aspects. Individuals who experience moderate levels of anxiety are often more inclined to engage in diligent study practices, as they seek to uphold their confidence and attain high academic scores (Yassin & Razak, 2018).

In China, foreign language education, particularly English, is a key part of the mandatory curriculum leading up to the college entrance exam. The country has recognized the significance of English for international communication and economic growth, prompting increased investment in language education (Hu et al., 2024). The connection between English learning anxiety and the motivation of Chinese students appears to be somewhat indirect. During the COVID-19 period, data revealed that 45.9% of Chinese EFL students reported no anxiety, while 54.1% experienced mild to severe levels of anxiety (Peng et al., 2024).

Methodology

The study involved two classes with different achievement levels, totaling 99 students (Class A: 50 students; Class B: 49 students). It focused on exploring motivation and anxiety in language learning performance. Participants completed the English Learning Motivation Scale, which assesses various motivation aspects, such as intrinsic interest, extrinsic goals, attitudes towards learning English, and perceived self-efficacy. These factors are vital for understanding student engagement and persistence in learning a new language.

In an educational setting, two classes were guided by advisors who employed contrasting teaching styles. The advisor for class A adopted a strict approach, establishing numerous detailed requirements for students to adhere to. In contrast, the advisor for class B encouraged a more flexible atmosphere, allowing for greater student autonomy.

Additionally, the Foreign Language Classroom Anxiety Scale (FLCAS) was used to evaluate levels of communication apprehension, fear of negative evaluation, and test anxiety. These anxiety factors are crucial in the language learning context as they can affect students' willingness to participate and perform in class. Conducted in Spring 2024, the study aimed to identify patterns in motivation and anxiety between the two classes. The collected data will help inform teaching strategies and improve students' language learning experience.

Results

The study revealed notable differences in motivation and anxiety levels between the two classes, shedding light on how these psychological factors interact in education. Class A, despite having higher academic achievements, had elevated anxiety levels, with an average score of 79.5 on the Foreign Language Classroom Anxiety Scale (FLCAS). Their motivation scores were moderate, averaging 65.2. This suggests that high-achieving students may feel increased pressure, leading to more anxiety while maintaining a reasonable level of motivation.

In contrast, Class B, with lower academic performance, reported significantly lower anxiety levels, scoring an average of 62.3 on FLCAS. Interestingly, they displayed higher motivation, with an average score of 74.8. This indicates that students facing academic challenges might have a strong intrinsic drive to improve, as a response to their struggles.

A key finding from the research is the significant negative correlation between motivation and anxiety, with a correlation coefficient of $r = -0.56$ ($p < 0.01$). This highlights the need for educational strategies that address anxiety to create a more motivating student environment. For example, incorporating stress-reducing techniques or fostering a supportive learning atmosphere could be beneficial. Additionally, multiple regression analysis showed that anxiety accounts for 31% of the variance in motivation scores ($R^2 = 0.31$), underscoring the importance of tackling anxiety to improve student motivation and learning outcomes.

Discussion

This study offers valuable insights but has some limitations. It was conducted in a rural area in China, so its findings may not apply to all rural contexts. Additionally, the reliance on self-reported data could introduce social desirability bias. Despite these concerns, the research enriches our understanding of rural students' motivations for language learning in China,

highlighting their unique needs and challenges. Rural students often encounter different situations compared to their urban peers, such as limited access to resources and educational support.

This study sheds light on the intricate relationship between motivation and anxiety in English language learning among junior high school students in a rural setting in northern Jiangsu, China. By employing two validated instruments—the English Learning Motivation Scale and the Foreign Language Classroom Anxiety Scale (FLCAS)—the research uncovers significant psychological and emotional patterns that affect students' learning experiences and outcomes.

One of the study's most compelling findings is the significant negative correlation ($r = -0.56$, $p < 0.01$) between anxiety and motivation, indicating that students who experience higher levels of anxiety tend to exhibit lower motivation and vice versa. This inverse relationship suggests that interventions designed to reduce anxiety may be critical in boosting students' motivation to learn English, particularly when pressure to perform is high or resources are limited. Furthermore, the regression analysis showing that anxiety accounts for 31% of the variance in motivation emphasizes the urgency for schools and educators to address emotional well-being as part of language education directly.

The comparison between classes—Class A and Class B—provides a nuanced perspective on how achievement levels intersect with emotional factors. Interestingly, Class A, composed of higher-achieving students, reported significantly higher anxiety but only moderate motivation, while Class B, with lower achievement levels, demonstrated higher motivation and lower anxiety. These results challenge the assumption that positive emotional experiences always accompany academic success and instead highlight that high-performing students may face increased pressure, which undermines their motivational drive. Conversely, lower-performance students might retain strong motivation due to a desire for self-improvement, especially in a rural educational setting where opportunities for upward mobility are highly valued.

The research underscores the importance of identifying the factors that motivate these learners and the anxiety they may face. Insights from this study can help shape targeted educational interventions. Educators and policymakers can create programs that address these challenges by understanding the motivational drivers and specific anxieties of rural students. This might involve developing teaching strategies that promote a supportive learning environment and resources to mitigate language proficiency and classroom performance anxiety. Ultimately, the findings expand the conversation around language learning in rural areas and suggest practical ways to improve educational outcomes. By focusing on the motivational and emotional aspects of learning, we can help rural students have a more fulfilling educational experience, aiding their success in a connected world.

Conclusion

In conclusion, this study brings attention to the distinct challenges rural students face in China, including limited access to quality educational resources, less exposure to authentic English environments, and often heightened parental or societal expectations. These factors can compound motivation and anxiety in unique ways that urban-centered research may overlook. As such, the findings underscore the necessity of context-sensitive educational strategies that prioritize emotional support, stress management, and student engagement in language classrooms.

While the study makes important contributions to the field of language education, particularly in under-researched rural contexts, it is not without limitations. The use of self-reported questionnaires introduces the possibility of bias, and the study's localized focus restricts the generalizability of its conclusions. However, these limitations do not detract from the study's value; they provide a foundation for future research to build upon, potentially involving longitudinal data collection, classroom observations, or qualitative interviews for deeper insight.

This study highlights the critical role of emotional factors—specifically anxiety and motivation—in shaping English language learning experiences for rural junior high school students. Educators and policymakers can design more effective, empathetic, and inclusive learning environments by integrating psychological understanding into educational practice. Ultimately, supporting students emotionally is not ancillary to language instruction; it is central to achieving lasting educational success.

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Classroom Interaction Analysis in Mathematics Grounding Activities: A Case Study of Decimal Concepts

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Abstract

In recent years, Taiwanese students have excelled in international mathematics assessments, yet reports reveal a gap between academic achievement and learning interest. Addressing this discrepancy has become a key goal for elementary mathematics education in Taiwan. This study analyzes teacher–student interaction patterns during the implementation of Mathematics Grounding Activities (MGA) focused on decimal concepts. Using the IRE (Initiation–Response–Evaluation) and IRF (Initiation–Response–Feedback) frameworks, five mathematics lessons were examined. Findings show that IRF interactions were more prevalent than IRE. While IRE structures often involved rapid checks of computational accuracy, IRF interactions were more frequent in game-based activities, fostering strategic reasoning, conceptual understanding, and error reflection. The study highlights that IRF-supported dialogues enhance students' logical thinking and engagement, underscoring the value of game-based, hands-on activities in promoting meaningful mathematical learning and active classroom participation.

Keywords: Mathematics Grounding Activities (MGA), classroom interaction, decimal concepts, Conversation Analysis (CA)

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Introduction

Taiwanese students have consistently demonstrated strengths in mathematical knowledge and skills in international assessments such as TIMSS and PISA. However, they face affective challenges, such as a lack of interest, low confidence, and mathematics anxiety (Ministry of Education, 2022). According to the TIMSS 2019 report, only 46% of Taiwanese students reported enjoying mathematics (Ministry of Education, 2022). To address this issue, educators and researchers have promoted various strategies, including curriculum reform, innovative instructional approaches, and technology-assisted learning. Approaches utilizing concrete real-life contexts (Hunter & Anthony, 2003) or game-based learning have been advocated to help students develop mathematical concepts.

Since 2014, the Ministry of Education has promoted Mathematics Grounding Activities (MGA), an instructional approach that integrates gameplay and guided hands-on activities to construct mathematical understanding. MGA uses manipulative and strategic games to guide students through concrete experiences, facilitating the cognitive processes of assimilation and accommodation. For teachers, MGA not only triggers student curiosity but also provides tangible experiences for students to progressively link gameplay to mathematical concepts, encouraging exploration and mathematical problem-solving.

Decimal concepts form an essential foundation for mathematics learning, frequently applied in daily life and serving as a basis for advanced topics such as ratios, fractions, and algebra. However, students often struggle with understanding place value, comparing magnitudes, and performing operations involving decimals. Common misconceptions include judging 0.5 as smaller than 0.45 (Lin, 2021), reflecting typical conceptual errors (Resnick et al., 1989; Steinle & Stacey, 2004).

Thus, exploring effective instructional designs to enhance decimal learning is a pressing issue. Integrating MGA into classroom instruction can boost students' motivation, cognitive engagement, and flexible thinking, while deepening abstract conceptual understanding through concrete experiences (Abdul Jabbar & Felicia, 2015; Moon & Ke, 2020). Research has indicated that game-based learning fosters cognitive and affective engagement, enriching students' learning experiences (Liang et al., 2014; Lin et al., 2018).

Nevertheless, few studies have systematically examined classroom interaction processes during MGA activities, particularly at the micro-level linking teacher–student dialogues to conceptual development. Therefore, this study uses conversation analysis to explore how interaction structures support learning processes in a case study of decimal-related MGA lessons in an elementary school context. The research questions guiding this study are:

(1) What are the characteristics of teacher–student verbal interactions during MGA lessons?
(2) What teaching features emerge when teachers adopt the IRE (Initiation–Response–Evaluation) structure?
(3) What teaching features emerge when teachers employ the IRF (Initiation–Response–Feedback) structure?

Literature Review

Mathematics Grounding Activities and the Decimal Decomposition Game

Mathematics Grounding Activities (MGA) focus on "building foundational mathematical knowledge" through structured game-based learning. Taiwanese mathematics education researchers developed MGA drawing upon Piaget's (1962) concepts of "assimilation" and "accommodation," combined with Dienes' (1973) theory of the "six stages of learning mathematics," advocating for knowledge construction through play (Lin & Hsieh, 2014). MGA modules align with mathematics concepts across primary and secondary school curricula.

The "Decimal Decomposition Game" is one such MGA module designed for elementary students. It emphasizes hands-on activities and games to help students understand decimal place value, the base-10 structure, and operations of addition and subtraction, while cultivating a sense of quantity and number sense. The instructional design highlights three core principles: First, introducing decimal concepts through fractional contexts to help students understand the meaning of 0.1 and 0.01, framing decimals as an extension of the integer system; Second, utilizing concrete manipulatives such as cards, rods, and hundred boards to visually and physically reinforce abstract concepts; Third, incorporating game elements like dice rolling and puzzle assembly to enhance student engagement and motivation. Overall, the module guides students to build decimal concepts through "learning by doing" and "thinking through games," thereby strengthening their mathematical foundational skills.

Decimal Concepts

Research over the past decade has highlighted common difficulties elementary students face in learning decimals, particularly the abstract nature of decimal notation and the invisibility of denominators, which often leads to misconceptions (Gorman, 2024). Decimal concepts are a core component of mathematical learning, closely tied to daily life and foundational to understanding ratio, proportion, and algebra. Children frequently encounter difficulties when attempting to grasp the abstract nature of decimals, leading to misunderstandings (Steinle & Stacey, 2004).

Common challenges include grasping place value, comparing magnitudes, and performing decimal operations (Resnick et al., 1989). Some students may become proficient in decimal calculations without developing a solid understanding of place value and relative magnitude, indicating an overemphasis on procedural fluency at the expense of conceptual understanding (Žakelj & Klančar, 2024). Without effective decimal conceptualization, students' future mathematics learning can be adversely affected. Thus, identifying appropriate instructional strategies to strengthen students' understanding and application of decimal concepts remains a crucial concern in mathematics education.

IRE and IRF Interaction Patterns

Classroom discourse analysis is a critical approach to understanding teaching and learning processes, with IRE/IRF frameworks recognized as valuable tools for uncovering how teachers and students co-construct knowledge through dialogue. Within classroom interaction research, the IRE (Initiation–Response–Evaluation) and IRF (Initiation–Response–Feedback)

structures, first introduced by Mehan (1979) and Sinclair and Coulthard (1975), have been widely applied to analyze classroom language and teacher–student exchanges. These frameworks help researchers elucidate the pragmatic structures and functions of instructional discourse, shedding light on how different interaction patterns influence student engagement and conceptual development (Li & Lam, 2022).

In traditional mathematics teaching, IRE structures typically dominate teacher-led questioning and evaluation sequences. While IRE can assist in managing classroom flow and confirming student responses, it may also restrict opportunities for extended mathematical reasoning (Wood, 1998) or prematurely close interactions after initial student responses, limiting deeper conceptual exploration (Nystrand, 2006). By contrast, the IRF structure emphasizes elaborative feedback following student responses, encouraging further articulation, correction, and reflective thinking. Research by Mercer and Howe (2012) indicates that IRF patterns can significantly enhance students' language participation and error correction in mathematics classrooms. Moreover, IRF interactions promote richer mathematical understanding and communication skills (Boaler & Greeno, 2000; Chapin et al., 2009).

Therefore, analyzing IRE/IRF structures not only allows researchers to identify interaction styles and linguistic features but also deepens the understanding of students' learning behaviors and participation dynamics. Based on this context, the present study aims to clarify the application of interaction structures in mathematics classrooms and provide empirical evidence and practical recommendations for designing effective dialogue strategies to promote deeper learning.

Through this exploration, the study seeks to enhance the understanding of teacher interaction styles and student engagement dynamics via IRE/IRF analysis, contributing to the evidence base for future instructional design and practice.

Methodology

This study adopted a qualitative case study approach, focusing on detailed observations and analyses of teacher–student interactions across five mathematics lessons. Data were collected from natural classroom settings through video recordings and teaching records to reconstruct the authentic discourse features during Mathematics Grounding Activities (MGA) lessons.

Sample Selection

The study was conducted in a third-grade mathematics classroom at a public elementary school in Taipei, involving 28 mixed-ability students (16 boys and 12 girls, approximately nine years old). The instructor, referred to as Teacher Jane, is an experienced educator with over 20 years of teaching experience and eight years of involvement in the MGA project, demonstrating expertise in designing and implementing Mathematics Grounding Activities. Teacher Jane's familiarity with MGA modules ensured the smooth execution of lessons and provided a stable instructional setting for observation. Over two weeks (from March 24 to April 7, 2023), Teacher Jane conducted five lessons focusing on single-digit decimal concepts using MGA modules.

Teaching Activities

The lessons were adapted from the Kang Hsuan version of Taiwan's Grade 3 mathematics textbook, incorporating MGA activities. The unit was divided into four instructional activities: (1) Understanding single-digit decimals, (2) Recognizing tenths-place decimals, (3) Comparing decimal magnitudes, and (4) Addition and subtraction of decimals. Although the original "Decimal Decomposition Game" module was designed for two-digit decimals, Teacher Jane, with the consent of the module's developers, modified the content to suit the instruction of single-digit decimal concepts.

Data Collection

Data sources included video recordings (approximately 40 minutes per lesson) of the five MGA decimal lessons and semi-structured interviews with the teacher and selected students after class. All video recordings were transcribed verbatim for conversation analysis (CA).

Data Analysis

To systematically analyze classroom interactions, this study adopted coding procedures based on the dialogue structures proposed by Sinclair and Coulthard (1975) and Mehan (1979). An interaction coding scheme (Table 1) was developed to distinguish between IRE (Initiation–Response–Evaluation) and IRF (Initiation–Response–Feedback) patterns, with teacher utterances coded sentence-by-sentence and categorized accordingly.

The analysis process was as follows: First, the researcher and a second rater, both with backgrounds in mathematics education, independently coded the teacher's speech in the first lesson ("Understanding Single-Digit Decimals") according to the operational definitions provided in Table 1. Discrepancies between coders were resolved through discussion to reach consensus. Subsequently, the primary researcher completed the coding of the remaining lessons. Interrater reliability was assessed, yielding a Cohen's Kappa value of 0.77, indicating an acceptable level of agreement.

Table 1
Interaction Coding Scheme

Type	Definition	Example
I-R-E (Initiation–Response–Evaluation)	1. The teacher initiates a question or instruction. 2. The student responds. 3. The teacher evaluates the student's response, usually confirming correctness.	T: "So, what is two-tenths?" SS: "0.2" T: "Is one-tenth equal to 0.1?" SS: "Yes."
I-R-F (Initiation–Response–Feedback)	1. The teacher initiates a question or instruction. 2. The student responds. 3. The teacher provides elaborative feedback, prompts further thinking, or scaffolds reasoning rather than simply evaluating correctness.	T: "How do you know that each part is equal, S1?" S1: "Because there are lines to divide them." T: "Right, and how does that prove that each part is the same size? S2?" S2: "Because if you draw the lines, you can see there are exactly 10 parts."

Note. T = Teacher; Sx = Individual Student; SS = Students responding in unison.

Findings

This chapter presents the preliminary findings based on the conversation analysis (CA) of teacher–student interactions observed during the five MGA decimal lessons, focusing on interaction patterns and discourse features.

Interaction Patterns in the Classroom

Based on the video recordings of the five MGA lessons (L1–L5), teacher–student interactions were analyzed and categorized into two primary structures: IRE (Initiation–Response–Evaluation) and IRF (Initiation–Response–Feedback).

At the beginning of the lessons (L1), the teacher predominantly employed the IRE structure to rapidly assess students' basic understanding of decimal concepts, as illustrated in Table 2 (a).

Table 2
Example of IRE Interaction: Confirming Decimal Reading

Speaker	Dialogue
T	So, what is two-tenths?
SS	0.2
T	Is one-tenth equal to 0.1?
SS	Yes.

Note. T = Teacher; SS = Students responding in unison.

This type of interaction shows the teacher using direct questioning and evaluation to swiftly gauge students' prior knowledge. As the lessons progressed (L2–L3), the proportion of IRF structures increased, particularly during game-based activities. The teacher utilized follow-up questions to guide discussions on strategies, reasoning, and conceptual understanding, as illustrated in Table 3.

Table 3
Example of IRF Interaction: Confirming Equal Division

Speaker	Dialogue
T	How do you know that each part is equal, S1?
S1	Because there are lines drawn on it.
T	Right, and how do you know each part is really equal? S2, how do you know?
S2	Because when you draw it out, you can see exactly 10 parts.

Note. T = Teacher; Sx = Individual Student.

Observations from Lessons L4–L5 indicated a more frequent and in-depth use of the IRF structure, where the teacher engaged students in multi-turn dialogues that extended reasoning and conceptual elaboration. Overall, a trend emerged wherein the teacher gradually shifted from predominantly IRE interactions to more IRF-based interactions, demonstrating flexible adaptation of discourse strategies according to different instructional stages.

Characteristics of IRE Interactions

This study further analyzed the IRE (Initiation–Response–Evaluation) interactions observed across the five MGA lessons, identifying the following instructional functions and features: First, the IRE structure enabled the teacher to quickly verify students' foundational understanding during the early stages of instruction. Typically, the teacher posed closed questions, eliciting single correct answers, followed by immediate evaluative confirmation, as seen in Table 2. IRE structures frequently appeared in whole-class questioning or rapid

checks with individual students, facilitating efficient monitoring of conceptual readiness and maintaining the instructional pace, as shown in Table 4.

Table 4
Example of IRE Interaction: Whole-Class Check

Speaker	Dialogue
T	Is writing 1.0 acceptable?
SS	Yes.
T	Is writing zero point ten acceptable?
SS	No.

Note. T = Teacher; SS = Students responding in unison.

From a longitudinal perspective, the highest frequency of IRE interactions occurred in the first lesson (L1), primarily for checking prior knowledge of decimal concepts. As the lessons progressed into game activities and strategic discussions (L2–L5), the frequency of IRE interactions declined, gradually being replaced by more exploratory IRF structures.

In summary, the IRE structure is characterized by its simplicity, directness, and efficiency, making it suitable for knowledge confirmation and error diagnosis. However, it provides limited opportunities for deeper reasoning or conceptual exploration and may not adequately support students' active mathematical understanding.

Characteristics of IRF Interactions

The study also analyzed the characteristics and effects of IRF (Initiation–Response–Feedback) interactions observed during the lessons: First, follow-up questioning (“Follow-up”) within the IRF structure emerged as a key strategy for extending students’ thinking. Through reflective prompts and requests for elaboration, the teacher fostered deeper conceptual understanding and enhanced students’ language articulation skills. An example from a discussion on ensuring equal division is shown in Table 5.

Table 5
Example of IRF Interaction 1: Ensuring Equal Division

Speaker	Dialogue
T	How do you know that each part is equal, S1?
S1	Because there are lines that you can draw.
T	Since there are lines, how do you know they divide it equally? S2?
S2	Because if you draw the lines, it splits into exactly 10 parts.

Note. T = Teacher; S = Individual Student.

Through such follow-up questioning, the teacher encouraged students to not only answer but also reason and support their explanations with observational evidence.

Second, the teacher employed diverse responsive strategies within the IRF structure, including further questioning, providing additional information, challenging students' reasoning, and offering extended examples. For instance, during an activity comparing decimal magnitudes, the teacher used sustained probing to deepen students' understanding of place value, as shown in Table 6.

Table 6
Example of IRF Interaction 2-Understanding the Importance of Place Value

Speaker	Dialogue
T	Why is it that if the whole number is larger, the tenths-place comparison doesn't matter? Like between 3.8 and 4.3—is 3 smaller than 4?
SS	Yes.
T	So, 4 must be larger! Then why don't we need to compare the tenths if the whole number is different? S1?
S1	Because ten tenths make one whole number.
T	Very good. Now, what if the tenths digit is 9? Could it be larger than the whole number? S2?
S2	No, because even 9 tenths would not exceed 10, so the whole number is still more important.

Note. T = Teacher; Sx = Individual Student.

Such interactions demonstrate how the teacher scaffolded layered reasoning and deepened students' understanding of the decimal place value system. Overall, the use of the IRF structure created an open and inquiry-oriented classroom atmosphere. Students were not only expected to answer questions but also to explain their reasoning, correct misconceptions, and construct new understandings. In the context of game-based learning, IRF interactions effectively supported students' self-directed exploration and knowledge construction.

Summary

Through conversation analysis (CA) of the five MGA decimal lessons (L1–L5), the following major findings were identified: First, the interaction pattern in the classroom showed a developmental shift from IRE (Initiation–Response–Evaluation) to IRF (Initiation–Response–Feedback) structures. In the early phase (L1), the teacher primarily used the IRE structure with closed-ended questions and immediate evaluation to quickly check students' grasp of fundamental decimal concepts. However, the depth of interaction in IRE was limited, often constrained to confirming correct answers rather than fostering higher-order reasoning.

As the lessons progressed into game-based activities and conceptual applications (L2–L5), the use of IRF structures increased. Through follow-up questioning, the teacher extended student thinking, promoted reasoning, and facilitated deeper conceptual elaboration. The use of IRF not only increased students' opportunities for verbal expression and strategy explanation but also nurtured a more open and inquiry-driven classroom environment.

Overall, the teacher demonstrated flexibility in adapting discourse strategies according to instructional phases and learning objectives, showcasing proficient language scaffolding techniques. The MGA modules, with their game-based learning design, further facilitated students' transition from passive responders to active explorers, enhancing both conceptual depth and engagement in decimal learning. The findings from this chapter provide empirical evidence on how teacher–student interactions can support conceptual development in mathematics classrooms and offer practical implications for optimizing classroom dialogue strategies.

Conclusions

Research Summary

This research adopted a qualitative case study methodology and applied conversation analysis (CA) to explore the dynamics of teacher–student discourse and its influence on third-grade students' understanding of decimal concepts during the implementation of Mathematics Grounding Activities (MGA). The key findings are summarized as follows:

First, the progression of classroom interaction patterns revealed a noticeable shift from the IRE (Initiation–Response–Evaluation) structure to the IRF (Initiation–Response–Feedback) structure. In the early stages of instruction, the teacher predominantly utilized IRE sequences to pose closed-ended questions followed by swift evaluations. This pattern proved efficient in gauging students' baseline comprehension of decimals and maintaining instructional momentum. Nevertheless, such exchanges often limited students' opportunities to engage in extended reasoning or construct their own understanding.

Second, as the lessons transitioned into phases emphasizing game-based exploration and strategic discussion, the teacher increasingly adopted the IRF pattern. Through probing follow-up questions and responsive feedback, students were encouraged to explain their strategies, examine alternative perspectives, and refine their conceptual frameworks. This shift fostered a more dialogic and inquiry-driven learning environment, supporting the development of students' mathematical language, logical reasoning, and deeper conceptual insight. Learners engaged through IRF interactions demonstrated greater autonomy in meaning-making and showed more active participation in collaborative problem-solving.

Third, the teacher's ability to adapt interactional strategies according to instructional intent and student response demonstrated pedagogical responsiveness and a keen awareness of students' evolving learning needs. The design of MGA—centered around game-based tasks and hands-on manipulation—further enriched the nature of classroom dialogue. These interactive elements supported students' transformation from passive recipients of information to active inquirers, facilitating the internalization of abstract decimal concepts through embodied and meaningful learning experiences.

In conclusion, this study highlights several implications for mathematics instruction: While IRE exchanges can be instrumental in assessing foundational knowledge, over-reliance on such patterns may constrain deeper student engagement. In contrast, the IRF structure offers a more generative space for learners to articulate reasoning, explore strategies, and consolidate conceptual understanding. Moreover, aligning flexible discourse strategies with interactive, game-based pedagogies can enhance student engagement, foster conceptual growth, and support the development of mathematical thinking in elementary classrooms. These findings provide practical insights for designing discourse-rich mathematics lessons and contribute empirical evidence to support the integration of inquiry-based teaching practices.

Practical Implications for Teaching

Based on the analysis of classroom interaction structures during Mathematics Grounding Activities (MGA) in a third-grade mathematics class, the following practical suggestions are proposed for instructional practices and classroom interaction design:

Appropriate Use of IRE Structures to Confirm Basic Conceptual Understanding

At the early stages of a lesson or when introducing new concepts, teachers can appropriately utilize the IRE (Initiation–Response–Evaluation) structure to conduct closed-ended questioning, allowing for a rapid assessment of students' foundational knowledge. Through efficient questioning and immediate evaluation, teachers can adjust instructional pacing to ensure that lesson progression is built on a solid conceptual foundation. However, it is recommended that teachers avoid relying excessively on unidirectional questioning and monitor student engagement to prevent interactions from becoming superficial.

Active Development of IRF Structures to Foster Deep Thinking and Conceptual Construction

As instruction moves into hands-on activities, strategic discussions, or conceptual application stages, teachers should consciously shift toward the IRF (Initiation–Response–Feedback) interaction structure. By posing follow-up questions, teachers can guide students in reasoning, explanation, and conceptual elaboration. Designing inquiry-based questions, encouraging

multiple rounds of student responses, and offering supplementary information or challenging prompts can help students connect concrete experiences with abstract mathematical concepts. This approach supports the development of mathematical language, critical thinking, and autonomous learning skills.

Integrating Game-Based Learning to Promote Natural and Rich Interactions

The findings suggest that incorporating game elements into mathematics instruction, such as the MGA Decimal Decomposition Game, can effectively enhance students' learning motivation and interaction engagement. Teachers are encouraged to design activities that combine concrete manipulation, rule-based gameplay, and challenging scenarios, creating opportunities for natural discussion and deeper thinking. Through active participation, students can progressively construct mathematical concepts in an engaging and meaningful context.

Strengthening Teacher Training on Interaction Strategies to Improve Classroom Quality

The study also highlights that teachers' sensitivity to interaction structures and their strategic adjustments play a crucial role in promoting student learning. It is recommended that schools and educational institutions incorporate training on interaction structures (e.g., IRE/IRF analysis) into professional development programs. Such training can help teachers understand the impact of different interaction models on learning processes and cultivate their ability to flexibly apply questioning and feedback strategies, thereby enriching classroom discourse and enhancing instructional effectiveness.

Research Limitations and Future Directions

Research Limitations

This study focused on a single case in a third-grade public elementary school classroom in Taipei, examining the characteristics and progression of teacher–student interaction structures during Mathematics Grounding Activities (MGA). While the qualitative data collected offer rich and in-depth insights, several limitations must be acknowledged:

First, the research sample was limited to one class and one teacher, with specific student demographics. As such, the generalizability of the findings to other regions, grade levels, or instructional cultures remains limited.

Second, the instructional content was confined to decimal concepts and based on a specific MGA module—the Decimal Decomposition Game. Therefore, the observed interaction structures and student behaviors may be influenced by the unique nature of the mathematical content and instructional design, and may not be directly transferable to other mathematical topics such as geometry or algebraic reasoning.

Third, the study adopted qualitative conversation analysis as its primary method. While this approach emphasizes the detailed portrayal and interpretation of interactive processes, it did not incorporate quantitative measures of student learning outcomes (e.g., pre- and post-tests). Consequently, the direct correlation between interaction structures and student achievement should be interpreted with caution.

Future Research Directions

In light of the above limitations, several directions for future research are proposed:

First, future studies could expand the sample to include diverse school settings, grade levels, and teacher backgrounds, enabling cross-case comparisons that reveal both commonalities and differences in teacher–student interactions. Such research would enhance the generalizability and practical relevance of the findings.

Second, researchers may explore interaction structures across various mathematical domains—such as fractions, ratios, or algebraic reasoning—as well as in different instructional formats, including inquiry-based or project-based learning. This could clarify how content-specific features influence interaction patterns and discourse strategies.

Third, future studies are encouraged to integrate both qualitative and quantitative methods. For example, analyzing interaction frequency, administering conceptual assessments, and tracking learning outcomes can provide more comprehensive evidence of how specific interaction structures impact reasoning skills, conceptual understanding, and achievement.

Finally, further research could investigate the development of teachers' interactive strategies over time, particularly how they transition from IRE to IRF patterns. This line of inquiry could shed light on the relationship between teacher professional development and long-term student learning outcomes, highlighting the role of teacher discourse expertise in fostering meaningful classroom interactions.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

In the preparation of this manuscript, generative artificial intelligence (AI) tools and AI-assisted technologies were employed to support language refinement, improve readability, and ensure clarity of expression. All intellectual contributions, including the research design, data interpretation, and conceptual development, were made independently by the author.

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The Study of Needs Assessment to Develop the Resilience of Pre-service Teachers

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Abstract

The purpose of this research was to assess and prioritize the needs to develop the resilience of pre-service teachers.1) For qualitative research, the needs assessment on resilience was conducted by using an in-depth interview and focus group. The key informants for the interview were expert teachers, university advisors totaling 7 persons. The key informants for the focus group were 9 pre-service teachers who studied in the 4th year of Bachelor of Education in Srinakharinwirot University, Bangkok, Thailand. 2) For quantitative research, the data were collected by using the questionnaire about needs assessment on resilience. The sample consisted of 256, 4th year pre-service teachers. The qualitative data were analyzed by content analysis, while the quantitative data were analyzed by mean, standard deviation, and modified priority needs index (PNImodified). The results from qualitative study showed that the pre-service teacher at present needed the enhancement in resilience, especially in the Problem management. This was in accordance with the quantitative research that the level of Problem management of the pre-service teacher in the actual condition aspect was lower that he expected condition. When considering the priority of needs in each component, the component that mostly needs development was the Problem management, followed by the Emotional stability, and Encouragement, respectively.

Keywords: needs assessment, resilience, pre-service teachers

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Introduction

In 2019, the Office of the Higher Education Commission of Thailand issued the **Undergraduate Qualification Framework for Education and Teacher Education Programs (4-Year Curriculum)**. This framework was established to guide higher education institutions in developing or revising their curricula and instructional practices to ensure the quality and standardization of graduates. According to the framework, students enrolled in teacher education programs are required to engage in **at least one year of teaching practice** at an educational institution (Office of the Higher Education Commission, 2019).

During the teaching practicum at educational institutions, pre-service teachers are expected to engage in a variety of professional activities. These include meeting with school administrators for an initial introduction and orientation, receiving work assignments, developing instructional plans, conducting classroom teaching, and fulfilling assigned duties. Throughout the practicum, pre-service teachers undergo evaluations and are encouraged to revise, improve, and develop their work based on feedback from school administrators, mentor teachers, and supervising lecturers.

Upon completion of the practicum, pre-service teachers are required to submit essential documentation, including course outlines, lesson plans, teaching portfolios, and research reports. They must also participate in a seminar organized by their university as part of the practicum completion process. It is evident that pre-service teachers are assigned a substantial workload during their teaching practicum in educational institutions. In addition to instructional responsibilities, they are also expected to collaborate and communicate effectively with various school stakeholders, including teachers, parents, and students.

Pre-service teachers are also required to adapt to various individuals and the dynamic environment within the school. This includes adjusting to the school's culture, norms, and professional relationships, which are essential for effective teaching and learning during the practicum period. As a result, pre-service teachers may experience stress and anxiety due to the heavy workload associated with their responsibilities. These include teaching students in the classroom, managing classroom behavior, creating instructional materials, and preparing various documents. Additionally, this pressure may lead to a lack of self-confidence and feelings of discouragement.

A critical factor in supporting students' mental well-being is **resilience**, which refers to the ability to bounce back from adversity and continue living with a sense of well-being is a key aspect of resilience. People can demonstrate resilience even in stressful and neglectful environments (Turner, 2000). Additionally, **resilience** protective role in preventing the loss of mental health when faced with uncontrollable events. It helps safeguard individuals and their families from mental health issues, such as depression, stress, anxiety, and other psychiatric conditions. Moreover, resilience also aids in preventing physical health problems that may arise from stress, including heart disease, hypertension, and diabetes (Department of Mental Health, 2020).

Srinakharinwirot University, Thailand, is an institution dedicated to teacher education with roots in the Higher Teacher Training School and the Faculty of Education. The university has long established a foundation in progressive education to promote democratic society in Thailand for over half a century. Teacher training for basic education is a vital part of the “reform of educational sciences.” This reform is not limited to the Faculty of Education but

also includes other faculties involved in teacher production, such as the Faculty of Science, Faculty of Humanities, Faculty of Social Sciences, Faculty of Physical Education, and Faculty of Fine Arts (Srinakharinwirot University, 2018).

Therefore, to ensure that the reform of educational sciences at Srinakharinwirot University is based on sound data leading to effective planning and development strategies that align with the current situation and meet the needs of the organization, the researcher believes it is necessary to assess the needs and prioritize the requirements of pre-service teachers in developing **resilience** by examining three areas: problem management, encouragement, and emotional stability. The findings will provide relevant organizations or stakeholders with essential information for planning activities, projects, or workshops designed to enhance resilience in pre-service teachers in each of these areas. This will lead to the development of effective plans and actions to fully address the identified needs.

Research Objective

To assess and prioritize the needs to develop the resilience of pre-service teachers.

Research Methodology

Key Informants and Sample

1. The key informants for the interviews were 7 supervising lecturers for the Bachelor of Education programs. The participants consisted of six faculties: Faculty of Education, Faculty of Science, Faculty of Humanities, Faculty of Social Sciences, Faculty of Physical Education, and Faculty of Fine Arts.
2. In addition to the key informants, a focus group discussion was conducted with 9 pre-service teachers studied in the 4th year who had already completed their teaching practicum in schools. These participants voluntarily participated in the focus group discussion, having expressed a willingness to share their experiences and perspectives.
3. The sample consisted of 4th year pre-service teachers in the Bachelor of Education program at Srinakharinwirot University during the 2024 academic year. A total of 256 students participated in the study, representing six faculties: 59 students from the Faculty of Education, 24 from the Faculty of Social Sciences, 28 from the Faculty of Humanities, 68 from the Faculty of Science, 52 from the Faculty of Physical Education, and 25 from the Faculty of Fine Arts.

Data Collection Instruments

The study adopts a qualitative research approach with the following data collection instruments:

1. To collect in-depth qualitative data, the researcher employed a semi-structured interview designed for supervising lecturers who oversee pre-service teachers during their teaching practicum. The purpose of the interview was to explore the challenges, stressors, and developmental needs related to building resilience among pre-service teachers. The interview content focused on three core dimensions of resilience: problem management, encouragement, and emotional stability. The results of the IOC (Index of Item-Objective Congruence) analysis indicated that the interview topics had IOC values ranging from 0.67 to 1.00.

2. The focus group discussions were designed to explore the experiences and developmental needs of pre-service teachers in relation to their resilience during the teaching practicum. The discussion framework was structured around three key domains of resilience, namely problem management, encouragement, and emotional stability and Pre-service teachers should be guided to prioritize the essential needs required for developing resilience. The results of the IOC (Index of Item-Objective Congruence) analysis indicated that the items discussed in the focus group had IOC values ranging from 0.67 to 1.00.
3. The instrument used in this study was a questionnaire designed to assess the needs for resilience development among pre-service teachers. The questionnaire employed a 5-point Likert scale and measured both the Actual and the Expected of resilience. It covered three core dimensions: Problem Management, Encouragement, and Emotional Stability. The questionnaire consisted of 35 items in total and was adapted from the original assessment tool developed by the Department of Mental Health, Ministry of Public Health (Department of Mental Health, 2019). The results of the discriminant power analysis for the questionnaire indicated values ranging from 0.29 to 0.98. Additionally, the questionnaire exhibited a Cronbach's Alpha coefficient of 0.86.

Data Analysis

1. The researcher employed content analysis to examine the data obtained from interviews and focus group discussions. The analysis focused on identifying key issues, such as the stress experienced by pre-service teachers during their teaching practice, and the needs for resilience development among pre-service teachers. This approach aimed to gain insights into the challenges faced by pre-service teachers and their needs for enhancing their ability to cope with various teaching situations.
2. The researcher conducted a quantitative data analysis using descriptive statistics, including percentage, mean, and standard deviation. Additionally, the Modified Priority Needs Index (PNImodified) was employed to prioritize the needs. This method involves calculating the difference between the expected condition (I) and the current condition (D), divided by the current condition (D), using the formula PNImodified = (I − D) / D (Wongwanich, 2015, p. 279).

Research Results

Qualitative Research Findings

The results of the interviews with supervising lecturers revealed that all participants agreed on the significance of resilience for pre-service teachers. The pre-service teachers often experience stress, anxiety, and pressure during their teaching practicum, stemming from both their workload responsibilities and interpersonal interactions within the school environment. It was suggested that promoting or developing resilience would help pre-service teachers manage their emotions, adapt to challenges, and recover from stressful circumstances. This would enable them to overcome difficulties and return to their normal functioning more effectively. In addition, the supervising lecturers prioritized the needs for promoting or developing resilience. Among the various components of resilience, problem management was identified as the most important area requiring development. Problem management refers to the pre-service teachers' ability to identify and address problems that arise during their practicum. This competency involves recognizing issues encountered during teaching

practice, analyzing the root causes, developing appropriate solutions, and implementing preventive strategies to avoid recurrence. Enhancing this skill is seen as a key component in strengthening pre-service teachers' resilience.

The results of the interviews revealed that pre-service teachers faced several challenges:

1) Stress and Anxiety from managing heavy workloads and adapting to a new role with high expectations. One participant shared, "We are afraid of not teaching well and of not helping students understand."
2) Classroom Management Issues were experienced by many pre-service teachers, particularly in managing student behavior, especially in large classrooms. Maintaining emotional control and discipline within the classroom was a significant challenge. One participant stated, "Classroom control is very difficult when the students don't listen and make noise."
3) Lack of Self-Confidence: Some pre-service teachers expressed feelings of insecurity in their teaching abilities or confusion when planning lessons. One participant noted, "Sometimes I'm not sure if the content I teach will be understood by the students."
4) High Expectations from Supervising Teachers: Supervising teachers often had high expectations for pre-service teachers' performance, which could lead to pressure and discomfort, preventing them from fully demonstrating their potential. One participant remarked, "Supervising teachers expect us to perform well all the time, which makes us feel stressed."
5) Lack of Communication Skills: Communication with students and clearly explaining content were noted as difficulties for some pre-service teachers, particularly when dealing with students of varying abilities and skills. One participant said, "Sometimes, I don't know how to explain things in a way that students can easily understand."
6) Time Management: Some pre-service teachers struggled with time management, which hindered their ability to prepare lessons effectively or to complete assessments on time. One participant commented, "Sometimes I don't finish my homework because I have too much preparation for teaching."
7) Lack of Support**:** Some pre-service teachers felt that they lacked support from supervising teachers or colleagues, which led to feelings of isolation during their practicum and a lack of confidence in decision-making. One participant mentioned, "Sometimes, I want to ask my supervising teacher for advice, but I'm unsure if I will receive the support I need."

Furthermore, the pre-service teachers prioritized the development of resilience, with a particular emphasis on problem management. Problem management is a critical process in developing resilience in individuals or organizations. This process enables the identification and resolution of issues quickly, enhancing flexibility in adapting and recovering from challenging situations. It also strengthens decision-making skills and reduces stress, helping individuals feel more confident and better equipped to handle challenges effectively. These aspects are crucial in fostering long-term, sustainable resilience. For example 1) pre-service teachers who face challenges in classroom management can utilize problem analysis to reduce stress and find effective solutions. This may involve adjusting lesson plans or seeking advice from supervising teachers to improve their approach. 2) pre-service teachers experience high levels of pressure, particularly when being evaluated by supervising teachers. Strategies to address this include effective time management to avoid stress from lesson preparation or other tasks, engaging in relaxation activities to alleviate stress and creating a support system with fellow pre-service teachers and supervising teachers for sharing experiences and advice.

Quantitative Research Findings

The results of the assessment of pre-service teachers' needs for developing resilience, based on a survey conducted with 256 students, are presented in the table below.

Table 1
Needs Assessment for Developing Resilience in Pre-service Teachers

Resilience	Expected average (I)	Actual average (D)	PNImodified (I-D)/D	Sequence
Problem management	4.45	3.16	0.41	1
Encouragement	4.31	3.28	0.31	3
Emotional stability	4.25	3.19	0.33	2

From the table, when considering the essential needs for developing resilience in pre-service teachers based on the analysis of the Modified Priority Needs Index (PNImodified), it was found that problem management had the highest priority index value (0.41), followed by emotional stability (0.33) and encouragement (0.31), which ranked third in terms of priority.

The research findings can be visualized in a graph, as shown in the figure.

Figure 1
Results of the Examined Expected and Actual of Pre-service Teachers' Resilience

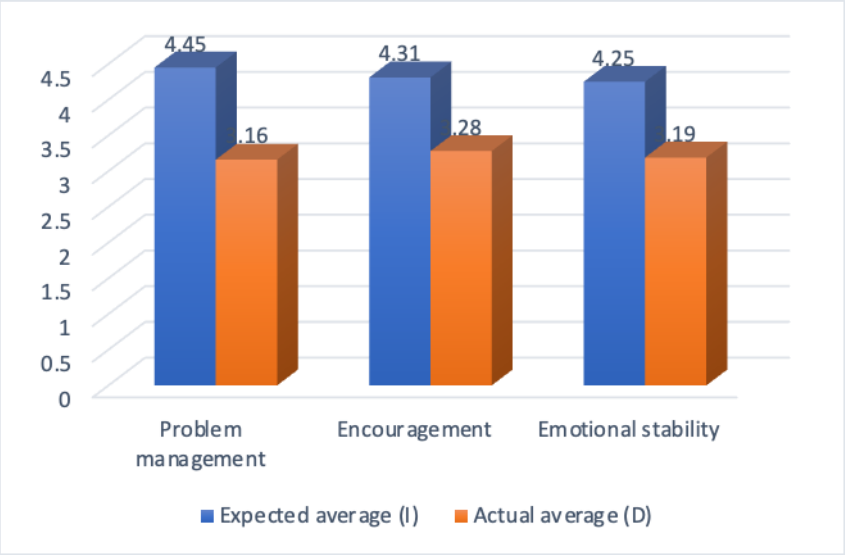
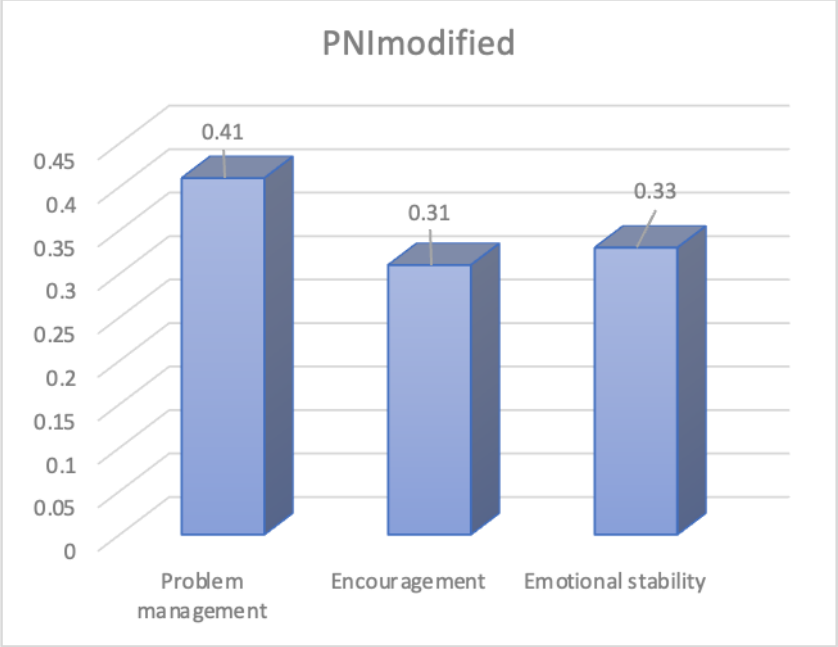


Figure 2
Results of the Needs (PNImodified) to Develop the Resilience of Pre-service Teachers



Research Conclusion

1. The qualitative study showed that the pre-service teacher at present needed the enhancement in resilience, especially in the problem management.
2. The quantitative research findings from questionnaire revealed that pre-service teachers' problem management in actual conditions was lower than expected. Among the prioritized needs, problem management required the most development, followed by emotional stability and encouragement.

Research Discussion

The results of both qualitative and quantitative research indicate that pre-service teachers have a significant need to develop resilience, with a primary focus on improving problem management, followed by emotional stability and encouragement in that order. Problem management is a crucial skill for pre-service teachers as it aids in developing the ability to handle various challenges that arise during the teaching process. Learning problem management enhances skills such as decision-making, establishing positive relationships in the classroom, self-confidence, flexibility in adjusting teaching strategies, and resilience in recovering from failures. The development of these skills will contribute to their effectiveness as teachers, enabling them to solve problems and improve their teaching approaches in the future (Goleman, 1995).

Strategies for Developing Problem Management Skills in Pre-Service Teachers (Fletcher 2010; Masten, 2001):

1) Handling Unexpected Situations: Pre-service teachers often encounter unpredictable situations, such as dealing with students who exhibit challenging behavior or encountering unexpected events in the classroom. Problem management enables pre-service teachers to handle these situations effectively without losing confidence.

2) Decision-Making Skills: Pre-service teachers need to make appropriate decisions to solve problems, such as determining the best teaching method for students with diverse needs or resolving issues that arise during instruction.
3) Building Self-Confidence: Developing problem management skills helps pre-service teachers manage challenges more effectively, which boosts their confidence in teaching and allows them to adapt more easily to different situations.
4) Building Positive Teacher-Student Relationships: Pre-service teachers can creatively resolve problems or conflicts with students, which helps build positive relationships and enhances the learning environment.
5) Learning and Developing Flexibility: Pre-service teachers must be able to adapt to unexpected situations, such as adjusting teaching strategies when challenges arise in the classroom. Problem management helps them develop flexibility in teaching and adjusting strategies to achieve the best outcomes.
6) Recovery from Failure: When problems or failures occur during teaching, pre-service teachers can learn from these experiences and refine their methods for future teaching.

Emotional stability refers to the ability to regulate emotions and manage stress or difficult situations in an appropriate and effective manner. Emotional stability is especially important for pre-service teachers, as they often face numerous challenging and complex situations in the classroom. The ability to control emotions helps pre-service teachers manage stress, anxiety, and various challenges that may arise. Pre-service teachers with emotional stability can maintain self-control, even in stressful situations. For example, when students exhibit inappropriate behavior, maintaining calm and not reacting emotionally can help improve the situation and allow for thoughtful, impartial decision-making.

Encouragement is a form of emotional and psychological support that enhances confidence, expressiveness, and resilience among pre-service teachers. During their practicum, pre-service teachers often experience anxiety; however, receiving encouragement from mentors or colleagues can significantly boost their confidence in decision-making and self-expression. Additionally, positive reinforcement such as praise, understanding, or even short encouraging remarks can substantially reduce stress levels. Encouragement helps pre-service teachers believe that “they can do it” and fosters a willingness to learn from mistakes—an essential factor for continuous development. When student teachers feel accepted and valued, they tend to form a positive self-image as future educators and are more likely to pursue a long-term teaching career (Ryan & Deci, 2000).

Recommendation

Recommendations for Teacher Education and Stakeholders:

1. Developing pre-service teachers at Srinakharinwirot University in problem management should be prioritized, as students identified it as their most needed competency.
2. Teacher education stakeholders in each faculty should design competency development activities that align with the specific characteristics and needs of their students, in order to effectively address their essential developmental needs.
3. Teacher education stakeholders analyzed the causes of pre-service teachers’ needs for resilience development to inform policy and practice by identifying appropriate strategies to support resilience-building efforts.

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The Development of Publication and Grant System: College of Arts, Media and Technology, Chiang Mai University

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Abstract

This study examines the impact of the Publication and Grant System on the efficiency of university lecturers and academic staff, emphasizing its role in improving institutional processes. The primary objective of the system is to support academic staff by streamlining workflows, reducing administrative burdens, and enabling faster management of funding applications and research-related tasks. While the system is not designed directly for student use, its improvements in staff efficiency ultimately enhance the support provided to graduate students in their research and publication efforts. The Publication and Grant System addresses delays inherent in traditional workflows by centralizing document submission, enabling real-time status tracking, and automating verification processes. Findings show that the system reduced processing times by up to 50%, allowing academic staff to handle tasks more efficiently. This enhanced workflow enables staff to allocate more time to their core responsibilities, such as research guidance, mentoring, and administrative decision-making, thereby indirectly benefiting graduate students by accelerating institutional support for their academic progress. Key factors driving these improvements include automation of repetitive tasks, centralized data access, and enhanced transparency in workflow tracking. The system also minimizes errors, reduces manual workload, and ensures a more streamlined research management process. This study demonstrates that implementing digital tools like the Publication and Grant System enhances institutional efficiency, improves research outcomes, and creates a supportive academic environment by empowering staff to perform their roles more effectively.

Keywords: publication and grant system, academic staff efficiency, workflow automation, research management, institutional support

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Introduction

In higher education institutions, research and publication are key supports that contribute to academic excellence, institutional reputation, and general impact. At the same time, managing research activities and grant applications often involves time consuming administrative procedures, complex documentation, and fragmented communication. These challenges can limit the time academic staff have for their core responsibilities research, teaching, and student supervision. Recognizing these limitations, the College of Arts, Media and Technology (CAMT), Chiang Mai University, initiated the development of the Publication and Grant System to address inefficiencies and support academic staff in their research management duties.

The system was designed in response to growing demands for a more transparent, efficient, and supportive environment for research development and funding processes. Previously, academic and administrative staff relied heavily on paper-based workflows or uncoordinated digital tools, which caused frequent delays, unclear status tracking, and an increased risk of human error. These limitations not only impacted the speed of internal approval processes but also placed a substantial load on staff who needed to manually follow up on multiple stages of document verification and grant application workflows.

The Publication and Grant System serves as a digital platform that centralizes research-related processes such as document submission, project tracking, and progress reporting. By streamlining these tasks and reducing manual interventions, the system supports academic staff in managing their responsibilities more effectively. Although the system is not directly used by students, the resulting improvements in staff efficiency contribute to faster supervision, better feedback quality, and more timely support for student-led research projects.

This paper aims to explore the design, implementation, and impact of the Publication and Grant System at CAMT. Specifically, it examines how the system has improved administrative workflows, reduced processing times, and enhanced transparency in research and grant management. The structure of the paper is as follows: Section 2 reviews relevant literature on digital research management systems; Section 3 presents the system design and methodology; Section 4 discusses results and findings; Section 5 provides an analysis of the system's institutional impact; and Section 6 concludes with key takeaways and directions for future development.

Literature Review

The adoption of digital Publication and Grant Management Systems in universities has significantly improved academic staff efficiency and institutional performance. These systems automate administrative tasks, and centralize data to focus on research and student mentorship. Jameel and Ahmad (2020) showed that such digital tools in Iraq's universities enhance research productivity by reducing time spent on manual tasks.

Mofoluso and Okpala (2024) emphasized the role of efficient grant management in institutional sustainability, citing improved reporting accuracy and reduced errors. Similarly, Ghabban et al. (2018) proposed that IT-enabled knowledge-sharing systems improve research collaboration and staff engagement in Saudi universities. Complementing this, Dzandza

(2020) highlighted how digitizing scholarly outputs through institutional repositories boosted visibility and streamlined publication processes.

Putra et al. (2024) found that digital e-services enhanced research and community engagement activities, improving lecturer performance and reducing administrative burdens. Access to digital databases also contributes to research outcomes. Adetomiwa (2020) reported that electronic resource usage strongly predicts research productivity in Nigerian private universities.

Digital workflows extend beyond academics. Ikaka et al. (2025) observed that centralized digital systems improved administrative efficiency in non-academic departments, enhancing overall institutional operations. This supports Rafi et al.'s (2022) findings, where digital integration under knowledge management frameworks improved service quality and staff coordination in academic libraries.

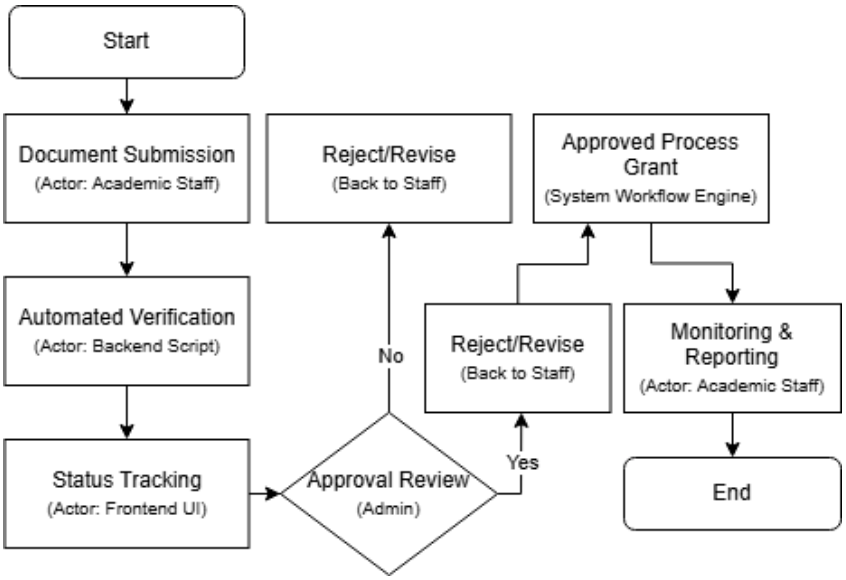
The institutional culture also affects digital adoption outcomes. Indiya et al. (2021) concluded that positive organizational culture enhances the effectiveness of digital quality management systems, increasing performance in Kenyan universities. Finally, Ghabban et al. (2015) linked publication productivity to the efficient use of digital systems, identifying barriers in traditional workflows that digital platforms help resolve.

Research Methodology

This study employed a design and development research (DDR) methodology to guide the creation and evaluation of the Publication and Grant System at the College of Arts, Media and Technology, Chiang Mai University. The main objective of this methodology was to develop a functional digital system that responds directly to the operational needs and challenges faced by academic and administrative staff. The research process was divided into three main phases: problem identification, system design and development, and system evaluation. This structured approach allowed the researchers to not only understand the context of existing workflows but also to implement improvements based on real user needs and measure the impact of those improvements.

In the initial phase, researchers gathered information about existing submission processes for research publications and grant applications through interviews and observations with academic staff, administrative officers, and committee members. The analysis revealed various problems such as delays, lack of status tracking, repeated document revisions due to incomplete information, and unclear communication between departments. Based on these insights, a digital workflow was designed to address these inefficiencies, focusing on automation, role clarity, and decision routing.

Figure 1
The Overall System Workflow



The overall system workflow is illustrated in Figure 1. The flowchart represents the process from the submission of documents to the final monitoring and reporting stage. The workflow begins with document submission by academic staff and continues through an automated verification step. This is followed by status tracking, where users can monitor the progress of their submissions. A key part of the process is the decision-making step labeled "Approval Review," which is displayed in the diagram using a diamond shape, in line with standard software engineering notation. From this decision node, two directional paths emerge: the "Yes" path leads to the approval process, where funding or support is granted; the "No" path leads to a revision process, directing the submission back to the academic staff for correction or improvement. This decision-routing structure reflects a core logic of the system, ensuring that every submission receives clear feedback and follows a transparent path toward either revision or approval. The final stages involve monitoring and reporting, which support follow-up and institutional accountability.

The system was implemented as a web-based application integrating both frontend and backend components. The frontend was developed to offer a user-friendly interface for academic staff to submit documents and track approval statuses. Meanwhile, the backend handled the core logic, including task automation, document verification, and system driven notifications. The design ensured that different user roles interacted with the system in distinct and efficient ways. Academic staff focused on submissions and revisions, administrative reviewers handled approvals, and the system itself managed the routing, validation, and record keeping processes.

To evaluate the effectiveness of the system, data were collected from system logs, user surveys, and observations of task completion in actual use cases. Processing times before and after system implementation were analyzed to determine efficiency improvements. In addition, qualitative feedback was gathered from academic and administrative users to assess the system's usability and perceived benefits. These findings are presented in the next section and used to measure the impact of the system on institutional operations.

Results & Discussion

Following a full semester of operation, the Publication and Grant System demonstrated clear, measurable benefits in key performance indicators. Table 1 summarizes two primary metrics: average processing time and technical rejections per semester, both before and after system deployment.

Table 1
System Implementation Results

Metric	Before Implementation	After Implementation	Improvement
Average processing time (working days)	10	5	50% reduction
Technical rejections (per semester)	15	3	80% reduction

The reduction in average processing time from ten working days to five was driven largely by the automation of document verification and real-time status notifications, eliminating the need for manual follow ups. Similarly, the 80% drop in technical rejections reflects the effectiveness of built-in error checking at submission, which flags missing files or incorrect formats immediately. Qualitative feedback from 37 academic staff members corroborated these findings: users reported greater confidence in the submission process and appreciated the transparent routing of decisions, as depicted in the flowchart (Figure 1).

Administrative staff also noted secondary benefits. The centralized dashboard simplified concurrent management of multiple submissions, reducing file misplacement and version confusion. Audit trails generated by the system provided clear logs of all actions, enhancing traceability during internal reviews. In addition, faster approvals led to more timely grant disbursements, aligning project start dates more closely with funding cycles and improving overall research planning.

Conclusion

The Publication and Grant System successfully addressed key challenges by implementing a clear decision logic at the Approval Review node illustrated in Figure 1 ensuring each submission follows a “Yes” or “No” path toward grant processing or revision. This routing accelerated throughput and reduced uncertainty, as reflected in the 50 percent decrease in processing time and 80 percent reduction in rejections (Table 1). Although senior users initially faced a learning curve mitigated by targeted training, overall satisfaction remained high. Future enhancements could include granular analytics of review times and integration with external funding databases, extending the system to student thesis submissions. These improvements would build on the current foundation, creating a scalable platform for continued innovation in research management at CAMT.

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Bridging Academia and Industry: A Triple-Win Strategy for Communication Education in Taiwan

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Abstract

Media convergence has blurred the boundaries between different media sectors. The rise of digital technologies and AI presents substantial challenges, demanding a transformation in Taiwan's journalism and communication education. Based on Albert Bandura's social learning theory and taking the Department of Mass Communication case at Chinese Culture University in Taiwan, this paper proposes a one-year experimental program in which the department will collaborate with several media companies to offer paid internship positions. This industry-academia collaboration project has received funding support of NT$800,000 (approximately USD24,000) from Taiwan's Ministry of Labor. It is estimated that 40 to 50 students will enroll in the courses, and among them, 15 undergraduate students from Chinese Culture University will be selected to work in the internship companies, including new, traditional media, and emerging tech companies. Furthermore, the companies have agreed to prioritize hiring those who perform well as future full-time employees. This study has significant academic and practical implications. First, it extends the applicability of social learning theory in Taiwan's context and communication education. Second, this industry-academia cooperation program offers students the opportunity to learn and accumulate experiences in two critical fields: the classroom and the workplace. This initiative marks a crucial milestone in communication education by bridging the gap between industry and academia. It also serves as a valuable reference model for advancing media education. Taiwan's experience can provide a valuable reference for countries with similarly competitive industrial environments requiring new generations of media professionals in communication education.

Keywords: social learning theory, industry-academia cooperation program, generative AI in education, internship effectiveness

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Introduction

In the post-pandemic era, people have begun to liberate themselves from confined spaces, and students have returned to campuses. However, following the pandemic, the education sector faces entirely new challenges. The so-called third wave of the communication revolution has arrived. Since the emergence of OpenAI in 2022, generative AI has become a sweeping trend, bringing a paradigm shift to industry and academia. The World Economic Forum (WEF) once pointed out that by 2025, 97 million new jobs will emerge, while 85 million jobs will disappear (Gregg, 2024). The changes in the skills required for work have quickly transformed from a vision of the future to a present reality.

During this period of transition, the media industry has been heavily impacted. According to media reports, the contemporary media industry continues to shrink. In January 2024 alone, hundreds of positions were cut by media organizations. Looking further back, the media sector lost over 20,000 jobs in 2023, marking the highest peak since 2009 (Becker, 2024).

Therefore, traditional media education requires an infusion of new energy. Increasingly, people need new skills to adapt to these transformative changes. First, in course design, developing new technologies and industrial transformations—such as AI, virtual reality, short video production, and the accompanying updates in industry and marketing concepts—necessitate entirely new curricula. Second, there is a shift in teaching concepts. According to Google's latest survey report, teachers were traditionally seen as gatekeepers of knowledge, focusing on one-way, passive, and static knowledge delivery. Teachers have now evolved into learning facilitators, promoting student-centered education and fostering active, enthusiastic engagement in the learning process (Google, 2024, p. 24).

Based on Albert Bandura's social learning theory, this study emphasized that people could learn more quickly by observing the behaviors of others in social contexts. The two most fundamental elements in this process are “speaking” and “listening.” which means that students should not be treated as passive recipients of information (Bok, 1988). The theory also highlights the reciprocal interaction among individuals, the environment, and behaviors, aligning closely with the transformation of contemporary teaching concepts.

Therefore, this study adopts the social learning theory and uses Chinese Culture University as the setting for a teaching experiment. By selecting suitable students and integrating external media resources, the study aims to bridge the gap between academic learning and practical application through courses and internship opportunities. This approach seeks to enhance student skills, achieving a triple-win scenario for the industry, academia, and students and fostering a positive cycle among individuals, the environment, and behaviors.

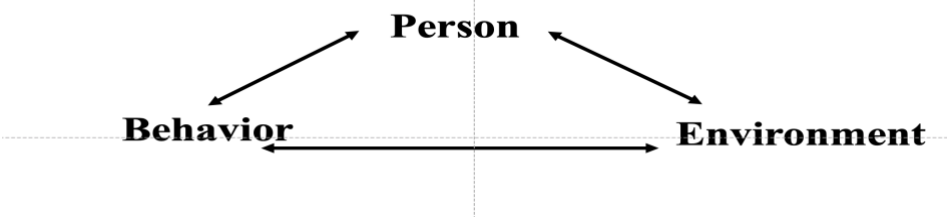
This teaching practice's industry-academia collaboration project is expected to make the following contributions. First, in terms of theoretical significance, it can extend the social learning theory to contemporary media education. Second, in terms of practical significance, by designing professional practice-oriented courses, students can gain practical experience through classroom instruction and hands-on practice, followed by internships in the industry. This approach not only cultivates talent for the media industry but also provides students with opportunities to apply their skills in the workplace. Thus, it contributes to the cultivation of contemporary communication professionals.

Literature Review

Social Learning Theory

Rotter proposed in the 1960s the interactional relationship among individual knowledge, experience, environment, and behavior, which was extended by Bandura (1968, 1977), who proposed the social learning theory. The premise of this theory is that behavior is the result of reciprocal determinism between the individual and the situation, and it is an ongoing process that can be used to facilitate learning, as illustrated in Figure 1.

Figure 1
Social Learning Theory Framework



Source: Albert Bandura (1977) & Crittenden (2005).

Therefore, the three main elements of the social learning model are “individuals,” referring to students who are usually brought into the classroom to learn; “environment,” created by the professor; and finally, all students in the classroom immerse themselves in this learning process. “Behavior” becomes the interaction between the students and the classroom environment. In other words, professors create the functionality of the classroom. The students first observe the classroom stimuli, and the interaction between the two produces learning outcomes and enhances students' self-efficacy.

Albert Bandura's social learning theory offers a practical and insightful perspective on how people learn. There are two ways through which learning occurs. The first is enactive learning, or learning through concrete experiences, where individuals learn by doing and experiencing the consequences of their actions. The second is observational learning, also known as vicarious learning. Mayes (2015) defines vicarious learning as learning that occurs by observing the behaviors of others.

In typical school settings, children compare themselves with peers, observe, and learn from their teachers' reactions to understand how to achieve their goals. In simple terms, in a classroom, enactive learning involves children observing their teachers and peers, noting the rewards and outcomes associated with specific behaviors. After observing the behavior of others, children make decisions, choosing to either imitate those behaviors or ignore them.

In Bandura's framework, self-efficacy plays a crucial role in children's learning processes because it helps children believe they can achieve academic success (Beatson et al., 2020). Self-efficacy is “a person's belief in their ability to execute the behaviors necessary to achieve specific performance” (Carey, 2009; Legg, 2023). According to Bandura (1977), observing similar others performing well often inspires the observer's self-efficacy beliefs, leading them to believe they can also excel in similar activities. Besides, learning how to solve problems is also a critical part of the learning process (Legg, 2023). Students observe others as they

struggle with challenges, encounter failures, try again, and ultimately succeed. Through this process, they gain experience and build their self-efficacy.

In summary, Bandura's social learning theory emphasizes learning through observation and imitation, which can enhance self-awareness and self-efficacy.

Industry-Academia Cooperation

With the rapid development of new technologies in the 1990s, the industry, particularly in software and computer science, recognized that collaboration with academia could help address problems in the work environment (Lucietto et al., 2021).

Generally, industry-academia collaboration can be divided into two types: internship-based industry-academia cooperative education and research-based industry-academia cooperative education. The former refers to industries providing internship opportunities during winter and summer breaks to supplement the shortcomings of traditional school education. Typically, interns are unpaid or receive lower salaries compared to regular employees. This type of collaboration is particularly popular in fields such as medicine and teacher training. The latter refers to problems encountered by industries entrusted to professors and students at academic institutions to conduct research projects, with companies providing the necessary funding and equipment for the research (Xu, 2023).

Scholars have previously conducted extensive reviews of relevant literature and summarized the primary forms of industry-academia collaboration. These include personal informal relationships (e.g., academic spin-offs, individual consultancy, academic exchange, and personal contacts); personal formal relationships (e.g., student internships, involvement in industrial projects, joint supervision, and personnel exchange); third-party intermediaries (e.g., technology transfer offices, government agencies, and industrial associations); formal targeted agreements (e.g., contract research, patenting and licensing, joint curriculum and research development); formal non-targeted agreements (e.g., framework agreements, endowed chairs, and industrially sponsored R&D); and focused structures (e.g., incubation centers, science parks, university-industry consortia, and cooperative research centers) (Ankrah & Al-Tabbaa, 2015).

University-industry collaboration generates many benefits for academic institutions and industrial partners. From an economic perspective, universities gain financial advantages through diversified revenue streams, licensing income, and increased commercialization opportunities while contributing to regional economic development. For industries, such collaboration leads to developing new or improved products, cost-effective R&D, increased competitiveness, and access to public grants that stimulate economic growth. On the institutional level, universities benefit from curriculum enhancement, practical exposure for students and faculty, access to advanced equipment, and promotion of spin-offs and joint publications. On the other hand, the industry gains access to cutting-edge knowledge, accelerated technology commercialization, research credibility, technical consultancy, and opportunities to influence academic research agendas. Both sectors may also co-author publications and access international research networks. Finally, on a social level, these partnerships enhance the university's societal contributions and reputation while allowing companies to strengthen their image as socially responsible organizations (Ankrah & Al-Tabbaa, 2015).

In the past decade, one of the primary forms of industry-university cooperation in the media industry has been the cooperation between the academic circle and the commercial film and television industry, which uses bilateral resources to increase the output of commercial products. For example, the University of York in the UK and Green Screen Productions Ltd. Produced the feature film The Knife That Killed Me (Mateer, 2020). Industry-university cooperation requires an entirely new model, mainly because the latest wave of technology has changed the market and reading and listening habits.

In other words, new technology has influenced the media industry, from the Internet, social media, and media convergence to AI and virtual reality. This transformation has dramatically changed media consumption habits. Hence, future media curriculum needs innovation and digitalization to build a robust professional foundation, which is the steppingstone for students to find a good job (Pavlik, 2013).

In the news industry, there is an urgent need to expand the interdisciplinary nature of journalism and mass communication education. Traditional media usually tell stories on any topic in various forms, including text, images, and sounds. However, the digital age gives storytellers more opportunities and tools. For example, data can provide the context for the story. Big data analysis and data-driven storytelling have transformed the traditional way of storytelling.

In addition, the implications of the digital age are not limited to the journalism aspect of media education. Advertising, public relations, and other professions in the media world are also affected by new technologies. Therefore, the media needs to seek interdisciplinary opportunities for extension, providing new content and skills in areas such as interactive content, video games, social networks, online courses, AI applications, digital content production, etc.

In other words, new technologies have disrupted many of the storytelling methods used by traditional industries and media education. As a result, students need to strive for new job opportunities and increase their competitiveness. Media education will inevitably need a completely new design through cooperation with the industry.

This industry-university cooperation project aims to introduce industry resources, including teachers, concepts, skills, and internship opportunities, and combine theory and practice to provide new courses for students to learn through classroom discussions, practical work, and observation, achieving better learning results.

Correspondingly, the industry can also select the next generation of communication talents outside the campus to solve the current industry's urgent need for new talents with new skills to cope with the rapidly changing industry needs and competition.

Therefore, this case selected four cross-media and new technology companies through cross-field and cross-disciplinary cooperation to create a triple-win situation for industry, academia, and students.

The Background of Taiwan's Media Industry and Communication Education

Since Taiwan lifted martial law in 1987 and legalized cable television in 1993, coupled with the rapid development of new technologies in recent years, the media industry has gradually

transitioned from a monopoly and oligopoly market structure to a fully competitive market. As a result, the media industry now requires entrepreneurial and multi-functional media professionals.

The Department of Mass Communication at Chinese Culture University, established in 1963 (Wikipedia, 2024), is one of the history communication departments in Taiwan. Over the years, it has cultivated media elites equipped with communication theory and practical skills, earning widespread recognition in various sectors of society. Currently, the department offers three major academic tracks: Public Communication, Communication Research, and Multimedia Communication, covering audiovisual production, public relations, and research. Each year, it nurtures hundreds of next-generation media professionals.

However, facing a turbulent and rapidly changing industrial environment, new curricula are needed to support the challenges of the contemporary media industry. First, with new waves of technological development, such as AI, which has emerged as a prominent technology in recent years, academia and industry intensely try to explore its applications.

Artificial intelligence (AI) in virtual production is revolutionizing the creation and consumption of digital media by automating various aspects of the production process. AI technologies are being utilized to generate realistic environments, streamline workflows, and create interactive experiences, significantly impacting media content production. This integration reduces production costs and time, opens new creative possibilities, and enhances user engagement. The following delve into AI's specific applications and implications in virtual production.

1. AI in Scene Creation: AI algorithms, such as procedural generation and deep learning, create complex and realistic virtual environments, enhancing visual realism and interactivity in digital media. These technologies automate scene classification and resource allocation, allowing developers to focus on creativity and innovation (Baburao, 2024). Virtual production technology seamlessly adds 3D models to real scenes, enhancing visual effects (Chan & Zhang, 2024).
2. Impact on Media Content: AI tools facilitate content creation by generating scripts, editing videos, and creating animations, thus streamlining production processes and reducing costs. AI-driven simulations create immersive virtual training, gaming, and storytelling environments, enhancing user engagement and satisfaction (Mohamed, 2024).
3. Economic and Creative Implications in Cinema: AI integration in visual effects (VFX) leads to significant cost reductions and enhanced efficiency in cinema production while also introducing new creative possibilities. However, the use of AI in VFX raises ethical concerns and potential job displacement, necessitating the development of ethical guidelines (Murodillayev, 2024).

While AI in virtual production offers numerous benefits, it also presents challenges, such as ethical concerns and the potential for job displacement. Ethical guidelines and careful consideration of AI's impact on creative industries are crucial to ensure a balanced integration of these technologies (Azzarelli et al., 2025; Murodillayev, 2024).

In addition to AI, many other new technologies, such as virtual studios, AR, and VR, also demand skilled professionals who can leverage these technologies during the digital transformation of the media and cultural industries. Furthermore, with the rise of audiovisual trends driven by mobile devices and social media, short videos dominate people's attention,

creating a need for talents skilled in video production and creativity and professional's adept at monitoring online public opinion and managing crisis communication in the multimedia era.

To encompass the three major academic tracks initially offered by the Department of Mass Communication—Public Communication, Communication Research, and Multimedia Communication—and to address the new wave of technological advancements in communication, three new courses were introduced following internal expert discussions: "AI Virtual Filmmaking: The Technological Magic of Future Cinema," "Public Relations Image Management," and "Digital Content Production." These courses aim to deepen the content of the existing curriculum. With in-depth guidance from industry instructors, these new courses enhance the continuity and depth of the original curriculum.

This industry-academia collaboration project plans to offer three courses, each worth three credits, totaling 162 hours of instruction. Taiwan's Ministry of Labor has funded the associated expenses, including instructor compensation and course development, with NT$800,000 (approximately USD 24,000). This funding will effectively create a triple-win situation for the media industry, media education, and students.

Methodology

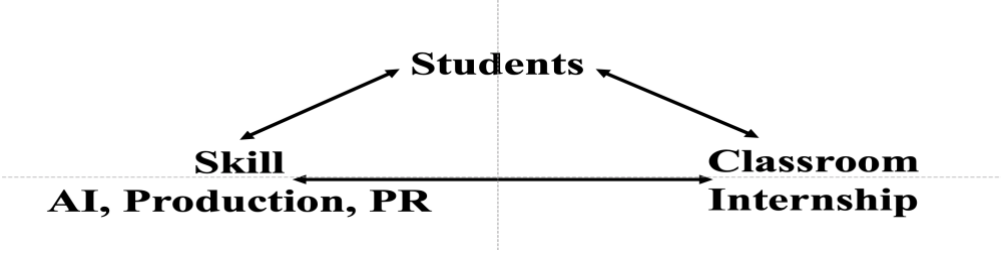
This project primarily adopts the "Practice-Based Research in Education" methodology, which is grounded in practical teaching activities. It aims to improve teaching effectiveness, innovate curriculum design, or enhance student learning outcomes. The related framework, context, curriculum planning, and evaluation are explained below.

Framework

According to Albert Bandura's social learning theory, the interaction between "individuals," "environment," and "behavior" is emphasized. In this industry-academia collaboration project, the "individuals" refer to selected students from the mass communication department at Chinese Culture University. Professors create the "environment" through classroom instruction and engaging external media organizations to provide internship opportunities. Students achieve their learning objectives through practical work and observational learning.

Outstanding students will be recognized and awarded scholarships, creating a positive cycle to motivate students' "behavior" and enhance learning outcomes and performance. (The conceptual framework of the industry-academia collaboration is shown in Figure 2.)

Figure 2
Conceptual Framework of the Industry-Academia Collaboration



Source: Compiled by this study.

Students: Undergraduate

This study estimated that 40 to 50 students will enroll in the courses. During the 114th academic year (fall and spring semesters), students are required to complete three new courses: “AI Virtual Production: The Technological Magic of Future Film and Television,” “Public Relations Image Management,” and “Digital Content Production.” Students who excel in these three courses, achieving an average grade of 80 or above and ranking in the top 10% of their class, will be given priority recommendations for corporate internships.

Field: Classroom and Internship

Mass communication media originally emerged as a product of the Industrial Revolution, closely tied to social, cultural, and technological changes. This study selects the Department of Mass Communication at Chinese Culture University as the primary experimental field for three reasons:

First, the Department of Mass Communication at Chinese Culture University is one of Taiwan's oldest communication programs. It enrolls nearly 120 first-year students annually, providing a substantial sample for observation.

Second, in recent years, many higher education institutions have actively introduced AI courses to address the rapid pace of industry evolution and the demand for skilled talent. The Department of Mass Communication at Chinese Culture University has also incorporated AI into its curriculum planning and strengthened industry-academia collaboration to enhance students' competitiveness in the job market after graduation. This makes it a highly suitable and resourceful field for observation.

Third, the Department of Mass Communication at Chinese Culture University is dedicated to “cultivating professional talent” and “meeting the needs of the times” as its educational mission. Facing the changes brought by contemporary communication technologies, the department currently offers a comprehensive faculty with both theoretical knowledge and practical experience.

Skill: AI, Production, PR

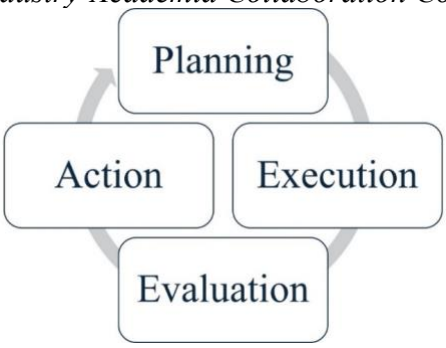
Therefore, this study uses the Department of Mass Communication at Chinese Culture University as the experimental field, integrating Albert Bandura's social learning theory to propose a one-year experimental course.

First, in the Planning (Plan) phase, the program's objectives and core competencies are established based on the Department of Mass Communication's mission and cultivation goals and students' employment needs. Teaching and guidance plans are developed through internal expert meetings. Second, in the Execution (Do) phase, teachers collaborate with industry partners for industry-academia cooperation, facilitate student participation and communication, and implement teaching and guidance.

The third step is the Evaluation (Check) phase, where the program's mission, cultivation goals, core competencies, and students' employment needs are used to evaluate and assess the outcomes of course design, implementation, and guidance. Finally, in the Action (Act) phase, a comprehensive review of course design, teaching and guidance, and evaluation results is

conducted, followed by implementing improvements and optimizations. The primary design process of this course is shown in Figure 3.

Figure 3
Industry-Academia Collaboration Course Design Mechanism Diagram



Source: Compiled by this study.

The course planning is divided into two main sections: “Courses” and “Paid Internships.” The details are as follows:

Course Offerings

The Department of Mass Communication at Chinese Culture University invites industry professionals to co-teach courses, including: “AI Virtual Filmmaking: The Technological Magic of Future Cinema,” “Public Relations Image Management,” and “Digital Content Production. “Each course is worth three credits for nine credits. Upon completing the courses, students earn nine credits and acquire new knowledge and skills required for professionals in the modern media industry (as shown in Table 1).

Table 1
Experimental Course Planning

Course	Credits	Introduction	Teaching Methods
AI Virtual Filmmaking: The Technological Magic of Future Cinema	3	Explore AI virtual production and uncover the technological magic behind it. The course begins with an overview of the development history of film and television production, analyzes the technological innovations of virtual production, and provides an accessible introduction to the application of generative AI in virtual production. The course invites industry experts to share practical experiences in AI virtual production and incorporates hands-on learning activities. Students will be guided through practical exercises to create virtual film and television projects.	Classroom Lectures Hands-On Practice Industry Visits Final Presentations

Public Relations Image Management	3	The course begins with the functions and value of public relations, discussing the market operations and issue construction models in the communication industry. It also covers strategies for monitoring online public opinion and crisis management, equipping students with essential knowledge and skills in public relations and image management across various fields.	Classroom Lectures Hands-On Practice Industry Visits Final Presentations
Digital Content Production	3	The course covers basic production concepts, including mobile video shooting, editing, special effects, subtitles, scripting, and planning, enabling students to become experts in multimedia content production.	Classroom Lectures Hands-On Practice Industry Visits Final Presentations

Source: Compiled by this study.

Paid Internships

This project collaborates with several leading Taiwanese media companies to offer paid internships. Outstanding students who perform well in the courses will be given priority for internships, including placements at the top-ranked new media company ETtoday, the commercial television station CTS under the Public Broadcasting Service, and two tech companies, Tiger AI, and Fengshui (as shown in Table 2).

Table 2

Corporate Internship Planning

Corporate	Internship Quotas	Notes
ETtoday	10 persons	ETtoday News Cloud launched in November 2011. It offers News, videos, programs, live streaming, social media, personalized services, and apps users have widely accepted and loved. It has achieved an internet reach of over 80% in Taiwan.
CTS	4 persons	The Chinese Television System (CTS) was established in October 1971 and became a Public Television Service Group member in 2006. It provides audiences with various informative, educational, and entertaining programs, making it a microcosm of Taiwan's film and television development.
Fengshui	1 person	Fengshui primarily provides real-time integration services for virtual film production and VTuber creation.
Tiger AI	1 person	Tiger AI is a startup team established by collaborating with the National Taiwan University of Science and Technology Distinguished Alumni Association and its Innovation Incubation Center. The company assists industries in implementing AI solutions and ensuring information security to maximize AI's effectiveness and success.

Sources: ETtoday (2024); Feng Shui (2024); The Chinese Television System (2024); and Tiger AI (2024).

Evaluation

Based on Albert Bandura's social learning theory and the industry-academia collaboration course design mechanism, these evaluation mechanisms are designed to understand student responses and use rewards to increase student motivation and self-efficacy. The details are as follows:

1. Learning Assessment
   Assessments are conducted according to course units. Students are required to submit class assignments, feedback on learning reflections, and projects. The program coordinator and course assistants verify whether students have truthfully and qualitatively submitted their reflections and projects. At the same time, these reflections, projects, and ideas will be promptly shared with industry instructors to sustain student motivation.
2. Practical Proposals and Presentations
   In addition to regular reflections, evaluations are planned for midterm and final assessments. These assessments deviate from traditional exams by requiring students to propose relevant plans or audiovisual works based on what they have learned in class, responding to topics provided by collaborating companies. This enhances students' practical experience.
3. Additional Guidance
   Partner companies will send industry experts or relevant HR managers to explain current industry trends and desired talent characteristics and teach students interview skills. They will also guide students using career analysis tools to understand their traits and competitiveness. Through mutual interactions, students will gain insights into corporate expectations and develop the workplace mindset needed as new professionals. Students who perform well during internships can secure full-time positions with the internship companies after graduation.

Action

This project will be implemented from September 2025 to June 2026, spanning the fall and spring semesters of the 114th academic year. Students at Chinese Culture University will be allowed to enroll in the courses. It is estimated that 40 to 50 students will take the courses, among whom up to 15 students will have the opportunity to participate in paid internships with companies. Additionally, the project will evaluate its overall effectiveness using the following indicators:

1. Learning Survey
   Students will be asked to rate aspects such as course design, faculty, and content arrangement through a quantitative survey. These ratings will serve as a reference for subsequent optimization and adjustments. The target is to achieve a course satisfaction score of 80 or above.
2. Employer Satisfaction
   Through a quantitative survey, supervisors from the four collaborating media companies will be asked to rate interns on aspects such as work attitude and professional performance. The target is to achieve an employer satisfaction score of 90 or above for the interns' performance.
3. Graduate Employment Tracking Survey
   After the trained students graduate, follow-up surveys will be conducted to track the number of students retained at their internship companies and their employment rates.

Their internship companies are estimated to retain 30% of the trained students after graduation, and the overall employment rate will reach over 50%.

Overall, this Industry-academia Cooperation will achieve the qualitative and quantity goals as shown in Table 3:

Table 3
The KPI of the Industry-Academia Cooperation (developed in this study)

Item	KPI indicators
Qualitative Objectives	Reducing the gap between the industry and academia
	Enhancing the media technology application ability
	Assisting the industry's digital transformation and promoting efficacy
Quantity Objectives	Recruiting at least 15 students to participate in a Corporate Internship
	Retaining up to 30% after trained students graduate
	The trained students' performance satisfaction up to 90%

Source: Compiled by this study.

Besides, trained students will obtain the production skills and marketing and PR knowledge to explore new job opportunities after graduation, as shown in Figure 4:

Figure 4
Career Opportunity for Trained Students

Source: Compiled by this study.

Research Limitations and Future Recommendations

This study presents several limitations and suggestions for future research.

First, the research was primarily conducted within the Department of Mass Communication at Chinese Culture University, which limits the experimental setting and sample diversity. This may affect the external validity of the findings. Future studies are encouraged to collect data from other universities and a broader range of participants to enhance the representativeness and generalizability of the results.

Second, the current evaluation of outcomes primarily focuses on short-term effects, such as student and internship provider satisfaction measured through questionnaires. Future research may incorporate long-term career tracking to assess the sustained impact and effectiveness of the program over time.

Third, the program's success heavily relies on the active engagement of partnering companies. To ensure the sustainability of such industry-academia collaboration models, future initiatives should consider establishing long-term and stable partnerships with selected industry players.

Lastly, given the rapid advancement of technology, curriculum design must remain adaptive. A rolling optimization and revision mechanism is recommended to ensure the courses remain competitive and aligned with current industry trends.

Conclusion

This industry-academia collaboration project strategically integrates resources from the industry, government, and academia sectors. The industry provides internship opportunities, positions, and professional instructors; Taiwan's Ministry of Labor has approved a job subsidy program, providing NT$800,000 (approximately USD 24,000) to support the development of new courses, which creates a triple-win strategy for the industry, communication education, and students, bridging the gap between academic learning and practical application while cultivating a new generation of communication professionals.

Based on Albert Bandura's social learning theory, this project adopts the “Practice-Based Research” method, emphasizing the interaction among students, the environment, and behavior. The primary participants are the Department of Mass Communication students at Chinese Culture University. The project aims to enhance students' learning outcomes and self-efficacy through new courses and paid internships.

The curriculum, “AI Virtual Filmmaking: The Technological Magic of Future Cinema,” “Public Relations Image Management,” and “Digital Content Production,” includes three courses with 9 credits and 162 hours. Students who enroll in all three courses with an average score of 80 or above and rank in the top 10% of their class will receive priority internship recommendations at four partner companies. These companies span new media, traditional media, and technology, offering abundant resources to broaden students' horizons and practical experience.

This one-year experimental program will run from September 2025 to July 2026. In the past, industry-academia collaborations were mainly focused on non-communication industries such as technology, medicine, and education. This collaboration project establishes a new model for industry-academia cooperation in media education, providing valuable references for other countries and markets. Besides, Taiwan's media education model, under policy subsidy and cross-sectoral cooperation, offers unique reference value for countries facing rapid digital transformation.

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The Development of Chatbots for the Financial and Procurement Office of the College of Arts, Media and Technology, Chiang Mai University

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Abstract

This research aims to develop a chatbot to support the financial, accounting, and procurement services of the College of Arts, Media, and Technology, Chiang Mai University, and to evaluate user satisfaction with the "Fin Dee" chatbot. The research process included designing the chatbot using Dialogflow integrated with the LINE Messaging platform. The study sample comprised 40 College of Arts, Media, and Technology staff members. Data collection tools included focus group discussions, interviews, and questionnaires, with data analyzed using mean and standard deviation. The findings reveal that the development of the chatbot, which utilizes Dialog flow in conjunction with LINE's Official Account, effectively facilitates processes related to disbursement, procurement, and supplies management. The "Fin Dee" Chatbot's unique features include receiving user messages, processing the messages using machine learning, and responding to users accordingly. The user satisfaction evaluation of the "Fin Dee" Chatbot indicates an overall high level of satisfaction. Among the evaluated aspects, design received the highest mean score, followed by content, while usability received the lowest mean score.

Keywords: LINE chatbot, Dialogflow, regulations

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Introduction

College of Arts, Media and Technology, Chiang Mai University There are 10 financial and procurement officers, each of whom has deep-seated knowledge (Tacit Knowledge), which is the knowledge that cannot be seen it is the result of training and working until a high level of skill and expertise is achieved. This knowledge is a personal experience that arises from judgment, quick wit, and techniques that are unique to each person. To bring this knowledge to practical use. It is necessary to take the knowledge that is deeply embedded in a person and store it in a systematic form. Moreover, it can be converted into knowledge that can be transferred and used (Explicit Knowledge). This process ensures that important knowledge is not lost. Moreover, it can be reused quickly and efficiently (Vichai Thosuwaninda, 2017).

The college personnel still do not understand the rules, regulations, and guidelines related to the university's finance and supplies work. There are often the same questions. Often, the financial unit has many finance and procurement officers, so sometimes, the information given to service recipients is not complete and consistent. Due to misunderstandings and communication between personnel in the college.

Therefore, to make the work of personnel efficient, it is fast, including good relations among personnel. The “Fin Dee” chatbot plays a crucial role in this aspect. Therefore, it is very important to have a communication channel. Communication tools and communication methods that provide accurate and clear information. Communication channels that will reduce the workload of financial personnel and service users. It is a communication channel that initially has a system to work on behalf of officials. For example, answering questions via chatbot, where the answers will go through an analysis process of finance and supplies officers to be correct and consistent.

In addition to reducing the time of financial officers, the “Fin Dee” chatbot also reduces communication errors. It makes it possible to prepare documents related to disbursement correctly and more efficiently. It can also reduce conflicts between each other. And the officials who disburse the money. There is no need to edit documents many times because you can study to find the correct knowledge and compile it clearly.

Objectives

1. To develop Chatbots for The Financial and Procurement Office of the College of Arts, Media and Technology, Chiang Mai University.
2. To assess user satisfaction with the "Fin Dee" chatbot.

Literature Review

Knowledge Management (KM) is a process by which organizations create, collect, store, share, and utilize knowledge to enhance efficiency and competitiveness. It focuses on gathering explicit knowledge, such as documented information, and tacit knowledge, which includes personal experiences or skills. The knowledge management process consists of key steps: Knowledge Creation, Knowledge Storage, Knowledge Sharing, and Knowledge Application. The tool used to disseminate knowledge in this instance is the LINE Chatbot (Smith, 2020), an automated communication tool that enhances the efficiency of responding to user needs on the LINE platform. It leverages artificial intelligence technologies such as Natural Language Processing (NLP) and Natural Language Understanding (NLU) to answer

questions and provide accurate information. Chatbots can be applied to various business types, including customer service, marketing, and information notifications. Key steps include connecting to the LINE Messaging API, designing message structures, and continuously analyzing user data to improve the user experience. Creating a chatbot on LINE is straightforward and does not require extensive programming knowledge. Several tools, such as Dialogflow and LINE Developers, assist in building chatbots. The main steps (AppDisqus, 2023). in creating a chatbot, including the following:

1. Register and create an account on LINE Developers.
2. Configure the Webhook to connect the Chatbot with LINE.
3. Create Intents in Dialogflow to define the conversations between users and the chatbot.

The chatbot uses pattern-matching processes to group data and generates responses that align with users through AIML, a standard language structure. It then employs Natural Language Understanding (NLU) to convert text into a structured format that computers can understand. Natural Language Processing (NLP) is also used, which includes tokenization, sentiment analysis, entity recognition, and dependency parsing to enhance the accuracy of responses and understand user needs (Adamopoulou & Moussiades, 2020).

Chatbots also help reduce personnel costs, increase service speed, and can work 24 hours a day. However, research still needs to focus on improving chatbots' ability to understand complex human language and build trust between chatbots and users. In addition to studying knowledge management processes and LINE chatbots, the researchers have reviewed related studies. Sutsanguan and Tangwanwit (2023) researched the development of a chatbot for university information services. The objectives were to study processing algorithms, develop an automatic conversation response system (Chatbot) for university information, and evaluate user satisfaction. The research utilized Natural Language Processing (NLP) techniques and the Fuzzy Wuzzy algorithm. The target group included five computer experts and 30 undergraduate students. The findings indicated that Fuzzy Wuzzy was more suitable, with an average score of 65.28 compared to NLP's 42.04. Experts deemed the developed system appropriate (mean score 4.36, S.D. 0.58), and users were delighted (mean score 4.05, S.D. 0.73), indicating the chatbot system's efficiency and responsiveness. Sukkee and Chatree (2024) researched the development of the "Nong Lamduan" LINE chatbot application to recommend tourist attractions in Sisaket Province. The objectives were to design and develop the "Nong Lamduan" application, a LINE chatbot for recommending tourist attractions in Sisaket, and to evaluate the application's effectiveness. The development utilized Dialogflow and the LINE Messaging API with the Django Web Framework. This system can process messages and automatically respond to them via the LINE Official Account. The research findings indicated that the "Nong Lamduan" application received the highest performance evaluation, with design scoring the highest (mean score 4.73, S.D. 0.31), followed by content and usability. This system effectively enhances access to tourism information and promotes the local economy. Arunsri and colleagues (2023) researched the development of a chatbot system to support the services of the Cooperative Education and Career Development Center at Nakhon Ratchasima Rajabhat University. The objectives were to develop a chatbot system that supports services and to study user satisfaction with the system. The chatbot system was developed using LINE Messaging API, DialogFlow, and Webhook, following the Software Development Life Cycle (SDLC). The research sample included five instructors and 15 students who used the system. The findings indicated that the chatbot system effectively responded to automatic conversations, reduced response time, and increased user satisfaction to the highest level, with an average satisfaction score of 4.55 (S.D. = 0.45). The system

demonstrated the capability to provide information and process human language efficiently, aligning with the development approach of chatbots that can be further enhanced in terms of intelligence and functionality diversity.

Research Methodology

Research Tools

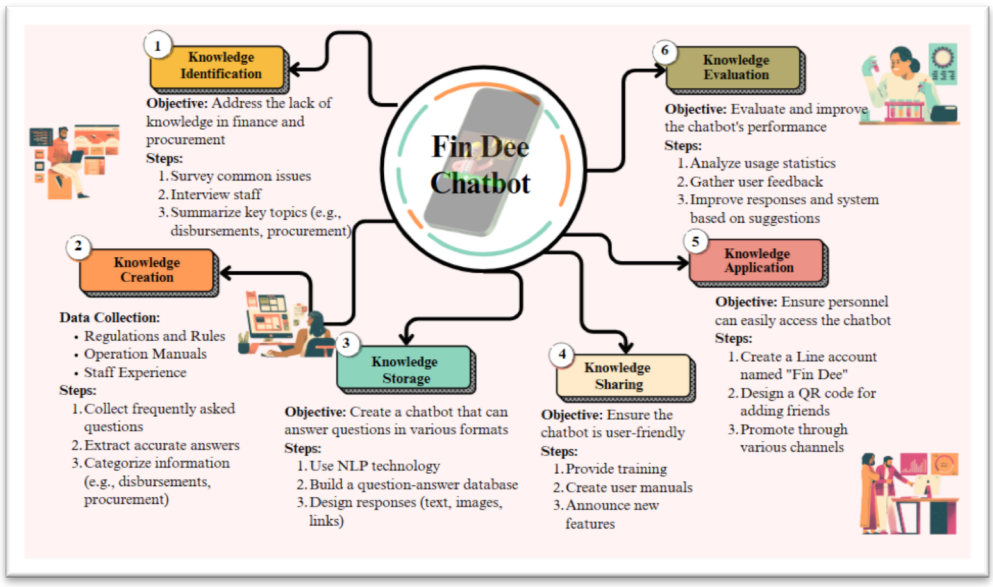
1. Focus group discussions, interviews, and online surveys were conducted twice using two sets of surveys as follows:
    - Set 1: An open-ended survey to identify problems and needs of the financial and procurement services staff.
    - Set 2: A rating scale survey to evaluate user satisfaction with the "Fin Dee" chatbot.
2. LINE Messaging API, DialogFlow, and Webhook.

Target Group

The College of Arts, Media, and Technology personnel, totaling 40 people, are divided into 10 financial and procurement officers—30 other related personnel, such as course coordinators, project coordinators, lecturers, and project leaders.

Research Steps

Figure 1
Research Implementation Steps



The steps and processes for knowledge management to develop a chatbot that supports financial and procurement services and addresses the issue of staff lacking an understanding of regulations related to disbursement and asset management can be carried out in six steps as follows:

1. Knowledge Identification
    - Identify which areas of regulations staff lack knowledge and which are important.

- Conduct surveys and interviews with staff or review errors in work performance caused by misunderstandings.
- Use questionnaires to survey understanding of regulations.
- Identify recurring issues.

2. Knowledge Creation
   - Develop and create explicit, easy-to-understand knowledge about regulations suitable for the chatbot.
   - Create question-and-answer sets about regulations in a format that staff can easily access.
   - Prepare documents or summary content of regulations, rules, and other relevant laws.
   - Create FAQs (Frequently Asked Questions) about regulations or issues related to financial and procurement services.
3. Knowledge Storage
   - Record knowledge about regulations in a format ready for use in the chatbot.
   - Upload regulatory content into the chatbot's database.
   - Categorize regulatory information by topic.
   - Use the chatbot's NLP (Natural Language Processing) technology to find answers quickly.
4. Knowledge Sharing
   - Ensure staff can easily access regulatory information through the chatbot.
   - Encourage staff to use the chatbot to find answers about regulations by providing training or creating a user manual and notifying staff about new chatbot features.
5. Knowledge Application
   - Promote staff use of the chatbot when they have questions about regulations before directly asking officers.
   - Encourage staff to use the chatbot in real situations.
   - Install the chatbot on the faculty's LINE official account and website.
6. Knowledge Evaluation
   - Evaluate whether the chatbot helps solve understanding issues regarding regulations and adjust the information in the chatbot accordingly.
   - Analyze the frequency and content of frequently asked questions to improve the chatbot, including collecting usage data such as the number of answered and unanswered questions.
   - Survey staff opinions on the chatbot's effectiveness.

The Statistics

The statistics used in the research include the mean and standard deviation. The criteria for interpreting the mean are as follows (Best & Kahn, 1993):

- A mean of 4.51 - 5.00 indicates the highest level of satisfaction.
- A mean of 3.51 - 4.50 indicates a high level of satisfaction.
- A mean of 2.51 - 3.50 indicates a moderate level of satisfaction.
- A mean of 1.51 - 2.50 indicates a low level of satisfaction.
- A mean of 1.00 - 1.50 indicates the lowest level of satisfaction.

Research Results

The chatbot development to support financial and procurement services at the College of Arts, Media, and Technology found that the "Fin Dee" chatbot was developed using Dialogflow. This tool enables the chatbot to understand human conversations. Machine learning processes the conversations in the background, allowing immediate use without developing NLP independently. The development process began with:

(1) Collecting frequently asked questions to ensure the chatbot can respond accurately and comprehensively.

(2) Extracting correct answers from reliable sources such as regulations, agency guidelines, and staff experiences in solving real issues.

(3) Designing a chatbot with Dialogflow involves defining Intents and Responses. The chatbot's responses can Create a chatbot using Dialogflow, which involves defining intents and responses. The chatbot's responses can be configured to display in three formats:

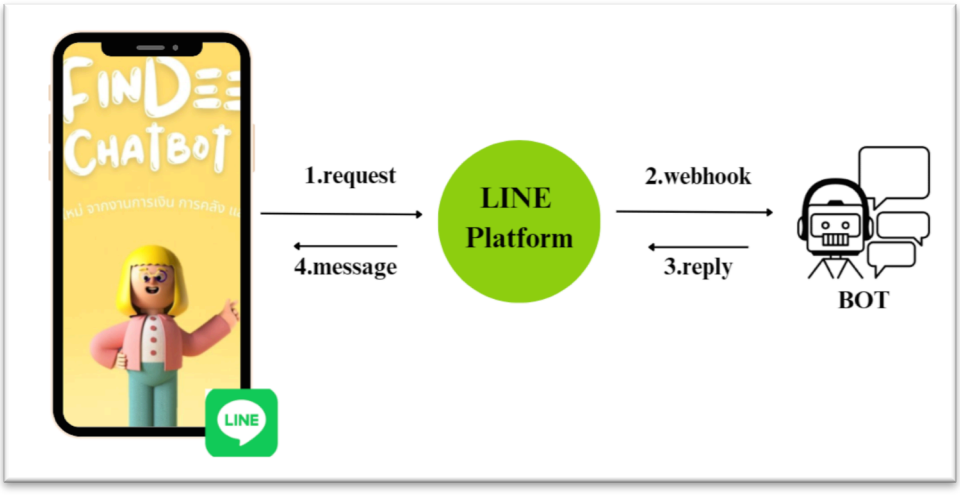
- Text: Answering questions that can be explained in sentences, e.g., "The documents required for disbursement are..."
- Link: If the answer involves detailed information, the chatbot will link to a document or website, e.g., "Read more in the disbursement manual."
- Image: Examples of completed forms or step-by-step images, e.g., "Steps for claiming speaker fees."

Figure 2

Creating a Chatbot With Dialogflow

Figure 3

The Working Principles of Webhook in the LINE Messaging API

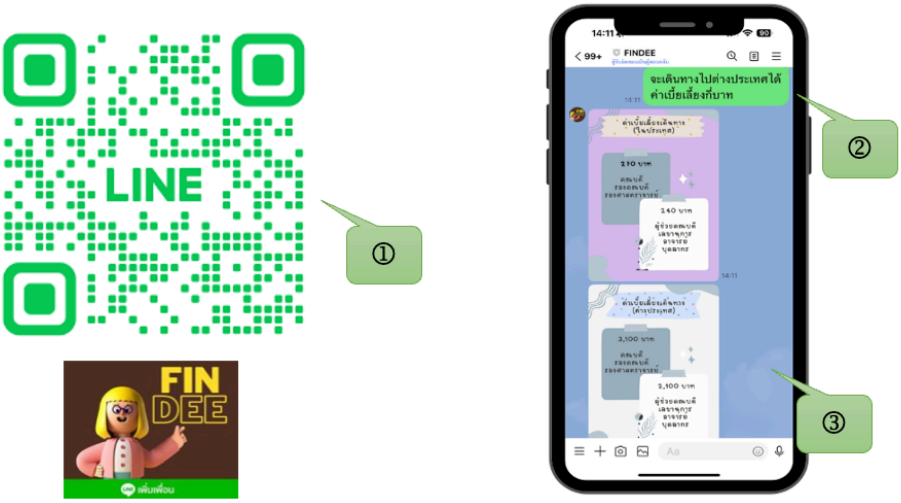


(4) Using the Chatbot via LINE: Staff can access the Chatbot through LINE by adding it as a friend via a QR code displayed on all organizational communication channels, such as the LINE official account, website, announcements, or promotional emails. The Chatbot's LINE account is named "Fin Dee." The usage steps are as follows:

1. Add the chatbot as a friend on LINE by scanning the QR code.
2. Send a question in the chat, e.g., "How much is the per diem for international travel?"
3. The Fin Dee chatbot will respond with the appropriate information.

Figure 4

How to Use the "Fin Dee" LINE Account



The study on user satisfaction with the "Fin Dee" chatbot found that the overall average satisfaction level was very high (X = 4.51, S.D. = 0.35). When considering individual aspects, the design aspect had the highest average satisfaction, followed by the content aspect. The aspect with the lowest average satisfaction was usability.

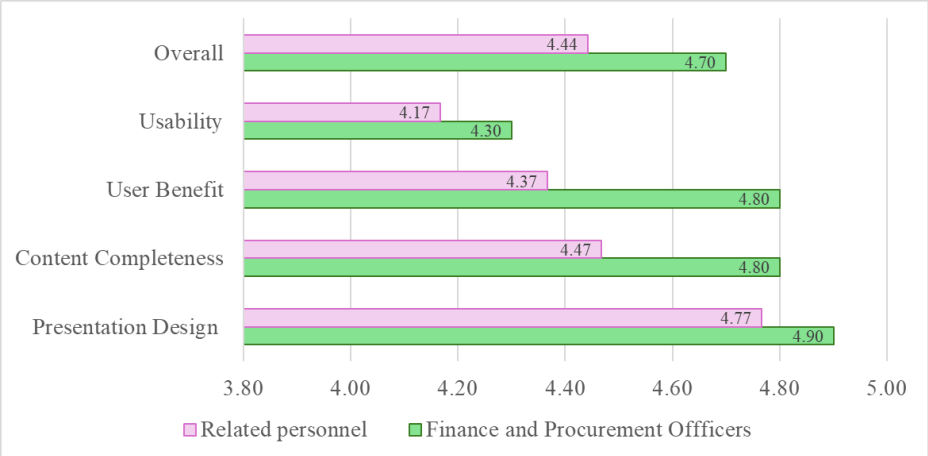
Table 1

Overall Satisfaction Analysis Results for the "Fin Dee" Chatbot

Evaluation of Satisfaction	$\bar{x}$	S.D.	Satisfaction Level
1. Presentation Design	4.80	0.41	Highest
2. Content Completeness	4.55	0.50	Highest
3. User Benefit	4.48	0.60	High
4. Usability	4.20	0.46	High
Overall	**4.51**	**0.35**	**Highest**

Figure 5

Satisfaction Analysis Results for the "Fin Dee" Chatbot by Target Group



It can be observed that the satisfaction levels of different target groups vary in each aspect. Therefore, the "Fin Dee" chatbot should be improved to maximize the satisfaction of the relevant personnel.

Discussion

The "Fin Dee" chatbot research aimed to develop a chatbot to support financial, fiscal, and procurement tasks and evaluate user satisfaction. The research results demonstrated the chatbot's effectiveness in reducing workload and increasing convenience in accessing relevant regulations and rules. The results can be discussed as follows.

1. Reasons for the Research Results
    1.1 Appropriate Design DialogFlow, in conjunction with the LINE Messaging API, allows the chatbot to receive questions, process them, and respond in various formats, such as text, images, and links. These capabilities make the chatbot user-friendly and easy to use.
    1.2 Comprehensive Data Collection The content of the questions and answers is extracted from regulations, rules, and the experiences of finance and procurement officers. This ensures the chatbot can provide accurate answers that meet the users' needs.
    1.3 Evaluation and Improvement Based on Feedback Using questionnaires and interviews to assess user satisfaction helps researchers improve the system to meet the needs of the target groups better.

2. Consistency With Previous Research
    2.1 Consistency with Previous Research. The research by Pisarn Sukkee and Jetsada Chatree (2024), which developed a chatbot for recommending tourist attractions using DialogFlow and the LINE Messaging API, found that using the chatbot reduced the time spent searching for information and increased service convenience. Similarly, "Fin Dee" reduces the workload of finance and procurement officers. Narittha Sutsanguan and Sakchai Tangwanwit research found that chatbots using NLP and specific processing techniques could answer questions effectively. This aligns with "Fin Dee," which can accurately answer regulatory questions.

2.2 Differences from Previous Research. The "Fin Dee" research focuses on solving organizational workflow issues, such as disbursements and procurement, while some previous studies focused on providing general information, such as tourism or student services.

3. Benefits and Applications

3.1 Improving Work Efficiency

3.1.1 Reducing Staff Workload: Helps reduce the time staff spend answering repetitive questions about regulations and procedures, such as disbursements and procurement. This allows staff to focus more on important or strategic tasks.

3.1.2 Increasing Accuracy in Answering Questions: Information in the Chatbot is verified by reliable sources, such as regulations and operation manuals, thus reducing communication errors.

3.2 Enhancing User Convenience

3.2.1 Access to information anytime, anywhere: Users can inquire about information through the chatbot on the LINE Official Account 24/7 without waiting for staff to respond.

3.2.2 Quick and diverse responses: The Chatbot answers questions through text, images, and links, helping users understand procedures and information more easily.

3.3 Enhancing Satisfaction

3.3.1 Reducing user waiting time: Users can find answers immediately without waiting for staff responses, increasing convenience and reducing dissatisfaction.

3.3.2 Increasing confidence in received information: The Chatbot's answers are verified for accuracy, ensuring the information is correct and up-to-date.

3.4 Organizational Support

3.4.1 Improving knowledge management efficiency: The Chatbot is a repository and disseminator of knowledge in an easy-to-use format, facilitating knowledge transfer within the organization.

3.4.2 Reducing human resource costs: By decreasing the staff needed to answer repetitive questions, labor costs can be reduced, or resources can be reallocated to more important tasks.

3.5 Further Development

3.5.1 Foundation for integrating AI into the organization: The "Fin Dee" system can be further developed into a self-learning chatbot capable of processing more complex information.

3.5.2 Supporting usage in other contexts: The Chatbot can be adapted to support functions in other departments, such as human resources or legal advisory services.

The Fin Dee chatbot enhances efficiency and reduces workload in financial and procurement tasks, making operations more convenient, faster, and more accurate. Additionally, it increases user satisfaction and creates opportunities for developing digital innovations within the organization.

4. Limitations of the Fin Dee Chatbot

4.1 The Chatbot may be unable to answer questions beyond the configured database, such as outdated regulations or procedures. If there are changes, such as

amendments to laws or new regulations, staff must continuously update the database, which can be an additional burden.

4.2 Answering Complex Questions: The chatbot may not provide complete answers for complex questions or those requiring in-depth analysis, such as consultations that need to consider specific contexts.

4.3 Understanding Human Language: Despite using Natural Language Processing (NLP), the chatbot has limitations in interpreting questions with specific terminology or informal language. It may not understand contextual meanings or ambiguous questions.

4.4 Resistance to Change: Some personnel may not be familiar with using the chatbot or may still prefer asking staff directly.

Conclusions

The research concluded that the Fin Dee chatbot enhances efficiency, reduces workload, increases user satisfaction, and creates opportunities for developing digital innovations within the organization.

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Using Technology and Online Tools to Support the Cooperative Learning Approach in the Mathematics Instructional Design Course for Undergraduate Students

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Abstract

This study aims to 1) develop the learning activities in the Mathematics Instructional Design course based on the cooperative learning approach together with technology and online tools for undergraduate students and assess the suitability of the developed learning activities using expert feedback 2) study the mathematics instructional design ability of the undergraduate students. A purposive sample was used to select five experts in instructional design and mathematics teaching. The sample used for the experiment consisted of 30 undergraduate students majoring in Teaching Mathematics, the Faculty of Education. They were selected by purposive sampling. The research instruments were mathematics instructional design ability assessment forms and questionnaires with a five-point rating scale and open-ended questions. The data were analysed using t-test, descriptive statistics and content analysis. The results showed that: 1) the developed learning activities in the Mathematics Instructional Design course consisted of eight activities integrated with seven technologies and online tools that promote interaction among students and teachers, and the experts agreed that the developed learning activities were generally appropriate at a very high level, with an average of 4.39; 2) after the experiment, the mathematics instructional design ability of the undergraduate students was higher than the criterion of 75%. The students indicated that they were able to design mathematics instruction more interesting. They also communicated more with their classmates and practiced collaborating with others by using technology and online tools.

Keywords: cooperative learning, technology and online tools, mathematics instructional design

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Introduction

High quality mathematics teaching is the result of the ability of mathematics teachers to design and manage lessons. The most important and necessary ability for mathematics teacher students is the mathematics instructional design ability (Roubides, 2015). The researchers responsible for the Mathematics Instructional Design course are committed to developing this ability for the undergraduate students.

Interaction between students promotes learning efficiency and academic achievement. Cooperative learning improves students' skills. Cooperative learning has 5 important principles: positive interdependence, individual accountability, promotive interaction, appropriate use of social skills, and group processing (Johnson & Johnson, 2008). There are many cooperative learning techniques (Science Education Resource Center at Carleton College, 2009). The cooperative learning techniques that are appropriate for the Mathematics Instructional Design course are Think-Pair-Share, Group Investigations, STAD (Student Teams-Achievement Divisions), Jigsaw and Peer Editing.

Nowadays, there are many technologies and online tools in the field of education that facilitate learning. In this study, we are interested in technologies and online tools that are suitable for undergraduate students and facilitate learning and communication among students, such as learning management systems (LMS), video conferencing technology, collaboration tools, assessment and quiz tools, gamification technologies, content creation platforms, and digital feedback tools (Camilleri & Camilleri, 2017; Haleem et al., 2022; Perraton, 2000).

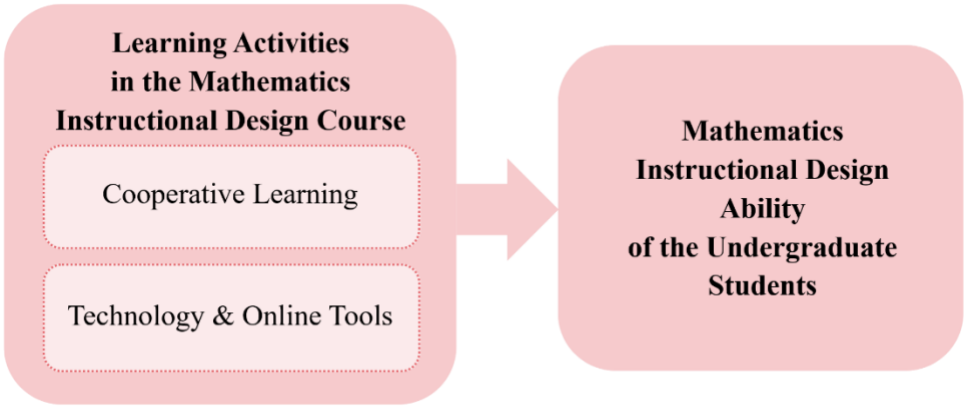
Purposes

This study aims to 1) develop the learning activities in the Mathematics Instructional Design course based on the cooperative learning approach together with technology and online tools for undergraduate students and assess the suitability of the developed learning activities using expert feedback 2) study the mathematics instructional design ability of the undergraduate students.

Research Framework

The research and development design was used in this study. The researchers developed the learning activities in the Mathematics Instructional Design course based on the cooperative learning approach together with technology and online tools for enhancing the mathematics instructional design ability of the undergraduate students. The research framework is shown in Figure 1.

Figure 1
Research Framework



Methodology

Sample

The sample used for the experiment consisted of 30 undergraduate students majoring in Teaching Mathematics at the Faculty of Education, Srinakharinwirot University, Thailand. They were selected by purposive sampling.

Research Instruments

The research instruments were mathematics instructional design ability assessment forms and questionnaires with a five-point rating scale and open-ended questions. The mathematics instructional design ability assessment forms consisted of 5 combinations with a total score of 60 points, namely: planning the learning process according to the differences of the learners, selecting appropriate teaching methods to enhance learners' learning, designing mathematical activities within the framework of active learning, selecting materials and creating a learning environment that promotes learning, and planning assessment to improve the learner. The mathematics instructional design ability assessment forms were validated by five experts, and their average appropriateness score was 4.25 out of a possible 5.

Procedure

Developing the learning activities: The researchers developed the learning activities in the Mathematics Instructional Design course based on the cooperative learning approach together with technology and online tools for undergraduate students.

Assessing the suitability of the developed learning activities: A purposive sample was used to select five experts in instructional design and mathematics teaching. Five experts in instructional design and mathematics teaching assessed the suitability of the developed learning activities. The researchers developed and improved the learning activities in accordance with the experts' feedback. The developed learning activities were piloted with a small group of undergraduate students to test the feasibility of implementation.

Conducting the experiment: The experiment was conducted with a sample group of 30 undergraduate students in the Mathematics Instructional Design course. The researchers

introduced the cooperative learning approach, technology and online tools in the first week, then arranged the learning activities for enhancing the mathematics instructional design ability of the undergraduate students.

Assessing the mathematics instructional design ability: The assessment forms of mathematics instructional design ability were used to assess the mathematics instructional design ability of the undergraduate students after the experiment.

Examining the data: The data were analysed using t-test, descriptive statistics and content analysis.

Results and Conclusion

1) The developed learning activities in the Mathematics Instructional Design course consisted of eight activities integrated with seven technologies and online tools that promote interaction among students and teachers, and the experts agreed that the developed learning activities were generally appropriate at a very high level, with an average of 4.39. The learning activities are shown in Table 1.

Table 1
Learning Activities

Learning Activities	Cooperative Learning	Technologies and Online Tools
1) Introduction	Think-Pair-Share	1) Learning Management Systems (LMS) 2) Video Conferencing Technology 3) Collaboration tools 4) Assessment and quiz tools 5) Gamification technologies 6) Content creation platforms 7) Digital feedback tools
2) Principles and theories of learning management in mathematics	Group Investigations Jigsaw	
3) Classroom management in mathematics	Think-Pair-Share STAD	
4) Methods of mathematics teaching and model of mathematics teaching	Jigsaw	
5) Learning materials for mathematics	Group Investigations STAD	
6) Design of mathematical activities	Think-Pair-Share Jigsaw	
7) Assessment to improve students' math skills	Jigsaw Peer Editing	
8) Practice: math lesson plan	Peer Editing	

As shown in Table 1, the learning activities in the Mathematics Instructional Design course consisted of eight activities, namely 1) introduction, 2) principles and theories of learning management in mathematics, 3) classroom management in mathematics, 4) methods of mathematics teaching and model of mathematics teaching, 5) learning materials for mathematics, 6) design of mathematical activities, 7) assessment to improve students' math skills, and 8) practice: math lesson plan. Technology and online tools that promote interaction among students and teachers consisted of seven tools, namely 1) learning management systems (LMS), 2) video conferencing technology, 3) collaboration tools, 4) assessment and quiz tools, 5) gamification technologies, 6) content creation platforms, and 7) digital

feedback tools. The cooperative learning techniques that are appropriate for the Mathematics Instructional Design course are think-pair-share, group investigations, STAD (Student Teams-Achievement Divisions), jigsaw and peer editing.

The experts agreed with the learning activities in the three aspects, such as the activities, cooperative learning techniques, technology and online tools to improve the mathematics instructional design ability of the undergraduate students. In conclusion: the experts agreed that the developed learning activities were generally appropriate at a very high level, with an average of 4.39.

2) After the experiment, the mathematics instructional design ability of the undergraduate students was higher than the criterion of 75%. The results of comparing the students' ability after the experiment with the criterion of 75% are shown in Table 2.

Table 2
The Results of Comparing the Students' Ability After the Experiment With the Criterion of 75%

Mathematics Instructional Design Ability	total score (points)	the criterion of 75% (points)	score		df	t	sig.
			mean	standard deviation			
after the experiment	60	45	51.52	3.029	29	11.780	0.000*

*Statistically significant at the level of .05

As shown in Table 2, the mathematics instructional design ability of the undergraduate students after the experiment is 51.52 points on average and the standard deviation is 3.029 points. In conclusion: the mathematics instructional design ability of the undergraduate students after the experiment was higher than the criterion of 75%.

The students indicated that the learning activities were appropriate to promote essential knowledge and skills in designing math lessons. They were able to design math lessons in a more interesting and creative way. They also communicated more with their classmates and practiced collaborating with others by using technology and online tools.

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Desirable Characteristics of Kindergarten Teachers As Perceived by Graduate Students of Division of Early Childhood Education Faculty of Education Srinakharinwirot University

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Abstract

The purpose of this research was to study the desirable characteristics of kindergarten teachers as perceived by graduate students of Division of Early Childhood Education, Faculty of Education, Srinakharinwirot University on teaching, personality and morality and ethics. The sample group of this study consisted of 49 graduate students that can suppurated to 36 master degree students and 13 doctoral degree students from Division of Early Childhood Education Faculty of Education Srinakharinwirot University. The research instruments were desirable characteristics of kindergarten teachers questionnaire. The data was analyzed by using frequency distribution, percentage, means and standard deviation. The research findings were as follows: 1. Concerning teaching: as perceived by graduate students indicated that teachers should understanding in early childhood fostering, organize teaching activities with 6 activities, produce instructional media, individual observation and compiling work of children. 2. Concerning personality: as perceived by graduate students indicated that teachers should humor, enjoy and cheerful, on time, speak politely and use correct Thai language and be punctual and dress under school regulation. 3. Concerning morality and ethics: as perceived by graduate students indicated that teachers should be kind and faith in nation, religion and king.

Keywords: desirable characteristics, kindergarten teachers, graduate students

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Introduction

The Early Childhood is the age at the beginning of the human life that the most important time. This is the age of foundation to prepare for life in the future and a range of the most learning in their life. The government authorization realized that the importance of Early Childhood Education driven by teachers for the efficiency education (Iamsupasit, 1994). Especially the kindergarten teachers who taught then required to have the knowledge and understanding the nature of the children. The characteristics of kindergarten teachers are different from other teacher levels that they should be steady calm and smiling are always their habits. Both body and mind are good. To offer unconditional love and take care for all children. There is also a positive attitude towards the accounting profession.

In the current society, father, mother, and parents have to earn their and have no time to take care of their children to encourage the development of children, to practice the habits of children's discipline, and the study to prepare for the potential development of their children. So they send their children to the Early Childhood Education system such as nursery, children's welfare and kindergarten school to prepare their children. Then, children will face the new environment and adapt themselves to their teachers. So, the baby sittings need to understand the nature and child development, capable to build the good relationship with the kids and parents including to educate the parents for developing their children with the same direction. Moreover, the baby sittings are the most important person to encourage the learning guide and facilitate the kindergarten for their basic knowledge and make them warm, trust, obtains the appropriate development as their age level, and able to live in their environment happily (Chotsuwan, 2007).

From problem above and the importance of kindergarten teachers, the researcher realized to study the desirable characteristics of kindergarten teachers for see the system condition and the performance probability of the kindergarten teachers in each school, to study the quality and potential of kindergarten teachers to provide the environment for children to self-study which is the foundation of parenting (Makkasman, 2007). The researcher is aware to study the desirable characteristics of kindergarten teachers, the importance of characteristics of kindergarten teachers and expect that the graduate students of Division of Early Childhood Education should be suitable to present about the desirable characteristics of kindergarten teachers by the perception of their own. So the researcher is interested in the study by the perception of the graduate students of Division of Early Childhood Education, Faculty of Education, Srinakharinwirot University to generate benefits of education management, early childhood education curriculum development and to build the teachers in the future.

The Purpose of the Research

The purpose of this research was to study the desirable characteristics of kindergarten teachers as perceived by graduate students of Division of Early Childhood Education, Faculty of Education, Srinakharinwirot University in 3 ways comprised with teaching, personality, and morality and ethics.

Scope of the Research

This research is the exploratory research which the scope of the research as follows:

1. The population of this study consisted of the graduate students of Division of Early Childhood Education, Faculty of Education, Srinakharinwirot University.

2. The research study on the opinions of the graduate students of Division of Early Childhood Education, Faculty of Education, Srinakharinwirot University about the desirable characteristics of kindergarten teachers as perceived.

Research Methodology

Population and Sample Group

The population of this study consisted of the graduate students of Division of Early Childhood Education, Faculty of Education, Srinakharinwirot University.

The sampling group of this study are the graduate students of Division of Early Childhood Education, Faculty of Education, Srinakharinwirot University that enrollment courses in the academic year 2013 consisted of 49 students, 36 master degree students and 13 doctoral degree students.

Variables

The variable that the study is the desirable characteristics of kindergarten teachers as perceived by graduate students of Division of Early Childhood Education, Faculty of Education, Srinakharinwirot University in 3 ways comprised with teaching, personality, and morality and ethics.

Data Collection

This research used to collect the data from questionnaires. The researcher collected data by collecting the returned questionnaires from the graduate students; master degree students and doctoral degree students.

Research Instruments

The research instruments were the desirable characteristics of kindergarten teachers as perceived by graduate students of Division of Early Childhood Education, Faculty of Education, Srinakharinwirot University questionnaires.

Data Analysis

1. Analysis of general information of the respondents identified by find frequency distribution and percentage.
2. Study of the desirable characteristics of kindergarten teachers as perceived by graduate students of Division of Early Childhood Education, Faculty of Education, Srinakharinwirot University in each side and the overall analysis by find Mean and Standard Deviation.
3. The data from open-ended questionnaires, presented by sorted tabular data presentation.

Results

The results of the study, the desirable characteristics of kindergarten teachers as perceived by graduate students of Division of Early Childhood Education, Faculty of Education, Srinakharinwirot University: summarized as follows.

1. The desirable characteristics of kindergarten teachers on teaching about knowledge of teachers.

   The results of the query from graduate students found that the desirable characteristics of kindergarten teachers on teaching about knowledge of teachers, the overall summary is in the level of average, the maximum average is the knowledge and understanding in early childhood fostering.

2. The desirable characteristics of kindergarten teachers on teaching about learning activity and teaching media.

   The results of the query from graduate students found that the desirable characteristics of kindergarten teachers on teaching about learning activity and teaching media, the overall summary is in the level of average, the average maximum is to organize learning activities by using the main 6 learning activities those are: 1) experience activities 2) movement-rhythm activities 3) education games activities 4) creative activities 5) outdoor activities and 6) play in the corner activities. Moreover, teachers can produce instructional media and instruments by themselves.

3. The desirable characteristics of kindergarten teachers on teaching about development evaluation.

   The results of the query from graduate students found that the desirable characteristics of kindergarten teachers on teaching about development evaluation, the overall summary is in the most, the maximum average is to observe children's behaviors and record in a system based on the fact of individual and collect their children's portfolio to see the progress of development.

4. The desirable characteristics of kindergarten teachers on personality about internal personality.

   The results of the query from graduate students found that the desirable characteristics of kindergarten teachers on personality about internal personality, the overall summary is in the most, the maximum average is teacher should humor smiling, enjoy and cheerful, and on time.

5. The desirable characteristics of kindergarten teachers on personality about external personality.

   The results of the query from graduate students found that the desirable characteristics of kindergarten teachers on personality about external personality, the overall summary is in the most, the maximum average is to use Thai language correctly, use the gentle tone and speak with the normal volume, the dress politely with according to the regulations of the school.

6. The desirable characteristics of kindergarten teachers on morality and ethics.

   The results of the query from graduate students found that the desirable characteristics of kindergarten teachers on morality and ethics, the overall summary is in the most, the maximum average is teachers should be kind with everyone equally, committed to the national institution, and religion and the king.

Discussions

The results of data analysis of the study, the desirable characteristics of kindergarten teachers as perceived by graduate students of Division of Early Childhood Education, Faculty of Education, Srinakharinwirot University: the researcher had the point of discussion as follows.

Teaching Methods

The desirable characteristics of kindergarten teachers as perceived by graduate students found that the kindergarten teachers should have the knowledge and understanding in early childhood fostering focusing on organize learning activities by using the major 6 learning activities, in accordance with (Poomman, 2001) that kindergarten teacher should organize activities to prepare children not teaching in individual subject course. Nevertheless they will teach children to learn by integration, children will participate to learn by using the main 6 learning activities comprised with: 1) experience activities (the circle activity) 2) movement-rhythm activities 3) education games activities 4) creative activities 5) outdoor activities and 6) play in the corner activities. Moreover, children can do the activity in classroom and outside classroom that corresponds to alignment of activities and media of early childhood education level. The Ministry of Education (1997) offered main 6 learning activities that appropriate for early childhood students, so that children have been developed covering all of child development are the physical development, emotional development, social development, and cognitive development. The the kindergarten teachers will need to be aware of individual differences because each children will have differences interest and ability, so the kindergarten teachers are also should promote children to analysis thinking, using the reason, ask questions and then try to do anythings by themselves. The kindergarten teachers should provide the instructional media and instruments by borrowing, made by themselves, and occasionally purchase to use the result for setting activities in accordance with (Neelamanee, 2001) said that the kindergarten teachers was people who set up the classroom for children, they should provide the instructional media and instruments and use fingers for teaching model with singing, games, read the rhyme with fun and the kindergarten teachers can apply media and instruments that is close or nature around such as newspaper, cotton, leaves, and etc. to manage the variety of instruction and cost-effective.

For development evaluation, the graduate students had the comment that kindergarten teachers should observe children's behaviors and record in a system based on the fact of individual and collect their children's portfolio to see the progress of development in accordance with the Ministry of Education (2003) that presented about the development evaluation of early childhood students was an ongoing process and as a part of the activities in accordance with the normal activity schedule for the day and covered all of child development were the physical development, emotional development, social development, and cognitive development. They used the results for setting activities or experience, developed children to the full potential of each person so the kindergarten teachers which was

the assessment of child development will need to have the knowledge and understanding of the child development of 3-5 years children as well and need to understand the structure of the assessment in detail how to assess when and how, to have the ability to select the tool and how it will be used correctly, it will contribute to the results of the assessment is accurate and reliable.

The Personality

The desirable characteristics of kindergarten teachers as perceived by graduate students on personality about internal personality, the students had comments that the kindergarten teachers should have a sense of humor smiling, enjoy and cheerful, and on time. About external personality, the students had comments that the kindergarten teachers should have to use Thai language correctly, use the gentle tone and speak with the normal volume, the dress politely with according to the regulations of the school which corresponds to (Oannim, 1996) that study personality of the kindergarten teachers under the Bangkok Metropolitan Administration found that the kindergarten teachers had obviously personality, was a little gentle that had the humility to others, quite lively with agility, eager to work, like to meet people and was very friendly consistent with (Sutatsanee, 1994) that the kindergarten teacher should dress politely in accordance with timely, use the gentle tone and speak with the normal volume, creative criticism. So the kindergarten teachers, they were necessary to be a person who had a personality and appropriate to the teacher because the teacher must be the role model for children and also the developer of the child to have a personality and appropriate to the ages.

The Morality and Ethics

The desirable characteristics of kindergarten teachers as perceived by graduate students, the students had comments that the kindergarten teachers should be kind with everyone equally, committed to the national institution, and religion and the king that corresponds to (Bhikkhu, 2004) that the integrity of the teacher tasks were consist of hard working, patience to sacrifice, use of intelligence, had mercy, and taught and point the right way to children. Secretariat Office of the Teachers Council of Thailand (2005) had proposed the Code of Ethics of Teaching Profession that the accounting profession in education shall act as the leader to conserve and develop economic, social, religion, arts and culture, Thai wisdom, environment and adherence to the democratic regime of government with committed to the national institution, and religion and the king. If the teacher is ethics that it will be useful for them, teacher will be praised and the beneficial will returns to children. Children will have a good role model and the society will got benefits because the teachers teach children about disciple and a good role model of the students in the future.

Conclusion

Recommendations

1. The higher education institutions which are the production of people in a professional teacher in Majors Early Childhood Education, can apply the desirable characteristics of kindergarten teachers from this research to the guidelines in the development of the study course consistent with the needs, use in the accounting profession, and the Early Childhood Education that has the following performance.

2. Related organization or school can apply the desirable characteristics of kindergarten teachers from this research to the guidelines for training and development for kindergarten teacher to have the desirable characteristics which affect the quality of children's education.

Implications

There should be a study the desirable characteristics of kindergarten administrator as perceived by graduate students of Division of Early Childhood Education, Faculty of Education.

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Enhancing Japanese High School Students' Global Awareness Through Pre-exchange Learning: A Case Study Using the MINPACK Suitcase Kit

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Abstract

The purpose of this study was to foster awareness of coexistence and a global perspective among Japanese public high school students who have limited opportunities to interact with foreigners and feel uncomfortable using English. This goal was pursued by promoting cross-cultural understanding through hands-on activities, conducted entirely in Japanese. The program targeted 54 second-grade students from a general course at a public high school in Hyogo Prefecture and was implemented during a special schedule of three 50-minute sessions. As preparation for an exchange with an Egyptian lecturer, a suitcase-style teaching kit from the National Museum of Ethnology was used. This kit, widely utilized in elementary and junior high schools, includes real-life objects and promotes active engagement with diverse cultures. In class, students worked in groups of four, explored Egyptian household items, discussed their potential uses, and shared findings with peers. A pre-class survey showed that over half of the students expressed low interest in foreign cultures. However, classroom observations revealed increased enthusiasm and active participation. Post-class reflections indicated a notable shift in student attitudes, with many expressing greater interest in Egyptian culture. Text mining of the free-response reflections showed an increase in keywords related to curiosity, understanding, and cross-cultural communication. These findings suggest that even short-term, language-free intercultural programs can enhance students' interest in global diversity and promote more inclusive perspectives.

Keywords: Japanese high school students, intercultural understanding, museum-based education, hands-on learning, global perspective

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Introduction

The purpose of this study is to foster an awareness of coexistence and cultivate a global perspective among Japanese public high school students who have limited opportunities to interact with people from other cultures and who often feel uncomfortable using English. Although the number of foreign residents in the local community is increasing, many students at the target school still perceive English as irrelevant to their daily lives, and some express a strong aversion to the subject. Opportunities for intercultural exchange remain limited. This research aims to provide students with experiences that promote broader worldviews and a deeper appreciation of cultural diversity.

Literature Review

The representation of religious and cultural artifacts in museums has undergone significant transformation in recent decades, particularly in contexts where the exhibited cultures are not part of the majority. Current museological discourse emphasizes a move away from colonial or purely aesthetic presentations toward participatory and dialogic approaches that foreground lived experiences and intercultural understanding.

In Japan, the National Museum of Ethnology (Minpaku) has been at the forefront of this shift through its development of MINPACK, a suitcase-style outreach kit. Designed to support multicultural and intercultural education, MINPACK contains everyday objects from specific cultural regions—such as religious tools, traditional clothing, and musical instruments—along with explanatory materials. Its portability and tactile nature enable hands-on engagement outside traditional museum spaces, making it especially valuable in school-based settings.

This initiative reflects a broader institutional commitment to connecting anthropology and education. Morimo (2016) details the evolution of Minpaku's educational outreach, noting the emergence of collaborative programs that bridge the gap between anthropological research and classroom practice. These programs exemplify public anthropology in action, fostering co-constructed learning environments between museum professionals and educators.

In this context, MINPACK has gained recognition not only as a teaching resource but also as a communication tool. Sato (2005) highlights its role in promoting intercultural dialogue by allowing students to physically interact with materials representing cultural diversity. Ishiro (2005) explores its application in music education, where instrument kits are used to cultivate global sensibilities through sensory and auditory engagement.

Despite the widespread use of MINPACK in elementary and secondary education, prior research has largely been descriptive. Few studies have evaluated its educational impact through empirical or statistical means. One exception is Fujiwara (2016), who analyzed post-workshop survey responses to assess the perceived effects of MINPACK-based programs. However, there remains a notable gap in research that systematically investigates changes in students' intercultural awareness as a result of such interventions.

Building on these foundations, the present study employs both quantitative and qualitative methodologies to examine how museum-based resources like MINPACK can shape high school students' perceptions of cultural diversity. In particular, it seeks to understand how

short-term, non-English-based intercultural learning experiences affect students in EFL environments where direct exposure to global cultures is limited.

Research Methodology

This section outlines the overall procedure, participant demographics, instructional design, and data collection and analysis methods. The study employed a multi-step instructional approach to investigate how hands-on, museum-based learning affects students' global awareness and intercultural understanding.

Procedure

The instructional sequence consisted of four key stages:

(1) Pre-lesson survey
Prior to the lesson, students completed a questionnaire assessing their interest in and attitudes toward foreign cultures and customs. This baseline survey was designed to gauge prior knowledge and perceptions of cultural diversity.

(2) Interactive lesson using MINPACK
During the main session, students worked with MINPACK, a suitcase-style educational kit developed by the National Museum of Ethnology. This resource provided tactile access to Islamic artifacts, encouraging direct engagement with material culture in an immersive learning environment.

(3) Guest lecture
A guest speaker from Egypt was invited to deliver a lecture on cultural practices and everyday life. This session aimed to provide firsthand perspectives and deepen students' understanding of global diversity.

(4) Post-lesson questionnaire
After the lesson, a follow-up survey was conducted, including open-ended items to capture students' reflections. The responses were analyzed to assess changes in intercultural awareness and attitudes.

This structured approach allowed for a multifaceted evaluation of students' engagement with foreign cultures through experiential learning and reflective analysis.

Participants

The study involved 54 second-grade students (28 males, 26 females) from a public high school in Hyogo Prefecture, Japan. Although the school is situated in a region with a large foreign resident population, students had limited opportunities to engage with individuals from different cultural backgrounds and often expressed discomfort using English in daily contexts. All students participated in the pre-lesson survey (100% response rate), and 48 valid responses were collected for the post-lesson survey (87% response rate).

All lessons were delivered in Japanese over three 50-minute periods to ensure clarity and inclusiveness for all participants.

Instructional Design and Implementation

The lesson was structured around the use of MINPACK, which provided a multisensory learning experience focused on Islamic culture. The pre-lesson survey measured students'

initial awareness and interest in the subject. During the activity, students worked in small groups and took on rotating roles—introducing objects, discussing interpretations, and confirming meanings using explanation cards. Items such as the Qur'an, prayer beads, and prayer rugs were handled directly, fostering deeper understanding and lowering cultural barriers. Group presentations and collective reviews reinforced key concepts. Post-lesson surveys were then administered to assess shifts in perception and understanding.

This hands-on, role-based instructional model encouraged active engagement, critical thinking, and the development of a more nuanced understanding of Islam and cultural diversity.

Data Collection and Analysis

A four-point Likert-scale questionnaire (4: Agree to 1: Disagree) was used to evaluate students' attitudes toward cultural engagement before the lesson. The post-lesson survey included open-ended prompts for student reflections.

Quantitative data from the Likert-scale survey were analyzed using statistical techniques to identify significant changes in attitudes. Qualitative data were analyzed using text mining with KH Coder (Higuchi, 2022) to extract frequently used vocabulary and examine co-occurrence patterns. This mixed-methods approach enabled a robust analysis of students' cognitive and emotional engagement with the intercultural learning experience.

Results and Discussion

Pre-class Questionnaire Results and Overview

Prior to the lesson, students were asked to respond to the statement: "I am not interested in actively learning about foreign cultures and customs." The results revealed that 57.2% of respondents either agreed (14.3%) or somewhat agreed (42.9%), suggesting a generally low level of motivation to engage with intercultural topics. In contrast, only 12.2% strongly disagreed, indicating that few students held a strong initial interest in such learning.

These baseline findings highlight the importance of designing lessons that can spark interest and engagement. Subsequent observations and post-class responses would later reveal how students' attitudes evolved through the lesson experience.

Text Mining Analysis of Post-class Reflections

To explore students' impressions following the lesson, a text mining analysis was conducted on their free-response reflections. This analysis aimed to uncover recurring vocabulary and reveal deeper patterns in student perceptions of cultural learning.

Table 1 presents the 30 most frequently occurring words in students' reflections. Terms such as thing, different, country, Japan, similar, realize, religion, clothes, and culture were most common. These keywords suggest that students actively engaged in cultural comparison, identifying both commonalities and differences—particularly in areas such as religious practices and everyday life.

To explore the structure of these reflections in greater depth, a co-occurrence network was generated using the same textual data.

Figure 1 visualizes the relationships among key terms. The size of each node indicates the frequency of word use, while the lines represent the strength of co-occurrence. Different colors highlight thematic clusters, including religion, learning, communication, and cultural items. The network illustrates how students cognitively and emotionally organized their experiences around core intercultural themes.

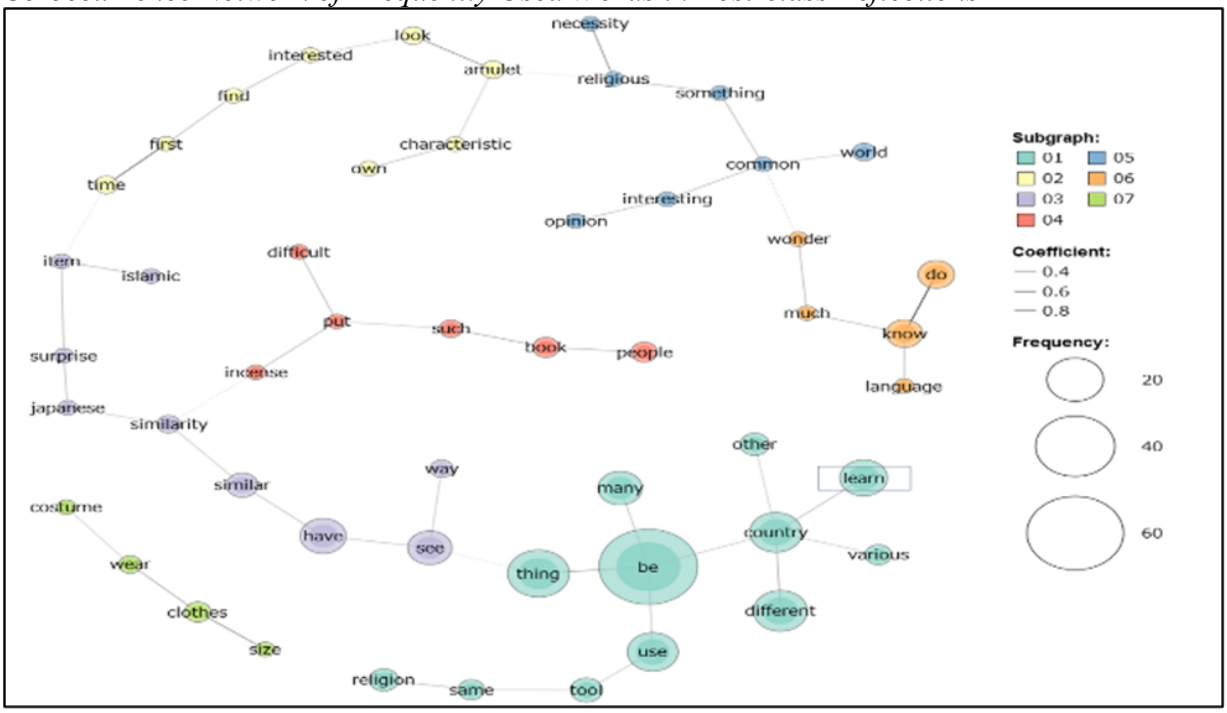
Table 1

Most Frequently Appearing Words in Post-class Free-Response Reflections (N=54)

Extract Words	Number of Appearances	Extracted Words	Number of Appearances
be	63	know	8
I	51	Japan	7
thing	24	that	7
different	18	able	6
country	17	similar	6
use	16	tool	6
we	15	it	5
learn	14	other	5
they	14	realize	5
have	13	religion	5
many	12	what	5
not	12	book	4
see	12	clothes	4
think	9	culture	4
do	8	people	4

Figure 1

Co-occurrence Network of Frequently Used Words in Post-class Reflections



Students' qualitative reflections reinforced these findings. Many expressed surprise upon realizing that different religions use similar tools or that the same object can have different uses across cultures. Others valued the diversity of perspectives within their groups, finding discussions to be thought-provoking and enlightening. Several students reflected on improvements in their communication skills and a heightened awareness of alternative viewpoints.

Additionally, students reported gaining exposure to unfamiliar cultural items. Some noted that the activity allowed them to learn about objects they had never encountered before, such as book holders or jugs used in religious or educational contexts. Others commented on differences in religious texts, talismans, and traditional clothing. These insights suggest that the MINPACK activity was effective in broadening cultural awareness, fostering curiosity, and encouraging students to consider multiple perspectives.

Reflections on the guest lecture by the Egyptian speaker also indicated high engagement. Students expressed fascination with Egypt's history, geography, and climate. Several were surprised to learn that traditional clothing in Egypt is not necessarily linked to religion, or that the population is concentrated almost entirely along the Nile River. These reactions illustrate how firsthand cultural narratives deepened students' understanding of global diversity and sparked further interest in intercultural topics.

Taken together, these findings suggest that the combination of tactile learning using the MINPACK kit and direct exposure to authentic cultural perspectives effectively nurtured students' openness to difference, global awareness, and understanding of the need for coexistence. Even in a short instructional period, this integrated approach helped shape students' international mindset and intercultural sensitivity.

Conclusion and Future Directions

This study demonstrates that even short-term international education, when carefully structured, can significantly enhance students' intercultural awareness and sensitivity. Through a combination of tactile materials, collaborative activities, and interaction with a guest lecturer, students—many of whom had limited prior exposure to other cultures—developed a greater openness to cultural difference and a clearer sense of global coexistence.

Although the lesson was conducted entirely in Japanese and did not involve English use, the experience nevertheless supported the foundations of global competence. Students reflected deeply on cultural similarities and differences, practiced articulating their perspectives, and became more receptive to intercultural dialogue.

To build upon these outcomes, this study identifies four directions for further development. First, designing a longitudinal curriculum that incorporates global themes will provide continuity and deepen understanding over time. Second, regular online exchanges with students from other countries—especially those in EFL contexts—can facilitate sustained cross-cultural communication. Third, expanding opportunities for communication in English, even in hybrid or non-native forms, can encourage functional language use as a tool for intercultural engagement. Finally, diversifying the range of countries and cultures introduced in the classroom will expose students to a broader spectrum of global values and experiences.

By pursuing these initiatives, educators can cultivate students with not only a global mindset, but also the adaptive skills and cultural empathy needed to thrive in increasingly interconnected societies.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

AI-assisted technologies, including DeepL Write for translation, were used to support the writing process. All translations were reviewed and revised by the authors to ensure accuracy and appropriateness.

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The Development Curriculum Training of Blended Learning of Mindfulness Based Learning to Enhance of Active Citizenship Competencies of Social Studies Teacher

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Abstract

The research on the development of a mindfulness-based blended learning training course to enhance strong citizenship competence for primary school social studies teachers has the following objectives: 1) to develop a mindfulness-based blended learning training course, 2) to study the effectiveness of a mindfulness-based blended learning training course, and 3) to study the satisfaction of primary school social studies teachers towards the training. The sample group who received the mindfulness-based blended learning training course to enhance strong citizenship competence were 45 primary school social studies teachers under the Office of the Nakhon Nayok Provincial Education Service Area, selected by purposive sampling, teaching grades 1-6. The research results found that: 1) The mindfulness-based blended learning training course to enhance strong citizenship competence for primary school social studies teachers consisted of training course documents and training materials, which included a course manual for trainers and a course manual for trainees. 2) The results of the comparison of the pre-training and post-training tests of the trainees were as follows: The post-training scores were significantly higher than those before pre-training at the .05 level. 3) The evaluation results of the trainees showed the highest level of satisfaction with the training course on classroom research to improve academic performance ($\bar{X}$ = 4.53, S.D. = 0.33).

Keywords: development curriculum training, active citizenship competencies, social studies teachers

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Introduction

According to the 20-year National Strategy, the National Education Plan 2017-2036 has been formulated with the objective in management of education in Item 2 to develop Thai people to become good citizens with characteristics, skills and competencies in accordance with the provisions of the Constitution of the Kingdom of Thailand. The Education Act and National Strategy No. 3 to develop Thai society into a society of learning and morality, ethics, love and harmony and cooperation are working towards sustainable national development in accordance with the philosophy of the Sufficiency Economy (Civic Education) in Thai society (McManus & Taylor, 2009).

The past crises have prompted research and the promotion of citizenship education, as well as the development of strong citizenship competencies (Active Citizenship), with the aim of reducing conflict and addressing the lack of critical thinking processes and civic consciousness. In light of recent political crises, the competency of active citizenship has become a key focus within the education system (Hébert & Sears, 2001). Furthermore, the Office of the Education Council has identified core competencies for learners, including the competency of active citizenship, which emphasizes participation in driving change towards equality and justice at the local, national, and global levels both in real and digital contexts to foster peace and sustainability (Suthasinobon, 2016).

Although education today places importance on citizenship education and requires learners to develop strong citizenship competencies (Active Citizenship), the focus remains primarily on curriculum promotion and development (Stolovitch, 2005). The Basic Education Core Curriculum emphasizes the development of learners to become good citizens in society, particularly within the Social Studies, Religion, and Culture Learning area, specifically in Strand 2: Civic Duties, Culture, and Social Living. However, current teaching practices tend to emphasize content knowledge, resulting in students lacking the integrated competencies that encompass knowledge, skills, attitudes, characteristics, and other abilities. Consequently, students find it challenging to successfully develop strong citizenship competencies. Problems in teaching for the enhancement of active citizenship, particularly in primary social studies education, reveal issues in instructional approaches. Learners often lack knowledge and understanding of the content, while teachers focus on content delivery. As a result, students still lack robust citizenship competencies, critical thinking processes, teamwork skills, and the ability to solve real-life problems as good citizens. This situation reflects issues within the curriculum and instructional practices, which prioritize theoretical knowledge over competency development and practical application in daily life (Bishop, 1985).

The analysis of the problem's significance and background has led the researcher, in their capacity as a university lecturer and social studies educator for undergraduate students training to become future effective social studies teachers, to investigate the development of a blended learning training curriculum using mindfulness-based approaches (Taba, 1962; Zais, 1976). This initiative aims to enhance active citizenship competencies for primary-level social studies teachers. The study focuses on the research topic: *"Development of a Blended Learning Training Curriculum Using Mindfulness-Based Approaches to Strengthen Active Citizenship Competencies for Primary Social Studies Teachers."* The training curriculum serves as a tool to improve educators' ability to implement blended learning with mindfulness-based strategies, thereby enhancing the efficiency and comprehensiveness of active citizenship competency development. Additionally, the curriculum emphasizes activities that foster essential knowledge in moral, ethical, and conscientious development

through mindfulness-based learning frameworks, further strengthening robust citizenship competencies.

Research Objective

1) To develop a mindfulness-based blended learning training course, 2) to study the effectiveness of a mindfulness-based blended learning training course, and 3) to study the satisfaction of primary school social studies teachers towards the training.

Research Methodology

Sample is 45 social studies teachers at the primary school affiliated to the Nakhon Nayok Provincial Education Service Area Office. This sample was obtained from purposive sampling (Purposive sampling), which was taught in grades 1-6 and had 1 year or more of teaching experience.

The research is conducted as research and development by the research model is Experimental Research, which has a research pattern of One group pretest – posttest design (Tuckman, 1999: p.151) by the process of developing a mindfulness-based blended learning management training course. To enhance the competency of active citizenship for primary-level social studies teachers, which are divided into 4 phases as follows (Suthasinobon, 2012):

Phase 1: Problem Study and Requirement Analysis Consists of 4 Steps

- **Step 1:** Study the scope of content from books, textbooks, and materials for blended learning management using mindfulness-based for social studies teachers at the primary-level.
- **Step 2:** Create a questionnaire on problems and requirements for blended learning management using mindfulness as the base.
- **Step 3:** Evaluate the quality of the questionnaire of the problem and requirement for blended learning management using mindfulness as the base.
- **Step 4:** Data collection and data analysis.

Phase 2: Development of Training Courses

The training course has 6 components: 1) the principles and rationale of the training course, 2) the objectives of the training course, 3) the structure and content of the training course, and 4) the training activities including lectures, discussions, practical exercises, and team learning. 5) Training materials including knowledge sheets, worksheets or exercises, computers, LCD projectors, video clips, audio CDs, WeChat App - Mobile Phone Tablet, Mobile wi-fi Cloud to store data and 6) Measurement and evaluation of training courses.

Phase 3: Quality Inspection of Training Courses

Develop and improve according to the recommendations of experts and specialists to ensure a complete and effective training course. Then, it will be tested on a sample to determine the efficiency and effectiveness of the course, which consists of 4 steps (Suthasinobon, 2015):

- **Step 1:** Verify that the training course outline is accurate by the experts.
- **Step 2:** Improve the training course outline after the expert confirms it.

Step 3: Verify the training course outline by having a group discussion with the experts (Focus Group Discussion).
Step 4: Improve the training course outline after a group discussion with the experts.

Phase 4: Performance Inspection and Improvement of Training Curriculum

Evaluation of the effectiveness and improvement of the training course by evaluating the results of the test with the sample before and after the use of the training course using the One group pretest – posttest design and conducting an assessment of the satisfaction of the sample with the use of the Mindfulness-based Blended Learning Management Training Course. To enhance the competency of active citizenship for primary-level social studies teachers. After this, the results of the evaluation of the use of the training course and the opinions of the sample were taken into consideration and used to improve the training curriculum to be complete.

Conclusions

1. Mindfulness-based blended learning management to enhance the competency of active citizenship for primary-level social studies teachers. There are 7 steps of learning management as follows:
   Step 1: Mindfulness Development
   Step 2: Reflections on concepts and experiences
   Step 3: Wisdom Development
   Step 4: Holistic practice
   Step 5: Customize and conclude
   Step 6: Awareness of the Phutthathorn into Application
   Step 7: Share experiences & learn together
2. The results of the comparison of the average scores of the Mindfulness-based Blended Learning Management Ability Test to enhance the competency of active citizenship founded that the Mindfulness-based blended learning management to enhance the competency of active citizenship for social studies teachers. After receiving the training, it was statistically significantly higher than before the training at the level of .01.
3. Participants were satisfied with the Mindfulness-based Integrated Learning Management Training Course to enhance the competency of active citizenship for social studies teachers at the highest level overall ($\bar{X}$ = 4.53, S.D. = 0.33).

Suggestions

1. Instructor must live according to religious principles to be able to control their own mindfulness and learners well.
2. Instructor and learners must have correct behavior, have a stable mind, and have a good knowledge management process and thinking process because it will make learning management effective.
3. To build up confidence for teachers in developing their teaching skills, we or those who are responsible should train teachers in a friendly and sincere manner and in a friendly atmosphere so that they can participate in managing teaching based on Mindfulness-based Blended Learning effectively.
4. More teachers should be trained to develop their teaching skills Mindfulness-based Blended Learning Model. Teachers should be aware of the importance of education which apply principles of religion to teaching and learning. They should also take part in

managing and developing education correctly and thoroughly as well as making use of innovation to develop teaching to suit the culture of the nation for future teachers of our country.

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Work, Family, and Dropping Out Among Adolescents in Thailand

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Abstract

Education is key to developing human capital and a country's growth. Dropping out of school is a serious problem, affecting both the economy and the individual's quality of life. Even though there are many policies and programs to make education easier to access, financial constraints and family issues still create major barriers. Single parenthood is a potentially important factor affecting dropout among adolescents. Time and financial constraints may limit single parents' ability to support their child education. In addition, children of single parents may face emotional and psychological challenges affecting their studies. Moreover, the trend of single parenthood in Thailand has been continuously increasing in recent years. This study explores factors affecting the dropout rate among Thai youth aged 15-19. Using data from Labor Force Survey Thailand 3rd quarter 2022, this study uses the OLS model and Probit to examine the relationship between single parenthood and children's school enrollment. The findings show that single mothers do not have a significant impact on the dropout rate, whereas single fathers are associated with a higher dropout rate after controlling for family income, work status in adolescents, and a host of potentially relevant demographic factors. Finding that children from single-father families have higher school dropout rates than those from single-mother or two-parent families. Policies should focus on addressing root causes, such as inconsistent parental involvement and financial difficulties, with interventions like learning centers for single fathers and tax deductions for education expenses. Further research to understand single parenthood and its impact on education.

Keywords: school dropout, single parents, adolescents

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Introduction

Education is not only a tool for developing the skills and knowledge needed to enter the labor market, but it is essential for improving overall quality of life (Sarker et al., 2019). High-quality education enables individuals to secure stable employment and earn higher incomes, contributing to both economic and social development through the strengthening of human capital (Hanushek & Wößmann, 2010). In Thailand, for instance, show estimated returns on education of 13.5% for primary, 13.4% for lower secondary, 10.6% for upper secondary, and 23.1% for higher education in 2002 (Colclough et al., 2010). Since the early 21st century, rapid global changes especially digital transformation in daily life have increased the need for specialized work skills. Thus, education systems have had to continuously evolve and adapt their curricula to meet the shifting demands of human capital in an increasingly competitive world. However, despite these advantages and skills that enhance human capital, many adolescents still face barriers that lead them to drop out of school. This study, therefore, aims to explore the factors contributing to school dropout.

School dropout refers to students leaving school without graduating, and it affects millions of children worldwide. In Thailand specifically, 238,707 children have dropped out, with those from low-income groups being at higher risk. This widespread issue need for effective solutions to ensure all children receive an education. Although some government policies have shown positive results in reducing school dropout rates, many others have failed to achieve their objectives (Tharmmapornphilas, 2013). Thus, adopting appropriate policies can benefit children at risk of dropping out and using government resources efficiently.

Ministry Of Education (2010) in Thailand's has launched "15 Years of Free Education with Quality" campaign aimed to provide free education up to the 12th grade for all children, supported by educational equipment. While this policy successfully increased enrollment rates at the basic level, many students still dropped out after the 12th grade due to financial constraints. Subsequently, the COVID-19 pandemic further exposed existing educational inequalities, as vulnerable households struggled with online learning, leading to additional dropouts. In response, UNICEF Thailand revived the "Education for All" program and launched to promote school re-enrollment. Office of the Permanent Secretary, Ministry of Education (2022) launched "Pha Nong Klub Ma Rean" aimed to bring all out of school children back. The government expected positive outcomes based on research by Dessy et al. (2023) found that free and compulsory education can reduce the negative impact of income shocks on school attendance, as demonstrated in Nigeria. However, these initiatives faced significant barriers, especially financial ones, resulting in lower-than-expected outcomes. These results suggest that financial support alone may not be sufficient to bring children back to school. As Pratibha et al. (2014) concluded, additional factors, such as overall financial stability of families, are also critical for academic success.

Family is the most influential agent among the different social factors that significantly influences the growth and development of any child (Pratibha et al., 2014). While income constraints are often a primary factor leading to school dropout, other family characteristics also play a substantial role. These include household income, number of siblings, single parent status, and various forms of family structural gaps factors that are frequently overlooked in educational policy discussions. Thus, exploring family structure becomes a compelling dimension of educational research.

Characteristics of single-parent families have been linked to child development, and lead to dropout as family size and parental marital status affect children's emotional and intellectual development (Egunsola, 2014; Falana et al., 2012). However, the impact of single-parent families on children remains a subject of debate. For example, Amato et al. (2015) show single mothers' education improves children's math scores, while Gupta and Kashyap (2020) associate single-parent households with higher dropout rates. In Thailand, single-parent households made up 10.6% of all households in 2020, may rise to 11.2% by 2040 (Bhubate Samutachak, J. R. S. C. K. T. P. N. S. S, 2022). This research aims to examine how single-parent families affect child educational attainment in Thailand to reduce school dropout among children from single-parent families and to enhance the educational opportunities or capabilities of youth for entry into the labor market.

This study examines factors influencing school dropout among adolescents aged 15–19, focusing on the role of single parenthood and economic causes in dropout rates. It highlights the need to explore this issue in Thailand, where single-parent families are rising, considering varying cultural beliefs and social support that impact education outcomes.

The increasing prevalence of single-parent families in Thailand necessitates examining their impact on child academic and dropout rates within the country's unique context. Azumah et al. (2018) explore family structure indicated no significant effects on academic performance of children but parental involvement significant difference in children's academic performance. However, recent technological advances and evolving social values promoting equal access to education have created new opportunities for children from all family structures to learn independently. Therefore, this study aims to determine whether single-parent families influence educational attrition in Thailand.

Research Question

- Does single parenthood of parents affect adolescents' school dropout.

Expected Outcome

- Recognize the importance of education children and find ways to reduce children's attrition from education.
- Make families and children aware of problems and be able to deal with it in time.
- Provide policy recommendations and support.

Literature Reviews

Family structure is recognized as a significant factor influencing children's behavior, emotions, and educational outcomes. This study aims to identify the factors contributing to educational attrition, with a particular focus on single-parent families in Thailand.

Dropout

School dropout is defined in various ways, including children not enrolling in school (Polat, 2014), leaving before completing compulsory education (Mpourgos et al., 2020), or exiting the education system without obtaining a minimum diploma (De Witte et al., 2013).Despite these differing definitions, school dropout consistently has negative consequences for the education system, individuals, and society as a whole (Boyacı, A., 2019). Lawrence and

Adebowale (2022) found school dropout occurs for many reasons; however, this study focuses specifically on students who leave school before completing secondary education. Furthermore, this study examines the influence of single parenthood and demographic factors on dropout rates.

Family Variables Can in Particular in Family Structure

Family structure significantly influences dropout rates (Rumberger et al., 1990). Single-parent families typically face economic and time constraints that impede children's academic success, unlike two-parent households that provide greater stability and support. Family dynamics, including parental involvement and family size, further affect dropout risk, with larger families often providing less individual attention. Effects on children in single-parent households extend beyond economics include behavioral problems, such as school disengagement and increased dropout likelihood (McNeal, 1999). Parental divorce or separation during high school can lead to more significant behavioral issues and heightened risks of early sexual activity, teen pregnancy, and substance abuse (Bago, B. A., 2022; Song et al., 2012; Usakli, Hakan., 2018). Understanding family structure whether nuclear or single-parent is crucial, as it continuously influences children's educational and career outcome while significantly impacting high school dropout rates (Biblarz & Raftery, 1999; Lawrence & Adebowale, 2022) and negatively affecting children's economic and social outcomes (Erola et al., 2016).

Single Parenthoods and School Dropout

Despite challenges, research reveals several advantages in single-parent families. Sangeet and Singh (2022) found that children from single-mother households often develop increased responsibility and improved decision-making skills. Similarly, Golombok et al. (2016) documented reduced mother and child conflict compared to two-parent families. Park (2007) found that children from single-parent families in Indonesia and Thailand outperform their peers in intact families. But negative effect of single parenthood remains to child outcome. Examining both advantages and disadvantages provides critical insights into the mechanisms influencing children's development, thereby informing effective support strategies for single-parent families.

The impact of divorce or separation varies by which parent the child lives with. In Japan, children in single-mother households face financial strain, while child with single fathers may lack emotional support due to limited parenting experience (Nonoyama-Tarumi, 2017). The absence of either parent can disrupt children's emotional and academic development (Coles, 2015; Haritha, Y. D., & Bilquis, 2022).

Family Background, Demographic Variables, and School Dropout

Household income significantly influences child education outcomes. Low-income families struggle with educational expenses, resulting in lower academic achievement and higher dropout rates (Acemoglu & Pischke, 2001; Bainbridge et al., 2005), particularly in resource limited rural areas (Gupta & Kashyap, 2020 ; Yi et al., 2015). Financial hardship negatively impacts both quality of life and children's attitudes toward education (Kearney & Levine, 2016; Maina et al., 2021). However, Blau (1999) suggests that family background factors including parental education and number of siblings play a more crucial role in child development than financial status alone. Szekely and Adelman (2016) note strategic policy

interventions at school and community levels more sense than individuallevel programs and mitigate these socioeconomic impacts on educational outcomes.

Larger families often face increased financial strain and resource allocation challenges, potentially impacting educational outcomes (Black et al., 2005). In addition, birth order also plays a role, with later-born children potentially experiencing less educational support in low-low parental education (Karwath et al., 2014). Furthermore, parental education levels significantly correlate with children's cognitive development (Noble et al., 2015). Low parental education can contribute to higher dropout rates, highlighting the interconnectedness of socioeconomic factors and educational attainment (Aina et al., 2022; Chenge et al., 2017). While these family factors are important, geographical factors also play a role, as the influence of urban and rural areas on dropout rates continues to be debated (Farah & Upadhyay, 2017; Jordan et al., 2011). Beyond family-related and geographical factors, it is also crucial to study and control for the individual characteristics of the child, as these personal attributes may directly influence decisions to continue education or drop out of school.

Child Labor

Previous studies show that a main reason children drop out of school is working while studying (Hovdhaugen, 2013) , as financial problems force them to balance both activities simultaneously. Dupéré et al. (2015) proposed precipitating factors that occur in the short period before the decision to drop out of school, such as new job opportunities, may play an important role in pushing students to drop out of school. While Edmonds and Theoharides (2021) and Mussida et al., (2019) identified child employment as a significant barrier to economic growth. McNeal (1997) show the relationship between work and dropout rates is significant, with both job types and working hours strongly influencing students' likelihood of dropping out. Hamenoo et al. (2018) in-depth interviews with children working on highways reveal that poverty and lack of parental care drive them to work, negatively impacting their health and education. Patrinos and Psacharopoulos (1997) noted that although work can harm education, without employment many children might not attend school at all, as economic constraints require income for educational supplies.

Gender

Barriers to education and factors leading to early school dropout are significant concerns. Gender differences in victimization and problematic behaviors also influence high school graduation rates (Tan et al., 2017). Although most dropouts are from behavior, when child separate the groups by gender, they find that the reasons for leaving school differ between males and females as Tabassum, N., & Tabassum, H. (2022) found females drop out more than males because of insecurity or harassment they face in both school and way to school. Rafique and Ahmed (2019) found that boys have a frequency of dropping out more than girls because they are more punished than girls’ social pressure and norms reflect different gender perspectives. Study (Buchmann et al., 2008; Ovejas, 2024) explore female has fewer dropouts than males due to various factors such as social influences, the higher perceived value of education and they believe graduating and having a degree will make them get a better job higher salary and inequality of gender led to employment-related interests associated with education (Kane, 1995).

Age

Many studies, such as Cardoso and Verner (2006) and Boyacı, A., (2019) shows age positively correlates with dropout rates. Older adolescents have higher dropout risks as they become more attracted to non-educational activities that seem more relevant or engaging to their interests. While government policies aimed at reducing tuition and fees for junior high school students may be necessary, they are insufficient to fully address the dropout issue(Yi et al., 2012) . Therefore, this study incorporates age as a key variable in modeling school dropout trends in Thailand.

Methodology

To answer the research question, this study compares dropout rates across three family structures: both-parent, single-mother, and single-father households (micro families). A higher dropout rate indicates a greater impact of family structure on education. The findings highlight the significant link between family structure and dropout rates.

Data Collection

This study uses data from Thailand's 2022 Q3 Labor Force Survey (LFS) (National Statistical Office of Thailand, 2022), covering private and group households nationwide, excluding foreign households. Data were collected through interviews using structured questionnaires on demographics, education, employment, and income. The survey applied a Rotation Sampling method (4 groups, 2-2-2 pattern) and three-stage weighting: design weight, non-response adjustment, and post-stratification aligned with ILO and UN standards (minimum working age: 15 years).

Data Used

The study controls for confounding factors using key demographics (age, gender, region, area) and focuses on employment status and single parenthood as primary explanatory variables, based on their expected impact on school dropout rates.

Limitations

The study focuses on nuclear family structures as two-parent, single-mother, and single-father households to enable a direct comparison of their impact on educational outcomes. extended families, though common in Thailand, are excluded to maintain analytical clarity. This limitation acknowledges that other family structures may also affect school dropout rates.

Population

The study focuses on nuclear family structures two-parent, single-mother, and single-father households to enable a direct comparison of their impact on educational outcomes. Extended families, though common in Thailand, are excluded to maintain analytical clarity. This limitation acknowledges that other family structures may also affect school dropout rates.

Samples

This study narrowed the sample down to the children who live in 1 of 3 family structures including:

- Children who stay with both parent
- Children who stay with single mother households
- Children who stay with single father households

The sample group among 15–19-year-olds includes 6,019 samples who live in 1 of 3 family structures from 13,447 observations. Children living with both parents serve as the reference group to identify differences between children who stay with single mothers and those who stay with single fathers when incorporating independent variables into the equation.

Measurement

Dependent Variable

Dropout. Dropping out was categorized under explanatory characteristics and divided into two main sections: Dropout = 1 refers to youth who drop out of school and Dropout = 0 refers to youth who study and serve as reference.

Explaintionary Variables

Single Parents. Single parenthood was analyzed by categorizing adolescents into two groups: those living with a single mother (momonly) and those living with a single father (dadonly). These two groups were compared to children living with both parents, with the latter group serving as the reference. Two dummy variables, momonly and dadonly, were used to analyze the impact of single parenthood.

- Momonly = 1 to control adolescents who stay with single mothers and 0 is otherwise.
- Dadonly = 1 to control adolescents who stay with single fathers and 0 is otherwise.

Work. The working was categorized under explanatory characteristics and divided into two main sections: part-time work is adolescents who work no more than 4 hours per day or 36 hours per week and Full-time work is adolescents who work more than 4 hours per day or 36 hours. By using an unemployed group as a reference group.

- Part-time work is 1 to control the working in adolescents no more than 36 hours and 0 is otherwise.
- Full-time work is 1 to control the working in adolescents and more than 36 hours and 0 is otherwise.

Control Variable

Age (Age) refers to a range of age groups with youth between 15-19 years old.

Male (Gender) refers to the number of males in the group receiving value 1 and used Female as reference.

Reg (Region) Region refers to one of five regions in Thailand with Reg = 1 (Bangkok Metropolis) as a reference:

- Reg1 = Bangkok

- Reg2 = Central region
- Reg3 = Northern region
- Reg4 = Northeastern region
- Reg5 = Southern region

Rural (Rural, Urban) Rural refers to adolescents who do not stay in the municipality in the group receiving value 1, and Urban value 0 refers to adolescents who stay in the municipality as a reference group.

hh_ltotmoinc (Log Total family income) hh_totmoinc refers to all of the income in the family including salary + Overtime income + (Bonus/12) + Other money, take log for (hh_ltotmoinc) to Reduce data dispersion, variance and transform data to linear.

The number of siblings refers to the number of siblings in the micro family in the family include:

- kidslt6 refers number of kids aged 6 years old in the family
- kidslt6_12 refers number of kids aged 6-12 years old in the family
- kidslt13_18 refers number of kids aged 13-18 years old in the family

Maxparenteducg represents the highest level of education completed by either parent. Using Max parent education to reduce potential bias that may arise from selecting inappropriate variables in econometric models because the highest level of education may have a greater influence on children education.

- maxparenteducg 2 refers to the highest level of education they complete in the family is primary school.
- maxparenteducg 3 refers to the highest level of education they complete in the family is junior high school.
- maxparenteducg 4 refers to the highest level of education they complete in the family is high school.
- maxparenteducg 5 refers to the highest level of education they complete in the family is vocational degree.
- maxparenteducg 6 refers to the highest level of education they complete in the family is bachelor's degree.
- maxparenteducg 7 refers to the highest level of education they complete in the family is master's and PhD degree.

Econometric Model

OLS Model

The data was analyzed using Ordinary Least Squares (OLS) regression to examine the relationship between school dropout and various variables. Each variable was added individually to observe changes in dropout outcomes. Data from the LFS was used, with a significance level set at $p \leq 0.05$, and Stata version 14.1 was employed for analysis.

First, find the relationship between dropout and single parenthood by using OLS the regression as follows:

$$\text{Dropout} = \beta 0 + \beta 1\ \text{momonly} + \beta 2\ \text{fdadonly} + \beta m Xm + u \quad (1)$$

By m = 1,…..,n where Xm are given in Table 1
u = Error term

Table 1
Demographic Variables

No.	Variable name	Description	
1.	Age	15-19 years old	control variable
2.	Male	male = 1, female = 0	control variable
3.	Rural	1 = outside the municipality, 0= in the municipality	control variable
4.	Reg	Reg2 = Reg5, Reg0 as reference	control variable

Dropout is a binary variable (1 = dropout, 0 = studying). β1 represents the effect of single mothers (momonly) on dropout rates, with a positive β1 indicating that more single mothers lead to higher dropout rates, and a negative β1 indicating the opposite. Similarly, β2 represents the effect of single fathers (dadonly), where a positive β2 suggests more single fathers increase dropout rates, and a negative β2 indicates a decrease in dropouts. A β1 or β2 of zero means no relationship between single parents and dropout rates.

Demographic variables (Age, Male, Rural, and Region) are included after Equation (1) to control for potential endogeneity in the relationship between single-parent households (momonly, dadonly) and dropout rates.

$$\text{Dropout} = \beta 0 + \beta 1\ \text{momonly} + \beta 2\ \text{fdadonly} + \beta m Xm + \beta n Xn + u \quad (2)$$

By n = 1,…..,n where X_n are given in Table 2
u = Error term

Table 2
Control and Explationary Variables

No.	Variable name	Description	
1.	Part-time	1 = parttime worked ,0 = otherwise	Explationary variable
2.	Full-time	1 = fulltime worked ,0 = otherwise	Explanatory variable
3.	hh_ltotmoinc	log Family income(Baht)	control variable
4.	kidslt6	number of kids aged 6 years old	control variable
5.	kidslt6_12	number of kids aged 6-12 years old	control variable
6.	kidslt13_18	number of kids aged 13-18 years old	control variable
7.	maxparenteducg	Max education level of parent graduate	control variable
8.	momonly	1 = child who stays with a single mother, 0 = otherwise	Explationary variable
9.	dadonly	1=child who stays with single father, 0= otherwise	Explationary variable

Equation (2-5) includes control and explanatory variables (Part-time, Full-time, hh_ltotmoinc, kidslt6, kidslt6_12, kidslt13_18, and maxparenteducg) to assess their direct effect on dropout rates and support the impact of single-parent households (momonly,

dadonly) on dropout. Household income (hh_totmoinc) is logged to reduce heteroscedasticity and linearize exponential relationships.

OLS is a simple and widely used method for exploring factors influencing dropout rates, but it may yield biased results when variables are not normally distributed, particularly with values between 0 and 1. Therefore, while OLS helps identify key factors affecting dropout, a probit model is more appropriate for accurately estimating the binary outcome of dropping out and studying among adolescents in Thailand.

Although OLS is widely used due to its simplicity and ease of interpretation for continuous data (Greene, W. H., 2019; Stock & Watson, 2020), it provides linear results and is not suitable for binary outcomes. Issues such as heteroscedasticity and autocorrelation can also cause biased results, which is why adding a probit model is necessary when analyzing binary variables.

To address these issues, this study uses the Probit model for binary outcomes, effectively handling heteroscedasticity. OLS is suited for continuous variables like age, income, and education, while the Probit model is better for binary outcomes like school dropout (1 = dropped out, 0 = studying).

$$Dropout = \beta 0 + \beta 1\ momonly\ +\ \beta 2\ fdadonly\ + \beta 3\ age\ + \beta 4\ male + \beta 5\ rural + \beta 6\ reg + \beta 7\ parttime + \beta 8\ fulltime + \beta 9 hhltotmoinc + \beta 10\text{kidslt6} + \beta 11\text{kidslt6\_12} + \beta 12 kidslt13\_18 + \beta 13\ headeducg\ + u \quad (3)$$

Using both models offers a more complete analysis. While Probit coefficients (β) don't directly show percentage changes, Marginal Effects reveal how a one-unit increase in an independent variable affects dropout probability in percentage terms.

Hypothesis 0 (H_0):

Adolescents from single-parent households are not affected to drop out of school compared to students from two-parent households.

Hypothesis 1 (H_1):

Adolescents from single-parent households are more likely to drop out of school compared to students from both-parent households.

Result

To estimate the factors influencing the dropout rate, this study collected data from the Labor Force Survey (LFS) in the 3rd quarter of 2022 (National Statistical Office of Thailand, 2022) and summarized it to descriptive statistics in Table 3, representing data characteristics such as average age of samples, average family income, the highest household education level, demographic characteristics of the samples. The analysis categorized households into three structure groups: two-parent households (Momdad), single-mother households (Momonly), and single-father households (Dadonly), along with a total summary (Total).

Table 3
Descriptive Statistic From National Statistical Office of Thailand

Variables	Household structure Momdad	Momonly	Dadonly	Total
Dropout	14.7%	14.5%	18.6%	14.9%
Male	52.4%	52.7%	55.6%	52.6%
AGE	16.796	16.842	16.736	16.80
Non-municipality	51.1%	44.4%	41.8%	49.3%
Region				
Reg1 = Bangkok	4.1%	4.2%	5.7%	4.2%
Reg2 = Central	26.3%	27.6%	30.1%	26.7%
Reg3 = Northern	18.1%	17.9%	18.1%	18.0%
Reg4 = Northeastern	25.5%	27.2%	23.2%	25.7%
Reg5 = Southern	26.1%	23.1%	22.9%	25.4%
Hh_totmoinc(HHincome)	11,883.438	7,801.817	8,933.708	10,971.893
Num. of hh kids less than 6	0.077	0.035	0.011	0.066
Num. of hh kids ages 6-12	0.268	0.201	0.143	0.248
Num. of hh kids ages 13-18	1.130	1.103	1.083	1.123
Parentmaxeducg				
Non-education	2.2%	3.3%	3.7%	2.5%
Primary	32.0%	40.5%	41.3%	34.1%
Junior high	18.9%	6.1%	16.6%	18.2%
High school	23.7%	19.3%	20.3%	22.7%
Vocational Degree	6.6%	5.2%	5.2%	36.3%
Bachelors	13.9%	13.6%	10.6%	13.7%
Master’s and PhD	2.6%	1.9%	2.3%	2.5%
Total	4,578 (76.1%)	1,092 (18.1%)	349 (5.8%)	6,019 (100.0%)

Source: Labor force survey 3rd Quarter 2022 from National Statistical Office of Thailand

Table 3 summarizes the study's 6,019 participants, revealing an overall dropout rate of 14.9%, with the highest rate (18.6%) in single-father households. The sample comprised 52.6% males with an average age of 16.8 years, with 76.1% living in two-parent households, 18.1% in single-mother households, and 5.8% in single-father households. Nearly half (49.3%) resided in non-municipal areas. Economic disparities showed two-parent households maintaining the highest average income while single-mother households had the lowest. Educational data indicated 32% of parents in two-parent households completed primary education, whereas single-parent households showed higher proportions of lower educational attainment.

Table 4
Descriptive Statistic Age and Gender (dropout rate %)

AGE	Gender		
	Female	Male	Total
15	3.1% (n = 616)	6.9% (n = 697)	5.1% (n = 1313)
16	3.4% (n = 656)	12.5% (n = 649)	7.9% (n = 1305)
17	4.1% (n = 687)	16.6% (n = 706)	10.4% (n = 1393)
18	14.1% (n = 597)	27.9% (n = 685)	21.5% (n = 1282)
19	31.8% (n = 296)	49.3% (n = 430)	42.1% (n = 726)
Total	8.7% (n = 2852)	20.5% (n = 3167)	14.9% (n = 6019)

Source: Labor force survey 3rd Quarter 2022 from National Statistical Office of Thailand

Table 4 shows that among 6,019 participants, school dropout rates rose with age, from 5.1% at age 15 to 42.1% at age 19. Males consistently had higher dropout rates than females, notably at age 18 (27.9% vs. 14.1%) and age 19 (49.3% vs. 31.8%). Overall, the male dropout rate was 20.5%, compared to 8.7% for females, highlighting the strong link between age, gender, and dropout risk.

Table 5
Descriptive Statistic Work and Gender Among Dropout Rate (%)

Working status	Gender		
	Female	Male	Total
Non-working	5.1% (n = 2,719)	8.2% (n = 2,708)	6.6% (n = 5,427)
Parttime	57.1% (n = 49)	89.3% (n = 159)	81.7% (n = 208)
Fulltime	95.2% (n = 84)	95.3% (n = 300)	95.3% (n = 384)
Total	8.7% (n = 2852)	20.5% (n = 3167)	14.9% (n = 6019)

Source: Labor force survey 3rd Quarter 2022 from National Statistical Office of Thailand

Table 5 examines dropout rates by gender and employment status. Among non-working youth, dropout rates were 5.1% for females (n = 2,719) and 8.2% for males (n = 2,708). Part-time workers showed substantially higher rates: 57.1% for females (n = 49) and 89.3% for males (n = 159), with a combined rate of 81.7%. Full-time employment correlated with the highest dropout rates: 95.2% for females (n = 84) and 95.3% for males (n = 300). These patterns reveal that employment intensity strongly predicts dropout likelihood, with males consistently showing higher dropout rates than females across all employment categories.

Table 6
Total Effect of Dropout by OLS

VARIABLES	(1)	(2)	(3)	(4)	(5)
	1	2	3	4	5
Momonly	0.022	0.023	0.026	0.017	0.011
	(0.021)	(0.021)	(0.021)	(0.020)	(0.020)
Dadonly	0.067**	0.068**	0.070**	0.070***	0.060**
	(0.032)	(0.032)	(0.032)	(0.023)	(0.023)
Age	0.074***	0.074***	0.069***	0.031***	0.031***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Male	0.119***	0.119***	0.118***	0.038***	0.040***
	(0.013)	(0.013)	(0.013)	(0.011)	(0.011)
Rural	0.050***	0.052***	0.051***	0.010	0.000
	(0.014)	(0.013)	(0.013)	(0.011)	(0.011)
Reg2 = Central	0.043*	0.043*	0.039	0.038*	0.036*
	(0.025)	(0.025)	(0.025)	(0.020)	(0.019)
Reg3 = Northern	0.064***	0.068***	0.064***	0.048***	0.038**
	(0.024)	(0.025)	(0.025)	(0.018)	(0.018)
Reg4 = Northeastern	0.036*	0.039*	0.037*	0.030*	0.022
	(0.021)	(0.022)	(0.022)	(0.016)	(0.016)
Reg5 = Southern	0.055**	0.056**	0.053**	0.043**	0.035**
	(0.023)	(0.023)	(0.023)	(0.017)	(0.017)
Hh_ltotmoinc		0.002	0.001	0.000	0.001
		(0.001)	(0.001)	(0.001)	(0.001)
Kidslt6			0.078**	0.063*	0.064*
			(0.036)	(0.037)	(0.036)
Kids6_12			0.015	0.016	0.017
			(0.015)	(0.013)	(0.013)
Kids13_18			-0.045***	-0.019**	-0.015
			(0.012)	(0.009)	(0.009)
Parttime				0.641***	0.631***
				(0.049)	(0.049)
Fulltime				0.812***	0.792***
				(0.023)	(0.024)
Maxparenteducg2					-0.093*
					(0.048)
Maxparenteducg3					-0.103**
					(0.049)
Maxparenteducg4					-0.133***
					(0.049)
Maxparenteducg5					-0.111*
					(0.062)
Maxparenteducg6					-0.177***
					(0.048)
Maxparenteducg7					-0.185***
					(0.049)
Constant	-1.245***	-1.255***	-1.123***	-0.499***	-0.382***
	(0.087)	(0.088)	(0.096)	(0.087)	(0.101)
Observations	6,019	6,019	6,019	6,019	6,019
Adjusted R-squared	0.113	0.113	0.121	0.499	0.507

p-value for significant level: *p < 0.05, **p < 0.01, ***p < 0.001.
Source: Labor force survey 3rd Quater 2022 from National Statistical Office of Thailand

To identify key factors influencing dropout, this study added variables step by step. Table 6 equation 1 shows that living with a single father increases dropout likelihood by 6.7% when compare with child from both parents, while single motherhood has no significant effect. Each additional year of age raises dropout risk by 7.4%, and males are 11.9% more likely to drop out than females. Living in non-municipal areas increases dropout rates by 5%. Regionally, students in the northern and southern regions have dropout rates 6.4% and 5.5% higher than those in Bangkok, while no significant differences were found for the northeastern and central regions.

Equation 2 from Table 6 shows that family income does not directly cause dropout but interacts with other factors, especially in single-father households. Income appears to increase dropout risk for students in rural areas, suggesting a stronger impact in non-municipal settings. These findings highlight the need for further research on how income and family structure jointly affect educational outcomes.

Equation 3 in Table 6 identifies a significant relationship between the number of younger siblings in a household and school dropout rates. Specifically, having a sibling aged less than 6 years old increases the likelihood of dropping out by 7.8%, whereas having siblings aged 13 to 18 years old reduces the dropout rate by 4.5%. Moreover, the presence of multiple siblings within a household increases the impact of single-father families on dropout rates. This finding suggests that increased child labor responsibilities within these households may contribute to higher dropout rates, highlighting potential challenges for the labor market.

Equation 4 from Table 6 examines how child labor and regional differences affect dropout rates. Northern and southern regions show 4.8% and 4.3% higher dropout rates than Bangkok. Part-time work raises dropout likelihood by 64.1%, and full-time work by 81.2%. Living with a single father increases dropout risk by 7.0%. Employment has a strong impact on dropout rates, especially with longer work hours, while other factors remain stable. Including work status, no significant difference is found between municipal and non-municipal areas. The findings highlight the trade-off between work and schooling and the need to consider family and demographic factors.

Equation 5 from Table 6 shows that children living with single fathers have a 6.0% higher dropout rate when compare with both parents. Dropout risk rises by 3.1% with each additional year of age and is 4.0% higher for males. No significant difference is found between municipal and non-municipal areas, but the northern and southern regions have dropout rates 3.8% and 3.5% higher than Bangkok, respectively. Child employment strongly impacts dropout rates: part-time work raises it by 63.1%, and full-time work by 79.2%. Higher parental education levels significantly reduce dropout risk, with reductions ranging from 9.3% (primary school) and 18.5% (master's or PhD level).

Table 7
Dropout Affected by Dad Only With OLS and Probit

VARIABLES	OLS coefficient	Probit coefficient	Probit Marginal effect (dF/dx)
momonly	0.011	0.106	0.017
	(0.020)	(0.130)	(0.022)
dadonly	0.060**	0.447***	0.087***
	(0.023)	(0.135)	(0.032)
Demographics control	Yes	Yes	Yes
Family control	Yes	Yes	Yes
Work status control	Yes	Yes	Yes
parenteducg control	Yes	Yes	Yes
Constant	-0.382***	-5.958***	
	(0.101)	(0.725)	
Observations	6,019	6,019	6,019

p-value for significant level: *p < 0.05, **p < 0.01, ***p < 0.001.
Source: Labor force survey 3rd Quater 2022 from National Statistical Office of Thailand
Note: The table variable by scope other variables to age, male, rural, reg2-reg5 define demographic control. Define family control including hh_ltotmoinc kidslt6 kids6_12 kids13_18 control. Define work status control parttime, fulltime. Define parenteducg control as parenteducation

This study initially used Ordinary Least Squares (OLS) regression to examine school dropout rates but switched to the Probit model to better analyze binary outcomes. The analysis focuses on the "dadonly" variable, with a binary dependent variable (0 or 1). Table 7 examines single-parent households while controlling for factors such as age, gender, rural residence, regional indicators, household income, child age groups, and parental education. To compare OLS and Probit results, marginal effects from the Probit model are used for clearer interpretation, as they allow for easier comparison with OLS coefficients.

The encouraging results from the comparison, Table 7, show that the results between the two models are slightly different, with single fathers affecting children's school dropout by 6% in the OLS and 8.7% in the Marginal effect. This result indicates the robustness and increases the credibility of the results that single fathers in Thailand affect school dropout.

Conclusion

This study examines factors influencing school dropout among Thai adolescents aged 15–19, using data from the National Statistical Office of Thailand 3Quarter, 2022 (National Statistical Office of Thailand, 2022). The analysis employs a Probit model with marginal effects for binary outcomes, while Ordinary Least Squares (OLS) identifies variables with the strongest impact on dropout rates. Findings highlight family structure, particularly single-father households, as a significant determinant. The consistency between Probit and OLS results strengthens the study's reliability, providing insights into the complex factors influence school dropout.

The study finds that single parenthood, especially in single-father households, significantly increases school dropout rates in Thailand, while single-mother households show no significant effect after controlling for income, employment, and demographics. This highlights the greater importance of emotional support over financial stability, with Thai fathers' limited involvement in caregiving contributing to children's academic struggles and

mental health issues. The higher dropout rates among children of single fathers reflect Thailand’s unique social and cultural context regarding parenting roles. The study suggests that further research should explore fathers' behaviors, parenting time, and the factors leading to single fatherhood to better understand and support these families.

The study reveals that family income does not directly influence school dropout rates but can indirectly affect single-father households, where financial strain may increase dropout risks. This underscores the importance of emotional support over financial stability in preventing dropout, particularly in single-father households, where caregiving time is often limited. Additionally, having young siblings under the age of 6 increases the likelihood of dropout, as older siblings may prioritize caregiving over their education, supporting the notion that resource competition among siblings negatively impacts academic outcomes. The study also finds that males have a significantly higher dropout rate than females, reflecting gender disparities in education, and that aging adolescents are more likely to drop out, indicating a shift in educational attitudes and the need for early intervention.

Regional analysis reveals higher dropout rates in Thailand's Northern and Southern regions compared to Bangkok, indicating disparities in educational opportunities and resource access. Employment status significantly impacts educational outcomes, with both part-time and full-time work correlating with increased dropout rates by promoting school disengagement and potentially leading to delinquency and substance abuse ultimately threatening the Thai workforce's skill development. The study recommends policies that better balance employment and education to prevent work from undermining educational attainment. Additionally, parental education emerges as a critical factor in children's success, with higher educational attainment among parents strongly predicting better academic and life outcomes for their children, reinforcing education's role as a protective factor against dropout risk.

To address rising dropout rates, especially among children of single fathers, it is crucial to tackle the root causes, though identifying them remains challenging. Effective interventions could include establishing learning centers to support single fathers with time management and parenting, and offering tax deductions for education expenses to ease financial burdens. These strategies would help sustain children's education. Further in-depth studies are needed to better understand differences between single mothers and single fathers in the context of single parenthood.

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The Innovation Development for Classroom of Students in Educational Field

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Abstract

This study explores the development of innovative classroom media by students enrolled in the course Media and Technology for Education and Learning, a mandatory pedagogy course for Bachelor of Education students. The objectives were to evaluate the effectiveness of student-developed media and reflect on the learning process. The study involved 27 students from one section of the course in semester 1/2024, selected through classified random sampling, students enrolled to the course then picked one group by random sampling. Research instruments included the developed innovations, evaluation forms, and semi-structured interview guides. Mean, Stadard Deviation (S.D.) and content analysis were used for data analysis in this research. The study highlights the potential of student-developed media to enhance classroom teaching and learning. The research results in quantitative showed high evaluations for the developed innovations in five aspects: applicability in teaching was very appropriated (Mean = 4.70, S.D. = 0.55), alignment with learning objectives was very appropriated (Mean = 4.66, S.D. = 0.53), cost-effectiveness was appropriated (Mean = 4.31, S.D. = 0.88), innovativeness was appropriated (Mean = 4.23, S.D. = 0.75), and durability was appropriated (Mean = 4.19, S.D. = 0.90). For the research results in qualitative using content analysis of student reflections revealed that the innovations effectively supported achieving learning objectives, while the development process fostered creativity and problem-solving skills.

Keywords: innovation development, education, ADDIE, design thinking

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Introduction

The Bachelor of Education (B.Ed.) program in Thailand is designed to prepare students to become professional teachers. This four-year program equips students with the knowledge, skills, and dispositions necessary for a teaching career. The curriculum consists of general education courses, professional education courses, subject-specific (major) courses, and free electives.

The professional education courses include core pedagogy courses that all education students are required to take. These courses cover a wide range of foundational topics, such as curriculum and instruction, writing the lesson plan, educational psychology, media and technology for education and learning, educational measurement and evaluation educational research, and educational internship. These subjects are intended to provide student teachers with essential theoretical, practical knowledge and teaching experiences to effectively teach and manage learning in diverse educational settings.

Media and Technology for Education and Learning is one of mandatory professional education courses for Bachelor of Education students. There are 4 objectives of this course as follow:

- Demonstrates knowledge and understanding of concepts, theories, scope, values, and characteristics of educational media and technology, including digital citizenship, media literacy, copyright infringement, plagiarism, technological changes, and cross-platform technologies.
- Able to ethically analyze problems arising from the use of computers and information technology.
- Able to select and utilize information sources, media, and digital technologies for instructional management and professional tasks.
- Able to design, develop, and evaluate innovation media effectively.

The development of innovative classroom media by students represents one of the highest-level learning outcomes achievable in teacher education. This task aligns with the Creating level of Bloom's Taxonomy, which reflects the ability of students to synthesize and apply their knowledge in a meaningful way. It demonstrates that student teachers are capable of integrating their theoretical understanding and practical skills to design and develop instructional innovations that enhance teaching and learning.

In this study, aim to evaluate the development of innovative classroom media by students enrolled in the course Media and Technology for Education and Learning, a mandatory professional education course for Bachelor of Education students.

Research Objective

To evaluate the effectiveness of student-developed media and reflect on the learning process.

Literature Review

Innovation Development is one of objectives in the Media and Technology for Education and Learning course. Students have learned about the innovation development through the 2 theories, ADDIE and Design Thinking.

ADDIE: The ADDIE model is one of the most widely used frameworks in instructional design, particularly in the field of education and training.

ADDIE has been using for a long time for instructional design and can also adapt for innovation development. The acronym ADDIE stands for A- Analyze, D - Design, D – Develop, I – Implement and E – Evaluation, representing a systematic and iterative process for creating effective instructional materials and experiences (Molenda, 2003):

1. **Analysis** – In the analysis phase, it is essential to examine key factors such as learner characteristics, needs assessment of learning, instructional activities, and the available infrastructure. This step provides a foundational understanding that informs the design and development of effective instructional strategies and learning materials.
2. **Design** – In the design phase, it is necessary to formulate clear learning objectives, instructional strategies, content structure, and plan appropriate instructional media and innovations. This phase also includes the design of assessment methods to evaluate learning outcomes and the effectiveness of instructional materials. The focus is on creating a blueprint for instruction.
3. **Development** –In the development phase, information gathered during the analysis and design stages is utilized to create the instructional components. This phase involves the development of content, instructional manuals, media and innovations, learning activities, and instructional procedures. All materials are constructed to align with the defined learning objectives and pedagogical strategies, ensuring coherence and effectiveness in the instructional design. Prototypes are often developed and reviewed during this phase.
4. **Implementation** – The instructional materials are delivered to the target learners in this phase. The implementation phase involves applying the materials and innovations developed during the previous stage to actual instructional practice. These instructional innovations can be integrated at various parts in the teaching process, including lesson introductions, core instructional activities, or lesson summaries. The goal of this phase is to facilitate effective teaching and enhance student learning through the practical use of the designed materials.
5. **Evaluation** –The evaluation phase includes both formative and summative assessment conducted to assess the effectiveness and efficiency of the instructional design. This phase emphasizes the importance of evaluating not only the learning outcomes, but also the learning process and the effectiveness of the instructional media or innovations. Formative evaluation is conducted throughout the instructional design and implementation to provide ongoing feedback, while summative evaluation focuses on measuring the overall success and impact of the innovation in achieving the intended learning objectives. Feedback gathered is used to make necessary revisions.

In teacher education, applying the ADDIE model helps students systematically design educational innovations. It encourages reflective thinking and supports the integration of pedagogical content knowledge with practical instructional strategies.

Design Thinking

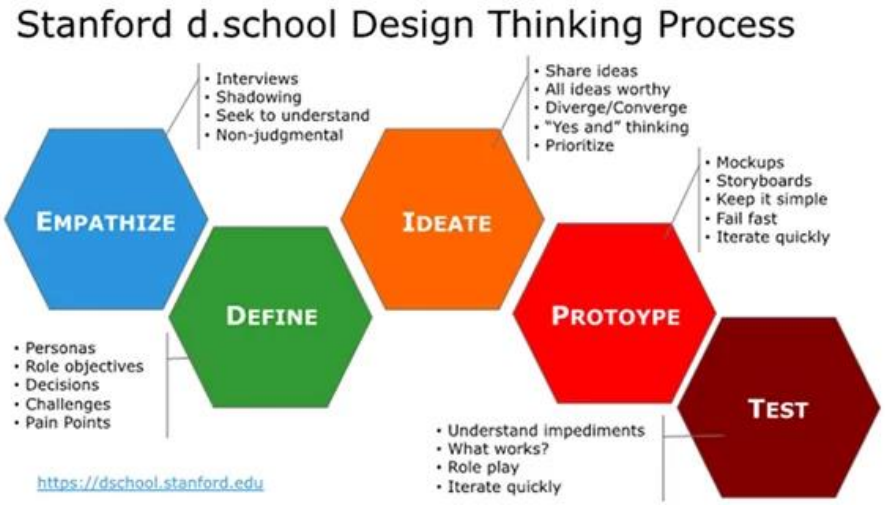
Design Thinking, as developed and popularized by the Hasso Plattner Institute of Design at Stanford University (commonly known as d.school), is a human-centered approach to innovation and problem-solving. It emphasizes empathy, collaboration, and iterative

experimentation in creating solutions that truly meet users' needs (Brown, 2009; d.school, 2010).

The d.school Design Thinking model consists of **five key stages** as shown in Figure1:

1. **Empathize** – This stage involves understanding the users and their needs through observation, interviews, and engagement. It is the foundation for identifying meaningful problems from the user's perspective.
2. **Define** – In this phase, insights from the empathy stage are synthesized to clearly define the core problem. A well-defined problem statement helps guide the design process toward user-relevant solutions.
3. **Ideate** – This is a brainstorming stage, where a wide range of creative ideas and potential solutions are generated without immediate judgment or limitations. The goal is to encourage innovation and divergent thinking.
4. **Prototype** – Selected ideas are turned into tangible, low-fidelity representations such as models, mock-ups, or simulations. Prototyping helps test concepts quickly and gather feedback.
5. **Test** – Prototypes are tested with users to evaluate their effectiveness and usability. Feedback collected during testing is used to refine and improve the solution. This often leads to revisiting earlier stages in an iterative cycle.

Figure 1
Stanford d.school Design Thinking Process (Schmarzo, 2017)



Design Thinking promotes a learner-centered and problem-based learning process, making it particularly relevant in educational contexts. When applied in teacher education, it empowers pre-service teachers to develop innovative instructional materials by deeply understanding learners' needs, generating creative solutions, and refining their ideas based on real feedback.

Samples

Twenty-seven third-year Bachelor of Education students were selected through classified random sampling. The participants were enrolled in the course during the first semester of the 2024 academic year, and one section was randomly selected for inclusion in the study.

Research Instruments

There are three research instruments used in this study:

1. The Developed Innovations – A total of five innovations were created by students, who were divided into five groups, with each group responsible for developing one innovation.
2. Evaluation Forms – These consist of five-point rating scale questionnaires assessing the following aspects: innovativeness of the innovation, alignment with learning objectives, applicability in teaching, cost-effectiveness, and durability.
3. Semi-Structured Interview Guides – These were used to collect qualitative data regarding the process of innovation development.

Statistics

The mean, standard deviation (S.D.), and content analysis were employed for data analysis.

Results

The students were divided into five groups, resulting in the development of five distinct educational innovations. Each group designed an instructional tool aimed at enhancing a specific aspect of English language learning:

- **Group 1** developed an innovation titled *"My Home"*, which focused on teaching vocabulary related to household items and their locations within different rooms.
- **Group 2** created an innovation called *"Origami for Prepositions"*, where students crafted origami characters and practiced using prepositions by placing them in contextual scenes and narrating short stories.
- **Group 3** designed an innovation named *"Time Flies, Knowledge Stays"*, which taught the concept of time in both British and American formats through the use of a Big Ben-themed interactive display.
- **Group 4** developed *"The Best Route is the Right Route"*, aimed at teaching students how to give and understand directions.
- **Group 5** produced an innovation titled *"Tense Mastery Wheel"*, which helped students understand and practice various tenses in English sentences using a visual and interactive wheel mechanism.

Images of these innovations are presented below to illustrate the creativity and instructional design approaches used by each group.

Figure 2
Group 1: My Home

Figure 3 & 4
Group 2: Origami for Preposition

Figure 5
Group 3: Time Flies, Knowledge Stay

Figure 6
Group 4: The Best Route is the Right Route

Figure 7 & 8
Group 5: Tense Mastery Wheel

The evaluation of five student-developed innovations was conducted across five key criteria: innovativeness, alignment with learning objectives, applicability in teaching, cost-effectiveness, and durability. The result shows as Table 1.

Table 1
The Result of Innovation Evaluation

		Group 1	Group 2	Group 3	Group 4	Group 5	Overall
Innovativeness	Mean	4.15	4.19	4.33	3.81	4.67	4.23
	S.D.	0.77	0.74	0.70	0.79	0.55	0.75
Alignment with learning objectives	Mean	4.81	4.63	4.70	4.41	4.74	4.66
	S.D.	0.4	0.49	0.47	0.75	0.47	0.53
Applicability in teaching	Mean	4.85	4.85	4.70	4.37	4.74	4.70
	S.D.	0.36	0.36	0.47	0.79	0.53	0.55
Cost-effectiveness	Mean	4.33	4.67	4.33	3.89	4.33	4.31
	S.D.	0.83	0.55	0.83	1.01	1	0.88
Durability	Mean	4.15	4.22	4.48	3.44	4.63	4.19
	S.D.	0.72	0.75	0.70	1.19	0.56	0.90

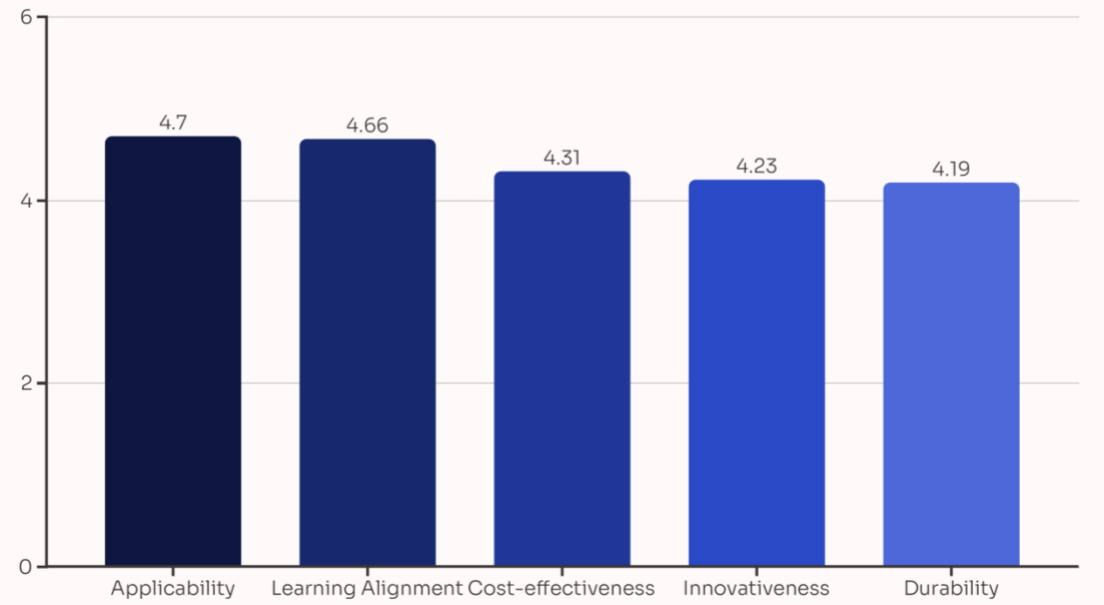
From Table 1, the results revealed that:

- **Innovativeness** received an overall mean score of **4.23** (S.D. = 0.75), with Group 5 achieving the highest score (**M = 4.67**) and Group 4 the lowest (**M = 3.81**).
- **Alignment with learning objectives** showed a high overall mean of **4.66** (S.D. = 0.53), indicating that all innovations were well-aligned with the intended learning goals.
- **Applicability in teaching** was rated highly, with an overall mean of **4.70** (S.D. = 0.55). Groups 1 and 2 achieved the highest scores (**M = 4.85**), reflecting strong practical use in classroom settings.
- **Cost-effectiveness** received a moderate overall mean of **4.31** (S.D. = 0.88). Group 2 scored the highest in this area (**M = 4.67**), while Group 4 received the lowest score (**M = 3.89**).
- **Durability** had an overall mean score of **4.19** (S.D. = 0.90), with Group 5 again leading (**M = 4.63**) and Group 4 scoring the lowest (**M = 3.44**).

These results suggest that the innovations were generally effective, particularly in terms of applicability and alignment with learning objectives, though there was variation in cost-effectiveness and durability across groups.

Figure 9

The Overall Result of Innovation Evaluation



From Figure 9, the research results in quantitative showed high evaluations for the developed innovations in five aspects: applicability in teaching was very appropriated (Mean = 4.70, S.D. = 0.55), alignment with learning objectives was very appropriated (Mean = 4.66, S.D. = 0.53), cost-effectiveness was appropriated (Mean = 4.31, S.D. = 0.88), innovativeness was appropriated (Mean = 4.23, S.D. = 0.75), and durability was appropriated (Mean = 4.19, S.D. = 0.90). The innovations effectively supported achieving learning objectives, while the development process fostered creativity and problem-solving skills.

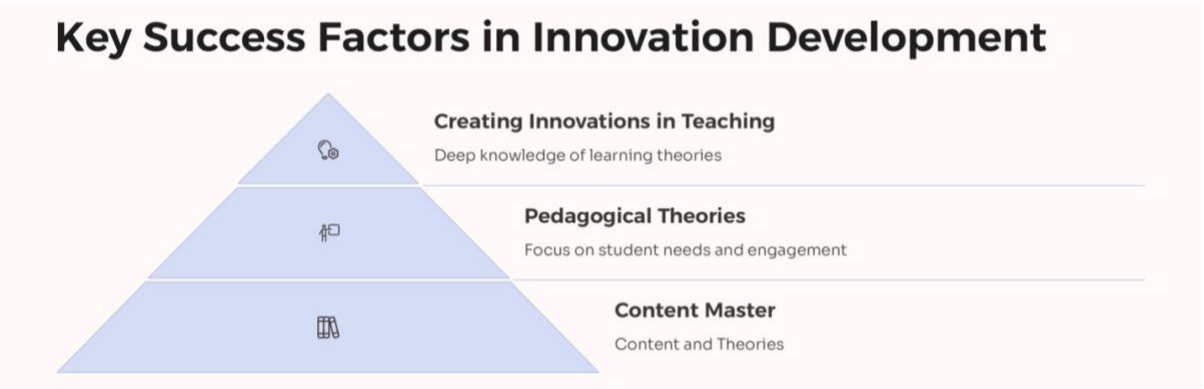
Conclusion

Students in the field of education are expected not only to master content knowledge and pedagogical theories but also to develop innovative teaching tools that support the

achievement of specific learning objectives. To accomplish this, content, pedagogy, and innovation must be effectively aligned to enhance student learning.

This alignment involves the thoughtful integration of subject matter, instructional strategies, and learners' needs to ensure that innovations are not only accurate in content but also promote meaningful and engaging learning experiences. When pedagogy and content are coherently connected through innovation, the result is a purposeful instructional tool that fosters student engagement, supports knowledge construction, and directly contributes to the achievement of intended educational outcomes (as shown in Figure 10 below).

Figure 10
Key Success Factors in Innovation Development



In conclusion, the development of educational innovations requires students to apply both theoretical knowledge and practical design skills. Utilizing instructional design frameworks such as the ADDIE model and Design Thinking enables students to create innovations that are systematic, learner-centered, and pedagogically effective. Moreover, for an innovation to be considered successful, it must demonstrate a balance of key qualities: innovativeness, alignment with learning objectives, applicability in teaching, cost-effectiveness, and durability. By integrating these elements, students are better equipped to design meaningful innovations that enhance the quality of teaching and learning in real educational settings.

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Online Platform to Help Children With Special Needs

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Abstract

This research aimed to develop an online platform to support children with special needs in the New Normal era using a mixed-methods approach, primarily qualitative with supplementary quantitative methods. The study was conducted in three phases: (1) a needs assessment phase that gathered data through in-depth interviews with parents and caregivers to identify essential features for the platform, (2) a development phase that employed a hierarchical or tree-structured design to create the online platform, and (3) an evaluation phase to assess the platform's effectiveness and user satisfaction through focus groups and pilot testing. The findings revealed that the platform effectively met structural and accessibility requirements, with a user-friendly interface, compatibility with various electronic devices, and a visually appealing design. It offered four key services: educational content in articles and videos, online expert consultations, a Q&A channel, and a centralized database of special needs services in Thailand. These services were rated highly beneficial, providing broad support for children with special needs and their families. User feedback, with over 80% being parents of children with special needs, highlighted the platform’s ease of use and the significant value of its information and consultation services. The study demonstrated the platform's potential to enhance care for children with special needs and suggested its scalability for future development.

Keywords: assistive technology, platform, children with special needs

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Introduction

The global outbreak of Coronavirus Disease COVID-19 led to widespread infection and significant mortality within a short period. The World Health Organization (WHO, 2020) officially declared COVID-19 as a pandemic, marking one of the most critical health crises of the modern era. This pandemic triggered profound changes across various sectors, including the economy, society, transportation, technology, and education. It also reshaped daily life, consumption behaviors, and social distancing practices.

In Thailand, the government declared a nationwide state of emergency, requiring all educational institutions to transition rapidly from face-to-face learning to online instruction. This sudden shift posed serious challenges, particularly for inclusive schools, special education centers, and organizations that provide services for children with special needs. These institutions were forced to suspend their operations, leaving many children without access to ongoing developmental support and therapy. As a result, children with special needs experienced higher levels of stress and decreased learning outcomes.

Hospitals and healthcare centers prioritized COVID-19 treatment, limiting access to general health services. Consequently, many children with special needs were unable to receive routine medical check-ups, developmental screenings, therapy sessions, or consistent medication. This disruption led to developmental regression in many children and placed the entire responsibility of care on families without adequate time for preparation or adjustment. The absence of accessible counseling services further intensified parental anxiety regarding their children's health and development, potentially leading to mental health issues and family stress. Key factors contributing to parental stress included the child's age, the perceived severity of the child's condition, parental attitudes toward caring for children with autism, and the level of professional support available (Phanthapak & Chansiri, 2013, p. 226). Even after the situation began to stabilize, many children with special needs remained on waiting lists for healthcare and developmental support services. Both pre-existing cases and new diagnoses that emerged during the global lockdown contributed to this backlog (Department of Empowerment of Persons with Disabilities, 2023). Simultaneously, many families faced reduced incomes, increased debt, and welfare programs that failed to meet the specific needs of children with disabilities.

The transition to a "new normal" lifestyle—marked by a significant increase in online activities such as remote work, online learning, telehealth services, and digital communication—presented both challenges and opportunities. However, this shift also created service gaps, particularly for families who had relocated from urban centers to rural areas during the pandemic and were unable to access the specialized services their children required. The UNICEF (2022) report highlighted similar challenges, noting that many families struggled with travel, healthcare access, and medication continuity due to financial hardship and limited local services. Given these conditions, there is a critical need for innovative solutions to support children with special needs and their families. Integrating technology with effective management practices can help bridge service gaps and ensure consistent support. The concept of using an online platform draws inspiration from e-commerce models established in 2007, designed to connect consumers with service providers through interactive, information-driven networks. These platforms foster ongoing, two-way communication between stakeholders, enabling the exchange of value and resources (Boonseua, 2016). Such platforms, often referred to as "matchmakers," create opportunities for interaction between distinct user groups, allowing participants to access necessary services without intermediaries. According to

Thubtimphairoj (as cited in Lertlumpleepan, 2019, p. 151), platforms serve as structures or spaces that facilitate easier connections among stakeholders within the value chain. This approach allows for flexible, on-demand engagement, creating ecosystems that encourage collaboration and resource sharing without long-term obligations.

Currently, there is no comprehensive online platform in Thailand that serves as a centralized hub for information and initial consultation services for children with special needs. Most existing platforms focus primarily on knowledge dissemination or hospital marketing efforts. Therefore, this research addresses the urgent need to develop an integrated online platform that provides practical, user-centered solutions for children with special needs and their families. The proposed platform aims to enhance the quality of life and promote the potential development of children with special needs by offering timely access to knowledge, service directories, funding sources, educational opportunities, and healthcare providers. It also seeks to facilitate communication and information exchange among parents, professionals, and service organizations, thereby reducing parental anxiety and supporting children's self-reliance and skill development. This research was conducted with the following objectives: (1) To assess the needs for developing an online platform model to support children with special needs. (2) To create an online platform designed to assist children with special needs and their families. And (3) To evaluate the effectiveness and user satisfaction of the online platform in providing support for children with special needs. By addressing these objectives, the study aims to contribute to the advancement of special education and healthcare services in the digital era, particularly within the “new normal” framework.

Research Methodology

This study used a mixed-methods research design with an unequal sequence design. The qualitative method was the primary approach, and the quantitative method was the secondary approach (QUAL → quan: explore and generalize findings) (Creswell & Clark, 2018). The research was divided into three phases: (1) The first phase was to assess the needs for developing the model of an online platform to support children with special needs in the new normal era. The population and sample group were parents and people involved in the care of children with special needs, both directly and indirectly. The researcher selected the sample by purposive sampling, including 7 to 10 participants, or until data saturation was reached. This phase was conducted using qualitative research. The data were collected through in-depth interviews, and the results were used to develop the platform model. (2) The second phase was to create the online platform for supporting children with special needs in the new normal era. The quality of the platform was checked by experts using focus group discussions. And (3) The third phase was to study the effectiveness and satisfaction of the online platform to support children with special needs in the new normal era. The population and sample group were parents and caregivers involved in taking care of children with special needs who used the platform. The total number of participants in this phase was 50 people. The data were collected using quantitative research through questionnaires.

Research Findings

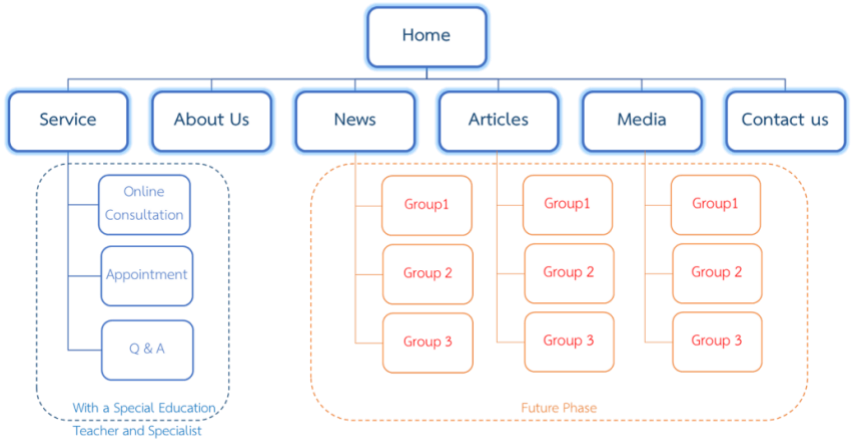
This research study aimed to develop an effective online platform to support children with special needs and their families, particularly within the context of the “new normal” era. The analysis of the collected data yielded insightful findings that are presented in three major parts: the needs assessment, the platform design and structure, and the user satisfaction results. Each part reflects the voices and experiences of the target users and contributes to the creation of a

meaningful, user-centered platform. The first phase of this research explored the needs and expectations of parents, caregivers, and related stakeholders regarding the development of an online platform designed to assist children with special needs. This phase identified two essential aspects: (1) Platform Design and User Access: Participants emphasized the importance of broad accessibility across all operating systems and electronic devices, including notebook computers, smartphones, and tablets. Beyond technical accessibility, users preferred a platform design that is simple, visually appealing, and easy to navigate. They highlighted the value of a clean interface with appropriate use of colors, graphics, and animations. Users expressed a strong desire for content that is clear, easy to understand, and limited to essential, practical information without unnecessary complexity. (2) Guidelines for Developing the Support System on the Platform: Participants envisioned the platform as a comprehensive knowledge center, offering reliable and up-to-date content in the form of articles and videos. In addition, they requested the inclusion of expert-led online consultation services, interactive question-and-answer channels, and a centralized database providing information about service centers and resources available for children with special needs across Thailand.

The second phase focused on Platform Design and Structure. Based on the needs assessment, the platform was designed using a hierarchical structure (also known as a tree model) that allows users to easily navigate the content through well-organized categories and web pages. The platform was structured into four main sections: (1) Knowledge Center, this section features a collection of articles and videos that have been screened and approved by multidisciplinary professionals. The content is carefully curated to ensure that it is accurate, reliable, and presented in a manner that is easy to understand for the general public. (2) Online Consultation Services by Experts, this section provides users with the opportunity to schedule and receive expert consultations online, eliminating the need for in-person visits. The consultation process includes four straightforward steps: Filling out the appointment request form, Waiting for a response from the expert, Scheduling the date, time, and details of the online consultation, and Receiving the consultation service online. (3) Question-and-answer services by experts. The users can submit their questions to the experts and can choose whether their questions will be public or private. The answers will be available through the platform service channel. And (4) A central database with information about medical institutions, educational institutions, and organizations related to supporting children with special needs in Thailand, both from the government and private sectors. This allows users to find additional information or contact related services (Figure 1).

Figure 1

Finding Additional Information or Contact Related Services



Additional suggestions from the focus group discussion included: (1) Government and private organizations that have strong potential in supporting children with special needs and their families can apply the research findings to develop systems, applications, or software and expand networks to meet user needs and reach more people. (2) Further research should be conducted to study the factors that influence the development of an effective platform for a broader range of users. (3) Organizations with sufficient resources and personnel can use these findings to improve service efficiency and maximize benefits for the service users.

The third phase of this research study of satisfaction among parents and caregivers, both directly and indirectly involved in taking care of children with special needs who used the platform, found that the sample group had the highest level of satisfaction with the overall use of the platform. The results revealed an impressively high overall satisfaction score of 4.88 out of 5, suggesting that the platform successfully responded to the expectations and requirements of the target users. This positive feedback reflected the effectiveness of four sections:

- Usefulness: 4.83 (highest level of satisfaction), users agreed that the platform provided meaningful and practical support, offering resources and services that could be directly applied to their caregiving needs.
- Usability: 4.84 (highest level of satisfaction), the simplicity of the platform's design, clear navigation, and ease of use were highly appreciated by the participants, allowing them to access the information and services without difficulty.
- Appropriateness: 4.91 (highest level of satisfaction), participants rated the platform as highly suitable for its intended purpose. The content was considered relevant, modern, and carefully aligned with the specific needs of children with special needs and their families.
- Accuracy: 4.94 (highest level of satisfaction), the highest score was reported in the dimension of accuracy, indicating the strong confidence of users in the reliability and correctness of the information and services provided on the platform.
- These results suggest that the platform effectively meets the expectations and needs of its target users, offering a promising model for digital support services aimed at enhancing the well-being and development of children with special needs.

Conclusions

The results of this study highlight a significant and ongoing interest among parents and caregivers of children with special needs in accessing reliable and supportive information. The participants expressed a clear desire for trustworthy knowledge resources that could assist them in caring for and promoting the development of their children. This finding is consistent with the research of Sukboonpan (2018), who reported that parents of children with special needs are often willing to engage in developmental activities and play an important role in the support and care of their children. Similarly, Harris and Graham (2010) emphasized that most parents who receive a diagnosis for their children seek out support groups to obtain essential information about the condition, available services, developmental stages, and effective teaching methods.

The COVID-19 pandemic drastically shifted human behavior toward remote communication and digital engagement. This aligns with the study by Saengsawangwatana et al. (2020), who reported that Thai families had to adapt to working from home and using online platforms for both communication and learning during the pandemic. In response, the government and private sectors developed temporary online learning platforms for children. However, there remains a significant gap in the availability of platforms specifically designed for children with

special needs. Parents indicated a strong preference for platforms that offer reliable knowledge through articles and videos, expert consultation services, interactive question-and-answer functions, and a comprehensive database of support services for special needs children across Thailand.

These expectations were echoed in the study by Jainapha and Rasanon (2020), which noted that parents carefully consider several factors when selecting support services for their children. These factors include the professionalism and credibility of the staff, the comprehensiveness of services provided by multidisciplinary teams, long-term affordability, and the availability of specialized resources that address individual needs.

The importance of providing accurate and modern content on such platforms is further supported by Worasetthapong et al. (2022), who found that users tend to return to online video platforms when the content is high-quality, up-to-date, appropriate, and educational. This resonates with the words of McKinnon (1955, as cited in Dorling Kindersley Limited, 2018, p. 19), who observed that technology and social media have empowered individuals to achieve meaningful outcomes through continuous information sharing.

The development of digital platforms for children with special needs can help preserve and share specialized knowledge effectively in the digital era. This is consistent with the research of Burns (2015), who reported that online platforms can successfully support users in managing information related to autistic children, especially when the platforms are regularly updated and improved.

Based on the findings and discussions presented, the platform developed in this study fulfills several key user requirements. By providing reliable, accessible, and up-to-date information, the platform has the potential to reduce the anxiety and burden experienced by parents and caregivers of children with special needs. It also serves as a digital gateway for sharing knowledge and connecting families to necessary services anytime and anywhere.

This approach aligns well with Thailand's 20-Year National Strategy: 2018–2037, particularly in promoting equitable access to healthcare and education for low-income and marginalized groups, and reducing inequalities across all dimensions (Office of the National Economic and Social Development Council, 2018, pp. 8–10). Furthermore, the platform supports the objectives of the Ministry of Social Development and Human Security's Five-Year Plan: 2023–2027, which focuses on enhancing family capacity, developing parenting skills, and providing timely support services during crises.

By addressing these national goals and user needs, the platform developed in this research offers a model for sustainable, inclusive, and user-centered digital support for children with special needs. Continued development, ongoing content updates, and systematic evaluation will be essential to maintain its effectiveness and ensure its long-term impact on the well-being of children and their families.

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