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Editorial

The September/October 2024 JIRSEA Issue has consistently resulted in 60% of papers being declined or withdrawn due to relevance to JIRSEA's focus on Higher Education issues or Institutional Research and those that do not meet the "sound scientifically grounded" research requirements of JIRSEA. Of the 40 papers that went through the Preliminary Reviews with revisions and re-submitted, 6 papers were rejected with 2 withdrawals. Of the remaining 32 papers that underwent the Double-Blind Review, only 16 papers (with an acceptance rate of 40%) were accepted for this issue publication after the rigorous and stringent vetting process, with 2 non-follow-ups. The papers continued to come from diverse geographic areas covering Taiwan, Malaysia, Indonesia, Thailand, Vietnam, Korea, the Philippines, China, the United Kingdom, USA, Iran and Jordan.

In this issue, we have the first paper from the Philippines dealing with LGBTQ+ issues related to learning English with another paper from Thailand dealing with Enhancing EFL Academic Writing through AI and Peer-assisted Learning. Many of the papers dealt with instruction, covering key areas like Factors Influencing Teachers' Innovative Teaching Efficacy and Effectiveness of Problem-based Learning on Students' Creative Thinking and Ethics, Values, and the Promotion of Life Skills among University Students. This issue also included topics covering Motivating Reasons behind Individual Switching Behavior on Nonformal Education Platforms, Communication and Connection in Solving Differential Equations, Teacher reviewing Student Anxiety and Engagement in the Classroom, and the Effectiveness of Peer Teaching Methods in Mindfulness Training to Enhance Student Mindfulness. In the hybrid learning environment, two of the research include looking at the Digital Inequalities Among Different Groups in Higher Education and Hybrid Learning at Higher Education Institutions and specifically, Students' Learning Experiences and Cognitive Outcomes in Online Learning Environment. In the curriculum design, implementation, and evaluation, some areas discussed were Designing and Implementing the Undergraduate Capstone Project in the Information Technology Program, Developing a Vocational Internship Program Evaluation Instrument, Evaluating an ESL Textbooks Evaluation Questionnaire using Rasch Analysis and Validation of Scores on the Online Homework Expectancy Value Cost Scale.

As part of its initiative to recognize the Best and Outstanding papers, the Best Paper from Vietnam looks at techniques by engineering students to expand their linguistic range. The Outstanding Paper from Thailand looked at the pre-service teachers' growth mindset. At the same time, the other Outsndning Paper from Vietnam explored the lived experiences that focus on the motivations, advantages, and barriers encountered by these learners in their EFL learning journey of a specific cohort.

This issue represents a very diverse set of research from various regions from the Middle East to Asia, with most still representing the core South East Asian regions. This positive response has continued to drive the JIRSEA into a more expansive coverage, making it an important source for those who do not have much opportunity in ranked journals. JIRSEA continues to thrive and strive for great and better access and availability to well-developed and researched papers from Asia.

The key synopses of these 19 papers are as follows:

- **Article 1 – Chiu-Yao Ting** of *China Medical University*, **Wet-Ting Hsu, Chin-Ling Ho,** and **Tao-Ming Cheng,** all from *Chaoyang University of Technology*, and **Hsing-Yu Hou** of *National Taichung University of Science and Technology, Taiwan, R.O.C.*, constructed a model of teachers' innovative teaching efficacy encompassing four key dimensions: "Understanding of innovative concepts," "Application of teaching methods," "Creating a teaching atmosphere," and "Implementation of diverse assessments" that explores the differences in innovative teaching efficacy among teachers from various backgrounds at a science and technology university in Taiwan. The study found that teachers who have applied for innovative teaching-related projects within the previous 3 years, particularly those who are female, aged 41–50 years, with 6 to 10 years of teaching experience, and who hold the rank of professor, exhibit a higher perception of their teaching efficacy. Moreover, educators who applied for innovative teaching projects within this timeframe demonstrated significantly higher overall teaching efficacy. This study proposes the potential to significantly enhance the teaching efficacy of faculty members in Taiwanese universities, thereby substantially improving educational quality.
- **Article 2 – Yee Ling Lee** and **R. Tharani Ramasamy,** both of *Taylor's University, Selangor, Malaysia,* action research aimed to investigate the challenges faced by postgraduate students and the types of scaffolds they needed during hybrid learning involving 78 postgraduate students from a private higher education institution in Selangor, Malaysia. The quantitative results showed that the students only faced a few challenges regarding the course content, teaching methods, assessment, learning resources, and personal issues, with the qualitative data revealing various challenges during hybrid lessons, indicating that they needed both fixed and adaptive scaffolds to support their learning. Based on the results from the baseline study, the researchers designed synergistic scaffolds, which consist of fixed and adaptive scaffolds to support student learning.
- **Article 3 – Li Lu, Siti Salina Mustakim,** and **Mohd Mokhtar Muhamad,** all from *Universiti Putra Malaysia, Malaysia,* focus on a meta-analysis to dissect the effect size of PBL on students' creative thinking by synthesizing cross-experimental effects and comprehensively analyzing variables, with the purpose of verifying whether PBL significantly improves students' creative thinking compared to conventional methods, and what moderating variables account for the differences in effect sizes across studies. The finding of this study showed that the overall effect size of the 15 studies is 1.240, $p<0.05$, which is a high-level effect size, indicating that PBL can significantly improve students' creative thinking than the conventional method. The subgroup analyses also revealed that the improvement of students' creative thinking in PBL was not affected by the experimental measurements, teaching methods, or the size of the sample but varied significantly across different education stages and subjects.
- **Article 4 – Yoel Zakhary Indraputra** and **Rifelly Dewi Astuti,** both from the *University of Indonesia, Jakarta, Indonesia*, explored the drivers of users' intentions to switch to performance on nonformal education platforms using Covariance-based structural equation modeling. The study's results showed an indirect influence of

perceived price and perceived usefulness factors on individuals' switching intentions. By understanding the driving reasons behind the intention to switch to nonformal education platforms, the research was expected to assist education platform providers in developing platform services aligned with user needs.

- **Article 5 – Rivan Gestiardi, Subanji, Toto Nusantara,** and **Muhammad Alfan,** all from *Malang State University, Malang Indonesia,* and **Siti Salina binti Mustakim** from *University Putra Malaysia, Sri Serdang, Malaysia*, evaluated the role of "teacher noticing" in assessing students' anxiety and their involvement in classroom activities through a systematic literature review using the Systematic Literature Review (SLR) protocol refers to the PRISMA approach. Findings highlight the importance of teachers' ability to recognize anxiety indicators, especially in post-COVID-19 distance learning contexts. Effective strategies include using motivational messages, integrating social networks, gamification, and mindfulness programs. Key implications involve developing teacher training programs focused on "noticing," adjusting educational policies to prioritize students' mental well-being, and implementing learning strategies that support student resilience.
- **Article 6 – Jihoe Park, Jang Wan Ko, and Yihyun Jung,** all from *Sungkyunkwan University, Korea*, and **Sumee Park** of *Konkuk University, Korea*, analyzed data from the National Assessment of Student Engagement in Learning (NASEL) in Korea to investigate the effect of personal background and learning experiences on the cognitive outcomes of 2,086 university students in the online learning environment. Results of the study showed significant mean differences by major for the variables of university students' learning experience and performance. It also showed that major, grade, learning attitude, challenging learning experiences, interaction with professors, and interaction with campus community members had significant effects on knowledge acquisition, while major, gender, active class participation, learning attitude, thinking activities, challenging learning, interaction with students from different backgrounds, and interaction with campus community members had significant effects on cognitive capacity. These results highlight the need for universities to identify effective teaching and learning methods in the online learning environment and implement appropriate improvement plans.
- **Article 7 – Mateo R. Borbon, Jr.,** of *College of St. Benilde, Philippines*, **Ma. Florecilla C. Cinches** of *Liceo de Cagayan University, Philippines,* and **Ruth Love V. Russell** of *Xavier University-Ateneo de Cagayan, Philippines,* examine digital inequalities in internet competencies among students and educational workers in selected higher education institutions (HEIs) in the northern and southern regions of the Philippines. The study focuses on four dimensions of internet skills: operational, information-navigation, social, and creative skills, and investigates how these skills impact internet usage and tangible outcomes. Results reveal significant differences between students and educational workers. Students demonstrated higher proficiency in creative and social internet skills, while educational workers excelled in information-seeking skills. However, students' lower information-seeking skills were found to hinder their effective use of online resources for academic achievement. Conversely, educational workers' lower creative and social internet skills limited their ability to leverage digital tools for career development. This research highlights the

need for targeted interventions to enhance information-seeking skills among students and creative and social internet skills among educational workers.

- **Article 8 – Nurliyana Bukhari, Fletchelle Arleen Apoi,** and **Mohd. Khairudin Kasiran,** from *Universiti Utara Malaysia, Sintok, Malaysia,* and **Mohammad Noman,** from *Wenzhou-Kean University, China,* examine the design and implementation of a capstone project in an undergraduate Information Technology (IT) program at a public university in Malaysia using the 2018 Ornstein and Hunkins' curriculum approaches of content, process, and product that analyzes the perspectives of both faculty and students. Five key themes emerged: Articulation of Objectives, Roles, and Responsibilities (Curriculum Approach: Content); Continuation and Sequence (Curriculum Approach: Process); Integration of Theory and Practice (Curriculum Approach: Process); Responsibility of Learning (Curriculum Approach: Product); and Alignment of Technical Guidance and Supervision (Curriculum Approach: Product). The findings reveal significant gaps in course progression, a mismatch between students' skills and assigned projects, and unclear supervisor roles and responsibilities. These issues hinder students' ability to take responsibility for their learning and fully apply theoretical knowledge in practical settings. Recommendations are provided to improve curriculum design, clarify supervisory roles, and ensure better alignment of capstone projects with students' capabilities.
- **Article 9 – Yolandaru Septiana, Tony Wijaya, Edi Istiyono,** and **Sukirno,** from *Universitas Negeri Yogyakarta, Yogyakarta, Indonesia* study was intended to develop standardized instruments that can be adopted in the internship program evaluation at the vocational School. Three experts, using the Aiken validity model, assessed the instrument's feasibility. Besides, an empirical validation was conducted by inviting 180 vocational school students. Finally, by using confirmatory factor analysis (CFA), root mean squared error of approximation (RMSEA), Tucker Lewis Index (TLI), and comparative fit index (CFI), this research has generated a reliable instrument consisting of 23 valid items which can be used as a standard in evaluating the internship program effectiveness for vocational School in Indonesia. The results estimate that 23 valid instruments can be used to evaluate the program of accounting field practice in vocational schools.
- **Article 10 – Geethaletchmi Ponniah, Samah Ali Mohsen Mofreh**, *Universiti Sains Malaysia,* and **Sultan Salem** from *the University of Birmingham* applied the Litz Theory (2005) to evaluate ESL textbooks in Malaysian community colleges through developing and assessing the validation of the questionnaire using the Rasch Model analysis of construct validity and reliability. The questionnaire investigates 123 community college students' perceptions of the ESL textbooks they use in their classrooms in Malaysia. The results of the Rasch Model Analysis reveal that the construct validity in the study shows the uniformity of the instruments in the good category. The study indicates that the items used in this study are related to the material's content. Hence, this questionnaire is valid and reliable to evaluate ESL textbooks in Malaysian community colleges.
- **Article 11 – Hà T. V. Nguyễn** of *Ton Duc Thang University, Vietnam,* and **Jianzhong Xu** of *Mississippi State University, USA,* validated the Online Homework Expectancy Value Cost Scale (OHEVCS) involving 1,192 college students. Results indicated that the OHEVCS consisted of three distinct yet related subscales: online

homework expectancy, value, and cost. In addition, results indicated no latent mean differences in the OHEVCS over gender (males vs females) and college year (years 1-2 vs years 3-4). Finally, online homework expectancy and value were associated positively with online homework completion and negatively with online homework distraction and procrastination. Online homework cost was associated positively with online homework distraction and procrastination and negatively with online homework completion.

- **Article 12 – Fateme Moradi** and **Masoumeh Cheraghi, both from** *Islamic Azad University, Tehran, Iran,* and **Zahra Rahimi** from *Allameh Tabataba'i University, Tehran, Iran,* emphasizes the significance of connections and communication in solving differential equation problems, highlighting their impact on meaningful learning. The participants in this study are 30 engineering students from the Islamic Azad University who attended a course on differential equations during the first semester of the 2022-2023 academic year. Over six consecutive weeks, the students were taught how to solve first-order differential equations, and their learning was assessed. The findings revealed that most students struggled to apply previously learned material to differential equations, indicating a deficiency in connecting new concepts with prior knowledge, such as simplifying algebraic expressions and factoring.
- **Article 13 – Jess V. Mendoza** of the *Philippine Normal University, City of Manila, Philippines,* and **Arceli M. Amarles** of *National University,* and *Philippine Normal University, City of Manila, Philippines,* explores the motivations and investments in English language learning among Filipino LGBTQ+ students. Through qualitative interviews with 11 self-identified LGBTQ+ individuals, the research reveals how societal pressures influence language learning and identity negotiation. The thematic analysis highlights participants' resilience and ambition in overcoming discrimination and affirming their identities through language proficiency. These findings emphasize the critical need for inclusive educational practices that support and empower LGBTQ+ students. Moreover, the study's insights extend beyond the Philippines, contributing to international discussions on language education and LGBTQ+ inclusion.
- **Article 14 – Edward Devere Bacon** and **Gessanee Maneerutt,** both from *Rangsit University International College, Pathum Thani, Thailand,* investigate the integration of artificial intelligence (AI), specifically ChatGPT, and peer-assisted learning (PAL) in enhancing academic writing skills among English as a Foreign Language (EFL) learners through a participatory action research design that utilized a mixed-methods approach, combining quantitative and qualitative data collection. The results indicated substantial improvements in writing scores and increased student confidence and engagement. This research provides empirical evidence on the synergistic effects of AI and PAL in EFL pedagogy, offering practical insights for educators.
- **Article 15 – I Made Dwi H. Suastika, Conrad Liab Hendricson Folamauk, R. Pasifikus Christa Wijaya,** and **Nicholas Edwin Handoyo,** all from *Universitas Nusa Cendana, Kupang, Indonesia,* determined the effectiveness of peer teaching methods in mindfulness training to enhance student mindfulness through a quasi-experimental with a pre-test-post-test control group design followed by 92 students.

The respondents' mindfulness level was measured using an online Mindfulness Awareness Scale (MAAS) questionnaire at three different measurement times. The data were analyzed using the Repeated Measure ANOVA test. The results indicated that the peer teaching method is effective and influential in increasing mindfulness in the peer tutor group (p-value <.001, f = 5.0). The effect size is moderate ($\eta^2p = 0.10$). The results showed that only the peer tutor group had significant results between observations one and 3 (p-value = 0.03). This paper concludes that peer teaching training can increase mindfulness in peer tutor groups. However, there was no significant difference between the peer and control groups.

- **Article 16 – Ahmad AlAhmad, Mohammad Al-Abdallat, Amani Al-Serhan, Marwan Al-Tawil, Hani Ayyoub,** all of *King Abdullah II School of Information Technology* **Aida Al-Awamleh, Derar Baniyaseen, Hadeel Boshmaf, Yasmeen A. Abu-Taleb, Talal Alqdah,** all of *The University of Jordan, Amman, Jordan* investigates life skills awareness among students at the University of Jordan (UJ) by measuring students' awareness of life skills through a questionnaire distributed to a random sample of 1,224 students enrolled in the Ethics and Human Values course. The analysis focused on differences in life skills awareness based on gender, academic specialization, academic level, and the completion of the Ethics and Human Values course. The results revealed a high overall average score on the life skills scale, indicating a strong level of awareness among UJ students. Statistically significant differences were found between students who had completed the Ethics and Human Values course and those who had not, with the former group exhibiting higher levels of life skills awareness. This study emphasizes the need to develop learning activities, instructional approaches, and assessment methods to promote life skills acquisition. It highlights the importance of expanding curricular and extracurricular opportunities within the university, recognizing that life skills development extends beyond academic pursuits.
- **Article 17 – 24th SEAAIR Conference "Best Paper"** of **Nguyen Trang Dung** from the *Ho Chi Minh City University of Technology, Vietnam,* conducted a study to identify the most and least commonly used techniques by engineering students to expand their linguistic range. The findings of the 126 students exhibited a preference for employing Cognitive Strategies and expressed a desire to engage in vocabulary acquisition actively. Teachers, students, and curriculum designers can benefit from this study in developing effective methods to enhance vocabulary learning.
- **Article 18 – 24th SEAAIR Conference "Outstanding Paper" of Tanutchaporn Namwat, Chitraporn Boonthanom,** and **Nanpapat Amborisuth,** all from *Ramkhamhaeng University, Thailand,* researched the exploratory study of components of year 4 pre-service teachers' growth mindset and to study its characteristics of 349 year-4 pre-service teachers in Bangkok, Thailand. The Kaiser-Meyer-Olkin (KMO) analysis of Commitment Leading to Success explained 48.453% of the variance, Challenge as Learning accounting for 7.176%, and Self-Awareness contributing 4.217% of the variance. These findings suggest that pre-service teachers with a Growth Mindset are characterized by a strong commitment to achieving success, a propensity to view challenges as learning opportunities, and a heightened level of self-awareness. The results underscore the importance of incorporating

Growth Mindset development into teacher education programs to foster resilience and adaptability among future educators.

- **Article 19 – 24th SEAAIR Conference "Outstanding Paper"** of **Nguyen Le An Phuong and Nguyen Thi Hoang Bau** from *Danang University of Foreign Language Studies, Vietnam,* seeks to explore the lived experiences that focus on the motivations, advantages, and barriers encountered by these learners in their EFL learning journey of a specific cohort: five adult women, ranging from 26 to 41 years old, who are currently enrolled at the University of Foreign Language Studies (UFLs) in Danang, Vietnam. The findings reveal an interplay of intrinsic and extrinsic motivations among female adult learners. Amidst the demands of work and study, familial responsibilities emerge as both an advantage and barrier to EFL female adult learners. Overcoming these barriers requires concerted support from educational institutions and family networks.

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EXPLORING THE MODEL AND DIFFERENCES OF INNOVATIVE TEACHING EFFICACY: A CASE STUDY OF TAIWAN

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ABSTRACT

In response to social change and the need for higher education reform, Taiwan's higher education system has made cultivating student innovation an important educational goal. Through the allocation of funds, tertiary institutions have been promoted to become centers of innovation and to create curricula and learning environments for creative education. To achieve this goal, universities provide teachers with funds and resources for innovative teaching to enhance teaching efficacy. This, in turn, affects student learning. Therefore, this study constructed a model of teachers' innovative teaching efficacy encompassing four key dimensions: "Understanding of innovative concepts," "Application of teaching methods," "Creating a teaching atmosphere," and "Implementation of diverse assessments." It further explores the differences in innovative teaching efficacy among teachers from various backgrounds at a science and technology university in Taiwan. A total of 357 valid samples were collected, and quantitative analysis was conducted using descriptive statistics, t-tests, ANOVA, and confirmatory factor analysis (CFA). Regarding reliability and validity, the internal consistency coefficients of the teachers' innovative teaching efficacy scale ranged between 0.75 and 0.85, and the second-order confirmatory factor analysis demonstrated an acceptable model fit and internal quality, indicating that the scale has appropriate reliability and validity. Additionally, the study found that teachers who have applied for innovative teaching-related projects within the previous 3 years, particularly those who are female, aged 41–50 years, with 6 to 10 years of teaching experience, and who hold the rank of professor, exhibit a higher perception of their teaching efficacy. Moreover, educators who applied for innovative teaching projects within this timeframe demonstrated significantly higher overall teaching efficacy. This study has the potential to significantly enhance the teaching efficacy of faculty members in Taiwanese universities, thereby substantially improving educational quality.

Keywords: *innovative teaching, teaching efficacy, higher education*

Introduction

Cultivating and enhancing creativity has transcended mere importance in addressing the demands of knowledge-based economies, emerging as a critical and indispensable objective in Taiwan. Therefore 2003, the Ministry of Education issued the “White Paper on Creative Education,” establishing creativity education as a key policy initiative (Ministry of Education, 2021). Teachers’ innovative teaching is the key to motivating students to be creative in their performance (Ministry of Education, 2015).

In light of evolving social dynamics, prevailing globalization trends, and anticipated demands for future talent development, the Ministry of Education embarked on a comprehensive overview of pertinent curriculum guidelines. This initiative culminated in the official implementation of the revised guidelines in August 2019. Central to these guidelines is a paradigm shift towards positioning students as the principal agents of their educational journey. By embracing adaptive education, the revised curriculum aims to kindle profound enthusiasm for learning and foster a bold spirit of innovation among students (Ministry of Education, 2021).

Through innovative teaching methods and strategies, teachers can engage students’ attention and stimulate their interest in learning (Zhu et al., 2013). Teachers’ innovative behavior and performance will empower students’ creative thinking and habits, which will be more in line with future trends in education (Chen, 2023). The ultimate goal of school education reform is to enhance students’ learning performance, with teachers’ teaching efficacy being a key factor (Sheu & Ni, 2019). In response to the changing needs of society and in line with the higher education reform policy, the Ministry of Education has been providing grants for individual instructors to conduct research on teaching practices since 2018.

This call for project proposals aimed to encourage instructors to start with the problems and challenges in their classrooms. Supplemented by relevant literature and observations, the research project should propose methods to solve practical issues in teaching, such as incorporating curriculum design, teaching materials, and methods, introducing teaching aids, using technological media, and adopting appropriate research methods and assessment tools to verify teaching efficacy (Ministry of Education, 2024). Although domestic and international universities allocate a considerable proportion of their budgets to teaching, no direct correlation exists between funding and quality. In other words, increased funding or project subsidies do not necessarily lead to tangible improvements in teaching support or efficacy (Lo & Chang, 2020).

Currently, higher education is exploring the influence of teachers’ personality traits and job stress on their teaching efficacy (Chao & Kung, 2021; Klassen & Chiu, 2010; Klassen & Durksen, 2014; Kokkinos, 2007), personality traits (Chen et al., 2001; Kim et al., 2019; Mojsa-Kaja et al., 2015), job stress (Collie et al., 2012; Klassen & Chiu, 2010; Klassen et al., 2013; Karabatak et al., 2018), burnout and job satisfaction (Harmsen et al., 2018; Shi, 2024), learning outcomes (Bandura et al., 2001; Bouih et al., 2021; Nurlu, 2015), and professional learning communities (Lien & Chang, 2017; Thadani et al., 2015; Ting, 2011). However, little research has been conducted on the correlation between participation in innovation-related projects and teaching efficacy. The objectives of this study are as follows:

1. Exploring the latent endogenous variables of first-order constructs such as "Understanding of innovative concepts,” “Application of teaching methods,” “Creating a teaching atmosphere,” and “Implementation of diverse assessments,” and conducting a second-order confirmatory factor analysis of teachers' innovative teaching efficacy while evaluating its reliability and validity.

2. Understanding the current status of innovative teaching efficacy among university faculty members.
3. Comparing the differences in innovative teaching efficacy among teachers from different backgrounds.

This study aims to elucidate university teachers' perceptions of innovative teaching efficacy and to construct a model of innovative teaching efficacy. It rigorously explores the differences in innovative teaching efficacy among teachers with diverse backgrounds. Additionally, the findings from this study will serve as a valuable reference for organizing future teacher competency workshops and seminars, ultimately aimed at bolstering the innovative teaching efficacy of educators.

Literature Review

Teaching efficacy

Tschannen-Moran et al. (1998) reported that teachers with high efficacy expend more effort in teaching and show greater persistence in facing obstacles. In addition, they are more likely to try new instructional approaches to find better teaching methods and are more willing to work with students experiencing difficulties. Self-efficacy, introduced by Bandura (1977), refers to "an individual's expectation of success, which influences their determination when facing challenges." Essentially, this is a belief in one's capability to succeed. Ashton et al. (1982) apply Bandura's self-efficacy theory as a foundational framework for teacher efficacy. Denham and Michael (1981) argued that teacher self-efficacy ensures effective teaching. Christensen (1996) posited that teacher self-efficacy, based on the broader concept of self-efficacy, reflects a teacher's belief in their ability to achieve educational objectives for their students. Moneys (1992) defines teaching efficacy as encompassing a teacher's mastery of subject knowledge, effective student communication, friendly and open attitudes, organizational skills, and classroom management techniques. Amabile (1996) noted that a positive classroom atmosphere enhanced students' intrinsic motivation and creativity.

Reynolds et al. (2003) highlighted three primary factors influencing teaching efficacy: professional characteristics, conducive classroom learning environment creation, and strong teaching skills. Effective teachers can design appropriate lesson plans and activities based on students' needs, effectively present materials, and employ suitable teaching methods, strategies, and assessments (Hackmann, 2009). Chang et al. (2014) suggest five key aspects of teaching efficacy: mastering instructional objectives, utilizing teaching strategies, enhancing effective communication, creating a learning environment, and using effective assessment feedback. Chesnut and Burley (2015) defined teaching efficacy as a teacher's ability to induce positive changes in students, foster a supportive atmosphere among students, and guide them in problem-solving and achieving successful experiences. Lai and Liao (2015) analyzed the dimensions of scholars' research about their hiring rates, categorizing teaching efficacy into four areas: teaching planning, teaching strategies, classroom management, and teacher-student interaction. Owing to the numerous factors that influence the teaching process, providing a concise and consistent definition of teaching efficacy is challenging. From the perspective of researchers, it is nevertheless clear that teaching efficacy has a multifaceted meaning.

Various studies have examined the impact of teachers' characteristics and background experience on their teaching efficacy. Chang et al. (2016) found no significant gender-based

differences in teaching efficacy. This result was echoed by Yang (2015), who explored the differences in teaching efficacy among teachers with varying personal background variables, including gender, age, educational attainment, years of service, rank, and teaching unit. Yang's findings revealed no significant differences in teaching efficacy based on these variables, except for teachers in technology-related fields who exhibited higher teaching efficacy than those in the humanities and social sciences.

Chang et al. (2016) investigated the differences in teaching efficacy among vocational high school teachers in the electrical and electronic disciplines based on background variables. Their study found no significant differences in teaching efficacy about gender, educational background, or teaching subject. However, teachers aged 51 years and above showed significantly higher teaching efficacy than those under 40, and teachers with more than 26 years of service exhibited higher efficacy than those with fewer than five years of service. Similarly, Hung and Chen (2015) indicated that teachers who are female, married, and have children aged 28 years and above and those with more service years tend to demonstrate higher teaching efficacy. Lien and Chang (2017) examined beliefs in professional learning communities and their impact on teaching efficacy. They found that elementary school teachers' teaching efficacy varied significantly with differences in years of service and participation in professional learning communities. Chiang et al. (2021) studied the differences in teaching efficacy among clinical teachers in medical centers with different personal background variables. Their results indicated that clinical teachers with more experience and those with workshop training demonstrated higher teaching efficacy.

Innovative Teaching Efficacy

The concept of innovation originates from Rogers' (1962) diffusion of innovation theory, which describes the dynamic process by which a new idea, concept, or entity is introduced into a social system over time through specific communication channels. In an educational context, innovation refers to teachers' adoption of new ideas, methods, practices, or assessment approaches to enhance the quality of teaching and learning (Nguyen et al., 2021). Boahene et al. (2019) found a significant correlation between teachers' self-efficacy and innovative practices. Teacher innovation fosters professional development and growth (Gong et al., 2020); this, in turn, helps educators better address teaching challenges, boosting their confidence and teaching efficacy (Chen, 2023).

Fan and Chang (2013) define teaching innovation as a practice wherein teachers, considering educational goals and student needs, effectively use technology to acquire knowledge and apply new teaching concepts in diverse and dynamic ways. This includes changes in teaching content, methods, assessment approaches, and software and hardware facilities to arouse greater student interest and enhance learning outcomes. Hsieh et al. (2016) stated that teacher innovation involves possessing advanced and accurate teaching concepts, utilizing various resources skillfully, and designing instructional activities to meet educational objectives. During the teaching process, it is crucial to consider students' diverse abilities and learning needs, reflect on teaching effectiveness based on current teaching conditions and student feedback, and ensure that learning is enjoyable and effective. To deconstruct the variables of teacher-teaching innovation, they categorized the dimensions of teaching innovation into "concepts," "content," "methods," and "assessment." Yao (2018) defines innovative teaching as introducing new concepts, methods, techniques, tools, and strategies by teachers to facilitate instruction. He categorizes innovative teaching strategies into five dimensions: curriculum materials, teaching philosophy, assessment methods, instructional methods (strategies), and teaching equipment.

Huang (2020) suggested that if teachers adopt diversified teaching methods and varied teaching content during the teaching process to stimulate students' intrinsic learning interests, they can effectively encourage students' proactive learning attitudes and enhance their learning outcomes. Chen (2022) defined innovative teaching efficacy as the perception that teachers who possess innovative ideas can employ creative instructional strategies centered on students, stimulate students' creative thinking abilities within an explorative learning environment, and utilize diverse and appropriate assessment methods to achieve innovative outcomes.

Innovative teaching efficacy encompasses multiple dimensions, and researchers have differing views on the meaning of innovative teaching. Most interpretations focus on aspects such as teaching philosophy, teaching methods, assessment, and instructional organization. The primary objective of this study is to approach the topic from the perspective of innovative teaching and to explore the innovative teaching efficacy scale across four key dimensions: "Understanding of innovative concepts," "Application of teaching methods," "Creating a teaching atmosphere," and "Implementation of diverse assessments." Additionally, this study aims to evaluate the reliability and validity of the scale, positioning it as an important tool for assessing teachers' innovative teaching efficacy within Taiwan's higher education system.

Methodology

Instruments

The instruments used in this study were developed based on a comprehensive review of previous research on teaching efficacy. During the conceptualization stage of the scale tool, this study initially distilled the definition of teachers and subsequently synthesized diverse dimensions to measure their teaching efficacy, as shown in Table 1.

Table 1: Research-aspect operational definition

Construct	Definition	Number	Indicator	Reference sources
Understanding of innovative concepts	Teachers are capable of responding to future trends, possessing forward-looking and innovative ideas, possessing a high degree of professionalism, constantly refining new knowledge in education, and demonstrating creativity in educational work.	4	I am willing to incorporate innovative teaching methods and adjust content in my courses as needed; I acknowledge the impact of innovative teaching on student learning; I will refer to creatively designed lesson plans from others, design appropriate teaching materials, and apply them in the classroom.	Chang et al. (2014); Chen (2022); Chen (2023); Fan & Chang (2013); Hsieh et al. (2016); Tsai et al. (2012)
Application of teaching methods	Teachers can use rich and diversified teaching strategies to enable students to participate in learning actively, stimulate	3	I will integrate "interdisciplinary" materials into my teaching curriculum; I will utilize information technology (such as e-books and computers) and Internet	Chen (2022); Chen (2023); Fan & Chang (2013); Reynolds et al.

	innovative thinking and behavior, and achieve the goals of tailor-made teaching and adaptive teaching.		resources (such as online learning platforms) to search for information on innovative teaching and apply it in my teaching; I will adapt the timing of teaching methods according to the needs of the instructional curriculum.	(2003); Hsieh et al. (2016)
Creating a teaching atmosphere	Teachers can create an environment conducive to developing creativity to encourage support or respond to students' needs to enhance the atmosphere of teacher-student interaction and students' innovative learning performance.	4	I will use various communication channels (such as discussion forums, LINE, FB, and social media) to convey messages and enhance interaction between teachers and students. I will encourage students to propose creative thinking and solve problems while learning bravely. I will also offer appropriate praise and encouragement to students for their creativity and performance.	Amabile (1996); Chen (2022); Yang (2015); Yeh (2005); Reynolds et al. (2003)
Implementation of diverse assessments	Teachers can assess students' learning efficacy through innovative assessment methods according to the teaching objectives, and student's learning needs to serve as a reference for teachers to reflect on innovative teaching and learning.	4	I will establish different assessment criteria based on students' learning differences; select appropriate assessment tools (such as practical work, reports, and observations) based on the content of innovative teaching; and design open-ended assignments and reports that require creativity or inspire critical thinking, allowing students to showcase their learning outcomes.	Chen (2022); Chen (2023); Fan & Chang (2013); Hsieh, et al. (2016); Tsai et al. o (2012)

The teaching efficacy scale comprises 15 items, all measured using a 5-point Likert-type scale ranging from strongly disagree (1 point) to agree (5 points). Higher scores indicate better teaching efficacy.

The reliability scores, indicated by Cronbach's alpha, ranged from 0.748 to 0.854 for all constructs, signifying satisfactory measurement of the variables of interest. This adherence to Nunnally and Berstein's (1994) recommendation suggests that Cronbach's alpha should exceed 0.7 in more mature studies. This indicates that the questionnaire is highly reliable.

Population and Sample

The questionnaire for this study was disseminated via the "Innovative Teaching and Learning Center" at a technology university in Taiwan, utilizing a convenience sampling approach. The target population comprised the university's faculty members, who received the survey link and comprehensive instructions outlining the procedural requirements and the overarching objectives of the research. Faculty members were encouraged to participate by completing the questionnaire within the designated timeframe. Conducted between February 14 and March 31, 2023, this survey successfully garnered 357 valid responses, yielding an impressive,

effective response rate of approximately 93.21% (Table 2).

The majority of respondents were female (62.5%). Regarding age distribution, 51.2% were within the 51–60-year-old age range, 29.4% were aged 41–50, 13.2% were over 61, and 6.2% were under 40. Regarding teaching experience, 42.6% had over 21 years, 20.4% had 16–20 years, 14.3% had 11–15 years, 11.8% had less than 5 years, and 10.9% had 6–10 years of experience. Regarding job titles, 38.3% were assistant professors, 35.3% associate professors, and 7.6% lecturers. Regarding the application for teaching innovation-related projects, 56.9% had applied, and 43.1% had not.

Table 2: Respondents' profiles

Demographics	Level	Count	Percentage
Gender	Male	233	65.3
	Female	124	34.7
Age	below 40	22	6.2
	41–50	105	29.4
	51–60	183	51.2
	above 61	47	13.2
Teaching Seniority	below 5	42	11.8
	6–10	39	10.9
	11–15	51	14.3
	16–20	73	20.4
	above 21	152	42.6
Job Title	Lecturer	27	7.6
	Assistant Professor	137	38.3
	Associate Professor	126	35.3
	Professor	67	18.8
Apply for teaching innovation-related projects	Not applied	154	43.1
	Applied	203	56.9

Data Analysis

Quantitative data analysis was performed using SPSS version 25.0 and AMOS 28.0. The statistical methods employed in this study are described below.

1. Descriptive statistical analysis: Using measures such as means and standard deviations, the characteristics of the sample were examined, providing insights into the average levels and variability of teachers' teaching efficacy.
2. Independent sample t-test: Independent t-test analyses were conducted to detect significant differences among various categories, including gender and application for teaching innovation-related projects within the past 3 years.
3. Analysis of variance (ANOVA): ANOVA was used to detect significant age differences, teaching seniority, and job title.
4. Confirmatory factor analysis (CFA): This study uses second-order confirmatory factor analysis to understand whether the four-component model of innovative teaching

efficacy measured by 15 items is supported by actual data. Teachers' innovative teaching efficacy is a second-order latent exogenous variable, which explains the first-order latent endogenous variables: "Understanding of innovative concepts," "Application of teaching methods," "Creating a teaching atmosphere," and "Implementation of diverse assessments."

Results

Validity and Reliability Analysis

Confirmatory Factor Analysis: This study used second-order confirmatory factor analysis to examine teachers' innovative teaching efficacy based on four dimensions: "Understanding of innovative concepts," "Application of teaching methods," "Creating a teaching atmosphere," and "Implementation of diverse assessments." The results of this analysis are shown in Figure 1 and described below:

1. Basic model fit test: As depicted in Figure 1, all error variances in this model were positive and significant, with no negative values. The factor loadings ranged from 0.37 to 0.70, with none falling below 0.50 or exceeding 0.95. The second-order factor loadings ranged from 0.83 to 0.95. These results indicate that the model met the basic fit test without identification issues.
2. Overall model fit test: Table 3 presents several model fit indicators and the recommended thresholds. The model demonstrated an excellent fit with the data, as evidenced by the following indices: Chi-square/df ratio (χ^2/df) = 2.28, Root Mean Square Error of Approximation (RMSEA) = 0.06, Comparative Fit Index (GFI) = 0.93, and Adjusted Goodness of Fit Index (AGFI)= 0.91. These indices collectively indicate that the proposed model is both parsimonious and accurate in representing the underlying data structure.
3. Component reliability (CR) value of the potential variables: As shown in Table 4, this value reflects the reliability of all measurement variables constituting a particular construct. This measures the internal consistency of the construct indicators, with high values indicating high internal consistency. Chin (1998) suggested a threshold of 0.7 or higher. This study's CR values ranged from approximately 0.77 to 0.86, indicating good internal consistency within the research model.
4. Average variance extracted (AVE) of the potential variables: As shown in Table 4, this measure calculates the variance explanatory power of each measurement variable within the potential variables. High values indicate the potential variables' high discriminant validity and convergent validity. Fornell and Larcker (1981) recommended a minimum threshold of 0.5 for the AVE values. In this study, all the AVE values exceeded 0.5, with the potential variables ranging from 0.53 to 0.60.

In summary, the results of the second-order CFA indicate that the four-component model of teachers' innovative teaching efficacy, measured by 15 items, does not violate basic fit standards and possesses acceptable internal quality and overall model fit.

Table 3: Model fit

Model fit	Criteria	Model fit of the research model
χ^2/df	$1 < \chi^2/df < 3$	2.28
RMSEA	< 0.08	0.06
GFI	> 0.9	0.93
AGFI	> 0.9	0.91

Table 4: Construct reliability results

Construct	Items	Loadings	CR	AVE
Understanding of innovative concepts	I am willing to incorporate innovative teaching methods and adjust content in my courses as needed. (T1)	0.81	0.86	0.60
	I will refer to creatively designed lesson plans from others, design appropriate teaching materials, and apply them in the classroom. (T2)	0.73		
	I will integrate relevant course materials and transform and design creative teaching content to achieve innovative teaching objectives. (T3)	0.82		
	I will design a curriculum (including activities) to enhance student learning. (T4)	0.74		
Application of teaching methods	I will integrate "interdisciplinary" materials into my teaching curriculum. (T5)	0.62	0.77	0.53
	I will utilize information technology (such as e-books and computers) and Internet resources (such as online learning platforms) to search for information on innovative teaching and apply it to my teaching. (T6)	0.72		
	I will adapt the timing of the teaching methods according to the instructional curriculum's needs. (T7)	0.82		
Creating a teaching atmosphere	I will use various communication channels (such as discussion forums, LINE, FB, and social media) to convey messages and enhance interaction between teachers and students. (T8)	0.66	0.86	0.60
	I encourage students to propose creative thinking and solve problems while learning bravely. (T9)	0.82		
	I will promptly praise and encourage students for their creativity and performance. (T10)	0.82		
	I will respect and encourage the unique performances of individual students. (T11)	0.79		
Implementation of diverse assessments	I will establish different assessment criteria based on students' learning differences. (T12)	0.61	0.82	0.54
	I will select appropriate assessment tools (such as practical work, reports, and observations) based on the content of innovative teaching. (T13)	0.84		
	I will design open-ended assignments and reports requiring creativity or inspiring critical thinking, allowing students to showcase their learning outcomes. (T14)	0.81		
	I will share my creative achievements in teaching with other teachers. (T15)	0.66		

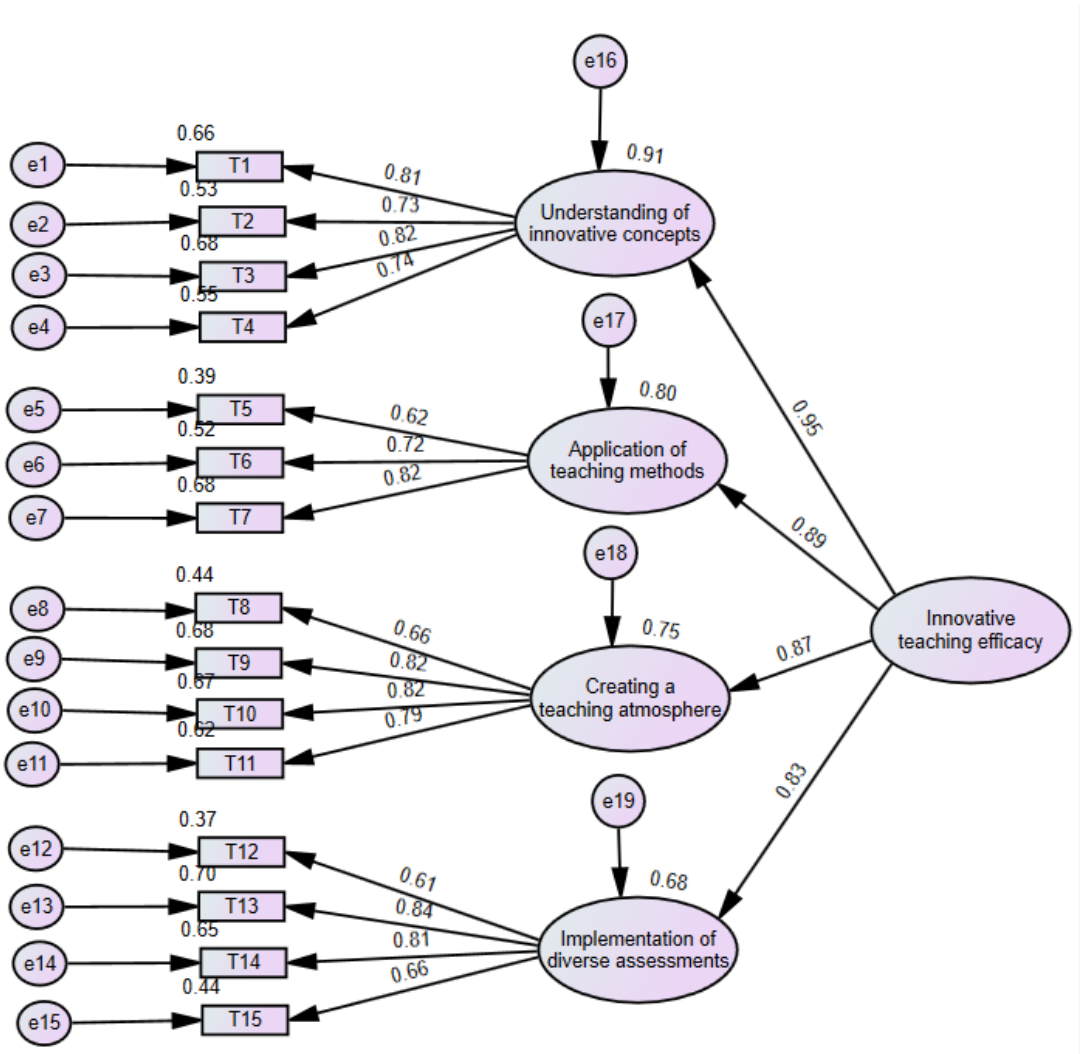

Figure 1: Second-order confirmatory factor analysis model of innovative teaching efficacy

Internal Consistency Analysis: The internal consistency analysis of the Teacher Innovative Teaching Efficacy Scale, along with its four sub-dimensions—"Understanding of Innovative Concepts," "Application of Teaching Methods," "Creating a Teaching Atmosphere," and "Implementation of Diverse Assessments"—produced Cronbach's α coefficients of 0.854, 0.748, 0.849, and 0.812, respectively. With most of these values exceeding 0.80, the results indicate a high level of reliability, indicating that the scale demonstrates good reliability.

Analysis of the Average Innovative Teaching Efficacy

As shown in Table 5, the overall average score for innovative teaching efficacy was 4.40, with the average scores for each item and factor measuring teaching efficacy exceeding 3.5. Most items scored above 4, with the highest score being 4.61. Notably, several items demonstrated exceptionally high satisfaction with scores above 4.5. These items include "1. I am willing to incorporate innovative teaching methods and adjust content in my courses as needed" (M = 4.53), "6. I will utilize information technology (such as e-books and computers) and Internet resources (such as online learning platforms) to search for information on innovative teaching, and apply it in my teaching" (M = 4.51), "7. I will adapt the timing of the teaching methods according to the instructional curriculum's needs" (M = 4.52), "9. I

encourage students to bravely propose creative thinking and solve problems during learning" (M = 4.59), "10. I will timely offer appropriate praise and encouragement to students for their creativity and performance" (M = 4.61), and "11. I will respect and encourage the unique performances of individual students" (M = 4.60) and "Factor 3 and creating a teaching atmosphere" (M = 4.57).

Table 5: Average score of each item and factor for innovative teaching efficacy

Item and Factor		M	SD
1.	I am willing to incorporate innovative teaching methods and adjust content in my courses as needed.	4.53	0.61
2.	I will refer to creatively designed lesson plans from others, design appropriate teaching materials, and apply them in the classroom.	4.45	0.63
3.	I will integrate relevant course materials and transform and design creative teaching content to achieve innovative teaching objectives.	4.36	0.63
4.	I will design a curriculum (including activities) to enhance student learning.	4.38	0.69
5.	I will integrate "interdisciplinary" materials into my teaching curriculum.	4.27	0.77
6.	I will utilize information technology (such as e-books and computers) and Internet resources (such as online learning platforms) to search for information on innovative teaching and apply it to my teaching.	4.51	0.61
7.	I will adapt the timing of the teaching methods according to the instructional curriculum's needs.	4.52	0.56
8.	I will use various communication channels (such as discussion forums, LINE, FB, and social media) to convey messages and enhance interaction between teachers and students.	4.46	0.66
9.	I encourage students to propose creative thinking and solve problems while learning bravely.	4.59	0.60
10.	I will promptly offer appropriate praise and encouragement to students for their creativity and performance.	4.61	0.57
11.	I will respect and encourage the unique performances of individual students.	4.60	0.55
12.	I will establish different assessment criteria based on students' learning differences.	4.03	0.81
13.	I will select appropriate assessment tools (such as practical work, reports, and observations) based on the content of innovative teaching.	4.39	0.63
14.	I will design open-ended assignments and reports requiring creativity or inspiring critical thinking, allowing students to showcase their learning outcomes.	4.32	0.73
15.	I will share my creative achievements in teaching with other teachers.	4.06	0.79
Factor 1	Understanding of innovative concepts	4.43	0.53
Factor 2	Application of teaching methods	4.43	0.53
Factor 3	Creating a teaching atmosphere	4.57	0.49
Factor 4	Implementation of diverse assessments	4.20	0.59
Overall	Innovative teaching efficacy	4.40	0.47

Analysis of Differences in Innovative Teaching Efficacy

Gender: Table 6 shows the average scores for different genders. Female teachers exhibit higher average scores than male teachers in most sub-factors and overall innovative teaching efficacy. The t-test revealed that the difference was not statistically significant.

Table 6: T-test analysis for different gender

Factor	Male	Female	t

	(n=233)		(n=124)		
	M	SD	M	SD	
Factor 1: Understanding of innovative concepts	4.41	0.52	4.46	0.57	-0.81
Factor 2: Application of teaching methods	4.40	0.53	4.49	0.53	-1.58
Factor 3: Creating a teaching atmosphere	4.56	0.48	4.59	0.51	-0.60
Factor 4: Implementation of diverse assessments	4.20	0.57	4.20	0.64	0.11
Overall innovative teaching efficacy	4.39	0.45	4.43	0.50	-0.74

Applying for teaching innovation-related projects: From the average scores of innovative teaching efficacy over the past 3 years, it is evident that teachers who applied for teaching innovation-related projects scored higher on the overall teaching efficacy scale and all subdimensions than those who did not apply for such projects. Through t-test analysis, it was found that the average scores of teachers who applied for innovative teaching innovation projects were significantly higher in the sub-factors of "Understanding of innovative concepts" and "Creating a teaching atmosphere," as well as in "Overall teaching efficacy," compared to those who did not apply for such projects (Table 7).

Table 7: t-test analysis for different applications for teaching innovation-related projects

Factor	**Not applied (n=154)**		**Applied (n=203)**		**t**
	M	SD	M	SD	
Factor 1: Understanding of innovative concepts	4.34	0.54	4.49	0.52	-2.56*
Factor 2: Application of teaching methods	4.37	0.53	4.47	0.53	-1.77
Factor 3: Creating a teaching atmosphere	4.49	0.54	4.62	0.45	-2.47*
Factor 4: Implementation of diverse assessments	4.14	0.59	4.24	0.59	-1.60
Overall, innovative teaching efficacy	4.34	0.48	4.46	0.45	-2.45*

* $p < 0.05$

Age: Table 8 presents the average scores for different age groups of teachers, showing that teachers aged 41–50 years had the highest average innovative teaching efficacy in overall teaching innovative efficacy (M = 4.44) and the sub-factors "Creating a teaching atmosphere" (M = 4.59) and "Implementation of diverse assessments" (M = 4.28). Conversely, teachers aged > 61 years scored highest in the sub-factors "Understanding of innovative concepts" (M = 4.49) and "Application of teaching methods." (M = 4.47). The ANOVA results indicated no significant differences in the four sub-scales and the overall innovative teaching efficacy across different age groups, with F values of 0.47, 0.11, 0.51, 0.98, and 0.43, respectively (Table 9).

Table 8: Average scores for different ages

Factor	below 40 **(n=22)**		41–50 **(n=105)**		51–60 **(n=183)**		above 61 **(n=47)**	
	M	SD	M	SD	M	SD	M	SD
Factor 1: Understanding of innovative concepts	4.35	0.46	4.45	0.53	4.41	0.54	4.49	0.53
Factor 2: Application of teaching methods	4.39	0.49	4.43	0.53	4.43	0.53	4.47	0.55
Factor 3: Creating a teaching atmosphere	4.45	0.49	4.59	0.51	4.57	0.48	4.54	0.52

Factor 4: Implementation of diverse assessments	4.15	0.49	4.28	0.62	4.16	0.60	4.22	0.55
Overall innovative teaching efficacy	4.33	0.40	4.44	0.48	4.39	0.47	4.43	0.45

Table 9: ANOVA analysis for different ages

Factor	Sum of Squares	F	Sig.	Post-hoc test
Factor 1: Understanding of innovative concepts	0.40	0.47	0.70	Not significant for all
Factor 2: Application of teaching methods	0.10	0.11	0.95	
Factor 3: Creating a teaching atmosphere	0.37	0.51	0.68	
Factor 4: Implementation of diverse assessments	1.03	0.98	0.40	
Overall, innovative teaching efficacy	0.28	0.43	0.73	

Table 10: Average scores for different teaching seniority

Factor	below 5 (n=42)		6–10 (n=39)		11–15 (n=51)		16–20 (n=73)		above 21 (n=152)	
	M	SD	M	SD	M	SD	M	SD	M	SD
Factor 1: Understanding of innovative concepts	4.33	0.50	4.41	0.58	4.45	0.55	4.40	0.54	4.46	0.52
Factor 2: Application of teaching methods	4.36	0.52	4.49	0.57	4.39	0.55	4.46	0.51	4.44	0.52
Factor 3: Creating a teaching atmosphere	4.56	0.44	4.58	0.57	4.52	0.48	4.57	0.54	4.58	0.48
Factor 4: Implementation of diverse assessments	4.17	0.58	4.31	0.64	4.17	0.57	4.17	0.65	4.21	0.57
Overall, innovative teaching efficacy	4.35	0.41	4.44	0.54	4.38	0.46	4.40	0.49	4.42	0.46

Teaching seniority: Table 10 illustrates the average scores for different levels of teaching seniority, revealing that teachers with 6–10 years of experience exhibit the highest average innovative teaching efficacy in overall innovative teaching efficacy (M = 4.44) and the sub-factors of "Application of teaching methods" (M = 4.49) and "Implementation of diverse assessments" (M = 4.31). Conversely, teachers with more than 21 years of seniority scored highest in the sub-factor of "Understanding of innovative concepts" (M =4.47). Notably, "Creating a teaching atmosphere" is a domain where teachers with 6–10 years of experience and those with over 21 years of seniority scored the highest. Furthermore, the ANOVA results indicated no significant differences in the four sub-scales and the overall innovative teaching efficacy across different teaching seniority groups, with F values of 0.61, 0.46, 0.12, 0.44, and 0.28, respectively (see Table 11).

Table 11: ANOVA analysis for different teaching seniority

Factor	Sum of Squares	F	Sig.	Post-hoc test

Factor 1: Understanding of innovative concepts	0.70	0.61	0.66	Not significant for all
Factor 2: Application of teaching methods	0.52	0.46	0.76	
Factor 3: Creating a teaching atmosphere	0.12	0.12	0.97	
Factor 4: Implementation of diverse assessments	0.62	0.44	0.78	
Overall, innovative teaching efficacy	0.25	0.28	0.89	

Job title: Table 12 illustrates the average scores across different job titles, revealing that the Professor job title exhibited the highest average innovative teaching efficacy in overall innovative teaching efficacy (M = 4.42) and the sub-factors of "Understanding of innovative concepts" (M = 4.46) and "Creating a teaching atmosphere" (M = 4.61). In contrast, The Lecturer's job title scored the highest in the sub-factor of "Application of teaching methods" (M = 4.49), while the Associate Professor led in the sub-factor of "Implementation of diverse assessments" (M = 4.22). Additionally, ANOVA analysis demonstrates no significant differences in the four sub-scales and the overall innovative teaching efficacy across different job title groups, with F values of 0.35, 0.20, 0.39, 0.10, and 0.06, respectively (see Table 13).

Table 12: Average scores for different job titles

Factor	Lecturer (n=27)		Assistant Professor (n=137)		Associate Professor (n=126)		Professor (n=67)	
	M	SD	M	SD	M	SD	M	SD
Factor 1: Understanding of innovative concepts	4.43	0.56	4.39	0.52	4.45	0.55	4.46	0.53
Factor 2: Application of teaching methods	4.49	0.52	4.42	0.53	4.44	0.56	4.41	0.49
Factor 3: Creating a teaching atmosphere	4.55	0.47	4.58	0.49	4.54	0.51	4.61	0.49
Factor 4: Implementation of diverse assessments	4.19	0.65	4.18	0.58	4.22	0.60	4.20	0.59
Overall, innovative teaching efficacy	4.41	0.47	4.39	0.45	4.41	0.49	4.42	0.46

Table 13: ANOVA analysis for job title

Factor	Sum of Squares	F	Sig.	Post-hoc test
Factor 1: Understanding of innovative concepts	0.30	0.35	0.79	Not significant for all
Factor 2: Application of teaching methods	0.17	0.20	0.90	
Factor 3: Creating a teaching atmosphere	0.29	0.39	0.76	
Factor 4: Implementation of diverse assessments	0.10	0.10	0.96	
Overall, innovative teaching efficacy	0.04	0.06	0.98	

Discussion and Conclusion

This study explored the relationship between university teachers' participation in innovative teaching-related projects and their teaching efficacy. After an extensive literature review, the "Innovative Teaching Efficacy Survey Questionnaire" was constructed as a data collection instrument. The survey data were analyzed in alignment with the research objectives. Based on these findings, the following conclusions were drawn.

1. The results of second-order confirmatory factor analysis indicated that the innovative teaching efficacy model did not violate basic fit tests and exhibited an acceptable overall fit and internal quality. This demonstrates that empirical data support the theoretical construction of the innovative teaching efficacy scale. Regarding reliability, the internal consistency coefficients for all participants across the four sub-dimensions ranged from 0.75 to 0.85, indicating that the innovative teaching efficacy scale possesses good reliability. The findings suggest that the innovative teaching efficacy scale has both strong reliability and acceptable validity, effectively measuring teachers' perceptions of their innovative teaching efficacy across the four dimensions.
2. The overall status of innovative teaching efficacy among university faculty members is commendable, with performance indicators reflecting above-average levels of efficacy. The scores for the various dimensions are ranked, from highest to lowest, as follows: "Creating a teaching atmosphere," "Understanding of innovative concepts," "Application of teaching methods," and "Implementation of diverse assessments." These findings are consistent with the results mentioned by Fan and Chang (2013), which highlight that innovative changes in teaching content, methods, assessment approaches, and software and hardware facilities can stimulate greater student interest and enhance learning outcomes. Additionally, the results showing no significant differences in age, teaching seniority, and job titles are similar to those of Yang (2015), except for the observation that teachers in technology-related fields exhibit significantly higher teaching efficacy than those in the humanities and social sciences.
3. Based on scores of various dimensions of teaching efficacy from different backgrounds, the study found that teachers who applied for innovative teaching-related projects within the previous three years, female teachers aged 41–50, and professors with 6–10 years of teaching experience exhibited higher perceptions of their teaching efficacy.
4. The efficacy of innovative teaching among educators varies significantly based on whether it has been applied to innovative teaching-related projects in the past three years. The research findings indicate that teachers engaged in such projects during this period demonstrate notably higher teaching efficacy on the overall efficacy scale and in the sub-dimensions of "Understanding of innovative concepts" and "Creating a teaching atmosphere." In addition, the differential analysis results indicated no significant differences in gender, age, teaching seniority, or job title. Regarding gender, our findings are consistent with those of Chang et al. (2016) and Yang (2015), who found no significant gender differences in teaching efficacy.

Implications

This study is grounded in relevant theoretical frameworks and has significant academic and practical implications. Teacher efficacy is pivotal for enhancing student learning outcomes. The overall findings indicate that innovative teaching efficacy is robust, with dimensions such as "Creating a teaching atmosphere," "Understanding of innovative concepts," "Application of teaching methods," and "Implementation of diverse assessments" all receiving average scores exceeding 4 points. Notably, the "Creating a teaching atmosphere" dimension scored the highest, suggesting that teachers excel at fostering effective communication and interaction with students, encouraging innovative thinking, providing timely praise and encouragement for creativity, and respecting and encouraging unique student performance, thereby creating a harmonious and proactive learning environment. Universities should also address areas of low teaching efficacy. The dimension with the lowest average score was "Implementation of diverse assessments." While prioritizing teaching innovation, schools

should actively organize teacher-development activities focusing on low-scoring items to enhance teachers' knowledge and skills using diverse assessment methods.

A comparative analysis of teaching efficacy across different backgrounds revealed significant differences based on whether the teachers had applied for teaching innovation-related projects over the past three years. The dimensions of “Understanding of innovative concepts” and “Creating a teaching atmosphere” were notably higher among those who had applied. Empirical data analysis confirmed the university’s success in promoting innovative teaching projects, particularly in enhancing the teaching atmosphere and understanding innovative concepts. The university prioritizes innovative teaching and has established an Innovative Teaching and Learning Center dedicated to promoting innovative teaching practices. This center organizes relevant development activities, provides funding for innovative teaching projects, and includes these efforts in teacher performance evaluations.

The university can leverage the demonstrated efficacy of teachers who have applied for innovation-related projects over the past three years. By facilitating peer exchanges on innovative teaching practices and publicly recognizing and rewarding outstanding teachers, universities can attract more faculty members to engage in innovative teaching, thereby diffusing teaching efficacy. Furthermore, universities can continuously refine their reward systems by promoting increased funding, additional resources, or enhanced performance points to encourage more teachers to apply for innovative teaching projects. This incentivizes teachers to be dedicated to teaching innovation, giving them the courage to persist in demonstrating teaching efficacy.

Additionally, the analysis of average teaching efficacy scores across different teacher backgrounds indicated that younger teachers (under 40 years old), those with less teaching experience (less than five years), and those with lower academic ranks (associate professors) were less confident in their teaching abilities. Universities should encourage new teachers to participate in innovative teaching activities and projects, enabling them to grasp the key points of curriculum design and diverse assessment mechanisms quickly, thereby promoting their professional development.

Limitations

The principal strength of this study lies in its comprehensive examination of the efficacy of innovative teaching practices among university faculty members and the impact of participation in related innovative teaching programs on teaching effectiveness. However, this study has certain limitations that warrant exploration.

The first limitation of the current study pertains to the assessment employed. Using a Likert scale to gauge respondents’ perceptions of various variables necessitates reliance on subjective judgment and retrospective completion. Consequently, the collected data may have exhibited discrepancies and biases. To address this issue, qualitative interviews with faculty members could provide a deeper understanding of the empirical findings regarding teaching efficacy.

The second limitation inherent in this study pertains to the indicators employed, which are articulated in the future tense with statements such as "I will." Such temporal framing raises concerns regarding the appropriateness of utilizing these indicators to assess teachers' teaching efficacy, as it relies on anticipated behaviors rather than actual performance.

Finally, a third limitation arises because some teachers who participated in the questionnaire did not engage with innovative teaching-related items. This might have led to divergent models of innovative teaching efficacy between the two distinct groups of educators involved in the study. This disparity may obscure a comprehensive understanding of the factors influencing teaching efficacy across varied teaching practices.

Recommendations

This paper offers several recommendations for future research in this field. This study used questionnaires to assess the comprehensive theoretical model. Future research could explore the inclusion of alternative measurement methods or introduce other significant dimensions and indicators from various sources to enrich the model for subsequent analyses. For instance, adding variables such as learning satisfaction and learning outcomes could contribute to the establishment of a more comprehensive theoretical framework.

Additionally, while this study focused on teachers at science and technology universities, future research could extend its scope to include educators from other universities. This would allow for a comparative analysis of the differences in teaching efficacy across diverse educational institutions.

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HYBRID LEARNING AT HIGHER EDUCATION INSTITUTION: A NEEDS ANALYSIS FOR SYNERGISTIC SCAFFOLDS

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ABSTRACT

Hybrid learning is a common learning mode in the post Covid-19 era. In a hybrid learning context, some students attend a lecture in person, while others join virtually from home. University students face several challenges when they learn in this context. Providing adequate scaffolds can help these students learn more effectively in hybrid lessons. However, a literature review revealed that scaffolds were designed based on the existing studies or teachers' conceptualization of scaffolding. Need analysis for scaffolding, especially in a hybrid learning context, is under-researched. This action research aimed to investigate the challenges faced by postgraduate students and the types of scaffolds they needed during hybrid learning. This research involved 78 postgraduate students from a private higher education institution in Selangor, Malaysia. The participants completed an online questionnaire comprising six closed-ended and four open-ended questions. Descriptive data was used to present the data for the close-ended questions. The qualitative data was coded and categorized into themes. The quantitative results showed that the students only faced a few challenges regarding the course content, teaching methods, assessment, learning resources, and personal issues. However, the qualitative data revealed that the students did face various challenges during hybrid lessons. They needed both fixed and adaptive scaffolds to support their learning. Based on the results from the baseline study, the researchers designed synergistic scaffolds, which consist of fixed and adaptive scaffolds to support student learning. The practical implications of designing synergistic scaffolds to support hybrid learning are discussed.

Keywords: hybrid learning, tertiary education, synergistic scaffold, needs analysis

Introduction

Lockdowns in response to COVID-19 led to the worldwide closure of higher education institutions (HEIs) (Schleicher, 2020), impacting 220 million students at tertiary institutions (UNESCO, 2021). In Malaysia, HEIs were closed when the government imposed a Movement Control Order (MCO) on 18th March 2020. Two years after the pandemic outbreak, with more countries gradually reopening their borders to international students, many HEIs have been reopened for physical lessons. However, many international students have to continue online learning due to various factors such as partial lockdowns in their home countries, cumbersome pre-departure, and post-arrival procedures, risk of getting Covid in flight, costly quarantine fees, and familiarity with the mode of online learning (Bülow, 2021; Xi, 2022). As a result, hybrid learning has been widely adopted as a substitute for face-to-face learning.

In a hybrid learning context, students who join lectures physically on campus and present virtually share the same learning space (Ackerman, 2008). In other words, some students attend a lecture in person on campus, while others join virtually from home (Ackerman, 2008). Hybrid learning is necessary to ensure a smooth transition from fully online learning to physical lessons while waiting for some countries to reopen their borders (Bülow, 2021; Xi, 2021). According to Malaysia's Endemic Guidelines, starting from 1 April 2022, individuals must maintain social distance of at least one meter from others to reduce the risk of virus transmission (Majlis Keselamatan Negara, 2022). This limited the number of students who could be present in a class simultaneously. Hybrid learning could be a solution for a class with many students.

A range of work has investigated hybrid learning from academics and students' perspectives. Those studies focused on the design and development of hybrid learning models and teaching methods, students' experience and satisfaction with hybrid learning, as well as individual factors influencing successfulness of hybrid learning (Arispe & Blake, 2012; Li et al., 2023; Raes et al., 2019). Studies investigating students' challenges in hybrid learning found that they experienced personal challenges such as isolation, low motivation, and inadequate self-regulation skills (Garrison & Kanuka, 2022; Kenney, 2011). Arispe and Blake (2012) highlighted that non-native English speakers were overwhelmed by instructors' language and learning resources. Course content, teacher reinforcement, teaching approach, and technology adoption also impact student learning in this context (Kenney, 2011). Issues related to assessment, such as fairness in grading and task complexity, are also reported in hybrid learning (Fitriani, 2022). Despite the prevalence of hybrid learning, research on the challenges postgraduate students face in hybrid courses during the post-pandemic period is scarce (Anderson, 2022). This may be built on the assumption that postgraduate students have a higher ability to navigate and adapt to hybrid learning. If unaddressed, these challenges will affect postgraduate students' academic performance. Deriving from the existing literature (Arispe & Blake, 2012; Garrison & Kanuka, 2022; Kenney, 2011), the first objective of this study was to explore the challenges faced by postgraduate students during hybrid learning in terms of course content, instructional methods, assessment tasks, and individual factors.

It is crucial to provide scaffolding for students, including hybrid learners, who face challenges in learning (Hsiao et al., 2017; Korhonen et al., 2019). Most scaffolds are designed based on the existing literature or teachers' conceptualization of scaffoldings (Richardson et al., 2021). Teachers' conceptualization of scaffolding differs based on their discipline and teaching philosophy (Richardson et al., 2021). They design scaffolds without conducting a need analysis to identify the challenges faced by their students and the types of scaffolds that are

helpful for them. As a result, these scaffolds may not be able to support the student effectively. Diagnosing students' learning needs is essential to designing effective scaffolds (van de Pol & Elbers, 2013). In higher education, the needs analysis of the types of scaffolds needed by postgraduate students in the hybrid learning context is under-researched. This gap leads to the second objective of this study, which was to investigate the postgraduate students' needs for scaffolding in a hybrid context.

Few scaffolding tools and agents can help students develop knowledge and skills in a complex, open learning environment (Tabak, 2004). It takes the concerted efforts of multiple types of scaffolds to support different aspects of learning to achieve a definite goal (Tabak, 2004; Ustunel & Tokel, 2018). Synergistic scaffolds (SS) are multiple forms of support that interact with each other concertedly to achieve a targeted goal (Tabak, 2004). Synergy can occur between fixed scaffolds (FS) and adaptive scaffolds (AS) over a sequence of learning activities. FS is static support planned before the implementation of lessons (Saye & Brush, 2002). AS is dynamic and situational support provided to students based on their progressive development in learning (Saye & Brush, 2002). Research showed that SS effectively supports student learning in both physical and online contexts (Ustunel & Tokel, 2018). However, less attention has been paid to designing and implementing SS in a hybrid learning environment. The third objective of the current study focused on designing SS, including both FS and AS, to help first-semester postgraduate students learn in a hybrid learning context.

Three research questions were formulated to achieve the research mentioned above objectives:

- Research question 1: What are the challenges faced by postgraduate students in a hybrid learning context?
- Research question 2: What are postgraduate students' needs for synergistic scaffolds in a hybrid learning context?
- Research question 3: How can synergistic scaffolds be designed to support postgraduate students' learning in a hybrid learning context?

Literature Review

Research Framework

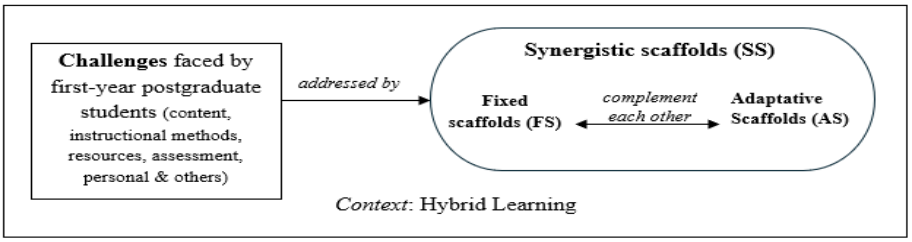


Figure 1: Conceptual framework of the study

This section will review the existing literature about the study's framing, as illustrated in Figure 1. The key dimensions include challenges in hybrid learning and synergistic scaffolds (SS), which consist of fixed scaffolds (FS) and adaptive scaffolds (AS). The acronyms in parentheses will be used in the article for brevity purposes.

Challenges in Hybrid Learning

Hybrid learning, which combines in-person and online instruction, poses significant challenges for HIE students. These challenges affect various aspects of the learning experience, including lesson content, teaching methods, learning resources, and assessment tasks. Understanding these difficulties from the students' perspective is crucial for improving the hybrid learning environment.

One of the primary challenges in hybrid learning is the inconsistency and fragmentation of lesson content. In a traditional classroom setting, content delivery is usually straightforward and cohesive. However, in a hybrid model, content may be delivered through various platforms and formats, leading to potential confusion and disconnection. The variability in teaching styles and technological proficiency can contribute to unpleasant learning experiences (Barbour et al., 2020). This fragmentation can make it difficult for students to integrate and synthesize information effectively. Furthermore, the quality and depth of online content often do not match face-to-face instruction. Design and delivery of online content require significant pedagogical changes, which many educators may not be adequately prepared for, leading to gaps in learning outcomes (Rapanta et al., 2020; Dzuiban et al., 2018)

Another significant challenge is adapting to the diverse instructional methods used in hybrid learning. Engagement is a critical component of effective learning, and maintaining it in a hybrid environment can be difficult (Dzuiban et al., 2018). Bawa (2016) notes that the lack of face-to-face interaction makes it challenging for instructors to gauge student comprehension and adapt their teaching methods accordingly. This can lead to a one-size-fits-all approach that does not meet the diverse needs of students. According to Coman et al. (2020), the shift to online learning often relies on asynchronous teaching methods, which may only effectively engage some students. Bao (2020) points out that online lectures sometimes need more interactive elements that facilitate a more profound understanding. This can be particularly challenging for complex subjects that require detailed explanations and immediate feedback. The absence of immediate interaction and feedback in online sessions can decrease motivation and participation.

Accessibility, quality, and appropriateness of learning resources are other concerns in hybrid learning. While digital resources for hybrid lessons offer flexibility, they also require reliable technology and internet access, which may only be available to some students (Dhawan, 2020). Besides, on-site learning resources must be more interactive when used without course instructors (Kebritchi et al., 2017). Deficiencies in self-explanatory elements, such as insufficient clarity, wordy description, and unorganized structure, often fail to support online learners in studying the materials independently (Lee et al., 2013). These resources need to be adapted or re-designed so that they can be effectively used by both physical and online learners (Kebritchi et al., 2017).

Assessment in a hybrid learning environment presents unique challenges. Traditional assessment methods, such as in-person exams and quizzes, may need to be more feasible and effective online. Gikandi et al. (2011) assert that formative assessments and frequent feedback are crucial for online learning success, but these require substantial time and effort from instructors. Furthermore, according to Adedoyin and Soykan (2020), the transition to online assessments has highlighted significant challenges in maintaining academic integrity, as the potential for cheating is higher in an online setting where monitoring is more complicated. Academic integrity necessitates the development of alternative assessment methods, such as

open-book exams and project-based assessments, which can be more challenging to design and implement. According to Gikandi et al. (2011), these alternative methods require careful planning and additional resources to ensure fairness and effectiveness. Moreover, the abrupt shift to online assessments has left many students feeling unprepared and anxious about the fairness and accuracy of these new methods (Gillis & Krull, 2020). The lack of standardization in online assessments can lead to inconsistencies in grading and feedback, further complicating the learning experience (Fitriani, 2022).

Scaffolding Student Learning

Wood, Bruner, and Ross were the first to propose the notion of scaffolding in 1976. Scaffolding explains the interaction between a tutor and a child that assists the child in solving a problem and accomplishing a more complex task that may be unachievable without any assistance (Wood et al., 1976; Spector & Merrill, 2014). Scaffolding can be helpful to students in some ways, namely:

- scaffolding fosters the development of independence to perform the target skills in the long run, in addition to enhancing present performance,
- scaffolding is applied when students work on real, uncontrolled problems (Belland et al., 2014),
- scaffolding relates to the assessment of students' abilities at that particular moment, expanding on what the students already know (van de Pol & Elbers, 2013),
- scaffolding preserves the complexity of certain activities while simplifying others (Reiser, 2004), and
- scaffolding enables students to engage entirely in the activity. It helps them focus on the issue at hand, which will help them acquire the necessary knowledge and improve the task's productive difficulty (Belland et al., 2014).

Synergistic Scaffolds: Complementary Roles of Fixed and Soft Scaffolds

There are two types of scaffolds: fixed and adaptive scaffolds (Azevedo et al., 2005) or hard and soft scaffolds (Saye & Brush, 2002). Both can be used to help students perform complex problem-solving tasks. Fixed scaffolds are static support planned before the implementation of lessons (Azevedo et al., 2005; Saye & Brush, 2002). Within the curriculum, fixed scaffolds are materials that are purposefully included in lessons to facilitate learning, such as using prompts to support students' cognitive and metacognitive processes during knowledge construction (Dominguez & Svihla, 2023; Ge et al., 2010). Adaptive scaffolds are situational since they are dynamic and dependent on the learner's needs at that moment for a given task. These interactive, responsive scaffolds are used in the classroom and modified according to the learner's needs by a teacher. For instance, teachers conduct ongoing diagnoses of students' emerging performances and provide adequate support by providing more support or fading their support till students can take responsibility for their learning (Dominguez & Svihla, 2023; Forman et al., 2017; Saye & Brush, 2002; Smit et al., 2012; van de Pol et al., 2014).

Pre-planned fixed scaffolds lack the elements of contingency and responsiveness compared to adaptive scaffolds (Saye & Brush, 2019). Adaptive scaffolds can reinforce support provided through fixed scaffolds or augment fixed scaffolds by providing essential scaffolding not embedded in fixed scaffolds (Tabak, 2004; Ustunel & Tokel, 2018). Synergistic scaffolds are multiple forms of support that interact with each other to achieve a targeted goal (Tabak, 2004).

Research shows that both fixed and adaptive learning are necessary to support physical and online learning (Tabak, 2004; Lee, 2019; Ustunel & Tokel, 2018). Examples of fixed scaffolds are computer-generated prompts, templates, charts, and discussion boards (Belland, 2017; Kannaki et al., 2011; Kim. 2017; Ustunel & Tokel, 2018; von Fintel & Eybers, 2000;). Adaptive scaffolds include asking reflective prompts, providing feedback, summarising ideas, creating social spaces, modeling, defining terms, and elaborating ideas (An & Cao, 2013; Hsiao et al., 2017; Rose & Meyer, 2002; Santoso, 2010).

There are few studies on scaffolding hybrid learning. For example, Hsiao et al. (2017) investigated the impacts of providing fixed and adaptive scaffolds to support student-centered learning in business modules. The hard scaffolds were provided in four forms: conceptual, procedural, strategic, and metacognitive scaffolds. The study showed that the scaffolds help the students construct knowledge. Conceptual and metacognitive scaffolds were more helpful for student learning than the procedural and strategic scaffolds. The conceptual scaffolds explained the conceptual framework of real-world scenarios, while the metacognitive scaffolds guided them to reflect on their learning. Similarly, An and Cao (2013) found that metacognitive scaffolds supported the students in problem-solving by helping them set goals and deadlines, engage in research, organize their ideas, challenge misunderstandings, avoid procrastination, monitor and evaluate their progress, and revise ineffective strategies.

In a study by von Fintel and Eybers (2000), different types of social interaction tools, such as discussion boards, blogs, and journals, were used to scaffold argumentative skills in a hybrid academic literacy module. The study found that the discussion board was the most effective scaffolding tool, allowing students to interact with the lecturers and their peers. The lecturers guided students through phases of identifying argumentative topics, formulating problem statements, and proposing evidence for claims. Creating social spaces for students to share ideas with their teachers and peers is crucial for scaffolding knowledge construction to meet individual learning needs (Rose & Meyer, 2002; Santoso, 2010). Scaffolds designed to sequence content, learning tools, and tasks systematically can develop students' argumentative skills (von Fintel & Eybers, 2000).

Methodology

Research Design: Action Research

This study adopted an action research design. Action research is a systematic procedure conducted by practitioners to address an actual educational issue they face. Action research aims to improve classroom practice through a spiral of self-reflection whereby teachers evaluate different solutions to their problems and gain knowledge from testing multiple ideas (Creswell, 2008). Action research involves four steps: (1) identifying an area of focus, (2) collecting data, (3) analyzing and interpreting data, and (4) developing an action plan (Mills, 2000). These steps do not follow a linear pattern but a "spiral" back-and-forth pattern to evaluate, revise, and repeat the plan.

In this study, the first author was the lecturer who taught a postgraduate core module named Learning and Assessment. The second author was the module tutor, who assisted the lecturer in assessing one of the students' assignments and co-teaching one lesson. This module was offered in the second block of the semester, from Week 8 to Week 15. Before enrolling in this module, the students had taken another core module that focused on the philosophical foundation of the curriculum from Week 1 to Week 7. The Learning and Assessment module

focuses on developing students' knowledge and skills in teaching and assessment. Among the topics covered are applications of learning theories in teaching, teaching approaches, lesson planning, assessment planning, and contemporary issues in assessment. This module was conducted in a hybrid setting at the time of this study. Due to varied travel restrictions in different countries (or provinces in the same country), the students were given the flexibility to join the lessons on-site or online. Each hybrid lesson took four hours as this was a 4-credit module.

We conducted this research in this postgraduate module to improve our students' learning experiences in a hybrid learning context. In line with the design of action research, firstly, we identified the areas of focus, which were the challenges our postgraduate students faced during hybrid learning and the potential synergistic scaffolds that could be designed to facilitate their learning from the existing literature. Secondly, we conducted a baseline study to understand these issues. Thirdly, we analyzed and interpreted the results from the baseline study. Finally, we designed SS to support their learning. This study was the first iteration of the action research. The research design is summarised in Figure 2.

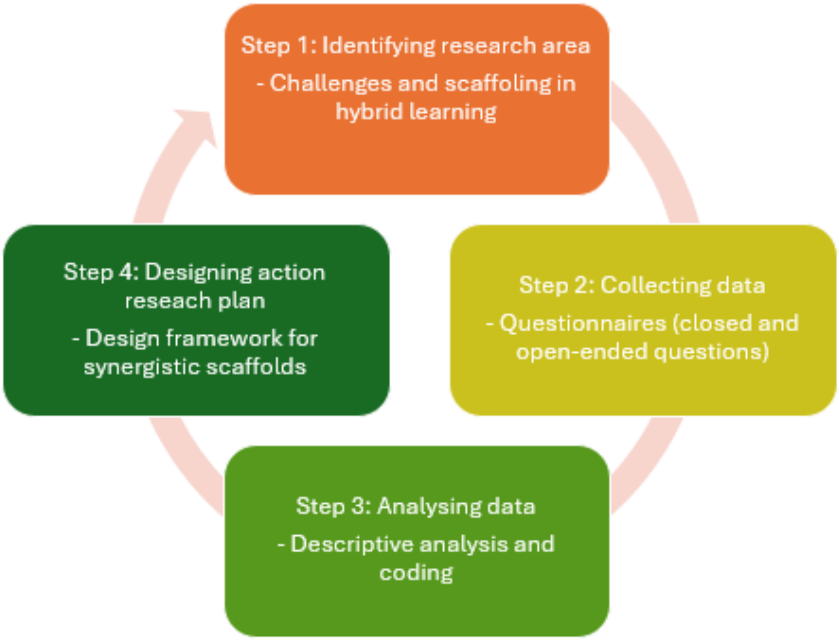


Figure 2: Action research design in the study

Participants

The participants of this study were first-year postgraduate students enrolled in the Master of Teaching and Learning (MTL) program at a private higher education institution in Malaysia. At the time of the research, they enrolled in the core module taught by the authors. Forty-eight out of a total of 78 students completed the survey. The response rate was 62%. About 88% of the participants were female and international students (90%). The participant profiles are shown in Table 1. Since they were still stranded in their home country when this survey was conducted, 42 students joined online lessons in this hybrid learning context.

Table 1. Participants' profiles

Demographic Information	Frequency (Percentage)
Gender	
Male	6 (12.5%)
Female	42 (87.5%)
Status	
Local	5 (10.4%)
International	43 (89.6%)
Learning mode	
Physical lessons on campus	6 (12.5%)
Virtual lessons	42 (87.5%)

The data was collected from an online questionnaire using a Google form. The survey questionnaire was developed based on a review of previous literature on hybrid learning (Dzuiban et al., 2018; Fitriani, 2022; Garrison & Kanuka, 2022; Gikandi et al., 2011; Kenney, 2011). The survey instrument consisted of four parts. Part A collected the participants' demographic profiles, such as gender, age, and nationality. Two questions collected information about how students joined hybrid lessons (i.e., physical and virtual). If they joined the lessons virtually, they were required to provide a reason to join virtual lessons.

Part B consisted of four close-ended questions and three open-ended questions. The questions focused on the challenges faced by the participants in terms of lesson content (Kenney, 2011), instructional methods (Garrison & Kanuka, 2022), learning resources (Kebritchi et al., 2017; Lee at al., 2013), assessment task (Gikandi et al., 2011; Fitriani, 2022) and personal challenges (Garrison & Kanuka, 2022). All close-ended questions consisted of a few items, as summarised in Table 2. For all these close-ended questions, the participants indicated their response using a scale of 1 to 5, from 1 being "strongly disagree" to 5 being "strongly agree that it is a challenge." The two open-ended questions asked the participants to explain if the instructional strategies and learning resources used in the hybrid lessons were appropriate to support their learning (Dzuiban et al., 2018; Garrison & Kanuka, 2022). The last open-ended question allowed the participants to explain the other challenges not listed in the sessions mentioned above. Part C consisted of one open-ended question, which required the participants to explain the scaffolds they needed.

Table 2. A summary of the questionnaire

Part	Category	Type of questions (Number of items)
Part A	Demographic information	Closed-ended
Part B	Challenges in a Hybrid Learning Context	
	Part B (I) Lesson Content	Closed-ended (5 items)
	Part B (II) Instructional Methods	Closed-ended (9 items) Open-ended (1 item)
	Part B (III) Learning Resources	Closed-ended (4 items) Open-ended (1 item)
	Part B (IV) Assessment Task	Closed-ended (8 items)
	Patt B (V) Personal	Closed-ended (4 items)
	Part B (VI) Other challenges	Open-ended
Part C	Scaffolds needed	Open-ended

A panel of two experts familiar with instructional design for hybrid learning was invited to review the initial questionnaire. The panel provided multiple comments and suggestions related to the wording of some survey items, the organization and length of the questionnaire,

and the relevance of the questions. Based on the experts' suggestions, the online questionnaire was revised.

The link to the Google form was shared with the participants during a hybrid tutorial lesson at the beginning of the second block of the semester. Since the students had taken another core module in the first block, they were familiar with class content, assessment tasks, and the term "scaffolds." Based on their prior learning experiences, the students could complete this questionnaire. The participants were given 20 minutes to complete the questionnaire.

Data analysis

IBM® SPSS, version 25.0, was used for data analyses. Descriptive statistics were used to describe the participants' demographics and challenges.

The responses to the open-ended questions were coded and categorized into themes based on the challenges related to teaching methods, learning resources, and types of scaffolds needed. Two coders coded the data. First, the coders chose one response and coded the data separately. Then, the codes were reviewed and revised based on the consensus of the two coders. Once agreement was reached on the coding schemes, all responses were coded. Next, the coders discussed their coding results until a consensus was reached. Across the entire process, approximately 10% of changes were made to the codes. The codes were then collapsed into themes to answer the two research questions. A coding system sample is shown in Table 3.

Table 3. Coding samples

Samples of students' responses	Codes	Categories	Themes
"I find classroom discussions and tools such as Peardeck and Classpoint are helpful in allowing me to contribute to the class discussion." (S7, VL)	Peardeck and Classpoint	Technology integration	Instructional methods
"*I feel that the information technology methods used by the teachers in the classes are all very good. For example, MyTiMes, Google Classrooms, Peardeck, etc., increase the engagement of our online students.*" (S26, VL)	MyTIMeS, Google Classroom, Peardeck		
"*The lecturer provided a set of questions for us to think about and answer as well as linking them together, which was very helpful in facilitating my active learning.*" (S33, VL)	Question and answers	Discussion	
"The teaching method supports my learning. The teachers timely discuss the questions in class, and the students can express their own opinions." (S44, PL)	Discuss questions		

Research Findings

The research findings report the challenges the participating MTL students faced and the type of scaffolds they needed when they learned in a hybrid setting.

Challenges in a Hybrid Learning Context

The challenges faced are reported from five aspects: content, teaching methods, assessment tasks, personal issues, and others. The mean for all items did not exceed 3.0, showing that the MTL students generally did not face many challenges when they followed hybrid lessons.

Table 4 shows the challenges that the students faced related to lesson content. The mean for Item CL1 was the highest (i.e., 2.90). The result indicated that the students held a neutral point of view on the quantity of lecture content. The students disagreed that the module content is irrelevant to their future careers (Item CL4, mean = 1.98). They also agreed that the learning outcomes of the lessons were communicated to them (Item CL5, mean = 1.92). The depth of the subject matter knowledge (Item CL2, mean = 2.63) and the language difficulty (Item CL3, mean = 2.54) did not pose many challenges to them.

Table 4. Challenges related to lesson content

Code	Description	Mean ± SD
CL1	There is too much content to be learned.	2.90 + 1.08
CL2	The subject matter knowledge is too deep.	2.63 + 0.94
CL3	The language used in the learning resources is too technical and difficult to be understood.	2.54 + 0.90
CL4	The content is irrelevant to my current/future career.	1.98 + 0.97
CL5	The learning outcomes of the lesson are not clearly explained.	1.92 + 0.71

Table 5 shows the challenges related to the teaching methods used by the lecturer during the hybrid lessons. The statistics show that the teaching methods used by the lecturer were appropriate for hybrid learning, as evidenced by the mean score, ranging from 1.17 to 2.27.

The students strongly disagree that the lecturer did not share real-life teaching experiences to complement the module content (TM9, mean = 1.17). They disagreed with the items related to the lecturer's incompetency in handling on-site and online students (i.e., Item TM1, Item TM3, TM4, and TM8). The mean for these items ranged between 1.94 to 2.00). The mean for Item TM2 and TM6 was the same (i.e., 2.19). This indicated that the technological tools were suitable for hybrid learning, and there were enough opportunities for small-group discussions. The mean for Item TM05 was the highest (mean = 2.27), showing that some students might find it challenging to interact with peers who joined the lessons using different modes.

Table 5. Challenges related to instructional methods

Code	Description	Mean ± SD
TM5	Communicating with peers who attend the classes in different modes is difficult.	2.27 + 1.14
TM2	The technological tools used are not appropriate for hybrid learning.	2.19 + 2.12
TM6	There are fewer opportunities for group discussions/ interactions.	2.19 + 0.94
TM8	The lecturer has difficulty monitoring the online chat and misses some messages.	2.00 + 1.05
TM1	I do not get enough attention as the lecturer is busy attending both on-campus and online students.	2.00 + 1.03
TM4	The methods cannot cater to the needs of both on-campus and online students.	1.96 + 0.92
TM3	There is not enough time for the lecturer to answer all questions from the on-campus and online students.	1.94 + 0.89
TM7	The teaching methods used are mostly lecture-based.	1.92 + 0.71
TM9	There is a lack of sharing real-life teaching experience.	1.17 + 1.02

The responses to the open-ended questions supported the findings from the questionnaire. Only two respondents perceived the teaching methods inappropriate to support hybrid learning. However, they did not provide any reason for their responses.

The students with opposite thoughts explained that the lecturers responded promptly and provided examples to clear their doubts. These statements support the findings of Item TM3. For example, S1 said, "*I can ask the teacher questions through chat, email, and other ways,*

and the teacher will give answers in time." S24 elaborated, "*The teacher explained it more understandably and also gave examples and showed pictures in class."*

In line with the findings from TM6, the students thought they had ample opportunities to interact with the lecturers.

> "*The lecturer provided a set of questions for us to think about and answer as well as linking them together, which was very helpful in facilitating my active learning*." (S33, VL)

> "*The teaching method supports my learning. The teacher timely discusses the questions in class, and the students can express their own opinions*." (S44, PL)

In agreement with Item TM2, some students thought technology integration helped them adapt to hybrid learning. They explained,

> "*I find classroom discussions and tools such as Peardeck and Classpoint are helpful in allowing me to contribute to the class*." (S7, VL)

> "*I feel that the information technology methods used by the teachers in the classes are all very good. For example, MyTiMes, Google Classrooms, Peardeck, etc., increase the engagement of our online students.*" (S26, VL)

One response from the "Other Challenges" section agreed with TM3, indicating that time constraints are a challenge in hybrid learning, especially for those who joined the lessons virtually. S32 (VL) also mentioned, "*I could not ask the lecturer my questions in time*." Consistent with the findings for Item TM6, one student shared, "*At home, I cannot ask my friends in time because of inconvenient communication mode*." (S27, VL)

Table 6 presents the challenges related to the learning resources. The students strongly disagreed with the items about limited resource type (LR1, mean = 1.20), delayed uploading of materials (LR2, mean = 1.10), and misalignment between the content and the learning outcomes (LR5, mean = 1.09). They also disagreed that the language of the learning resources was incomprehensible (LR3, mean = 1.84) and excessive number of resources (LR4, mean = 1.50).

Table 6. Challenges related to learning resources

Code	Description	Mean ± SD
LR3	The language of the learning resources is difficult to understand.	1.84 + 0.89
LR4	There are too many learning resources provided for a week.	1.60 + 1.01
LR1	There is no variation in the learning resources.	1.20 + 0.73
LR2	The learning resources are not uploaded on time.	1.10 + 0.43
LR5	The content of the learning resources is not aligned with the module learning outcomes.	1.09 + 0.56

The qualitative data supported the findings for Item LR3, showing that the students faced few challenges in understanding or utilizing the learning resources. For instance, the students explained,

> "*The PowerPoint slides can help me to understand the content of the lessons and main points.*" (S32, VL)

> "*When I do not understand the content, I can repeatedly watch the learning resources to solve my doubts*." (S38, VL)

Concerning Item LR4, one student shared that she found it challenging to finish watching all the videos posted on the platform. She said,

> "*I think there are too many videos (in the previous module). I did not have time to watch all the videos before the class*." (S9, VL)

However, one student expressed her disappointment over the content, commenting that, "*The courseware is not rich in content.*" (S30, VL)

Table 7 shows the challenges related to the assessment task faced by the students. The mean for seven items was close to 2.0. The students did not face many challenges with the alignment of the assessment task with the module learning outcome (AT4, mean = 2.19) and module content (AT6, mean = 1.92); rubrics (Item AT8, mean = 2.17); question clarity (AT2, mean = 2.10); and assessment details (AT1, mean = 1.92). The lecturer clarified their doubts (AT7, mean = 1.94) and provided timely feedback to help them improve the quality of their assessments (ATt5, mean = 2.02). Even though the students had to complete three assignments within eight weeks, they disagreed that it was too demanding (AT3, mean = 2.58).

Table 7. Challenges Related to Assessment Tasks

Code	Description	Mean ± SD
AT3	The assessment tasks are too demanding to be completed within a short period of time.	2.58 + 0.96
AT4	The assessment tasks are not aligned with the learning outcomes.	2.19 + 0.84
AT8	The rubrics are confusing.	2.17 + 0.83
AT2	The questions in the assessment tasks are ambiguous.	2.10 + 0.78
AT5	The feedback given to the draft does not help improve the assessment.	2.02 + 0.79
AT7	My doubts about assessment tasks are not addressed on time.	1.94 + 0.73
AT6	The assessment tasks are irrelevant to the module content.	1.92 + 0.85
AT1	The assessment brief is unclear.	1.92 + 0.77

Table 8. Personal Challenges During Hybrid Learning

Code	Description	Mean ± SD
PC1	It is challenging to pay attention for 4 hours in the hybrid context.	2.96 + 1.35
PC3	I am not familiar with the technological tools used.	2.63 + 0.94
PC2	I experience a sense of detachment or isolation as I am not able to communicate with on-site and online peers.	2.25 + 1.21
PC4	I do not have the confidence to ask questions.	2.19 + 0.96

The students' competencies and attitudes toward learning posed challenges to them. As shown in Table 8, the students disagreed with items related to low IT competency (PC3, mean = 2.63), detachment from the lessons (PC2, mean = 2.25), and lack of confidence (PC4, mean = 2.19). However, the mean for Item PC1 (2.96) showed that they neither agreed nor disagreed that it was challenging to concentrate in the hybrid class for 4 hours.

The students faced challenges beyond the four aspects discussed above. These challenges can be categorized into interruptions, motivation, language issues, and peer relationships.

Interferences with family members were one of the challenges faced by the students who joined the hybrid lessons online. The students said, "*When I attend classes from home, my*

classes are sometimes interrupted by my family as they expect me to be available to them." (S7, PL) and "*Interference at home from my family members*." (S22, VL)

> Isolation also impacted the student's motivation as one of them said, "*I also struggle with low motivation when attending classes online as it feels isolating*." (S7, PL)

The students also came across challenges caused by their language proficiency. One of them shared, "*My English is not very good. Sometimes it is difficult to understand some homework*" (S24, VL)

Two students expressed that they could not develop good relationships with their peers due to the constraint of hybrid learning. They explained, "*We have poor peer relationships as we do not see each other.*" (S31, VL) and "*There is less participation in the discussion from classmates. So, we cannot get to know each other.*" (S35, VL)

Types of Scaffolds Needed

The research findings from the close-ended questions suggest that the students did not face many challenges that could hamper their hybrid learning. However, the students' responses to the open-ended questions indicated that they needed both FS and AS in hybrid lessons.

Fixed scaffolds

Fixed scaffolds are pre-designed static supports. Three students mentioned detailed explanations of the assignments and samples among the fixed scaffolds. For example, S1 (VL) said, "…*I would like to have more detailed assignment requirements or homework examples*."

S2 (VL) shared that she needed visual aids. However, she did not specify the examples of visual aids she needed.

Adaptive scaffolds

The students needed adaptive scaffolds, which are just-in-time support given by the lecturer when teaching and learning opportunities emerge. The adaptive scaffolds mentioned by the students include providing explanations, examples, and lesson summaries, as well as creating opportunities for reflection.

Three students mentioned that they needed more explanations from the lecturer regarding the class content and assessment tasks. For instance, S4 said, "*Provide explanations to help me understand the theories and complete the study*." (S4)
S31 and S48 hoped the lecturer would provide more real-world examples when explaining the theories. S31 (VL) said, "*The lecturer can support theories with real-world examples*."

S38 (VL) preferred the lecturer to give a summary at the end of the lesson, "*I would like to have a lesson summary after each lesson to recap everything we have discussed in that lesson*."

S2 (VL) thought that reflection was necessary. She said, "*The lecturer can give us time for a short reflection after every class. She can give us some prompting questions…*"

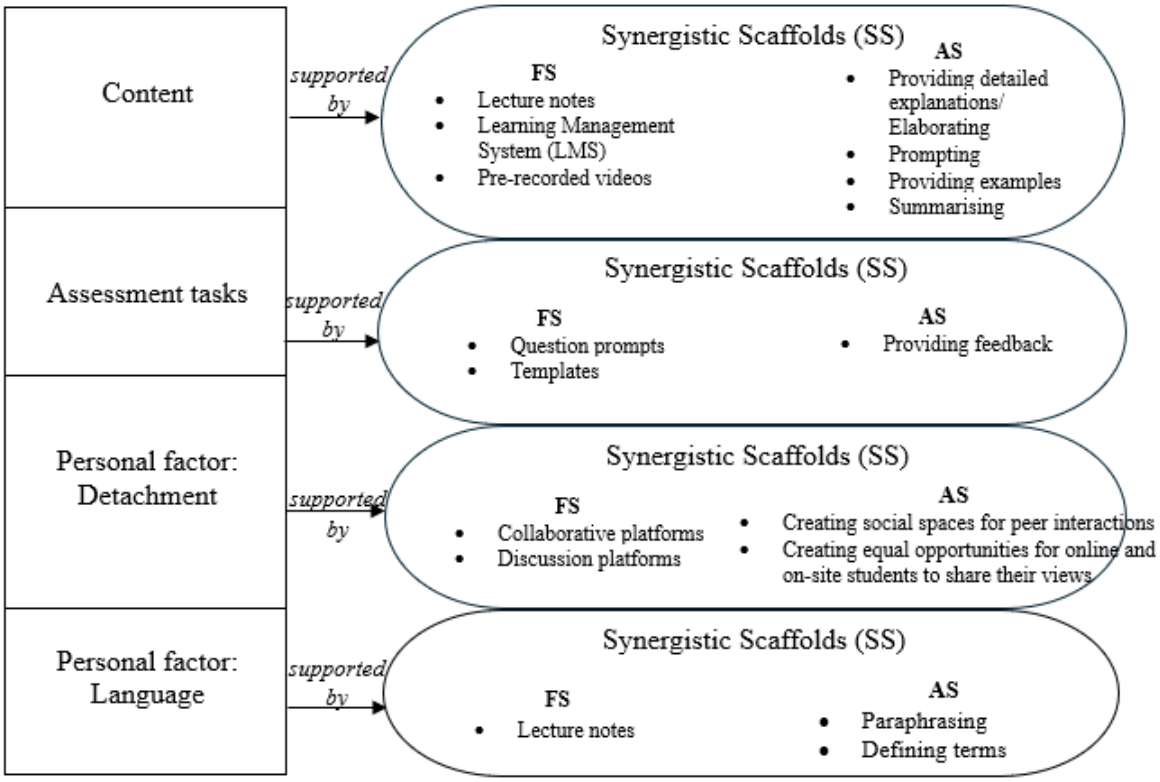


Figure 3. Synergistic scaffolds framework

Based on the findings from the needs analysis, we designed multiple forms of FS and AS to facilitate hybrid learning. The SS was designed to address the students' challenges regarding lesson content, completion of three assessment tasks (i.e., reflection, assessment plan, and case study), and personal factors, including detachment and language, as illustrated in Figure 3. The synergistic scaffolds were designed based on the existing literature on scaffolding hybrid learning and online learning, as most of the students were virtual learners. We designed fixed scaffolds such as prompts, templates, charts, and discussion boards (Belland, 2017; Gerard & Linn, 2016; Kim. 2017; Ustunel & Tokel, 2018; von Fintel & Eybers, 2000) to address the challenges faced by the students. Some of the adaptive scaffolds we designed include asking reflective prompts, providing feedback, summarising ideas, creating social spaces, modeling, defining terms, and elaborating (An & Cao, 2013; Hsiao et al., 2017; Rose & Meyer, 2002; Santoso, 2010).

The descriptions for FS and AS are presented in Table 9 and Table 10, respectively.

Table 9. Fixed scaffolds for supporting hybrid learning

Challenges addressed	Fixed scaffolds	Description
Content	Lecture notes (Kannaki et al., 2011)	The lecture notes contain detailed explanations, examples, figures, and tables for each topic (e.g., learning theories, different teaching methods, etc.) to deepen students' knowledge.
Content	Forum in Learning Management System	The forum allows students to provide opinions and respond to the comments posted by their peers. Non-

	(LMS) (von Fintel & Eybers, 2000)	verbal interactions among students encourage them to construct knowledge through interactions.
Content	Pre-recorded videos/ Videos from the internet (Ustunel & Tokel, 2018)	The pre-recorded videos complement the lecture notes. It contains some examples to elaborate on the ideas/concepts presented in the lecture notes.
Assessment tasks	Question prompts (Belland, 2017; Gerard & Linn, 2016; Kim. 2017; Ustunel & Tokel, 2018)	Question prompts aim to stimulate student thinking and keep them focused on the key requirement of the assessment task.
Assessment tasks	Template (Kannaki et al., 2011)	A template consists of all the essential components of an assessment plan.
Personal: Detachment	Collaborative platforms (Google Slides, Wiki)	Platforms that create social spaces for students to work together with their peers
Personal: Detachment	Discussion platforms (i.e., Padlet, Classpoint, Forum on LMS)	Platforms that create social spaces for students to share their ideas
Personal: Language	Lecture notes (Kannaki et al., 2011)	The lecture notes contained definitions for jargon and were written in clear, precise, yet simple language.

Regarding adaptive scaffolds, some question prompts and sentence starters were drafted based on the existing literature, as shown in Table 10. Lecturers could adopt or adapt these AS to address the challenges faced by the students in terms of lesson content, completion of assessment tasks, and personal factors (e.g., language proficiency and detachment) during lecture hours.

Table 10. Adaptive scaffolds for supporting hybrid learning

Challenges addressed	Adaptive scaffolds	Description	Examples
Content	Providing detailed explanations/ Elaborating (Kannaki et al., 2011)	Answer a question, provide more detailed information or clarification, and say something that adds to the information present in the discussion	The concept of object permanence at the sensorimotor stage means that children will learn how to search for an object when they cannot see it.
Content	Prompting (An & Cao, 2013; Kannaki et al., 2011)	Ask for the next step, which is an example of understanding a problem or content knowledge.	Why do you think flipped learning is more suitable to be implemented at the tertiary level than the secondary level?
Content	Providing examples (Kannaki et al., 2011)	Give a concrete example to deliberate an idea/ concept	Teachers must consider their students' prior knowledge before designing a lesson. For example, it is inappropriate to teach water cycles if students do not know the different states of water.
Content	Summarising/ concluding (Kannaki et al., 2011)	Summarise key content knowledge/ make a conclusion	The following are the highlights of this lesson: 1. The four major learning theories are behaviorism,

			cognitivism, constructivism, and humanism. 2. Learning theories allow teachers to understand how students learn and develop more comprehensive learning and assessment strategies for students.
Assessment tasks	Providing feedback (Kannaki et al., 2011)	Provide opinions, reviews, evaluations, and suggestions for improving student work.	You need to provide a concrete example to support your argument.
Personal: A sense of detachment	Creating social spaces for peer interactions (Kannaki et al., 2011; Rose & Meyer, 2002; Santoso, 2010)	Create group discussions for students to make their thinking visible and construct knowledge through interactions and active negotiation.	Can you tell us how your group is going to design a differentiated lesson based on the given scenario?
Personal: A sense of detachment	Creating equal opportunities for online and on-site students to share their views	Requires responses from online and on-site students	I invite one on-site student and one student to join us virtually to express your views on this issue.
Personal: Language	Paraphrasing (Gerard & Linn, 2016)	Rephrase a statement using better-known words in response to students' language problems.	In other words, "What else do you need to know so that you can design an effective lesson?"
Personal: Language	Defining terms (Gerard & Linn, 2016)	Explain the meaning of a term	Rote learning is the process of memorizing information based on repetition.

The need analysis was completed during the first lesson. Based on the initial design of the synergistic scaffolds, we created an action plan that would be implemented starting from the second lesson. The action plan lasted 6 weeks and covered various topics related to teaching and assessing learners. Figure 4 shows a sample of the action plan for a topic related to applying learning theories in teaching and learning.

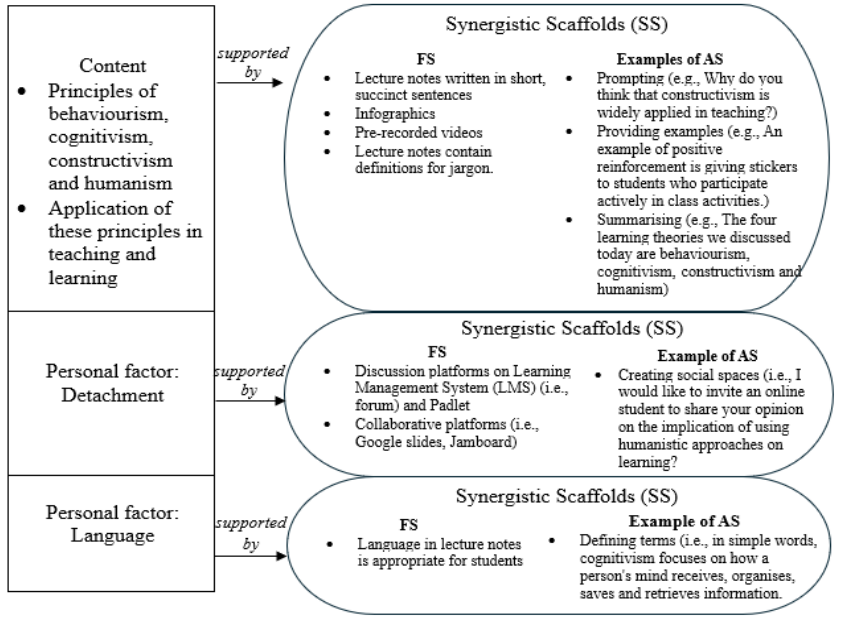
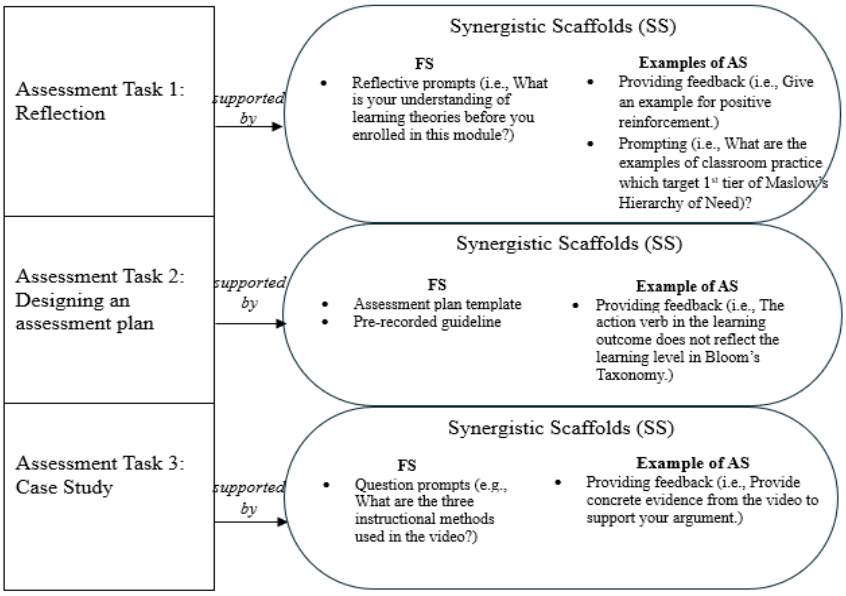
Challenges	Synergistic Scaffolds
Content Week 2 Application of learning theories in the classrooms • Behaviorism • Cognitivism • Constructivism • Humanism	
Assessment tasks	

Figure 4. Sample of action plan for synergistic scaffolds

Discussion

As highlighted in the systematic review by Raes et al. (2019), "most of the existing literature is exploratory and qualitative and has focused mostly on the description of students' experiences, the organizational implementation, and the technological design. Empirical studies have only begun to emerge, and more research is needed…." (p. 2). This study was empirical research that could provide insights into the challenges faced by postgraduate students during hybrid learning and the scaffolds they desired in this learning context. Even though the questionnaire results showed that the students faced minor challenges related to the content, instructional methods, assessment tasks, learning resources, and personal issues,

the qualitative data provided insights into the changes they faced. Regarding lesson content, the students mostly agreed that the content was relevant to their teaching profession and aligned with the module objectives. However, they showed some concerns about the depth of the content and the number of topics covered. Since most of the students were not native English speakers, the language of the content also posed some challenges to them.

Well-designed hybrid lessons allow students to access learning resources easily and flexibly (Li et al., 2023). In this study, the students faced very few challenges regarding the learning resources. Various learning resources such as lecture notes, assignment guides, and research articles were uploaded on the LMS a few days before the lessons so the students could come prepared for class. Factors such as course objectives and resources influence the effectiveness of hybrid lessons (Liu, 2021). The students in this study agreed that the learning resources supported attaining the module learning objectives.

Various instructional strategies, such as collaborative learning, technology integration, and direct instruction, were adopted during hybrid learning to cater to the needs of both on-site and online students. In contrast with the research by Raes et al. (2019), which showed that the students faced pedagogical challenges when they learned in hybrid mode, the students in this study thought that the methods used by the lecturers created sufficient opportunities for the students from different learning spaces to interact. They agreed that the lecturer could manage two groups of students well and allowed them to share their thoughts equally. This finding disagreed with Li et al.'s (2023) study, which indicated that hybrid learning lowered the levels of interaction among the students and made it more difficult for the lecturers to manage the classroom. A plausible reason for this difference was that the lecturer and the tutor (i.e., the first and the second author) had conducted hybrid lessons for a few semesters. Thus, we developed the skills to design the hybrid lessons appropriately based on the students' learning needs.

The academics in Li et al.'s (2023) study provided positive feedback for their students' assessment participation. Similarly, this research indicated that the students could understand the assessment brief, descriptors in the rubrics, and assessment requirements. Academics need to conduct fair assessments and prepare assessment materials to cope with the situations in hybrid learning (Li et al., 2023). They may also need to modify the assessment tasks, including using formative assessments to monitor students' progress in the course (Singh et al., 2021).

Effective online learning necessitates interactive and multimedia-rich content, which can be time-consuming and resource-intensive to develop (Gikandi et al., (2011). Consequently, students may have to rely on subpar materials that do not effectively support their learning. The responses provided by the students to the learning resources were positive. This indicated that the students in this study did not face many challenges regarding the accessibility, quality, and quantity of the learning resources. A plausible reason was that the lecturer had taught this module for three years since Covid-19. Over the years, the learning resources have been continuously adapted based on virtual students' learning needs. For example, the resources were prepared in visual and audio forms, and there was less non-academically related jargon in the resources, as suggested in the literature (Carstens, 2016; Smit et al., 2012).

Among all the challenges, the students rated the personal challenges the highest. This was due to the nature of the lesson, which lasted 4 hours per lecture. This core module was also offered in the first semester when the students were newly enrolled in the programs. They might still need more time to adapt to a postgraduate program. Besides, similar to research by Garrison

and Kanuka (2022), the absence of instructors causes a sense of isolation for students who join hybrid lessons online. Compared to face-to-face learning, hybrid learning provides fewer real-time interactions between lecture students and student-students, hindering the spark of meaningful conversations and the development of close relationships between all parties involved (Cho & Berge, 2017; Singh et al., 2021).

Personal issues related to technology accessibility and student's inadequate information technology (IT) competencies are widely reported (Dhawan, 2020; Smith et al., 2019). However, these two challenges did not emerge from the data. The postgraduate students in this study had learned how to navigate the LMS and used some online apps in the first module they enrolled in. They should have developed the basic IT competency in using the common online platforms. In addition, teachers who have taught in many settings could easily devise solutions to overcome the hindrance in their teaching practice (Raes et al., 2019). Since we have taught this module for a few semesters, we understood the kind of assistance the students might need in terms of the use of technology. Whenever we used new apps such as Classpoint and Google Jamboard, we demonstrated how to access the learning apps, post a response, and insert an online photo. These practices facilitated their use of IT.

Attention should be paid to scaffolding student learning when teaching staff design pedagogical methods for their students (Korhenan et al., 2019). Pre-designed materials on LMS also play pivotal roles in scaffolding students (von Fintel & Eybers, 2020). Thus, based on the needs analysis, we designed SS, which consisted of FS and AS, to support the postgraduate students' learning. For instance, to scaffold content knowledge construction, we designed FS, such as lecture notes and pre-recorded videos, to explain the key concepts the students needed to learn in this module (Kannaki et al., 2011; Ustunel & Tokel, 2018). AS provided by the lecture, for example, providing concrete examples, prompting, and explaining on the spot, are expected to reinforce the content delivered through FS (An & Cao, 2013; Kannaki et al., 2011). Korhenan et al. (2019) argued that the most productive scaffolds for online learning are teachers' comments throughout the lessons and feedback on student assessments. FS and AS are equally important in supporting student learning, and thus, it is crucial to seek a balance between the roles of these two types of scaffolds to maximize the potential of SS (Ustunel & Tokel, 2018). In the next stage of this research, we will implement the SS and evaluate their effectiveness in scaffolding hybrid learning.

Conclusion

Although the challenges explained by the students may only represent their engagement in hybrid learning during the post-COVID-19 era, when the traveling restrictions were not entirely removed, this research shed light on students' perceptions of scaffolding in a unique period in higher education. This research shed light on the challenges postgraduate students face and their perceptions of scaffolding in the hybrid learning context. Hybrid learning presents numerous challenges for HIE students regarding lesson content, instructional methods, learning resources, and assessment tasks. Addressing these challenges requires a concerted effort from educators and institutions to standardize content delivery, provide equitable access to technology, create engaging and high-quality digital resources, and develop effective assessment strategies. Understanding those challenges and the need for scaffolding is essential to ensure that the scaffolds designed adequately support them. Fixed scaffolds alone are far from a perfect instructional means to support student learning, and thus, adaptive scaffolds are needed to complement the fixed scaffolds (Tabak, 2004). Without

concerted efforts to scaffold student learning, the potential benefits of hybrid learning may be overshadowed by its difficulties.

This study has practical implications for practice and research in the field of scaffolding hybrid learning. This study allowed students to share the challenges they faced in hybrid learning and the types of scaffolds that could help them learn effectively. By considering students' voices for scaffolds, the research findings can help lecturers design fixed and adaptive scaffolds to support hybrid learning more effectively. Students can be counted as collaborators as they provide inputs for designing the scaffolds instead of passive learners who are being scaffolded. Besides, this study expanded the research context to include hybrid learning, which has become a popular learning mode in the post Covid-19 era. Therefore, understanding how to scaffold on-site and online students simultaneously is crucial to ensure that both student groups are adequately supported. The excerpt of the action plan provides teaching staff with a more concrete and contextualized example to design synergistic scaffolds. They can design synergistic scaffolds that address the student's learning gaps.

This study, being of an exploratory nature to understand student learning in a hybrid learning context, raises several opportunities for future research. However, this study has several limitations. First, all data was collected through a questionnaire. Most of the responses to the open-ended questions were brief, without any elaboration. For example, a student mentioned that visual aids could support student learning. However, since this student did not specify the type of visual aids needed, it would be challenging for lecturers to identify the type of visual aids that would be helpful for students. Besides, only some of the students' responses supported the closed-ended questions. For instance, the quantitative data showed that the students strongly agreed that the assessment brief was clear. However, some students mentioned needing more detailed explanations of the assessment tasks with open-ended questions. Thus, interviews are needed to understand better their struggles and how each type of scaffold can support student learning. For future studies, the researcher can collect the data using a few methods such as questionnaires, interviews, and classroom observation for data triangulation.

The second limitation was related to the questionnaire. Only the sections related to the teaching methods and assessment tasks contained an open-ended question. In-depth information on the challenges regarding the lesson content, as well as personal and other challenges, was not obtained. In future studies, students can be asked to provide real-life examples of the challenges to support their arguments. This study informed the lecturers about the challenges faced by the students and the types of scaffolds needed. Future studies may focus on designing scaffolds to address those challenges in a hybrid learning setting. This can be followed by an evaluation of the effectiveness of scaffolds to support student learning. The researchers would propose guidelines for future research and practice in hybrid learning based on the results.

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THE EFFECTIVENESS OF PROBLEM-BASED LEARNING ON STUDENTS' CREATIVE THINKING: A META-ANALYSIS STUDY

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ABSTRACT

Problem-based learning (PBL) is well esteemed by scholars as one of the most effective methods for nurturing creative thinking. However, due to the limitations of the sample, the discipline, and so on, single fragmented studies are incapable of summarizing the overall effectiveness and application of PBL, resulting in researchers being unable to maximize the effectiveness of PBL for creative thinking. Responding to the above issues, this paper focuses on a meta-analysis to dissect the effect size of PBL on students' creative thinking, as meta-analysis is capable of synthesizing cross-experimental effects and analyzing variables comprehensively. The purpose of this paper is to verify whether PBL significantly improves students' creative thinking compared to conventional methods and what moderating variables account for the differences in effect sizes across studies.15 studies were included in this meta-analysis, based on strict inclusion criteria and after a meticulous risk of publication bias analysis. After the overall effect size analysis, due to the heterogeneity of the source literature, a random effects model was chosen for this analysis. The finding of this study is that the overall effect size of the 15 studies is 1.240, $p<0.05$, which is a high-level effect size, indicating that PBL can significantly improve students' creative thinking than the conventional method. The subgroup analyses also revealed that the improvement of students' creative thinking in PBL was not affected by the experimental measurements, teaching methods, or the size of the sample but varied significantly across different education stages and subjects.

Keywords: Problem-based learning, Creative thinking, Creativity, Improvement, Thinking skill, Meta-analysis.

Introduction

With the approach of the twenty-first century and the challenges and pressures brought about by the fourth industrial revolution sweeping across the globe, there is an urgent demand for mankind to cope with all sorts of predicaments through various means. Education is indisputably one of the most crucial methods because it is the most effective approach to enhancing human capabilities. To surmount the challenges of science, technology, economy, culture, and life in the new century, education must cultivate human resources with the four crucial skills of communication skills, collaboration, critical thinking, and creative thinking, which are the basis of core competitiveness in the new century (Fatmawati et al., 2022). Out of these skills, creative thinking drives students to explore and discover new things, supports effective responses to challenges, and is integral to student growth and development (Gafour, 2020). Creative thinking triggers individuals to generate new and unique ideas and choose appropriate methods to solve problems successfully, and it is one of the essential skills for students to possess (Sudirjo et al., 2023). In addition, in a highly competitive and stressful environment, creative thinking can motivate students to collect materials systematically, methodically analyze information, and strategically practice new ideas, thus guiding them to find solutions to difficult problems, surpassing bottlenecks, and turning dangers into opportunities (Musaidah et al., 2022). That's the reason why creative thinking should be emphasized and valued.

As creative thinking is emphasised by human beings, the relevant theoretical system of creative thinking has also been gradually developed, commencing with the four stages of creative thinking proposed by Walles (1926), which mainly interpreted the progression of creative thinking, including: preparation; incubation; illumination; verication; The secondary is Wertheimer's (1945) structural theory, which uses Gestalt theory in psychology to explain creative thinking, indicating that creative thinking is realised through epiphanies, i.e. structural reorganisation and interpretation of meaning; Then followed Guilford's (1956) structure of intellect theory, which suggested that the core element of creative thinking is divergent thinking, i.e. fluency, flexibility and originality of thought; Drawing on Guilford's theory, Torrancee (1972) considered creative thinking to be at the centrepiece of creativity, and that creativity consists of four processes: perceiving a problem; formulating a hypothesis; verifying the hypothesis; and presenting the results, and developed the world-renowned Torrance Tests of Creative Thinking (TTCT), which tests an individual’s fluency, flexibility, precision and uniqueness of thinking. Sternberg (1988) proposed a three-dimensional theory of creativity, namely, intelligence dimension, personality dimension, and modality dimension, claiming that the intelligence dimension is the vital dimension of creative thinking. These theories offered a significant foundation and direction for scholars to discuss and analyze creative thinking.

As one of the most prominent skills in the 21st century, creative thinking skills have been analyzed and interpreted by experts and scholars from a variety of perspectives, and a total of three insights have been developed, i.e., creative thinking is regarded as an ability, or a thinking process, or a mode of thinking. Firstly, Amrina et al. (2020) have considered that students use creative thinking to analyze problems creatively, which is an instrumental ability to explore issues, seek answers, and solve problems. Sudirjo et al. (2023) believe that creative thinking is an ability that is sensitive to problems and intimately related to problem-solving, mainly through identifying, analyzing, gathering information, drawing connections, and finally solving problems. Selviana et al. (2022) point out that creative thinking is a skill for solving problems, forming ideas, and producing new perspectives. It has also been recognized

that creative thinking is an intellectual potential that can be fully developed in the learning process (Cahyono et al., 2021). From this perspective, creative thinking is indeed an invaluable ability that facilitates problem-solving and the production of new ideas. Another group of scholars resolved creative thinking from the perspective of the process that creative thinking is a systematic process of analysis, planning, commenting, and summarizing, which aims at obtaining correct decision-making solutions and solutions to problems (Nurcholifah et al., 2021). Anisaroh et al. (2018) are convinced that creative thinking is the process of securing new perspectives and ideas. Helaluddin et al. (2023) have concluded that creative thinking is a sophisticated mental process that involves a diverse range of activities, including making connections to previous experiences, comprehending new situations, arriving at new solutions, and yielding novel products. According to the points mentioned above, it is clear that creative thinking is also a systematic and intricate thinking or mental process. Other researchers claim that creative thinking is a mode or way of thinking that attempts to integrate various elements of the thinking process in a unique and novel way, which is processed and organized by the individual's brain to craft new ideas, perspectives, and things (Santi et al., 2019). In summary, creative thinking is extensively perceived as an ability, skill, or potential, as a thinking process, thinking procedure or mental process, and as a thinking mode or way of thinking, and the enriched meanings reflect the extensive use of creative thinking and the attention it has commanded.

Whether viewed as an ability, a thought process, or a mode of thinking, creative thinking is characterized by four essential features. According to Guilford (1975), creative thinking is characterized by four main features: fluency, flexibility, originality, and elaboration. Fluency, which indicates the smoothness of thinking, is measured by the quantity of ideas produced in a given period. The greater the number of ideas, the more fluid the thinking is. Flexibility, which refers to the variability of thinking, is gauged by the variety of ideas produced; a greater variety of ideas implies that the mind is able to jump between different kinds of ideas, associating as well as distinguishing between ideas. Originality, which refers to the novelty of the thinking, is assessed by the uniqueness of the ideas produced; the more different they are from those of others, and the more they have never appeared before, the higher the originality is. Elaboration refers to the meticulousness of thinking. The more detail you concentrate on, the better the elaboration.

In addition to this, It has been proven that creative thinking is divergent, i.e., it can output many different types of ideas (Adam & Mujib, 2020). Birgili (2015) has argued that creative thinking is open to varying perspectives and criticisms. It has been confirmed that creative thinking is characterized by sensitivity to problems and the ability to identify, analyze, synthesize, define, and solve problems (Sudirjo et al., 2023). In a nutshell, creative thinking is characterized by fluency, flexibility, originality, and elaboration, as well as divergence, openness, and sensitivity to problems. In the face of such a vast range of characteristics of creative thinking, only by understanding creative thinking in its essence can we grasp the goals to be achieved and the methods to be adopted in cultivating creative thinking.

Creative thinking is of the utmost strategic value as a vital problem-solving ability, a systematic process that provides accurate decisions, effective solutions, innovative perspectives, and a mode of thinking that solves fresh problems and creates novelties and is used extensively in practice to cope with global change (Hadzigeorgiou et al., 2012). Creative thinking should be prioritized as a development competency, especially in overcoming challenges (Gafour & Gafour, 2020). The cultivation of creative thinking has always been a topic of recollection. To improve students' creative thinking, scholars have used various ways and modes to explore enhancing and strengthening creative thinking. For example, from the

perspective of problem-solving, it is believed that problem-based learning (Buana & Astawan, 2020; Anjarwati et al., 2018) and creative problem-solving (Septian et al., 2020; Yayuk & As' ari, 2020) are two approaches that can effectively improve students' creative thinking skills; in addition to this, researchers have used a variety of specific methods to improve students' creative thinking in the practice of education and teaching. For instance, Halim and Syahrun (2020) indicate that jigsaw cooperative learning promotes students' creative thinking skills. Forte-Celaya et al. (2021) analyzed the effect of active learning strategies on developing students' creative thinking. In addition, worksheet-based learning (Krisdiana et al., 2019), project-based learning (Yamin et al., 2020), journal article writing (Senel & Bagçeci, 2019), instructing with brainstorming (Hidayanti et al., 2018), these approaches also have been used to strengthen students' creative thinking skills.

Within all these methods and strategies, problem-based learning is multiplying and enhancing students' creative thinking. It is employed widely to develop creative thinking with a notable effect. There is a profound relationship between thinking and problem-solving, with the development of thinking contributing to the efficiency of problem-solving and the process of problem-solving facilitating the systematization and refinement of thinking. Kusumawardhany et al. (2022) directly indicated that problem-based learning is intricately associated with creative thinking because it confronts students with authentic problems, puts them into unconventional situations, and pushes them to apply the knowledge and skills they have acquired in order to solve these problems, thus outputting new perspectives and ideas and enabling them to develop their creative thinking (Ananda & Azizah, 2016). PBL provides ample opportunities for self-directed learning, utilizing real-world problems to stimulate students to explore and address issues on their own and for students to increase creative thinking as they tackle new situations and problems (Srikan et al., 2021). At the same time, problem-based learning is conducive to the development of creative thinking skills as it promotes active participation in meaningful problem-solving, careful problem identification, problem analysis, and problem-solving at a high level of cognitive activity (Hidayati et al., 2019). In addition to this, the problem-based learning model provides a discovery space for students, guiding them to utilize their potential to discover and solve problems driven by interest and motivation, thereby boosting creative thinking (Selvy et al., 2020). Thus, problem-based learning can provide authentic problems so that students can promote the development of creative thinking in the process of discovering, analyzing, and settling problems. In order to investigate the effect of problem-based learning on the development of creative thinking, the characteristics of problem-based learning will be analyzed in the following.

PBL originated from McMaster University School of Medicine in Canada and is a learning model designed by the School of Medicine in 1970, which mainly uses real clinical cases for students to diagnose so as to improve students' clinical problem-solving ability, which is based on the problem, and stimulates students to use their communication skills, information processing skills, and problem-solving skills to independently and autonomously learn and deal with the problem (Ernawati et al., 2022). With the extensive use of PBL in the field of education, scholars have developed different opinions on its definition, which mainly contains two kinds, the first of which considers PBL as a learning mode or learning method, and the second of which considers PBL as a teaching strategy or teaching method.

When PBL is used as a learning model, Amrina et al. (2020) identify it as an effective learning strategy based on real-life problems, with the aim of upgrading creative thinking and enhancing problem-solving skills, and a series of knowledge acquisition, conceptual understanding, and problem-solving, is an efficacious learning strategy. At the same time, Purba et al. (2017) believe that PBL is a learning method that develops high-level inquiry and

thinking skills, which starts with authentic problems, focuses on knowledge construction, resolves problems through a complete step-by-step process, and enhances students' self-confidence and independence Susetyarini et al. (2022) are very confident that PBL is a discovery and problem-solving learning model that spurs students to use their existing knowledge and skills to locate answers to problems, thereby empowering their creative thinking and problem-solving skills. Some researchers are persuaded that PBL is an efficient learning method that employs authentic problems as the learning context, with the learning objectives of students' creative processing of information and practical problem solving, and with the eventual outcome of improving students' learning skills and performance (Ernawati et al., 2022). Therefore, PBL as a mode of learning is a miraculous method of learning that takes authentic, real, or life problems as a starting point and systematically addresses the problems faced through a series of knowledge, concepts, and skills, thus promoting problem-solving and creative thinking skills in students.

When PBL is considered an instructional strategy, some researchers point out that it is an instructional method with the primary purpose of problem-solving (Sulaiman, 2011). It is also a holistic approach to education that views the nature of learning as the active construction of new knowledge by the learner on the basis of what they already know; the main mission of PBL is to provide learners with opportunities to learn and understand theories of knowledge and develop cognitive abilities; it uses problems as triggers for students' self-directed learning, and group work and discussion as effective strategies for perfecting learning, and it is essentially about problem-solving to increase knowledge and understanding (Awang & Ramly, 2008). PBL is also recognized as a pedagogical approach that focuses on self-directed learning and teamwork, using problems as the entry point for knowledge acquisition and self-directed analysis and discussion and collaboration as the primary learning methods, with the firm belief that this series of procedures implicitly facilitates students' creative thinking and problem-solving skills (Srikan et al., 2021). PBL is also an innovative approach to education that is student-centered, places emphasis on stimulating students' intellectual curiosity through real-life problems, makes problem-solving the central task of teaching and learning, and makes critical thinking and creative thinking skills a crucial goal (Widiastuti et al., 2023). Therefore, PBL as a teaching strategy emphasizes student-centered methods, independent learning, teamwork, and problem-solving as the main purpose and the construction of student knowledge.

In summary, whether it is PBL as a learning model or PBL as a teaching method, realistic and authentic problems are its starting point, and students are its center. It takes knowledge construction and problem-solving as the ultimate goal and students' independent learning and teamwork as important learning strategies, which often enhance students' self-confidence and creative thinking skills.

Problem-solving is the starting point and central task of the PBL model. The process of problem-solving is crucial to the PBL model, and its procedures are mainly centered on problem-solving, which is generally regarded by researchers as consisting of five steps and is widely used in practice. Srikan et al. (2021) designed a 5-step process by applying the PBL model in a study to improve undergraduate students' creative thinking and digital media skills:(1) identifying the problem, (2) analyzing the problem, (3) researching the problem, (4) presenting the results, and (5) summarising and evaluating. Another researcher used the following five procedures in a study to analyze the impact of the use of the PBL model on high school students' creative thinking and problem-solving skills: (1) focusing on the problem and guiding students to become aware of the problem, (2) learning about the problem, so that students can learn about the characteristics of the problem, (3) independently researching and

investigating the problem to find a solution to it, (4) solving the problem and presenting the results in a presentation, (5) analyzing and evaluating the problem-solving process (Sihaloho et al., 2017). Wijayanto et al. (2023) identify the five steps necessary for the PBL model as (1) explaining the problem and describing the basics of the problem, (2) assigning students and assigning them to groups as appropriate, (3) guiding the students to conduct independent and group investigations, (4) presenting the results of the investigations and research, (5) evaluating and summarizing the problem-solving procedures. Some researchers add several steps depending on the specific situation and requirements of the study. For example, one researcher used six steps: (1) outlining the subject of the course, (2) posing a problem, (3) defining the problem, (4) exploring the problem, (5) solving the problem, and (6) reflecting on the problem-solving process (Sulaiman, 2011). Other researchers used seven steps: (1) accessing or identifying the problem, (2) finding the focus of the problem, (3) authoritative analysis of the problem, (4) individual research, (5) teamwork, (6) problem-solving, and (7) evaluating the summary (Amrina et al., 2020). In essence, the analysis shows that no matter how many steps researchers use, there are five necessary procedures that they use whenever they apply the PBL model to improve students' creative thinking: First, identifying the problem, focusing on the problem, and posing or providing the problem; second, learning, analyzing or understanding the basic characteristics of the problem; third, investigating the problem, i.e., beginning a systematic investigation of the problem to find a solution; fourth, solving the problem and presenting the results or findings, and fifth, summarizing and evaluating and evaluating the process of solving the problem. These steps are essential procedures for systematic problem-solving, which guide students to carry out problem-solving learning activities in a structured manner and provide a refined operating procedure for increasing students' creative thinking skills.

In studies on the use of the PBL model to improve students' creative thinking, many researchers have affirmed and illustrated the ability of the PBL model to polish students' creative thinking skills. However, these studies are scattered and sporadic in their illustration of the effectiveness of the PBL model in fostering creative thinking. However, there has been no comprehensive, systematic analysis of the effects of the PBL model on improving creative thinking, and there are even fewer comprehensive reports on the exact level of impact of the PBL model on creative thinking. The absence of this synthesis report has prevented the researcher from gaining an in-depth and comprehensive understanding of the role of the PBL model in developing creative thinking. It has also resulted in limitations in the practical use of PBL. Therefore, a systematic literature review on the effect size of the PBL model in improving creative thinking is essential, as it will propel the researcher to a new level of awareness and use of the PBL model and provide new insights and opportunities for developing creative thinking.

This study focuses on collecting relevant studies on the application of PBL to enhancing students' creative thinking and undertaking a meta-analysis of the effect size of PBL to enhance creative thinking based on a comprehensive and systematic calculation and analysis of the effect size of PBL. In order to achieve these objectives, the main issues addressed in this study are as follows:

- Does PBL have a more significant effectiveness in improving students' creative thinking than conventional methods?
- Do The educational stage, measuring method, teaching method, sample size, and subject make a difference in the effect size of PBL on improving students' creative thinking?

The first question primarily compares the effectiveness of PBL with conventional teaching methods in enhancing students' creative thinking and examines whether PBL has a more significant effect. Since a quasi-experimental approach dominates the primary literature collected in this paper, the experiment was designed with an experimental and control group, in which the experimental group was taught employing PBL as a treatment. In contrast, the control group was taught employing a traditional teaching method; hence, the dependent variable is students' creative thinking, which is generally measured by various tests of creative thinking, and the independent variable is the teaching method, which is categorized as PBL versus conventional teaching methods; Every single study calculated the effect size by comparing the data from the experimental and control groups and then applying a formula, where the effect size represents the magnitude of the effect, with a higher effect size indicating that PBL improves students' creative thinking more than the traditional method. However, the sample, subjects, etc., constrain the effect size of a single article. It is impossible to fully and comprehensively demonstrate the effects of PBL, so it is essential to collect a considerable amount of literature, enter each effect size collected into the meta-analysis software, and then analyze them to derive a composite effect size across multiple studies and their level of significance. The overall effect size is the weighted mean of the individual effect sizes, which illustrates the effectiveness and significance of PBL as a whole; therefore, as long as the overall effect size in the meta-analysis is high and significant, it demonstrates that PBL is more effective than traditional methods in promoting students' creative thinking.

The second question focuses on analyzing the effect of moderating variables on PBL to boost students' creative thinking, as each study is affected by a handful of factors with varying high and low effect sizes, in order to analyze the sources of these differences and using PBL more efficiently, the educational stage, methods of measurement, teaching methods, sample size, and subject are considered as moderating variables to interpret the variability between different studies, and to analyze the causes of this variability, so as to explore more deeply the effective ways and strategies of using PBL to improve creative thinking.

Method

Research design

This article will use a meta-analytical approach to investigate the effectiveness of applying the PBL model to improve students' creative thinking skills. Meta-analysis is a scientific quantitative research method. Two essential pre-requisites are crucial to the application of the approach: firstly, providing the effect size, which is the object of analysis of the meta-analysis, the researcher must either extract or adopt the data from the primary literature to calculate the effect size; secondly, evaluating the risk of bias, which is required for the conclusions of the meta-analysis to be correct and reliable, i.e., to test the magnitude of the risk of the primary literature being published and to eliminate the risky literature (Borenstein, 2021).

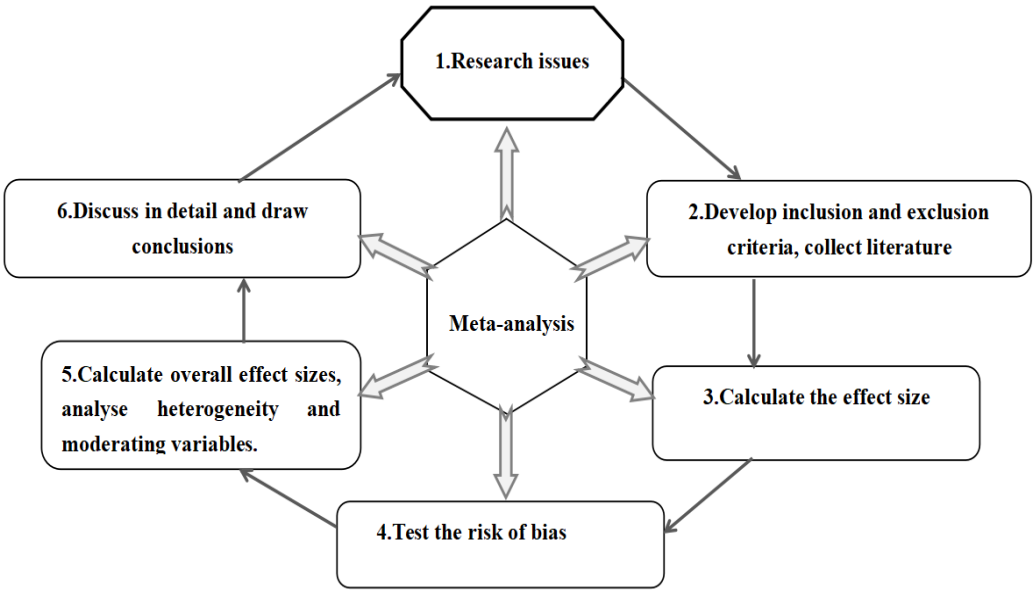

Figure 1: The Research Framework

To meet the above core prerequisites, this study designed a detailed and specific procedure for calculating effect sizes under a variety of studies such as t-tests, ANOVA, correlations, etc., utilizing four formulas; five risks of bias detection tests were also adopted to guarantee the accuracy of the research data. With this core prerequisite fulfilled, this study further designed a specific procedure for applying meta-analysis, firstly, to identify specific research issues and establish keywords to pinpoint the literature and secondly, to develop fine-grained inclusion and exclusion criteria to screen for literature that can provide effect size efficiently; Third, extract the mean, standard deviation, t-value, and correlation coefficient in the literature, and compute the effect size of each literature accurately by applying the formula; fourth, conduct the risk of bias test by using the CMA software, i.e., Funnel plot, Orwin's fail-safe N and other 5 tests based on the specific effect sizes; fifth, calculate the overall effect sizes, analyze the heterogeneity and moderating variables to determine the significance of the data; sixth, a detailed discussion and a succinct conclusion of the study(Asrizal et al ., 2023). According to this procedure, the research framework was designed for this study:

Develop inclusion and exclusion criteria and conduct data collection

This meta-analysis focuses on the effectiveness of utilizing the PBL model to develop students' creative thinking skills, with two research questions: Firstly, Does PBL have more significant effectiveness in improving students' creative thinking than conventional methods? Secondly, do The educational stage, measuring method, teaching method, sample size, and subject make a difference in the effect size of PBL in improving students' creative thinking? Concentrating on these two questions, the study will initially conduct a literature search. Using the keywords "problem-based learning, enhance or improve or develop, students, creative thinking skills or creativity," the study searched four databases, Web of Science, Scopus, Eric, and Google Scholar, and 76 relevant articles were found.

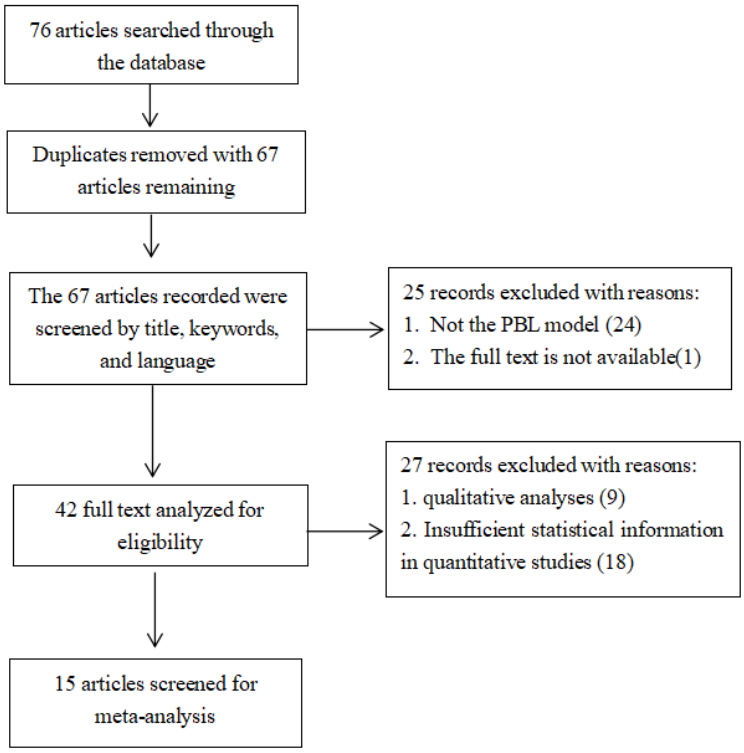

Figure 2: The Flow of Selecting Data Sources

This study uses the PICOS framework (Siagian et al., 2023) as the inclusion criteria for further screening of 76 articles, which can assist researchers in clarifying the inclusion criteria systematically and accurately. The specific screening criteria are as follows:： Population: students in primary schools and above; Intervention, the adoption of a problem-based learning model or a combination of such a model and other methods as a treatment; Comparison, a study that includes comparisons of experimental and control groups, or pre-tests and post-tests, or comparisons of the results of traditional methods with those of a problem-based learning model; Outcome, test scores with creative thinking in the results; Study design, the use of true experiments and quasi-experimental methods. On that basis, there are further criteria: 1. period: from 2013-2024; 2. articles written and published in English; 3. access to full text; 4. sufficient data for effect analysis, including mean, standard deviation, sample size, t-value, P-value, F-value, etc. Based on the inclusion criteria, the literature that reaches the criteria will be screened, and the specific sessions are as follows:

Analyzing the study sample

After screening the inclusion criteria, 15 articles were finally used as the data source for this study. In the meta-analysis, no explicit and specific rules and requirements regarding the amount of literature to be investigated. Based on the analysis of the literature employed by researchers over the years, most meta-analyses adopt between 10-60 articles of literature, which generally include both creative and critical thinking, while a single meta-analysis of creative thinking employs around 5 to 20 articles of literature (Asrizal et al ., 2023; Hikmah et al., 2023; Siagian et al ., 2023; Ramdani & Susilo, 2022). Thus, in a specific meta-analysis, the five separate works of literature on creative thinking are also amenable to meta-analysis, and the conclusions reached remain sound. This study is a meta-analysis specifically focusing on the application of PBL to enhance students ‘ creative thinking, and the number of literature is 15, which is within a reasonable range and appropriate for the application of meta-analysis.

These 15 documents are rigorously screened from 76 articles, that is, the most representative of all the literature that fulfills the conditions of the meta-analysis, and among them, 9 documents in the last 5 years cover the latest data and views on the application of PBL to enhance students' creative thinking. Therefore, the 15 original papers are sufficient to support the conclusions of this study.

The sample employed for meta-analysis in this paper is 15 articles, which were carefully selected to meet the inclusion and exclusion criteria of this paper fully. These 15 articles are across the period of 2013-2024, covering the last 10 years of major research data on the application of PBL to increase the creative thinking of students, and the research involves a wide range of subjects including biology, chemistry, economics, mathematics, physics, etc.; the number of students is large, up to 1009 students, including 531 male students accounting for 52.67%, 492 female students accounting for 47.33%, 25 students in primary school, 83 students in junior high school, 370 students in senior high school and 531 students in university.

Calculation of effect size

The effect size, as a measure of the strength of a phenomenon, is an important statistical concept regarding the effectiveness of a method; the larger the absolute value of the effect size, the more pronounced a phenomenon is, i.e., the more powerful the effect of a method. The effect size can be calculated as the standardized difference in mean between the experimental group and the control group, as the regression coefficient in a regression model, or as the degree of correlation between the two variables, which varies from study to study(Lakens, 2013). For example, some studies have employed Cohen's d, others Hedges' g, and others Eta Squared.

In practical research, the standard for measuring the strength and size of each effect size is inconsistent. In the meta-analysis, in order to compare the effect sizes of different studies, it is necessary to convert different types of effect sizes into the same effect size to analyze and compare them under a unified standard, and the unified effect size used in this study is Cohen's d. Therefore, this study needs to apply different formulas to calculate Cohen's d for each study, as follows:

$$d = \frac{\overline{X_1} - \overline{X_2}}{\sqrt{\frac{SD_1^2 + SD_2^2}{2}}} \quad (1)$$

$$d = t\sqrt{\frac{1}{n_1} + \frac{1}{n_2}} \quad (2)$$

$$d = \frac{2r}{\sqrt{1 - r^2}} \quad (3)$$

$$d = \frac{2\sqrt{\eta^2}}{\sqrt{(1-\eta^2)}}, \quad \eta^2 = \frac{F \times df_{effect}}{F \times df_{effect} + df_{error}} \quad (4)$$

In quasi-experiments, some studies provide the mean and standard deviation of the experimental and control groups, i.e., Cohen's *d* can be used to calculate the effect size through the mean and standard deviation as in formula 1, $\bar{x}_1$ and $\bar{x}_2$ indicate the mean of the two groups, and SD_1^2, SD_2^2 indicate the variance of the two groups, respectively; this formula implies that the difference between the means of the two groups is divided by the pooled standard deviation of the two groups, i.e. the difference between the standardized means. In some quasi-experiments, applying the t-test to test the significance of the mean between the experimental and control groups, then the *d* effect size can be calculated using the t-value and the sample size of the two groups, i.e., formula 2. Some studies focus on the correlation between PBL and students' creative thinking and provide r-values. The d-effect size can be calculated by applying the r-value according to formula 3. At the same time, other quasi-experiments use analysis of variance (ANOVA) or multivariate analysis of variance (MANOVA) and provide F-values. The F-value and the degrees of freedom between groups (k-1), as well as the degrees of freedom within groups (n-k), are calculated to yield the effect size Eta Squared, thus converting Eta Squared to a *d* effect size as in formula 4 (Fritz, 2012). When the effect sizes of all the studies have been transformed into Cohen's *d* by calculation, each effect size can be analyzed using the CMA software.

Table 1. Categories of effect sizes

Effect Size	Category
$0 \leq ES \leq 0.2$	Low
$0.2 \leq ES \leq 0.8$	Medium
$ES \geq 0.8$	High

(Suryono et al., 2023; Hikmah et al., 2023)

The process of data analysis started with an overall analysis, i.e., bias analysis was performed first to test the publication bias of the 15 articles, and articles at risk of bias were screened out, which was done to ensure the impartiality of the data source; Subsequently, the size and level of the combined effect size of these studies were evaluated and the choice of whether to adopt a fixed or random model was made based on the magnitude of the overall heterogeneity, a step taken to ensure the accuracy of the data from the meta-analysis. Secondly, the moderating variables are analyzed according to the magnitude of heterogeneity. This is to find out the causes for the differences or connections between the data to dig out the deeper meanings behind the data, and, finally, the results of the whole study are fully interpreted, explained, and illustrated, mainly through a detailed and thick explanation, to draw a convincing conclusion.

Test the risk of bias

Publication bias in meta-analyses is an important factor affecting the quality of the analysis; therefore, it was crucial to test the 15 papers for publication bias before formal analyses were initiated. This study will use CMA Ver. 3 for publication bias testing, which contains five tests: First, Funnel plot, as the most commonly used approach to evaluate publication bias, mainly evaluates the magnitude of bias by analyzing the uniformity and symmetry of literature distribution in the funnel plot; Second, Orwin's fail-safe N, which determines publication bias by calculating the number of literature that need to override the current effect size, i.e., when the value of Orwin's fail-safe N is greater than 5k+10 (k is the number of original literature,

which is 15), i.e., 85, it indicates that no publication bias has been observed (Siagian et al., 2023); Thirdly, Kendall's tau correction test ,and Egger's regression intercept test, these two tests determine the risk of bias by the significance of P-value, when *P*>0.05, all the studies do not have the publication bias; Finally, Duval and Tweedie's trim and fill, which focuses on publication bias by analysing the number of articles trimmed and filled, and the change in effect size after trimming (Aytaç & Kula, 2020).

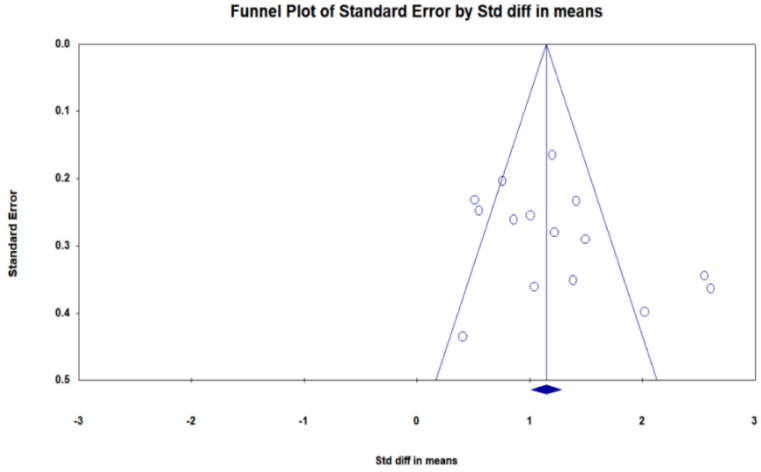

Figure 3：Funnel Plot of Students' Creative Thinking

Table2. Analysis of Publication Bias

Publication bias analysis	Result
Orwin's fail-safe N	
Z-value	16.95
Z for alpha	1.96
P-value	0.00
N	15
Number of missing studies that would bring P-value to>alpha	1109
Kendall's tau correction test	
Tua	0.31
Z-value	1.63
P-value(2-tailed)	0.10
Egger's regression intercept test	
Intercept	3.05
t-value	1.53
P-value(2-tailed)	0.15
Duval and Tweedie's trim and fill	
Q-value	62.22
Studies trimmed	0

From the funnel plot, it can be seen that 15 articles are mainly distributed in the middle of the funnel, more evenly distributed on both sides of the funnel, and most of the articles fall within the confidence intervals, indicating no publication bias in these articles. Orwin's fail-safe N calculates a value of 1109, and 1109 is much greater than 85, which suggests that 1109 more articles with opposite conclusions would be needed to make the effect size of the original literature zero, so there is no publication bias in these studies. The p-value of Kendall's tau correction test is 0.11; the p-value of Egger's regression intercept test is 0.14, and the p-value of both tests is greater than 0.05, indicating no publication bias in these articles. The results of Duval and Tweedie's trim and fill indicate that the number of articles to be trimmed and filled is zero, which suggests that no original studies have been excluded or need to be filled

in with new studies. In summary, the results of the above tests indicate that none of the 15 selected articles had publication bias, and further systematic analyses can be carried out.

Result

After publication bias analysis, 15 articles fully achieved the inclusion criteria. They were identified as data sources for analyzing the impact of problem-based learning on the development of creative thinking and, subsequently, the CMA Ver. Three software were used to analyze the effect size of the above literature at 95% confidence intervals: Standard error(SE), Variance(V), Lower limits (LL) and upper limits(UL), Z-Value, p-value, the effect size under the fixed and random effects models will be calculated as follows：

Table 3. Results of Effect Size Analyses for Primary Studies

Resource	*d*	SE	V	LL	UL	Z	*p*
Pamula et al., 2018	2.607	0.363	0.132	1.895	3.320	7.173	0.000
Helaluddin et al., 2023	2.552	0.345	0.119	1.876	3.228	7.399	0.000
Mariati et al., 2021	1.203	0.165	0.027	0.880	1.526	7.291	0.000
Siti et al., 2021	0.860	0.261	0.068	0.348	1.372	3.291	0.001
Dwi et al., 2023	0.759	0.204	0.042	0.360	1.159	3.723	0.000
Kani et al., 2018	1.387	0.351	0.123	0.699	2.076	3.949	0.000
Dwi et al., 2022	1.413	0.233	0.055	0.995	1.871	6.052	0.000
Indahet al., 2023	1.008	0.255	0.065	0.508	1.508	3.949	0.000
Farrah et al., 2020	0.515	0.232	0.054	0.060	0.970	2.220	0.026
Wartono et al., 2018	1.496	0.290	0.084	0.927	2.065	5.153	0.000
Te Sheng et al., 2022	1.042	0.361	0.130	0.334	1.750	2.885	0.004
Dianita et al., 2023	0.408	0.435	0.189	0.455	1.261	0.938	0.348
Esen et al., 2013	0.552	0.248	0.061	0.066	1.038	2.226	0.026
Roni et al., 2017	1.221	0.280	0.078	0.672	1.770	4.359	0.000
Jason et al.,2016	2.022	0.398	0.159	1.242	2.803	5.078	0.000
Fixed effect model	1.150	0.069	0.005	1.015	1.284	16.735	0.000
Random effect model	1.240	0.150	0.022	0.946	1.533	8.280	0.000

The overall effect size

As can be observed in Table 3, the composite effect size of the 15 articles is d=1.15 in the fixed model and d=1.24 in the random model, both of which have p-values less than 0.05, indicating that the problem-based learning method can significantly improve the level of student's creative thinking. Moreover, the combined effect size of PBL is high according to Cohen's d 's effect size criteria. Among them, the highest effect size d=2.607, p=0.000; the lowest effect size d=0.408, p=0.348; out of all the primary literature, only the effect size of the study of Dianita et al.(2023) was not significant, the results of the other 14 literature on the use of Problem-Based Learning to empower students' Creative Thinking were significantly effective. Subsequently, the Heterogeneity Test will be conducted, which is mainly used to test the heterogeneity of the effect sizes of the 15 articles. If the heterogeneity is significant, the meta-analysis will be performed using the random effects model, and vice versa using the fixed effects model (Suryono et al., 2023), and the results of the Heterogeneity Test are shown in Table 4.

The heterogeneity test

Table 4. Results for the Heterogeneity Test

Q-value	df(Q)	*P*	I^2
62.216	14	0.000	77.498

After the Heterogeneity Test, it can be seen that the Q-value is 62.216, P<0.05, the heterogeneity is significant; in addition, I^2 is used to measure the magnitude of heterogeneity

of the effect size when it is less than 25 percent, it indicates that the heterogeneity is low, when between 25 percent and 75 percent, it indicates that the heterogeneity is medium, and when greater than 75 percent, it indicates that the heterogeneity is high (Aytaç & Kula, 2020). In this analysis, I^2 =77.498 is greater than 75%, which suggests that the heterogeneity of the effect sizes of the 15 articles is large, so this meta-analysis chose a random effects model with a mean effect size of 1.24. However, because of the large heterogeneity of all the articles, this paper is followed by a moderating variable analysis, i.e., subgroup analysis. In meta-analyses related to the development of the human mind, some researchers have used the subject learning and education stages as moderating variables (Hikmah et al., 2023). Some researchers incorporated sample size as a moderating variable 、 Other researchers have applied measurement and teaching methods as moderating variables (Abrami et al., 2008). Considering previous research, educational stage, measurement method, teaching method, sample size, and subject type will be used as moderating variables for the heterogeneity test of the meta-analysis to analyze the sources of heterogeneity. The following figure presents the heterogeneity test results for each moderating variable (subgroup).

Table 5: Heterogeneity Test results for each subgroup

Groups	Q-value	df(Q)	*P*
Education stage	13.096	3	0.004
Measuring method	1.891	3	0.595
Teaching method	1.867	1	0.172
Sample size	0.485	1	0.486
Subject	37.299	9	0.000

In the heterogeneity test, heterogeneity is not significant when the p-value is greater than 0.05; when the p-value is less than 0.05, heterogeneity is significant. From the results of the heterogeneity analyses of the moderator variables in the figure, it can be seen that the p-values for the measurement method (Q=1.891, *p*=0.595), teaching method (Q=1.867, *p*=0.172), and sample size (Q=0.485; *p*=0.486) are greater than 0.1, and the heterogeneity is not significant. This suggests that the adoption of different ways of testing creative thinking or creativity, the use of problem-based learning, or the combination of the PBL model with Computer Simulation, project-oriented approach scaffolding, brainstorming, and experiential learning methods to teach creative thinking or the size of the experimental sample had no significant effect on the heterogeneity of the effects of creative thinking skills. The p-value was less than 0.1 for the experimental subject (Q=37.299, *p*=0.000) and education stage (Q=13.096, *p*=0.004), indicating significant heterogeneity, thus requiring detailed analyses of these moderating variables.

The analysis of moderating variables

CTST： Questions to test creative thinking skills, set according to the essence of creative thinking； ET： essay test； MT： multiple tests， Observations, questionnaires, interviews, creative thinking indicators； TTCT： Torrance Test of Creative Thinking； PBL: Problem-based learning; PBL+： Problem-based learning integrated with other teaching methods.

Table 6. Results of Effect Size Analyses for Subgroups

Groups	Effect size and 95% confidence interval						Test of null (2-tail)	
	N	*d*	SE	V	LL	UL	Z	*P*
Education stage								
Elementary	1	0.359	0.421	0.177	0.430	1.220	0.938	0.348
Junior high school	1	0.510	0.230	0.053	0.060	0.961	2.220	0.026
Senior high school	6	1.509	0.209	0.044	1.100	1.918	7.233	0.000
University	7	1.179	0.225	0.050	0.738	1.619	5.248	0.000
Measuring tool								
CTST	3	1.607	0.475	0.226	0.675	2.539	3.380	0.001
ET	4	0.984	0.167	0.028	0.657	1.311	5.899	0.000
MT	4	1.273	0.400	0.160	0.490	2.057	3.186	0.001
TTCT	4	1.188	0.313	0.098	0.575	1.802	3.798	0.000
Teaching method								
PBL	9	1.414	0.252	0.064	0.920	1.908	5.611	0.000
PBL+	6	1.030	0.125	0.016	0.785	1.275	8.233	0.000
Sample size								
Less than 30	2	0.910	0.485	0.235	0.040	1.860	1.877	0.000
More than 30	12	1.265	0.160	0.026	0.952	1.579	7.918	0.000
Subject								
Biology	1	1.993	0.329	0.154	1.224	2.762	5.078	0.000
Chemical	2	1.069	0.324	0.105	0.433	1.705	3.296	0.001
Economic	1	2.519	0.341	0.116	1.852	3.187	7.399	0.000
Environment	2	1.764	0.786	0.618	0.223	3.305	2.244	0.025
Inter-discipline	1	1.022	0.354	0.126	0.328	1.717	2.885	0.004
Mathematics	2	0.660	0.172	0.029	0.324	0.997	3.847	0.000
Physics	2	1.339	0.199	0.040	0.948	1.730	6.714	0.000
Science	2	0.889	0.390	0.152	0.126	1.653	2.283	0.022
Statistics	1	0.546	0.245	0.060	0.065	1.027	2.226	0.026
Visual arts	1	1.336	0.346	0.120	0.688	2.044	3.949	0.000

Firstly, in terms of education stage, there are four education stages in this study: primary school, junior high school, senior high school and university, among which the effect size of senior high school is the largest（*d*=1,509，*p*=0.00）, next is university（*d*=1,179, *p=0.00*）, both are high effect sizes； The second is junior high school (*d*=0.510, *p*=0.026), elementary (*d*=0.395, *p*=0.348), both of them belong to the medium effect size, but much lower than that of senior higher school and university, in which the p-value of elementary is greater than 0.05, indicating that compared with other stages of education, the PBL model is not significant for the development of creative thinking in primary school students, but has a great effect on the development of creative thinking in high school and university students.

In terms of subject, this study contains ten types of courses, which are diverse, with the largest effect size being economic (*d*=2.519, *p*=0.000). The other courses with high effect sizes being biology (*d*=1.993, *p*=0.000), environmental education (*d*=1.764, *p*=0.025), visual arts (*d*=1.366, *p*=0.000), physics (*d*=1.339, *p*=0.000), chemical (*d*=1.069, *p*=0.001), Inter-discipline (*d*=1.022, *p*=0.000), science (*d*=0.889, *p*=0.022). This suggests that using PBL teaching methods in these courses can significantly improve students' creative thinking. Mathematics (*d*=0.660, *p*=0.000) and statistics (*d*=0.546, *p*=0.026) belong to the medium effect size; compared to the previous types of courses, the effect of PBL in mathematics as well as in statistics to improve the creative thinking of the students is not as prominent. However, the effect is still significant as the p-value is less than 0.05. In summary, the heterogeneity of this study is not related to the way the data from each study were tested, the method of teaching, or the sample size, but it is mainly influenced by the stage of education and the courses taught.

Discussion

Effectiveness of PBL compared to traditional methods in developing students' creative thinking

This study found a statistically significant effect of problem-based learning on students' creative thinking development through a comprehensive analysis of 15 articles using the random effects model (d=1.24, p<0.05). According to Cohen's (1988) criteria, the overall effect size is of a high category, which shows that problem-based learning is more excellent for developing creative thinking in students than the conventional methods the control group employs. This finding is in line with the findings of other researchers. Some studies confirm that PBL is an effective learning method that pushes students to learn through authentic problems that increase innovation and creativity in learning and can significantly enhance students' creative thinking than traditional methods, which directly instill knowledge instead of providing real problems (Simanjuntak et al., 2021; Amrina et al., 2020). Through a survey study of teachers, Widiastuti et al. (2023) noted that teachers recognized PBL as an effective teaching method to enhance creative thinking. The PBL model promotes students' active participation in authentic problem solving, playing the role of creative scientists throughout the process, actively discussing with the teacher, seriously participating in group work, enthusiastically exchanging ideas with fellow students, bravely expressing their ideas, and solving problems through joint efforts, so that the student's creative thinking ability can be rapidly improved (Wartono et al., 2018; Zulkarnaen et al., 2022; Anisaroh et al., 2018). The PBL model is a student-centered learning model that strengthens students' confidence in learning, improves student initiative, promotes active voice, and facilitates creative thinking; in contrast, in traditional teaching, students' learning is mainly arranged and designed by teachers, and their autonomy and motivation are inhibited, which is not conducive to the development of students' creative thinking(Hasanah et al., 2023; Purba, 2021; Anazifa, 2017). Eny et al. (2018) consider PBL a form of innovative learning that uses teamwork to systematically optimize students' creative thinking skills, pushing them to hone and empower their fluency, sensitivity, flexibility, elaboration, and originality of thinking in problem-solving. It can be concluded that problem-based learning is both an effective learning method and an efficient teaching method because it focuses on authentic problems, provides students with a wide space for discovery, allows students to assume the role of creators, resides at the center of the whole learning process, and actively participates in meaningful problem solving while employing systematic techniques for identifying, defining, analyzing, designing, implementing and evaluating the problem-solving process, and emphasizes teamwork, so it can enhance self-confidence and promote the development of creative thinking. The process of problem-solving and teamwork are valued, so it can improve self-confidence and promote the development of creative thinking.

The effect of educational stage, subjects on the effectiveness of PBL in improving students' creative thinking

Another finding of this study is that the stage of education and the subject significantly affect the improvement of creative thinking by PBL. An analysis of heterogeneity immediately followed the meta-analysis of the overall effect sizes of the 15 articles, and it was found that the heterogeneity of the effect sizes of these 15 articles was very significant (Q=62.216, p<0.1, I^2=77.4980) and came mainly from the stage of education and the type of subject.

Analyzed in terms of education stage, PBL is more suitable for use to improve the creative thinking of students at the high school and university levels, and this conclusion is based on the findings of other researchers. In a study on improving university students' classical 4C (communication skills, collaboration, critical thinking, and creative thinking) skills, Susetyarini et al. (2022) confirm that using PBL can improve university students' creative thinking skills. Srikan et al. (2021) employed PBL in a constructivist learning environment to improve the creative thinking of university students. They concluded that the method efficiently improved the creative thinking of Thai university students because of its explicit learning steps and well-designed learning environment, which were conducive to enhancing their creativity. The study of Hasanah et al. (2023) demonstrated that using PBL assisted by video animation can significantly improve the creative thinking of high school students because this method helps high school students form specific learning goals and motivates them to participate in their academic endeavors actively. The research of Eny et al. (2018) showed that PBL was able to significantly boost students' creative thinking in a plastic waste disposal course for high school students.

For students in the lower grades, especially those in primary schools and below, the data from the Dianita et al. (2023) study on creative thinking in the primary school science curriculum screened for this study showed no significant effect of PBL. In a review study, Wijayanto et al. (2023) indicated that many studies have evidenced that PBL can be used to improve students' creative thinking and suggested that PBL can also be utilized with children as young as 5 years of age but did not adequately demonstrate whether the effect was significant or not. However, in a meta-analysis of the application of other methods to improve creative thinking, there were different conclusions. Aytaç and Kula (2020) examine the adoption of a student-centered approach to improving students' creative thinking, and the study's conclusions show that preschool students are best suited to using a student-centered approach to increase creative thinking. A meta-analysis of the application of project-based learning to improve student's critical and creative thinking found that the effect sizes of students' creative thinking tended to decrease from primary to university level, with a high effect size of 2.808 at the primary level, which was the most effective (Hikmah et al., 2023). It is evident that PBL, as an effective method to improve creative thinking with explicit steps, specific objectives, and subtle design, significantly affects the creative thinking of students above the high school level. However, PBL is ineffective in improving primary school students' creative thinking skills. However, a student-centered or project-based learning approach is the desirable pathway that should be implemented and investigated.

In terms of subjects, the study covers 11 types of courses, including a variety of courses ranging from primary school to university. As a systematic, well-developed, and effective model of teaching and learning, PBL is highly valued and esteemed by experts, scholars, and front-line teachers. The application of PBL has spread to all stages of schooling, covering subjects such as math, physics, biology and chemistry, pedagogy, and statistics in higher education. The effectiveness of PBL on the development of creative thinking in different subjects is quite variable; it has the most significant effect on the development of creative thinking in economics, with high effect sizes for the development of creative thinking in biology, environmental education, visual arts, physics, science, chemistry, and interdisciplinary subjects. In a study on improving students' higher-order thinking skills in microeconomics using PBL, Kurniawati (2019) noted that PBL improves students' creative thinking skills. Susetyarini et al. (2022) indicated that PBL effectively improves creative thinking among university students through a study of learning in biology courses. The research of Satriawan et al. (2020) has revealed that the use of scenario-based PBL

enhances students' creativity in physics; the increase in creative thinking in mathematics and statistics is of medium effect size. A comparative study by Ratnaningsih (2017) found that PBL was more powerful in improving students' mathematical creativity than discovery learning, suggesting that PBL can be more effective in improving students' mathematical creativity. In summary, the possibility that PBL might be utilized for the improvement of creative thinking skills in such numerous disciplines suggests that PBL possesses a very wide range of disciplinary adaptability and enables the stimulation of students' creative interests and the enhancement of their creative thinking in the context of different disciplinary knowledge systems, which is ample proof of its powerful practicality and applicability.

The effect of measurement instrument, teaching method, and sample size on the effectiveness of PBL in improving students' creative thinking

It was also found that the adoption of different measurement tools, teaching methods, and sample sizes did not affect the effectiveness of PBL on creative thinking enhancement, and the reasons for this are explored in detail in this paper. Firstly, before the commencement of the test, the researchers need to verify the Clonbach Coefficients of the test instruments. When the coefficient value is greater than 0.79, it proves that these instruments have the credibility to be utilized for the test of creative thinking (Anjarwati et al., 2018; Creswell, 2017). A total of four measurement instruments (essay test, creative thinking indicators, Torrance test, and combination of multiple testing methods) were used in the 15 articles in this meta-analysis, and all four instruments passed the pre-use reliability test, so the students' creative thinking scores tested with them were highly reliable. In the 15 source papers, the effect size of creative thinking measured by the four tools is greater than 0.8, which is consistent with the overall effect size, so the measurement tools that passed the reliability test will not affect the experimental effect, i.e., no matter which measurement tool is used, the true effect size of using PBL can be tested with a scientific reliability test.

Secondly, regarding the effect of teaching methods on improving students' creative thinking, the findings of the heterogeneous analyses showed that the application of a single teaching method under PBL (d=1.414, p=0.000) or the combination of PBL with other methods (d=1.030, p=0.000) such as brainstorming, scaffolding, etc., yielded high effect sizes and the difference between the two was not significant. However, in the analysis of the reports of individual studies, it was found that the use of PBL in combination with computer simulation was more effective than PBL alone and conventional teaching methods in the study of Simanjuntak et al. (2021). The reason for this is that the combination of PBL and computer simulation is more advantageous because it promotes a greater focus on the problem-solving process, the development of creative thinking in the problem-solving process, and an understanding of the relationship between the theory and the observed phenomena. A combination of PBL and scaffolding was used in the research of Ernawati et al. (2023), and the conclusions of the study showed that this approach significantly improved students' creative thinking in biochemistry courses; he also agrees that PBL alone can improve students' creative thinking, but that scaffolding as an adjunct to PBL in biochemistry provides students with an interesting learning environment, timely feedback, and incentives to ask questions and express their opinions. Praminingsih et al. (2023) illustrated in their study that the use of PBL combined with brainstorming was more effective than traditional methods in improving students' creative thinking with respect to environmentally changing materials. Still, it was not obvious that this method was necessarily better than PBL alone. Chang et al. (2022) used project-oriented, problem-based learning to improve creative thinking in learning interactive disciplines among college students and reported significant results. Dianita et al. (2023)

applied a combination of PBL and experiential learning to foster creative thinking in elementary school children's science courses, and the study results showed that this approach was very productive. The findings of these individual studies suggest that PBL, in combination with other teaching methods, can also significantly improve students' creative thinking. However, there is no particularly significant difference in the effectiveness of PBL alone versus a combination of PBL methods. However, combining PBL with other methods is also a highly recommended approach for the discipline or research design requirements.

The third aspect is the sample size; in this study, the sample size was divided into two groups with a cut-off of 30, and the results of the heterogeneous analyses showed that the size of the sample did not have a significant effect on the effect size. However, most studies used samples greater than or equal to 30. Siagian et al. (2023), meta-analysis on the application of the collaborative learning model to improve students' creative thinking, states that whether the sample is greater than or equal to 30 or less than 30, the effect of the PBL model on students' creative thinking is significant. There is no obvious difference, so the sample size does not affect the significance of the final effect size.

To sum up, the effectiveness of PBL is not affected by the measurement tools, single or mixed teaching methods, and the size of the sample, which shows that PBL is a systematic, mature, and refined method as long as the implementation procedures of PBL are strictly followed, following the purpose of PBL, i.e., taking the real problem as the starting point, focusing on the students, adopting the cooperation as the method, and aiming at the knowledge construction problem-solving. Meanwhile, teachers fully utilize their role as facilitators and different measurement tools will measure the real effectiveness of PBL, disparate methods will show the actual effect of PBL, and differing sample sizes will reflect the effectiveness of PBL.

Conclusion

Through a meta-analysis of the application of PBL to improve students' creative thinking skills, the main conclusion of this article is that PBL can significantly improve students' creative thinking. The intensive analyses and discussions found that PBL is more conducive to developing creative thinking in high school and university-level students, and comparatively speaking, PBL is not as effective for elementary-level students. PBL can be effective in various subjects and is particularly effective in enhancing students' creative thinking in economics courses and fostering creative thinking in biology, environmental education, visual arts, physics, science, chemistry, and interdisciplinary subjects. There were no significant differences in the use of various measurement tools, teaching methods, and samples in the study for PBL to enhance students' creative thinking, all of which were high-ranked effect sizes. However, combining PBL with other effective teaching methods is a new tendency to promote PBL to improve creative thinking, providing a new approach to promoting PBL.

Recommendation

In order to maximize the effect of PBL, teachers must adopt real-life, authentic problems in teaching, i.e., important problems that exist or are about to emerge in students' daily lives, rather than directly appropriating problems from books. Secondly, attention is paid to integrating students into the problem scenario so that they can identify the problem as a real

problem they have to face rather than an assigned task so that students will realize the importance and relevance of problem-solving and will devote themselves to problem-solving so that they can accumulate knowledge of future life, gather experience in the form of judgment, and formulate ideas to deal with the problem through the problem solving so that they can learn to be dictatorial and develop creative thinking.

In applying PBL to improve students' creative thinking, it is important to put student-centeredness at the center of the process and implement it effectively. In order to achieve this, teachers should first be aware that students can learn independently and co-operatively, and they should take the initiative to provide students with sufficient learning space and cooperation opportunities so that they can take the initiative to identify and solve problems, construct knowledge, and exercise their thinking. Secondly, teachers should be clear about their role in this model. Student-centered learning does not mean that teachers should give up their authority and let students alone, but that they should play a more comprehensive and responsible role as guides, for example, by posing real and interesting questions, organizing structured groupings, providing guidance on difficult problems and conducting fair and impartial evaluations.

This study discovered that PBL has no obvious effect on improving students' creative thinking in primary school. The effect size belongs to the medium level, which is mainly attributed to the fact that there is less related research. It is impossible to conduct a comprehensive and in-depth study. It does not mean that PBL does not affect primary school students at all; as long as more scholars and primary school teachers adopt PBL, dig deeper to solve problems in teaching, and adjust the teaching strategies continuously, the effect of PBL on primary school students will be enhanced. At the same time, other teaching methods, such as student-centered or project-based approaches, should be applied to explore strategies to improve the creative thinking of primary school students to provide more effective approaches for the development of creative thinking at the primary school level.

The findings of the study also reveal that PBL is moderately effective in improving creative thinking at the middle school level and more effective at the high school and university level, and that it can be applied in small classrooms with fewer than 30 students and in large classrooms with more than 30 students or even more students with no change in effectiveness; Neither single nor blended approaches to teaching and various measurement methods affect the effectiveness of PBL, plus its broad subject adaptability to subjects such as economics, biology, chemistry, etc.; therefore, when selecting a method to increase the creative thinking of students in middle school and beyond, teachers can confidently choose PBL; in addition, apart from single PBL, trying to combine brainstorming, scaffolding, project-oriented learning, computer simulation and experiential learning with PBL can also increase students' creative thinking, and mixed or varied methods are more adaptable to different abilities and personalities, so the employment of mixed PBL can also improve students' creative thinking. Adopting mixed PBL is also an innovative way to open up new paths for in-depth study of the development of creative thinking.

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DO YOU REALLY WANT TO LEARN? THE MOTIVATING REASONS BEHIND INDIVIDUAL'S SWITCHING BEHAVIOUR ON NONFORMAL EDUCATION PLATFORM BASED ON PUSH-PULL-MOORING FRAMEWORK

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ABSTRACT

While the online learning industry has a positive growth rate, the completion rate has remained low in recent years. Previous studies have examined the influence of the push-pull-mooring effect on individuals' intentions to switch to non-formal educational platforms. Since financial and usability factors had been overlooked, this study added perceived price and perceived usefulness factors. Based on the push-pull-mooring framework, the study aimed to explore the drivers of users' intentions to switch for performance on non-formal education platforms. Data were gathered through an online survey of 370 respondents. Covariance-based structural equation modeling (CB-SEM) was used to analyze the data. The study's results showed an indirect influence of perceived price and perceived usefulness factors on individuals' switching intentions. By understanding the driving reasons behind the intention to switch to non-formal education platforms, the research was expected to assist education platform providers in developing platform services aligned with user needs.

Keywords: non-formal education, learning platform, switching behavior, online education, platform switching

Introduction

Online education platforms are becoming increasingly popular in Indonesian society. In 2022, the online education industry in Indonesia recorded revenue from in-app purchases of $4.87 million. This figure increased to $5.27 million in 2023 and is projected to reach $5.67 million in 2024. In terms of total downloads of education platforms, there were 125.2 million downloads in 2023, and it is estimated to increase to 137.9 million downloads in 2024 (Statista, 2022). The continuous increase in demand each year reflects the population's preference for digital learning methods. This trend is also supported by the push for professional skills development, leading to an increase in language learning and professional and vocational education platforms.

In the Statista report (2022), online education in Indonesia indicates that a total of 81.58 million hours were spent on learning management, 38.49 million hours on language learning platforms, and 12.19 million hours on professional education platforms. The i360 Report (2020) found that the most extensive segmentation in the online education industry in Indonesia is the MOOC (Massive Open Online Course) segment and the marketplace segment. The MOOC segment provides courses that offer learning services accessible to many students simultaneously. MOOCs use learning management systems (LMS) to distribute learning materials. Some well-known LMS platforms are EdX, Canvas, Coursera, and Udacity.

Meanwhile, the marketplace segment, similar to the concept of e-commerce, bridges educators and students. The marketplace segment provides services such as tutoring centers, language schools, and private tutors. One example of a marketplace segment platform is Ruang Guru and Cakap. These two segments are the largest in Indonesia because they can meet students' specific needs and preferences. An example of the Ruang Guru platform is that it allows students to find teachers who suit their learning needs.

Despite the significant potential indicated by the increasing market size of the online education industry and the government's support through the integration of the two tracks, there does not seem to be an increase in the desire to learn. Research conducted by Hollands et al. (2018) at Columbia University, studying the EdX and Coursera platforms, shows a completion rate of only 15% of the courses followed. This figure has remained low for the past 4 years. Research by Reich (2014) at Harvard University states that only 22% of students intend to complete courses and obtain certificates. Considering the very low completion rate of education platforms, an interesting phenomenon occurs where the revenue obtained by the online education industry comes from students who do not complete the courses they purchase.

This phenomenon has drawn the attention of researchers, as the low completion rate contrasts with the increasing performance of the online education industry year after year. Researchers employed the Push-Pull Mooring Framework to understand the phenomenon of high switching intention to online platforms despite the low completion rate. The intention to

switch or switch behavior can be explained through the Push-Pull Mooring Framework (Lin et al., 2021). This framework was first proposed by Everett Lee in 1966 in migration theory and further developed by Rogers in 1983 in the diffusion of innovation theory (DOI). The Push-Pull-Mooring theory provides a robust foundation for understanding the dynamics of individual decisions in transitioning to online education (Chen & Keng, 2019). It emerges as a relevant conceptual framework for understanding the dynamics behind learners' decisions to switch to educational platforms (Lin et al., 2021). Push, pull, and mooring factors are interrelated and can provide deep insights into learners' choices regarding non-formal education platforms. The behavior of online user switching and population migration share similar characteristics, involving movement from one place to another. Therefore, the Push-Pull-Mooring (PPM) theory can be used to understand better user switching behavior (Hou et al., 2011).

Previous research conducted by Nayak et al. (2022) used DOI theory as a basis to explain why students switch to online education. This study used a combination of extended TAM and DOI theory. This is based on research conducted by Al-Rahmi et al. (2019), which also explains behavioral intention (BI) in online education using extended TAM and DOI theory. However, in this study that uses extended TAM, the perceived usefulness variable, which is the main component of TAM, was not included. This study also did not include economic factors in the PPM framework. Economic factors such as perceived price are important variables that can motivate students to switch. Offline course students have experienced physical learning. Suppose the learning level is not adjusted, and the quality remains constant or similar to that of other courses. In that case, students will be more inclined to focus on minimizing price (Garbarino & Maxwell, 2010), which will motivate them to seek better course prices. Research conducted by Chen and Keng (2019) showed that perceived price and usefulness play a significant role in motivating students to switch. Considering this, the researcher tried to provide a new understanding by adding two variables: perceived price and perceived usefulness to the PPM framework.

Aims

This study aimed to understand the factors contributing to the low completion rates of online courses in Indonesia despite the substantial growth in user engagement and industry revenue. It sought to uncover the reasons behind the discrepancy between the high number of enrollments and the relatively low percentage of students who finish their courses. By exploring both the motivations and barriers faced by users, the study aspired to provide a deeper understanding of user behavior within the context of online education. Ultimately, the research aimed to generate actionable insights that can improve course design, delivery, and support mechanisms, enhancing the effectiveness and appeal of online education platforms in Indonesia.

Purpose

This study aimed to analyze why users switch to online education platforms and identify the factors contributing to low course completion rates. By employing the push-pull-mooring (PPM) framework, the study systematically investigated the elements that influence users'

decisions to engage with and persist in online learning environments. It sought to understand the motivations that drive individuals toward online education as well as the specific challenges they face that hinder course completion. The findings informed the development of user-centered strategies that enhance the online learning experience and improve outcomes for users in Indonesia.

Objectives

The study's objectives were threefold. First, it aimed to identify the push factors that drive users to transition to online education platforms, revealing the reasons that compel individuals to engage with these learning environments. Second, it sought to evaluate the pull factors that make online platforms attractive, highlighting the features and benefits that encourage users to choose and remain on these platforms. Third, the study investigated the mooring factors that influence users' decisions to complete or abandon their courses, examining social support, intrinsic motivation, and external commitments. By addressing these objectives, the research aimed to provide insights that can help online education providers better support their users and achieve higher completion rates.

Literature review

Push, pull, and mooring framework

The Push-Pull-Mooring (PPM) framework, stemming from migration theory pioneered by Everett Lee in 1966, elucidates individual adoption decisions concerning innovations, services, or products. Lee introduced the concept to explain migration patterns, defining migration as a change of residence driven by push, pull, and mooring factors. Push factors impel individuals to leave their origin, pull factors attract them to a destination, and mooring factors anchor them despite push-pull dynamics. Rogers (1983) further developed the framework within the Diffusion of Innovation theory, categorizing factors into push (motivations for change), pull (advantages of the innovation), and mooring (emotional ties to the origin). This framework offers insights into understanding user switching behavior online, akin to population migration, emphasizing the interplay of motivations, benefits, and emotional connections in decision-making (Hou et al., 2011). User switching behavior online and population migration share similar characteristics, involving movement from one place to another. Therefore, the Push-Pull-Mooring (PPM) framework can be used to understand better user switching behavior (Hou et al., 2011).

Push factors

In the context of the push-pull mooring framework, "push" refers to external factors that drive or influence an individual or organization to behave or take certain actions (Rogers, 1983). The push effect pertains to negative factors that urge people to leave their origin (Coast et al., 1998).

Platform knowledge scope

Platform knowledge scope (PKS) is crucial for understanding the effectiveness and efficiency of learning in online courses (Cheng et al., 2019). PKS encompasses three variables: the

effectiveness and efficiency of learning, the development of new teaching models, and individuals' progress and personal development (Alhumaid et al., 2020; Crawford et al., n.d.; Teräs et al., 2020). Nayak et al. (2022) define these three components as platform knowledge scope.

Experts and educators have leveraged online education platforms extensively as a teaching medium (Deming et al., n.d.). Technological advancements in educational platforms facilitate user transition between products with similar functions (Xu et al., 2021). Consequently, online education platforms provide the technological framework for conducting online courses and support educational institutions in designing, producing, and delivering these courses (Chirikov et al., 2020). These platforms are promising for individuals looking to enhance their skills and performance (Nayak et al., 2022). Nayak et al. (2022) argue that online education boosts individuals' decision-making confidence by aiding their learning process.

The flexibility in developing new learning models and relevant materials is a key strength of online platforms (Nayak et al., 2022). Online education platforms offer opportunities for individuals to improve their skills and performance. Schunk and Zimmerman (1994) state that individuals motivated by relevant learning materials are more driven to learn. Research by Xu et al. (2021) indicates that individuals are inclined to switch to and commit to online education that enhances their knowledge, skills, and performance. The development of materials and learning models is thus a significant factor for such a transition and commitment to online education. Therefore, it can be assumed:

- H1: Platform knowledge scope (PKS) positively influences decision self-efficacy (DSE)
- H2: Platform knowledge scope (PKS) positively influences motivation & intention for switching (MIS)
- H3: Platform knowledge scope (PKS) positively influences switching behavior for performance (SBP)

Perceived price

Perceived price (PP) is a crucial concept in consumer behavior, referring to individuals' perception of the value or sacrifice associated with a product or service rather than the actual listed price (Phan Tan & Le, 2023). Beneke and Zimmerman (2014) distinguish between the actual product price and the price perceived by buyers, emphasizing that consumers tend to interpret prices in personally meaningful ways. This subjective perception often holds more weight than the actual price, as consumers can perceive the same price differently depending on their unique contexts and experiences.

In this study, price perception encompasses monetary costs and perceived sacrifices such as time, effort, search, or psychic costs. Consumers who value their time and effort are susceptible to these sacrifices, significantly influencing their price perception (Yu et al., 2011). For individuals accustomed to physical learning in offline courses, maintaining similar quality levels while minimizing perceived sacrifices can motivate them to seek better-priced courses (Garbarino & Maxwell, 2010). Moreover, high perceived prices can lead customers

to switch to other service providers that better align with their quality and price expectations (Xu et al., 2021). Thus, understanding perceived price is essential for anticipating consumer behavior and switching intentions in the context of online education. Considering this, it can be assumed:

- H4: Perceived price (PP) negatively influences motivation & intention for switching (MIS)
- H5: Perceived price (PP) negatively influences switching behavior for performance (SBP)

Pull factors

The primary pull factor involves influencing individuals to switch from one place to another (Lee, 1966). It drives the intention to switch, emerging when the provided platform or service is more satisfying (Tang & Chen, 2020; Xu et al., 2021). Similarly, from a service perspective, higher service quality generates a stronger pull effect, urging consumers to switch to new services (Keaveney, 1995).

Alternate media attractiveness

Nayak et al. (2022) define alternate media attractiveness (AMA) as the increasing interest of individuals in switching to educational platforms, driven by their preference for online education as a tool to enhance career opportunities. Factors driving AMA include the relevance of course materials to job market needs, the quality of online learning, and the flexibility offered by online programs. The positive attributes of an alternative service provider characterize attractiveness. According to Kim and Yoon (2004), the attractiveness of an alternative encompasses the quality of service, image, and reputation, suggesting that a substitute provider is expected to offer more suitable or superior services than the current one.

In the context of online learning, the functional value is a key determinant in consumer decision-making, reflecting a rational evaluation of the product (Chen & Keng, 2019). Individuals' decisions are influenced by the comparative ease provided by one platform over another, encompassing aspects such as usability, features, location, time, and training methods. The provision of superior learning resources, activities, instructor quality, and facilities can enhance users' skills and competitiveness, making the platform more attractive (Al-Kumaim et al., 2021). In competitive markets, platforms that offer advanced features like artificial intelligence and the Internet of Things can stimulate switching behavior (Fang et al., 2019). Conversely, users tend to remain with their current provider if they are unaware of more attractive alternatives. Online courses are perceived as opportunities to gain valuable experience and knowledge applicable to future work (Crawford et al., 2020), supported by robust IT infrastructure and expert-driven quality materials (Chirikov et al., 2020). The ease and freedom provided by online education platforms enhance the likelihood of individuals switching to online education (Knightley, 2007). Considering this, it can be assumed that:

- H6: Alternate media attractiveness (AMA) positively influences decision self-efficacy (DSE)

- H7: alternate media attractiveness (AMA) positively influences motivation & intention for switching (MIS)
- H8: Alternate Media Attractiveness (AMA) positively influences switching behavior for performance (SBP)

Perceived usefulness

Perceived usefulness (PU), also known as utility, is a key factor in the Technology Acceptance Model (TAM) proposed by Fred D. Davis (1989). TAM explains how individuals adopt and use new technology, with perceived usefulness defined as the extent to which an individual believes that using a particular technology will enhance their performance (Davis et al., 1989). Common dimensions of perceived usefulness measured in TAM research include increased productivity, job effectiveness, job quality, goal achievement, and the acquisition of knowledge and skills. Perceived usefulness strongly influences users' attitudes and intentions to use technology. The higher an individual's perceived usefulness, the more positive their attitude toward the technology and the greater their likelihood of using it (Venkatesh et al., 2003).

The Technology Acceptance Model (TAM) has been utilized in numerous studies to explain and predict user acceptance of specific types of systems (Davis et al., 1989). When users recognize a new technology product's usefulness and ease of use, they exhibit a positive attitude toward that technology, influencing their intention and behavior. Additionally, individuals who believe that using an educational platform can enhance their learning performance tend to be more motivated towards that platform (Chen & Keng, 2019). Consequently, when individuals find online education beneficial, they are more likely to switch to using that platform (Liu et al., 2010). Given that perceived usefulness is related to the improvement of learning performance resulting from the educational platform, this study defines the perceived usefulness of the learning platform as a perceived usefulness effect. When the perceived usefulness of the learning platform is more significant than traditional classroom learning, their intention to switch from physical learning to the learning platform will be higher. Considering this, it can be assumed:

- H9: Perceived usefulness (PU) positively influences motivation & intention for switching (MIS)
- H10: Perceived usefulness (PU) positively influences switching behavior for performance (SBP)

Normative environmental pressure

Normative pressure, the urges or demands of social norms, rules, or group expectations, plays a powerful role in shaping individuals' decisions to stay or leave (Ramesh & Gelfand, 2010). It can impose demands and expectations, but it also empowers individuals to make choices that align with their goals. Normative environmental pressure, stemming from network effects (Cheng et al., 2019), is a force for positive change. In this study, NEP is based on several

factors, including the influence of friends and relatives encouraging individuals to switch to online courses.

Normative pressure refers to the influences or demands from social norms, rules, or group expectations that affect individuals. These influences or demands shape an individual's decision to stay or switch (Ramesh & Gelfand, 2010). In the theory proposed by Bandura (1977) through Social Learning Theory, four main sources are mentioned that can enhance self-efficacy: mastery experiences (successfully completing tasks), vicarious experiences (observing others' successes), social persuasion (receiving support and encouragement), and physiological states (managing stress and emotions). Considering that vicarious experiences and social support and encouragement are key factors that shape self-efficacy, it can be assumed:

- H11: Normative Environmental Pressure (NEP) positively influences Decision Self-Efficacy (DSE)

Peer influence is a significant motivator for individuals to try new online courses (Alhumaid et al., 2020) and to complete those courses (Hodges et al., 2020). This social dynamic is a key consideration in this study.

- H12: Normative Environmental Pressure (NEP) positively influences Motivation and Intention for Switching (MIS)

Individuals are more likely to have the intention to switch to an online course or platform if they have peer companions. Some individuals prefer online courses or platforms if encouraged or accompanied by peers, despite differences in price, features, and other factors (Xu et al., 2021). Considering this, it can be assumed:

- H13: Normative Environmental Pressure (NEP) positively influences Switching Behaviour for Performance (SBP)

Mooring factors

Mooring factors refer to the personal and social impacts that can either encourage or deter an individual from leaving or staying in their residence (Moon, 1995).

Decision self-efficacy

Albert Bandura first developed the concept of self-efficacy in 1977 as part of the Social Learning Theory. Self-efficacy is defined as an individual's belief in their ability to succeed in specific situations, drawing from personal experience, vicarious experiences (observing others), social persuasion (encouragement from others), and physiological states (Bandura, 1977). Self-efficacy is crucial in motivation, behavioral choices, and individual achievements. Individuals with high self-efficacy are more likely to set challenging goals, persevere in the face of difficulties, and remain resilient. Conversely, those with low self-efficacy risk avoiding challenges, giving up quickly, and achieving less (Bandura, 1977).

Further research has explored factors influencing self-efficacy. Bandura (1977) identified four main sources that enhance self-efficacy: mastery experiences (successfully completing tasks),

vicarious experiences (observing others' successes), social persuasion (receiving support and encouragement), and physiological states (managing stress and emotions). Additionally, studies have found that self-efficacy can be influenced by personal factors such as self-confidence and optimism and environmental factors like social support and cultural influences. Previous research by Nayak et al. (2022) defines decision self-efficacy as individuals' choice to opt for online education to enhance or support their learning. Nayak et al. (2022) suggest that the availability of features and the ease of use of learning platforms can influence individuals' decision-making, affecting their self-efficacy.

Individuals also view online education as a substitute for classroom learning (Senthamarai, 2018). Those who see digital educational platforms as value-adding are motivated to choose and use them in online courses (Hodges et al., 2020). This indicates a tendency for individuals to adapt to online platforms to enhance their skills and knowledge (Teräs et al., 2020). In e-learning systems, learning motivation includes intrinsic, extrinsic, self-efficacy, and learning experience (Chang et al., 2015). Self-efficacy is an important factor that motivates individuals to use online education. Considering this, it can be assumed:

- H14: Decision self-efficacy (DSE) positively influences Motivation & Intention for Switching (MIS)
- H15: Decision self-efficacy (DSE) positively influences Intention to Adapt for Knowledge (IAK)

Motivation and intention for switching

Nayak et al. (2022) posit that motivation and intention are pivotal for switching. Motivation, defined as internal forces propelling individuals to act and achieve goals (Eccles & Wigfield, 2002), is crucial in online education, representing the desire and determination to learn and complete programs (Chen & Keng, 2019). Factors like interest, relevance, beliefs, and values play significant roles in fostering motivation for online learning (Schunk & Zimmerman, 1994; Bandura, 1977; Eccles & Wigfield, 2002). Intention, conversely, refers to an individual's commitment to specific actions (Ajzen, 1991) concerning online education, denoting students' dedication to completing programs and achieving learning objectives (Nayak et al., 2022). Perceived usefulness and support, including encouragement from family, friends, and instructors, influence individuals' intentions toward online learning (Ajzen, 1991; Alhumaid et al., 2020). Technology integration has also become an integral part of the academic environment. Although technology has merged into everyday life, some individuals are more adept at using technology than others. For some, mastering new technological skills is significant (McCoy, 2010). It has been observed that there is a relationship between the need to use new learning technologies for educational purposes and the ability to adopt these technologies to drive changes in how individuals want and are willing to learn (Nayak et al., 2022). There is also a correlation between the level of learning completion in courses driven by individual motivation (Anyatasia et al., 2020). Considering this, it can be assumed:

- H16: Motivation and intention for Switching (MIS) positively influence Intention to Adapt for Knowledge (IAK)

Intention to adopt knowledge

Nayak et al. (2022) define Intention to adapt for knowledge (IAK) as depicting students' desire and motivation to utilize online learning opportunities to expand their knowledge base. This concept emerged during the COVID-19 pandemic, where prolonged lockdowns necessitated a shift to online education. IAK is influenced by several factors, including active information seeking, focus on knowledge development, and learning motivation (Nayak et al., 2022). Individuals with high IAK actively search for information and reviews of online courses to identify the most relevant and valuable learning opportunities (Willging & Johnson, 2009). They use their spare time to explore online resources, driven by a desire to expand their knowledge base (Grouws & Cebulla, 2000). IAK represents a strong motivation for lifelong learning, as individuals with high IAK recognize the importance of broad knowledge for future success. Individuals who push themselves to adapt to using online education platforms can improve their learning performance (Alhumaid et al., 2020; Hodges et al., 2020). Nayak et al. (2022) mention that the intention to adapt for knowledge (IAK) is based on active information seeking, focus on knowledge development and learning motivation. Individuals with high IAK actively seek information and reviews of online courses to identify the most relevant and valuable learning opportunities (Willging & Johnson, 2009). Those with IAK use their free time to explore online resources, driven by a desire to expand their knowledge base (Grouws & Cebulla, 2000). IAK is a strong motivator for acquiring knowledge and lifelong learning. Individuals with high IAK recognize the importance of broad knowledge for future success. Researchers assume that individuals with high IAK will have a solid intention to switch to online education. Considering this, it can be assumed:

- H17: Intention to adapt for knowledge (IAK) positively influences Switching behavior for performance (SBP)

Switching behavior for performance

Switching behavior for performance (SBP) refers to consumers' tendency to move from familiar brands, products, or services to those of competitors (Oliver, 1997). Zeithaml et al. (1988) argue that SBP is not just about switching but also involves evaluation and consideration before making the decision. In the educational context, individuals' transition to online learning platforms from traditional offline classes can be called switching behavior (Chen & Keng, 2019). Nayak et al. (2022) define switching behavior for performance as individuals' intent to switch to online learning platforms and courses more seriously, indicating the intention to switch and the time, effort, and attention individuals dedicate to online course learning.

Methodology

Research model

The model employed in this study builds upon the research by Nayak et al. (2022). This research utilizes several PPM (Push-Pull-Mooring) factors influencing the transition to educational platforms. The study elucidates the adoption process undertaken by individuals towards educational platforms. The PPM framework is used as the theoretical model. Unlike

other studies employing the PPM framework, this research integrates self-efficacy, motivation, and intention as mediators between the PPM factors and the intention to switch to educational platforms. Nayak et al. (2022) argue that individuals who perceive online education as a means to enhance their skills demonstrate greater efficiency, effectiveness, and a stronger desire to engage in online learning, leading to their decision to transition to online education. Nayak et al. (2022) study utilized PPM variables as follows: the push variable consisted of platform knowledge scope (PKS), the pull variables included alternative media attractiveness (AMA) and normative environmental pressure (NEP), and the mooring variables, which also served as mediating variables, comprised decision self-efficacy (DSE), motivation, and intention for switching (MIS). The intention to re-adapt for knowledge (IAK) was also a mediating variable but was not part of the mooring variables. As a result, all direct effects from PKS, AMA, and NEP towards SBP were insignificant. Furthermore, economic factors and perceived usefulness were also incorporated as PPM factors. However, the results did not demonstrate significant support for a change in switching behavior for performance.

To address this, the researchers revisited the topic with additional studies. Chen and Keng (2019) examined the push, pull, and mooring factors influencing individuals' intentions to switch from offline English language learning to using educational platforms for English learning. This study posited that perceived price and perceived usefulness are significant factors driving individuals to transition to online education. These two variables are crucial in determining individuals' intentions to switch. Individuals' perceptions of the cost of online education influence their motivation and intention to switch. The lower the perceived cost of online education, the more motivated individuals are to switch. Similarly, perceived usefulness plays a role; when individuals perceive online education as beneficial for their learning process, they become more motivated to switch to online education (Chen & Keng, 2019). To address the gaps identified in Nayak et al.'s (2022) research, the current study incorporated these variables, perceived price, and usefulness, into the analysis.

Chen & Keng's (2019) study included other variables: push factors like learning convenience and service quality, pull factors like e-learning motivation, and mooring factors like social presence, switching cost, and learning engagement. This study showed that the pull effect was the most significant switching force. The push and mooring effect had a negative influence on switching intention. The variable learning convenience is a push factor, represented by the variable alternative media attractiveness, a pull factor. Alternative media attractiveness discusses how educational platforms compete to attract individuals through features such as social interaction, ease of learning, and service quality (Nayak et al., 2022). Hsieh et al. (2012) also used convenience as a pull factor. The switching cost variable is represented by perceived price because perceived price encompasses not only monetary cost but also the time and effort involved (Beneke & Zimmerman, 2014). Social presence and learning engagement, mooring variables, represented by normative environmental pressure, a pull variable. Li & Ku (2018) used social factors, including the presence of others and social interaction, as pull factors.

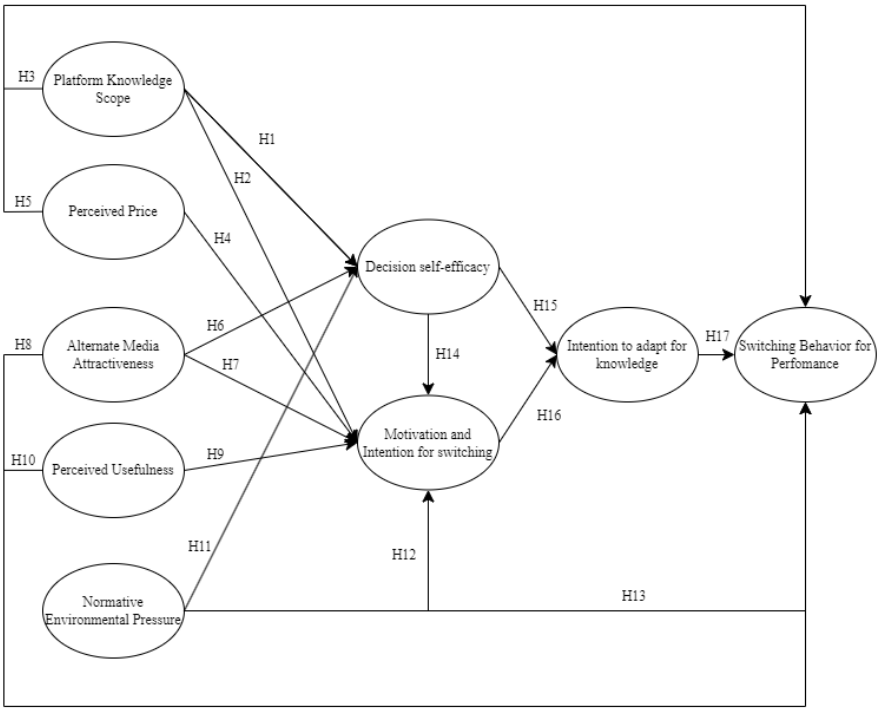

Figure 1: Conceptual framework

This study's push factors include platform knowledge scope and perceived price. Hsu (2014) identified push factors as those driving individuals to switch to another product. Platform knowledge scope compares offline and online learning. If individuals perceive online courses as superior, they will be motivated to switch to online courses (Nayak et al., 2022). Similarly, when individuals perceive that the cost of offline courses is not commensurate with their value, they will be driven to switch to online courses (Chen & Keng, 2019). Thus, this study's platform knowledge scope and perceived price are push factors. The pull factors in this study are alternate media attractiveness, perceived usefulness, and normative environmental pressure. Hsu (2014) identified pull factors as those attracting individuals to a product. Alternate media attractiveness pertains to features that capture individuals' attention (Nayak et al., 2022; Sun et al., 2017). Supported by perceived usefulness, when individuals find the provided features useful and beneficial for their development, they are more inclined to use the product (Chen & Keng, 2019; Kang et al., 2021). Normative environmental pressure involves the influence of social expectations and pressures. When individuals see that their environment suggests and uses a product, they are likelier to use it (Nayak et al., 2022; Sprague & IEEE Computer Society, 2009). Thus, alternate media attractiveness, perceived usefulness, and normative environmental pressure are pull factors in this study. The variable normative environmental pressure was modified to show a relationship between decision self-efficacy and switching behavior for performance.

The mooring factors, decision self-efficacy, motivation, and intention for switching also serve as mediators. This follows previous research by Nayak et al. (2022). According to the PPM framework, mooring factors do not directly influence switching intention; some may act as mediators or moderators affecting switching intention (Lee, 1966). When push and pull factors are strong, but mooring is weak, individuals are inclined to stay with the previous product

(Bansal et al., 2005). For instance, Nayak et al. (2022) used mooring variables as mediators between push and pull factors and switching behavior for performance. Monoarfa et al. (2023) found that switching cost mediated the relationship between push and pull factors and individuals' intention to switch to E-grocery. Thus, the mooring variables in this study also functioned as mediators for push and pull factors. Finally, the intention to re-adapt to knowledge will be a mediator, consistent with previous research (Nayak et al., 2022).

Instrument

Respondents answered 29 questions related to the research variables, including platform knowledge scope (4 items) (Nayak et al., 2022), perceived price (3 items) (Chen & Keng, 2019), alternate media attractiveness (3 items) (Nayak et al., 2022), perceived usefulness (3 items) (Chen & Keng, 2019), normative environmental pressure (3 items) (Nayak et al., 2022), decision self-efficacy (3 items) (Nayak et al., 2022), motivation and intention for switching (4 items) (Nayak et al., 2022), intention to adapt for knowledge (3 items) (Nayak et al., 2022), and switching behavior for performance (3 items) (Nayak et al., 2022). The scale in this study was measured using a 5-point Likert scale. According to Arikunto (2016), the Likert scale measures individuals' or groups' attitudes, perceptions, and opinions.

Table 1: Operational Variable

Constructs	Measure	
Platform knowledge scope (Nayak et al., 2022)	PKS1	Online learning platforms contribute a lot to my personal development
	PKS2	Online learning platforms help improve my performance in comparison to classroom teaching.
	PKS3	Online learning platforms help improve my effectiveness in comparison to classroom teaching.
	PKS4	Online learning platforms help me manage my learning efficiency compared to classroom teaching.
Perceived price (Chen & Keng, 2019)	PP1	The price of physical learning is lower than online courses
	PP2	The price of physical learning is more reasonable than online courses.
	PP3	The price of physical learning is more approachable than online courses.
Alternate media attractiveness (Nayak et al., 2022)	AMA1	Online courses should have content that meets industry requirements
	AMA2	Online courses should provide better learning value, considering the price charged.
	AMA3	Online courses should help me become better skilled in the field of my study.
Perceived usefulness (Chen & Keng, 2019)	PU1	Online courses should be convenient
	PU2	Online courses are helpful for my learning.
	PU3	Online courses save me time.
Normative environmental pressure (Nayak et al., 2022)	NEP1	I get influenced to study a particular course or certification online when my friends think it is appropriate to undertake.
	NEP2	I get influenced to study a particular course or certification online when my friends consider it necessary to do it.
	NEP3	I get influenced to study a particular course or certification online when my friends have already completed it.
Decision self-efficacy (Nayak et al., 2022)	DSE1	I can motivate and change myself to experience a suitable online platform with ease.
	DSE2	I can motivate and change myself to learn to use the features offered by online platforms.
	DSE3	I can motivate and change myself to streamline my learning efforts with an online platform methodology.

Constructs	Measure	
Motivation intention for switching (Nayak et al., 2022)	MIS1	In the future, when I study online courses, I would like to increase the time I devote
	MIS2	In the future, when I study online courses, I would like to be determined to take up the course/ certification options.
	MIS3	In the future, when I study online courses, I would like to have more focus while choosing the online courses/certifications.
	MIS4	In the future, when I study online courses, I would like to increase my level of effort to learn from the online course/certification.
Intention to adopt for knowledge (Nayak et al., 2022)	IAK1	In the next few months, I intend to invest time in online courses to increase my knowledge base
	IAK2	In the next few months, I intend to invest effort in online courses to improve my knowledge base.
	IAK3	In the next few months, I intend to search for different online sources of courses to improve my current knowledge base.
Switching behavior for performance (Nayak et al., 2022)	SBP1	In the future, I will prefer to consider online courses/certifications as a substitute for classroom teaching.
	SBP2	In the future, I would prefer to increase the time I devote to online courses relative to the time I devote to classroom teaching.
	SBP3	In the future, I will prefer to believe that I will be able to switch to online learning mode substantially.

Data collection

A definitive and illustrative research design was utilized to examine the research hypothesis and obtain a thorough understanding of the target demographic. Information was gathered via a cross-sectional approach using an online survey from January to March 2024. Only individuals who meet the criteria will be selected to participate in this survey. The required criteria are individuals who have taken an online course, obtained certification, and fall within the age range of Gen Z and Gen Y (12-39 years old).

The determination of the minimum sample size for SEM, according to Hair et al. (2019), is (Number of items) x (5 to 10 times). Since the number of measurement items in this study is 29 items, the sample size for this research would be 145-290 respondents. The survey gathered 410 questionnaires, and 370 valid questionnaires were returned. Table 2 shows the demographic distribution of the sample. Among these valid respondents, males account for 59%, and females account for 41%. 80% of respondents were between the ages of 20 and 29. Most respondents get a bachelor's degree or higher for education background demographics. Most respondents (69%) used professional and vocational as their course type, and 44% chose low course prices (<Rp 500.000).

Table 2: Respondent profile

Variable	Levels	Frequency	Percentage (%)
Age	15-19	9	2
	20-29	294	80
	30-39	67	18
Gender	Male	217	59
	Female	153	41
Education	High school or below	31	8
	Bachelor's degree	279	77
	Master's degree or higher	54	15
Course type	Language	50	14
	Tutor	65	17
	Professional and vocational	255	69
Course price	< Rp 500.000	162	44
	Rp 500.000 - Rp 999.900	69	19
	Rp 1.000.000 - Rp 1.999.900	40	11
	Rp 2.000.000 - Rp 2.999.900	27	7
	Rp 3.000.000 - Rp 4.999.900	24	6
	Rp 5.000.000 - Rp 9.999.900	24	6
	> Rp 10.000.000	24	7

Data analysis

Common method bias

Common Method Bias (CMB) analysis is conducted to detect potential bias arising from responses collected using the same type of scale. This study examined variance inflation factors using Harman's test. The guideline for using Harman's test is that the variance of the first component should be less than 50%, and more than one component should be generated. If the variance of the first component is greater than 50%, it indicates collinearity or redundancy in the responses. Additionally, if only one component is generated, it also indicates collinearity (Hair et al., 2019).

Measurement model

According to the rule of thumb (Hair et al., 2019), Standardized loading estimates should be 0.5 or higher. Ideally, 0.7 or higher, and the Average Variance Extracted (AVE) value should be 0.5 or higher to suggest adequate convergent validity. Furthermore, items are considered reliable if Composite Reliability (C.R) and Cronbach's Alpha ≥ 0,70.

Covariance-based structural equation modeling (CB-SEM)

According to Hair et al. (2021), CB-SEM is considered more suitable for analysis when the research objective entails testing and confirming the theory along with its underlying hypotheses. The present study encountered this scenario, where the research aims to validate hypotheses derived from observed variables within the frameworks of push-pull mooring.

Structural model

After the absence of multicollinearity is verified, the next stage involves evaluating the model's capacity to anticipate internal constructs and/or measurable variables. According to Hair et al. (2019), the significance and relevance of the structural model relationships are evaluated by examining path coefficients (β), T values, and P values. P values, path coefficients (β), and T values with results ≤ 0.05 indicate a significant relationship between the observed variables.

Results and Discussion

CB (Covariance based) was adopted in this study to test both the measurement model (i.e., measures underlying each construct) and structural model (i.e., relationships among the conceptual of interest) simultaneously (Gefen & Straub, 2005). CB-SEM is well suited for testing theoretical models. It explicitly accounts for measurement error, which improves the reliability and validity of the relationships between constructs (Hair et al., 2019). In addition, 370 respondents were enough to use CB-SEM analysis. SmartPLS4 was used as the main analysis technique in this study.

Measurement model

Before model measurement, we evaluated the collinearity variance of the construct measures first. A collinearity variance test was conducted to detect potential bias originating from responses collected using the type of scale (Hair et al., 2019). Collinearity variance was examined using Harman's test. The critical value for the first component is 50%, and the number of components generated is more than one. Table 3 shows that the first component value is 22.668%, and 9 components were generated using Harman's test, suggesting that there are no potential biases from the data collected in this study.

Table 3: Harman's test for assessment of collinearity variance of constructs

Total	% of Variance	Cumulative %
6.266	22.668	22.668
2.266	9.077	31.745
2.111	8.421	40.167
1.963	7.695	47.862
1.513	6.573	54.434
1.348	6.070	60.504
1.080	4.789	65.293
0.959	4.583	69.876
0.886	4.150	74.026

Before testing hypotheses, we evaluated the reliability and validity of the construct measures first. The reliability of the measurement was examined using average variance extracted (AVE), composite reliability (CR), and Cronbach's Alpha. The critical values for AVE CR are 0.5 and 0.7, respectively, and the recommended value for Cronbach's Alpha is 0.7 (Fornell & Larcker, 1981). Table 4 shows that the minimum values of AVE, CR, and Cronbach's alpha were 0.529, 0.768, and 0.767, respectively. Each value was higher than the recommended value, suggesting that all constructs were reliable.

Table 4: Assessment reliability of constructs

Variables	Cronbach's Alpha (CA)	Composite Reliability (CR)	AVE
Platform knowledge scope (PKS)	0.815	0.816	0.530
Perceived price (PP)	0.791	0.777	0.561
Alternate media attractiveness (AMA)	0.795	0.795	0.564
Perceived usefulness (PU)	0.767	0.768	0.529
Normative Environmental Pressure (NEP)	0.882	0.882	0.714
Decision self-efficacy	0.866	0.865	0.685
Motivation and intention for switching (MIS)	0.817	0.819	0.531
Intention to adapt for knowledge (IAK)	0.885	0.887	0.720
Switching behavior for performance (SBP)	0.891	0.890	0.734

Structural model

Since the measurement model evaluation provides evidence of validity and reliability, the structural model was examined to evaluate the hypothesized relationships among the constructs in the research model (Hair et al., 2019). A range of indices was used to asses the model fit. Table 7 demonstrated broadly satisfactory levels of fit. The model fit indices, mainly the absolute fit indices, did not differ significantly from the measurement model, suggesting strong model validity.

Table 7: Model fit indices

Fit indices	Value	Desired value
Absolute fit indices		
ChiSqr/df	1.667	< 3
Goodness-of-fit Index (GFI)	0.907	≥ 0.90
Root Mean Square Residual (RMR)	0.051	≤ 0.6
Root Mean Square Error of Approximation (RMSEA)	0.042	< 0.05
Incremental fit indices		
Tucker-Lewis Index (TLI)	0.945	≥ 0.90
Comparative Fit Index (CFI)	0.953	≥ 0.90
Adjusted Goodness of Fit Index (AGFI)	0.884	≥ 0.90
Normed Fit Index (NFI)	0.891	≥ 0.90

Figure 2 presents the results of the CB analysis of the structural model. As expected, platform knowledge scope had significant positive effects on decision self-efficacy ($\beta = 0.196$, $t = 2.854$, $p < 0.01$) and switching behavior for performance ($\beta = 0.309$, $t = 4.521$, $p < 0.01$). This result indicates that the higher the knowledge scope of an online education platform, the more likely a person is to choose online education, accepting H1 and H3. Contrary to our expectation, the impact of platform knowledge scope had a significant negative effect ($\beta = -0.141$, $t = 1.903$, $p < 0.01$), indicating that the higher the platform knowledge scope of an online education platform, the lower a person's motivation and intention to switch to online education tends to be, rejecting H2. Perceived price had a significant negative effect on motivation and intention for switching ($\beta = -0.181$, $t = 2.702$, $p < 0.01$) but only modest on switching behavior for performance ($\beta = -0.043$, $t = 0.750$, $p > 0.01$), validating H4 and rejecting H5. This result indicates that a higher perceived price will lower a person's motivation to choose online education. There has been no research showing a relationship between perceived price and switching behavior for performance. However, the study by Kwarteng et al. (2020) indicates

a negative relationship between perceived price and switching behavior in the context of online switching behavior. The path coefficient also shows a negative relationship between these two variables. However, the insignificant t-stat and p-value suggest that this relationship can be re-tested by changing the sample and increasing the sample size.

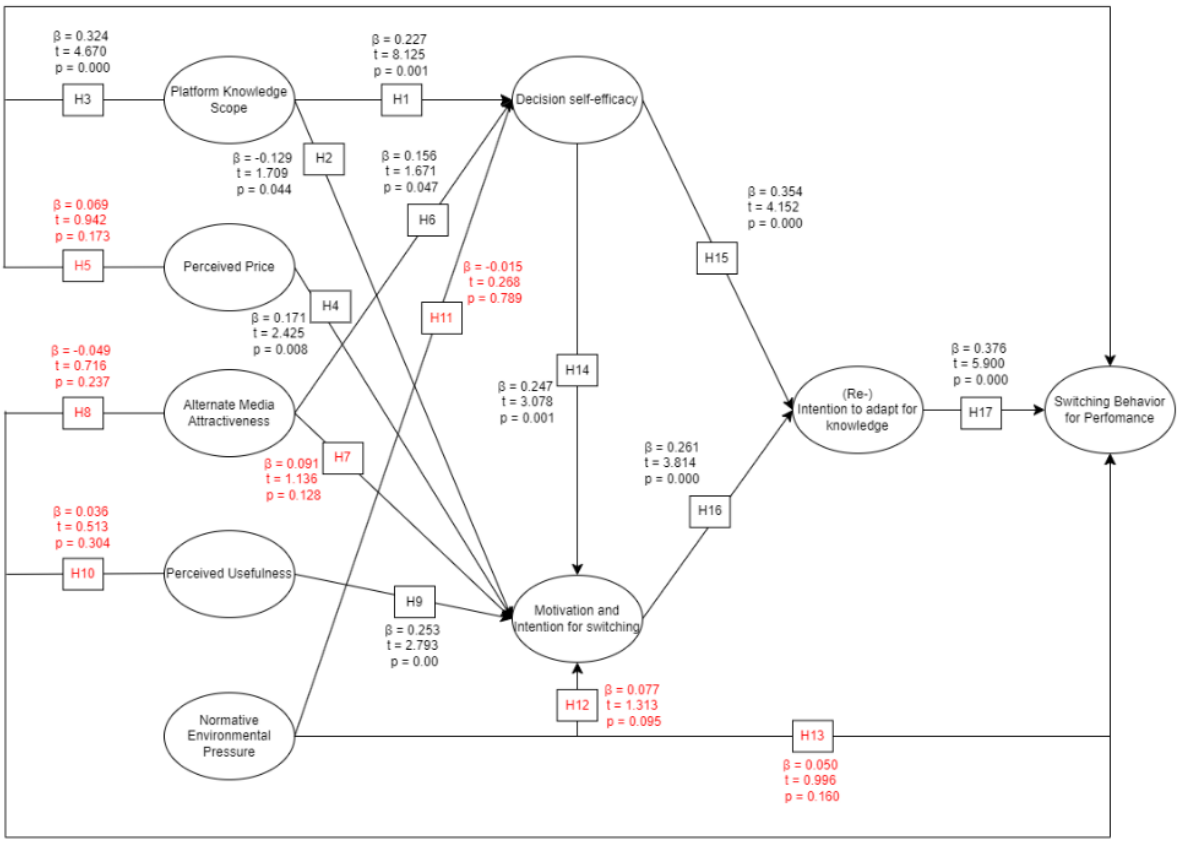

Figure 2: Results of the structural model

Alternate media attractiveness had significant positive effects on decision self-efficacy (β = 0.169, t = 2.816, p <0.01), validating H6. On the contrary, the impacts of alternate media attractiveness towards motivation and intention for switching (β = 0.095, t = 1.475, p >0.01) and switching behavior for performance (β = -0.011, t = 0.190, p >0.01) were only modest, rejecting H7 and H8. This result indicates that a higher appeal of an online education platform does not necessarily increase an individual's motivation and intention to choose online education. Perceived usefulness had a significant positive effect on motivation and intention for switching (β = 0.239, t = 3.220, p <0.01) but only modest for switching behavior for performance (β = 0.108, t = 0.839, p <0.01), validating H9 and rejecting H10. This result indicates that the higher an individual's perception of the usefulness of an online education platform, the greater their motivation and intention to switch to online education tends to be. There has been no research showing a relationship between perceived usefulness and switching behavior for performance. However, the study by Kwarteng et al. (2020) indicates a positive relationship between perceived usefulness and switching behavior in the context of online switching behavior. This difference in context suggests that the relationship between perceived price and switching behavior for performance needs to be re-examined. The path coefficient shows a negative relationship between these two variables. However, the insignificant t-stat and p-value suggest that this relationship can be tested again by changing the sample and increasing the sample size. Lastly, for the pull effect, normative environmental

pressure had no significant effect on decision self-efficacy (β = -0.021, t = 0.399, p >0.01), motivation and intention for switching (β = 0.047, t = 1.454, p >0.01) and switching behavior for performance (β = 0.244, t = 0.953, p >0.01), rejecting H11, H12, and H13. As expected with our mooring factors, decision self-efficacy had a significant positive effect on motivation and intention for switching (β = 0.241, t = 3.392, p <0.01) and intention to adapt for knowledge (β = 0.354, t = 5.865, p <0.01), validating H14 and H15. Motivation and intention for switching had a significant positive effect on the intention to adapt for knowledge (β = 0.262, t = 4.190, p <0.01) as well, validating H16. This result indicates that the higher an individual's motivation and decision to choose an online education platform, the greater their intention to adapt to learning and their motivation to switch to online education tends to be. Lastly, the intention to adapt to knowledge had a significant positive effect on switching behavior for performance (β = 0.367, t = 6.396, p <0.01), validating H17, indicates that the higher an individual's intention to adapt to learning, the greater their likelihood of transitioning to online education tends to be.

Table 8: Hypotheses testing results

	Path	Path coefficients	Standard errors	T statistics	P-values	Result
H1	PKS→DSE	0.196	0.085	2.854	0.005	Supported
H2	PKS→MIS	-0.141	0.054	1.903	0.040	Not supported
H3	PKS→SBP	0.309	0.104	4.521	0.000	Supported
H4	PP→MIS	-0.181	0.039	2.702	0.007	Supported
H5	PP→SBP	-0.043	0.069	0.750	0.454	Not supported
H6	AMA→DSE	0.169	0.066	2.816	0.005	Supported
H7	AMA→MIS	0.095	0.042	1.475	0.141	Not supported
H8	AMA→SBP	-0.011	0.078	0.190	0.850	Not supported
H9	PU→MIS	0.239	0.074	3.220	0.001	Supported
H10	PU→SBP	0.108	0.129	0.839	0.611	Not supported
H11	NEP→DSE	-0.021	0.051	0.399	0.801	Not supported
H12	NEP→MIS	0.047	0.032	1.454	0.149	Not supported
H13	NEP→SBP	0.244	0.085	0.953	0.341	Not supported
H14	DSE→MIS	0.241	0.042	3.392	0.001	Supported
H15	DSE→IAK	0.354	0.071	5.865	0.000	Supported
H16	MIS→IAK	0.262	0.125	4.190	0.000	Supported
H17	IAK→SBP	0.367	0.060	6.396	0.000	Supported

Table 9 shows the results of the analysis of 13 mediation effects (indirect effects) based on the structural model. In the PKS→SBP path, significant mediation occurs through DSE→IAK→SBP and DSE→MIS→IAK→SBP, whereas MIS→IAK→SBP was not significant, with a p-value above 0.05. Given the significant mediation effects, it can be stated that DSE, MIS, and IAK mediate the relationship between PKS and SBP. This aligns with the hypothesis that PKS positively affects SBP, consistent with previous research by Nayak et al. (2022). In the PP→SBP path, the mediation path through MIS→IAK→SBP was significant, indicating that MIS and IAK mediate the relationship between PP and SBP.

In the AMA→SBP path, all mediation paths were not significant, supporting the hypothesis that AMA does not positively affect SBP. Since no significant mediation effects were found, DSE, MIS, and IAK were not mediators in the AMA→SBP relationship, differing from Nayak et al. (2022), where DSE, MIS, and IAK were mediators for AMA→SBP. This discrepancy may be due to geographical and national differences in sampling and respondent

characteristics. In the PU→SBP path, the mediation path through MIS→IAK→SBP was significant, suggesting that MIS and IAK mediate the relationship between PU and SBP.

In the NEP→SBP path, no significant mediation effects were found through DSE, MIS, and IAK, supporting the hypothesis that NEP did not positively affect SBP. This differs from Nayak et al. (2022), where MIS and IAK were mediators for NEP→SBP, possibly due to different sampling and respondent characteristics.

Table 9: Mediator testing results

Path	Path coefficient	Confidence interval 95%		T statistics	P value	Result
		Lower Bound	Upper Bound			
PKS→DSE→IAK→SBP	0.046	0.016	0.087	2.050	0.020	Significant
PKS→MIS→IAK→SBP	-0.019	-0.043	-0.000	1.453	0.073	Not significant
PKS→DSE→MIS→IAK→SBP	0.008	0.002	0.017	1.788	0.037	Significant
PP→MIS→IAK→SBP	-0.017	-0.033	-0.006	2.104	0.018	Significant
AMA→DSE→IAK→SBP	0.029	-0.001	0.069	1.327	0.092	Not significant
AMA→MIS→IAK→SBP	0.012	-0.003	0.035	1.049	0.147	Not significant
AMA→DSE→MIS→IAK→SBP	0.005	-0.000	0.012	1.407	0.080	Not significant
PU→MIS→IAK→SBP	0.020	0.006	0.040	2.171	0.015	Significant
PU→DSE→MIS→IAK→SBP	0.010	0.002	0.021	1.639	0.051	Not significant
NEP→DSE→IAK→SBP	-0.002	-0.015	0.010	0.242	0.404	Not significant
NEP→DSE→MIS→IAK→SBP	-0.000	-0.003	0.002	0.239	0.406	Not significant
NEP→MIS→IAK→SBP	0.009	-0.002	0.023	1.182	0.119	Not significant

Conclusion

This study built on previous research by Nayak et al. (2022) and Chen & Keng (2019), exploring how push-pull-mooring effects influence switching behavior towards online education. Nayak et al. (2022) conducted their study among Indian students, enhancing the push-pull-mooring framework by incorporating mediation variables, which provided a nuanced understanding of the factors driving students to switch to online education. On the other hand, Chen & Keng (2019) focused on Taiwanese students, investigating their switching intentions specifically towards online English education without including mediation variables. Their study emphasized the direct influences on switching behavior, such as the appeal of learning English online.

In the context of Indonesian individuals engaging in nonformal online education, this study expands on these foundations by testing 17 hypotheses to understand the dynamics of switching behavior. Out of these, 10 hypotheses were accepted, and 8 were rejected, offering a detailed view of the factors at play.

The findings of this study highlight several key points. Firstly, the scope of platform knowledge (PKS) emerged as a significant determinant of switching behavior for performance, underscoring the importance of technological innovations and the dissemination of shared knowledge within online education platforms. This indicates that platforms with a broad and accessible knowledge base are more likely to attract and retain users.

Secondly, the perceived price was found to have an indirect influence on switching behavior through its effects on motivation and intention. Lower prices were shown to enhance individual motivation to switch, suggesting that affordability is a critical factor in attracting users to online education platforms. Interestingly, the attractiveness of alternative media did not significantly affect switching behavior in this study.

Perceived usefulness also played an indirect role in influencing switching behavior, aligning with findings from previous studies that emphasize the importance of the perceived value of the platform's offerings. Conversely, normative environmental pressure did not have a direct impact on switching behavior, indicating that social expectations and pressures may be less critical in the decision to switch to online education in this context.

Regarding mooring factors, the intention to adapt to knowledge was identified as the second most influential factor in switching behavior. This highlights the crucial role of learners' intrinsic intentions and desires to gain knowledge. Additionally, decision self-efficacy and motivation for switching were found to be pivotal, influenced by factors such as platform knowledge scope and perceived price.

These findings reveal the complexity of factors influencing switching behavior in online education, providing valuable insights for both future research and strategic planning in the industry. They suggest that online education platforms should focus on enhancing their knowledge scope, maintaining affordable pricing, and fostering intrinsic motivation among users to improve engagement and completion rates.

Theoretical implications

This study provides a significant theoretical contribution by extending the existing body of knowledge on switching behavior in the context of online education, specifically within the Indonesian market. The study integrates new variables such as perceived price and perceived usefulness into the push-pull-mooring framework, offering fresh insights into the indirect mechanisms that influence switching behavior for performance. In doing so, it highlights the importance of decision self-efficacy, motivation and intention for switching, and intention to adapt for knowledge as mediating factors.

Firstly, this research addresses a gap in the literature by identifying the indirect relationship between perceived price and perceived usefulness with switching behavior for performance. Previous studies, such as those by Nayak et al. (2022), did not find a relationship between perceived price and perceived usefulness. Chen & Keng (2019) observed that these factors influence intentions but do not change behavior. In contrast, Kwarteng et al. (2020) identified a positive relationship between these variables and switching behavior, but no studies have explored their link to switching behavior for performance. By establishing an indirect relationship through mediating factors, this study adds a new theoretical layer, showing that while the perceived price and perceived usefulness do not directly trigger switching behavior for performance, they shape the broader motivational and decision-making processes that drive individuals to engage in online education.

Secondly, the findings suggest that while alternate media attractiveness and normative environmental pressure are often theorized to influence behavior, these variables do not consistently affect all aspects of switching behavior, as seen in Nayak et al. (2022). This study provides empirical evidence that these factors have limited influence on switching behavior for performance. Specifically, alternate media attractiveness did not significantly impact switching behavior, indicating that the perceived value of the current platform may be more important than the allure of alternatives in driving switching behavior in online education.

Thirdly, the research confirms the pivotal role of mediating variables, such as decision self-efficacy, motivation, and intention to switch, in influencing switching behavior for performance. By demonstrating that these mediators have a substantial effect on the switching process, the study underscores their importance in shaping individuals' willingness and readiness to transition to online education platforms. These findings advance the literature by clarifying how psychological readiness and self-belief in decision-making play critical roles in users' adoption of new educational platforms.

Lastly, this study's focus on the Indonesian market adds to the body of research on consumer behavior in emerging markets. It offers specific insights into how cultural and economic contexts shape the relationships between perceived price, usefulness, and switching behavior. The findings suggest that affordability and perceived value are significant drivers in an emerging market like Indonesia, where economic considerations may play a more substantial role in shaping consumer decisions than in more developed markets. This research offers an enhanced understanding of switching behavior for performance by integrating perceived price and usefulness into the push-pull-mooring framework and exploring their indirect influence. This theoretical expansion has implications for future studies on consumer behavior, especially in the rapidly evolving field of online education. It highlights the need for marketing and product development strategies that address these mediating factors to improve user retention and performance outcomes.

Limitations and recommendations

Based on the analysis and implementation of this study, the researchers acknowledge several limitations and challenges. Firstly, the research was conducted with respondents residing in Indonesia, which means the results may not be generalizable to other contexts or countries with different socio-economic dynamics and cultures without proper adaptation. Future research could compare respondents from various countries to explore broader findings and enhance the generalizability of the results.

Secondly, this study involved respondents from diverse backgrounds, including different types of online courses, education levels, and occupations. The study by Nayak et al. (2022) focused solely on individuals, while the research by Chen & Keng (2019) targeted workers in the service industry. The diverse respondent pool in this study led to more general conclusions. Future research could specify respondent criteria more narrowly to achieve more precise results. The variables of perceived price, perceived usefulness, and alternate media attractiveness showed different outcomes compared to previous studies, suggesting that these variables could be further investigated in subsequent research.

Lastly, this study did not focus on specific types of online education, resulting in general conclusions. Non-formal online education types, such as community learning centers and religious study groups, were not analyzed. Future research could sample these specific types of online education to provide deeper insights into individuals' switching intentions towards online learning. By addressing these limitations, future studies can offer more targeted and applicable insights for the online education sector.

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TEACHER NOTICING IN REVIEWING STUDENT ANXIETY AND ENGAGEMENT IN THE CLASSROOM: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

Numerous studies have examined how anxiety affects students in academic settings. However, there is still a lack of understanding regarding the role of educators in addressing this issue. This study aims to evaluate the role of "teacher noticing" in assessing students' anxiety and their involvement in classroom activities through a systematic literature review. This study uses the Systematic Literature Review (SLR) protocol, which refers to the PRISMA approach. Data were obtained from publisher Elsevier (Science Direct) with indexed articles randomized from Q1-Q3. Thematic analysis of 65 articles from the Scopus database (2010-2023) revealed three main themes: teachers' observational skills, student anxiety and engagement interpretation, and teacher responses and interventions. Findings highlight the importance of teachers' ability to recognize anxiety indicators, especially in post-COVID-19 distance learning contexts. Effective strategies include using motivational messages, integrating social networks, gamification, and mindfulness programs. Key implications involve developing teacher training programs focused on "noticing," adjusting educational policies to prioritize students' mental well-being, and implementing learning strategies that support student resilience.

Keywords: *Teacher Noticing, Anxiety, Systematic Literature Review*

Introduction

Developing skilled human resources requires a strong emphasis on education. According to, active student involvement in learning is crucial for academic success. However, depressive anxiety can hinder some students from fully engaging in their education, particularly during class presentations. This issue is a growing concern for educators and researchers as it can hurt academic performance and result in lower grades (BlackDeer et al., 2023). Despite extensive research on student anxiety, there are still gaps in understanding the role of teachers in recognizing and addressing anxiety in the classroom. Teacher noticing, which refers to the teacher's ability to observe, interpret, and effectively respond to learning situations, has not been fully explored in the context of emotional engagement (Kaiser et al., 2017; Styers et al., 2020; Tekin-Sitrava et al., 2022).

The ability to observe, interpret, and respond appropriately to learning situations is a key skill teacher must possess, known as teacher noticing(Amador et al., 2024; Bakker et al., 2022). This skill becomes particularly important in recognizing anxiety symptoms in students during presentations and understanding their underlying causes. Students who feel anxious during a presentation may exhibit physical symptoms such as shaking, sweating, and difficulty speaking(Li et al., 2023; Walkup et al., 2023). By honing their mindfulness skills, teachers can identify these signs and recognize that students are experiencing anxiety. For example (Ní et al., 2022; Wang & Zhang, 2021) found that 84% of primary school teachers accurately identify anxiety in students. Additionally, teachers can identify factors that contribute to student anxiety, such as inadequate preparation, fear of negative feedback from peers, or past negative presentation experiences (Romano et al., 2020a; Wang & Zhang, 2021).

Research indicates that effective teachers play a vital role in recognizing and interpreting student behavior during learning, implementing teaching strategies, fostering inclusive classroom environments, and appropriately responding to reduce anxiety and increase engagement (Anjomshoaa et al., 2021; Hsu & Goldsmith, 2021). To achieve these goals, teachers must offer emotional and verbal support, create an inclusive classroom environment, and provide constructive feedback (Anjomshoaa et al., 2021; Hsu & Goldsmith, 2021). Moreover, teachers can provide guidance and emotional support to help students prepare for academic learning (Romano et al., 2020b; Shen et al., 2021). However, previous research has primarily focused on factors influencing student anxiety in learning, such as students' lack of social adaptation and perceived importance of the learning process (Liu et al., 2022), fear of negative judgment, and feelings of burden and isolation from peers (Pineda, 2024), without specifically investigating the role of teacher noticing without being influenced by perceptions of competence (Schwichow et al., 2022).

Excessive anxiety is among the most common forms of pediatric psychopathology in the United States of America (USA) and globally and impairs academic functioning (Battaglia et al., 2017; Ghandour et al., 2019; Racine et al., 2021; Swan & Kendall, 2016). Students with anxiety present challenges to teachers who are tasked with managing their students' social,

emotional, behavioral, and educational impairments caused by excessive anxiety. For instance, data show that students with higher (compared to lower) levels of anxiety are more dependent on and have more conflict with their teachers (Zee & Roorda, 2018). A majority of teachers report that student anxiety negatively impacts their classrooms (Birnbaum et al., 2017). While teachers are not responsible for diagnosing student anxiety, their accurate observations of student anxiety often affect their teaching methods (i.e., how they respond to students in the classroom to optimize their learning); moreover, teachers may refer a student to a school mental health professional. The mental health needs of students internationally have risen dramatically in light of the global COVID-19 pandemic, highlighting the likelihood that teachers globally will encounter excessive student anxiety (Chavira et al., 2022; World Health Organization, 2022).

Another important dimension of this work has been a consideration of attention, which is critical to engagement – that is, a learner must direct their attention to tasks and to connections between language form and its meanings in use to be truly engaged. While there are marked parallels to (Hiver et al., 2024) pioneering work on noticing, the field of language learning is still notoriously divided regarding the role of deliberate attention and awareness in language acquisition (Cevikbas et al., 2024). Nevertheless, as (Maral, 2024) explains, attention itself is the gatekeeper of our working memory and the ultimate currency of instructed L2 settings. Because engagement is 'the major force of learning' (Klarin, 2024), engagement research in language learning raises critical questions about the link to implicit and explicit learning mechanisms and knowledge and the elements that learners' attention is being directed to – whether that is formal features of the language, the task, the content, and/or the social interaction.

Therefore, through a systematic literature review, this study aims to evaluate the role of "teacher noticing" in assessing students' anxiety and their involvement in classroom activities. Further research is necessary to explore the relationship between teacher noticing and student anxiety during presentations and class participation. This research is crucial for evaluating the impact of teachers' noticing on student anxiety concerning classroom activities. The findings will be a foundation for developing effective approaches to address presentation-related anxiety and enhance student engagement. Ultimately, this will lead to improved learning outcomes and optimal development of students' presentation abilities. The specific objectives of this study are:

RQ1. Exploring how teachers' skills in observing signs of anxiety and student engagement in the classroom
RQ2. Analyze how teachers interpret students' anxiety and engagement
RQ3. Identify teacher-provided responses or interventions to support students experiencing anxiety and increase their engagement

To improve this study, we will incorporate the theoretical framework of the chosen method, educational environment strategies, and prospects. The findings of this study can contribute to the development of more effective training programs for teachers. This will enable them to

better recognize and address student anxiety during presentations by utilizing teacher noticing to its fullest potential.

Methods

This study uses the Systematic Literature Review (SLR) method to identify, evaluate, and interpret all available and relevant research related to teacher attention and student anxiety in classroom activities. The SLR protocol refers to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure a systematic and comprehensive review (Moher et al., 2009; Page et al., 2021).

The inclusion criteria used in this SLR are (1) Research journals published in Scopus ; (2) Research that uses the search terms "teacher paying attention", "student anxiety", and "classroom engagement".; (3) Research that reports on learning outcomes, motivation, or student involvement in learning; (4) The search is limited to English-language journal articles; and (5) Articles published in the period 2010-2023.

Meanwhile, the exclusion criteria include (1) Articles that do not address at least two of the main constructions; (2) Articles that focus on non-teacher populations or are not in the classroom context are also excluded to maintain a focus on teacher perceptions and experiences (3) Research that cannot be downloaded in pdf form.

Performing keyword search: ("teacher" OR "educator" OR "instructor" OR "professor") AND ("noticing" OR "observing" OR "detecting" OR "identifying") AND ("student" OR "learner" OR "pupil") AND ("anxiety" OR "stress" OR "tension" OR "worry") AND ("engagement" OR "involvement" OR "participation" OR "interaction").

A total of 1,576 articles from 2010-2023 were collected from Scopus and ScienceDirect. The researchers filtered the 415 unique articles down to 65 articles for analysis by developing inclusion and exclusion criteria based on the relevance of the articles to teacher concern, student anxiety, and classroom engagement. Filtering articles will be presented using the PRISMA flowchart in Figure 2. They reviewed each article's abstracts, keywords, and full text to determine their alignment with the established criteria. Articles that did not meet the criteria, such as those not addressing at least two of the main constructs, focusing on non-teacher populations, or being outside the classroom context, were excluded from the analysis. Articles that did not address at least two of these main constructs were excluded, as the analysis focused on these specific research areas. Articles that focused on non-teacher populations or were not in a classroom context were also excluded to maintain a focus on teacher perceptions and experiences. Performance metrics, such as ranking the top 10 journals and SJR journals, are calculated for 65 articles that meet the analysis criteria.

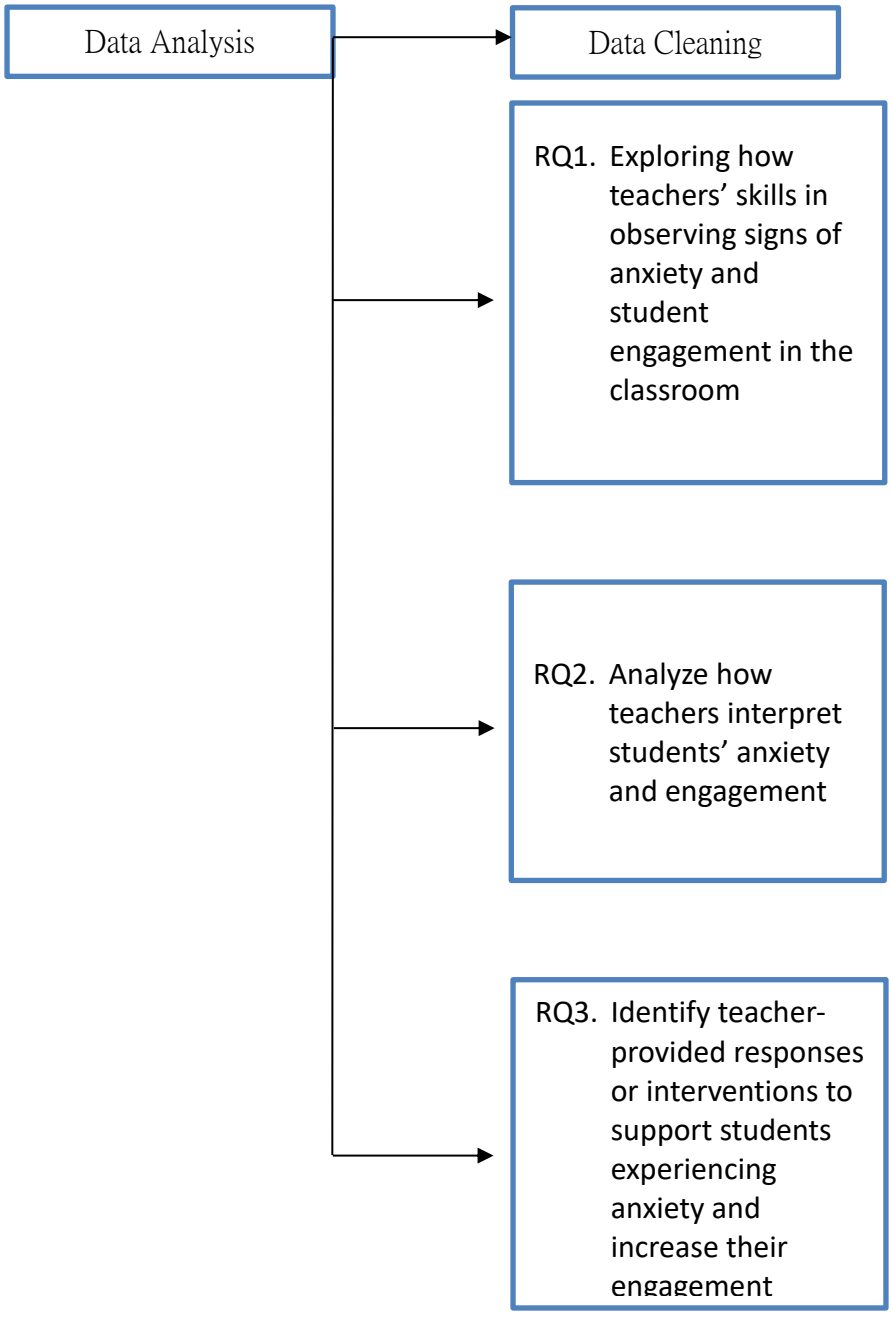

Figure 1: Systematic Literature Review Process Flow Diagram

The data analysis technique in SLR adopts a thematic-based narrative synthesis approach. It can be seen in Figure 1. Every article that passes the final selection will be read thoroughly. The analysis begins with an in-depth reading of each article to understand its context, methodology, and key findings. Furthermore, the relevant information from each article is coded according to the predetermined research questions, covering aspects such as teachers' skills in observing students' anxiety and engagement, teachers' interpretations of students' behavior, and interventions carried out to support students.

The coding from the various articles is then grouped into broader themes that align with the

research question. These themes are organized into a coherent and comprehensive narrative, answering each research question with the support of evidence from the analyzed articles. Finally, based on this narrative synthesis, general conclusions are drawn about how teachers pay attention, interpret, and respond to students' anxiety and involvement in the classroom.

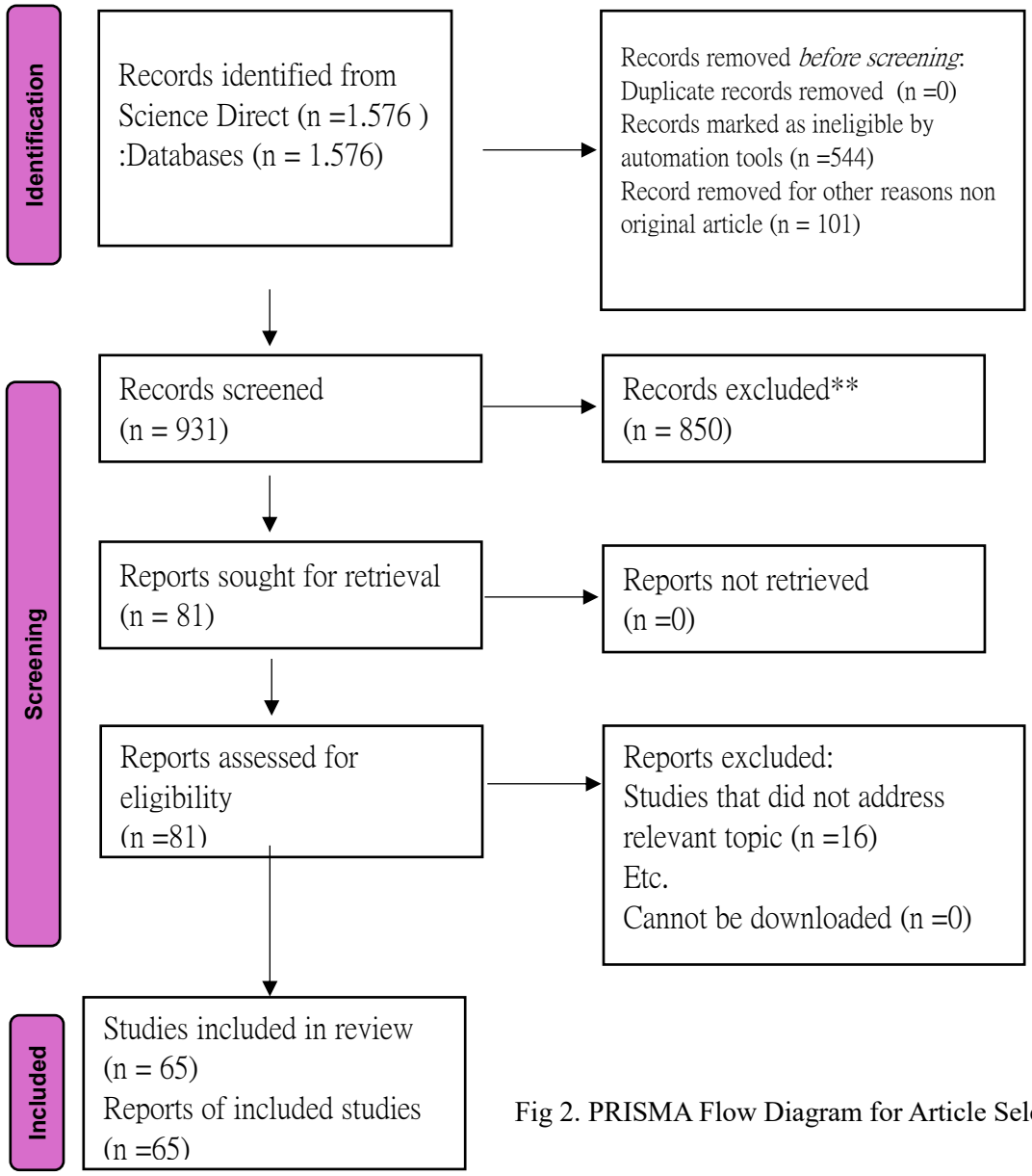

Fig 2. PRISMA Flow Diagram for Article Selection Process

Through this analysis process, the study aims to analyze the effectiveness of teachers' skills in paying attention to and responding to students' anxiety and involvement in the classroom based on relevant research in the Scopus database.

In this study, narrative insights are carried out on a subset of relevant articles selected based on their relevance to comparing the theories used, the setting of educational strategies, and future expectations. Filtering articles will be presented using a PRISMA flowchart, as shown in Figure 2. Before entering the analysis based on the research question, the researcher wanted

to see the relativity and distribution of data from the final paper, which identified the following results:

- ***Sample articles include studies:*** These studies involved various samples. In the study of (Harb et al., 2023), a survey was distributed among teachers and students from different colleges, with a total of 253 responses collected from 123 teachers and 130 students. In the study (2023), a population sample consisting of 51 teachers and 815 children was selected from 70 primary schools in Finland. The population sample in the Dragomir & Dumitru study (2023) was 415 undergraduate accounting students. The population sample consisted of six students aged 16-17 years (Wilkie et al., 2023). The sample size of the research population is 313 elementary school students aged 7 – 12 years. The sample size consisted of more than 900 students for the Tosto et al. (2023) study. The research of Yin et al. (2023) used a population sample of about 650 EFL students, and 591 EFL students were accepted to participate in this study.

- ***The most commonly used methods:*** The research methods varied. Face detection and alignment algorithm used for emotion recognition, Neural Architecture Search (NAS) for optimizing emotion classification architecture, speech emotion recognition using deep learning and multimodal analysis, data mining of online forums for emotional state classification, illumination compensation and background segmentation for image processing and multi-task Cascaded Convolutional Networks (MTCNN) for face cropping in the study of Harb et al., (2023). The study used statistical analysis, correlation analysis, and visual examination of scatter plots, and a random group was established for the research design (Dragomir & Dumitru, 2023). Cheng (2023) is a review article. Cluster randomized control trial designs, ManCoVAS and ANCOVA, were used in the research of GarcÃa-Rubio et al. (2023). Class-based studies, SvCMC and FTF, and task performance were recorded and transcribed for analysis (Aubrey & Philpott, 2023). The study design of mixed methods and integrated statistical analysis (Tosto et al., 2023). The research of Yin et al. (2023) used multivariate regression and Pearson correlation coefficients, and SPSS and AMOS software were used for data analysis.

- ***The Context includes studies:*** The context of the research covers the problems of students' diverse emotional states and provides an interactive dashboard for teachers (Harb et al., 2023). This study examines teacher-child interaction and social competence (Soininen et al., 2023). The research of Dragomir & Dumitru (2023) analyzed online learning during the COVID-19 pandemic, focusing on student engagement and learning outcomes. This research focuses on students' mindfulness, creativity, anxiety, and boredom in education (Cheng, 2023). The research context of Wilkie et al. (2023) emphasizes the importance of student voice and student engagement related to classroom context features. This study highlights the role of mindfulness in education (GarcÃa-Rubio et al., 2023). This study emphasizes the importance of empathy and connection in the learning process (McLaughlin et al., 2023). The context of this study emphasizes a positive classroom atmosphere that facilitates engagement (Aubrey & Philpott, 2023). The study addresses gaps in previous research on online education (Tosto et al., 2023). This research explores academic engagement spanning cognitive, emotional, and social-behavioral components (Yin et al., 2023).

- **Country:** The research was conducted in various countries: Saudi Arabia (Harb et al., 2023),

Finland (Soininen et al., 2023), Romania (Dragomir & Dumitru, 2023), Israel (Wilkie et al., 2023), Spain (GarcÃa-Rubio et al., 2023). The research of McLaughlin et al. (2023) involving the United States and Mexico also refers to the West Bank and Palestine. (Tosto et al., 2023) conducted research in the United States, and Yin et al. (2023) in Guangdong Province, China. Cheng's (2023) research is by (Arai & Takizawa, 2024), and research (Baker et al., 2013) is an article review that does not mention a specific country but includes studies from various international contexts.

Result

An overview of educational publications in the past decade is presented in Table 1. A significant portion of educational research is made up of articles. While the annual growth rate of publications is 8.49%, the average annual number is 1,576. A total of 171 countries have contributed to educational research.

Table 1. Top 10 Journal of the topic

No.	Authors	Article Title	Journal	Quartile
1.	(Yin et al., 2023)	Chinese students' perceptions of social networks and their academic Engagement in technology-enhanced classrooms	Heliyon	Q1
2.	(Tosto et al., 2023)	Online learning in the wake of the COVID-19 pandemic: Mixed methods analysis of student views by demographic group	Social Sciences & Humanities Open	Q1
3.	(Aubrey & Philpott, 2023)	Second language task engagement in face-to-face and synchronous video-based computer-mediated communication modes: Performances and perceptions	System Journal	Q1
4.	(McLaughlin et al., 2023)	Decolonizing internal and external borders: Reflections on therapeutic engagements with asylum seekers	The Arts in Psychotherapy	Q3
5.	(GarcÃ-a-Rubio et al., 2023)	Effectiveness and mechanisms of change of a mindfulness-based intervention on elementary school children: A cluster-randomized control trial	Journal of School Psychology	Q1
6.	(Wilkie et al., 2023)	Exploring ways to engage disaffected mathematics students through formative assessment processes with rich tasks	Teaching and Teacher Education	Q1
7.	(Cheng, 2023)	Delving into the role of mindfulness in the relationship between creativity, anxiety, and boredom among young EFL learners	Heliyon	Q1
8.	(Dragomir & Dumitru, 2023)	Two years into the COVID-19 pandemic: An analysis of learning outcomes and student engagement at an economics university	Journal of Accounting Education	Q2
9.	(Soininen et al., 2023)	Reciprocal associations among teacher-child Interactions, teachers' work Engagement, and Children's social competence	Journal of Applied Developmental Psychology	Q1
10.	(Harb et al., 2023)	Diverse distant-students deep emotion recognition and visualization	Computers and Electrical Engineering	Q1

In Table 1, the Top 10 Journals on the topic provide a comprehensive list of the best journals that publish high-quality research on various topics. One such topic is "Teacher Attention in Assessing Student Anxiety in Class Activities". These journals maintain strict standards for article selection, peer reviews, and impact assessment.

Scopus ranks these journals as Q1 and Q2, indicating their popularity and readability. Experts review articles to ensure quality, accuracy, and relevance. These articles provide valuable guidance for researchers studying how teachers can identify and support anxious students in the classroom. They help identify future internal disorders while providing mental health literacy training and efforts to implement easily applicable strategies (Ginsburg et al., 2022; Poorman et al., 2019). The study, published in the journal, emphasizes the importance of teachers paying attention to anxious students as it can impact their learning in the classroom. These articles are widely read within the scientific community, promoting the exchange of knowledge and learning. Researchers can follow the lead of these journals to produce high-quality work that aids teachers in better understanding and managing student anxiety, ultimately improving students' problem-solving skills and anxiety management (Minahan & Ablon, 2022). These articles highlight the significance of conducting thorough research on how teachers can support students experiencing anxiety in the classroom. This list underscores the importance of publishing exceptional work in these journals. By following the example of these leading journals, researchers can produce superior articles that help teachers discover more effective ways to address student anxiety, ultimately enhancing student learning.

Teacher

An analysis of the 65 articles provided shows that teachers should consider several factors when assessing students' anxiety in classroom activities. These factors include stress, anxiety, cognitive involvement, and behavioral involvement. It is very important for teachers to actively observe and recognize the signs of stress in students during classroom activities, as stress can exacerbate or trigger anxiety. Furthermore, students' behavioral engagement levels, including active participation and self-disclosure, serve as important indicators for teachers to identify students experiencing anxiety.

The study of GarcÃa-Rubio et al. (2023) describes awareness-based interventions for student development. Increased attention by teachers improves emotional regulation, academic performance, and student engagement, highlighting the role of mindfulness in education. In addition, teachers should also consider the level of cognitive engagement shown by students. It involves evaluating how well students can stay mentally focused on their learning and overcome academic difficulties, even when anxious. By recognizing and understanding these various factors, teachers can develop effective strategies to help students manage their anxiety effectively and stay actively engaged in classwork.

A significant increase in the keyword "anxiety" occurred from 2010 to 2023, in 2020 and 2022, to be precise. This shows the substantial impact of the COVID-19 pandemic on the mental health of students in the learning environment. Tosto et al. (2023) explained from the perspective of students who said that online learning during the COVID-19 pandemic, students were concerned about the reduced interaction of teachers when the learning process was online. There was a gap in online learning. During the pandemic, pandemic studies were

confounded by stress and abrupt transitions. The abrupt transition to remote or hybrid learning as a result of the pandemic has increased anxiety levels among students, presenting new challenges for teachers to acknowledge and address these issues. In this context, an important skill for teachers is their ability to pay attention, which allows them to assess students' anxiety during classroom activities. Teachers must cultivate sensitivity to recognize indicators of anxiety, including behavioral changes, decreased participation, or difficulty concentrating, which can be subtle in a remote learning environment. Failing to identify these signs can lead to untreated mental health problems among students, which adversely affects their learning and overall development. In addition, the high level of student anxiety experienced during the peak of the pandemic necessitated changes in learning practices. Teachers should prioritize emotional support and build a psychologically safe learning environment. (Regaieg et al., 2022; Tshering & Dema, 2022; Xu & Wang, 2023).

Interpreting student anxiety and engagement

Student anxiety is a common problem in education, and teachers play an important role in identifying and addressing these problems. Recent research highlights the different ways teachers deal with anxiety and the techniques they use to minimize their impact on student learning outcomes. Teachers closely observe the relationship between student anxiety and academic achievement, monitoring how anxiety affects classroom participation, engagement, and use of digital technology. They also acknowledge the influence of anxiety on students' motivation and creativity, understanding that anxiety can inhibit their desire to take risks and engage in creative activities. Regarding online learning, teachers have noticed that anxiety affects how students use the camera and interact with the material. They realize that anxiety can hinder active participation in virtual classes.

Teacher-provided responses or interventions to student anxiety and engagement

When teachers encounter conditions where students feel anxious in the learning process, teachers use various strategies to overcome them. Research by Harb et al. (2023) explains that recognizing emotions can monitor student engagement and find the right teaching strategies. They encourage positive thinking and goal-setting techniques, use teacher lecture strategies to relieve anxiety and encourage engagement, and carefully craft messages that predict student motivation and academic performance. By addressing boredom and anxiety, teachers seek to increase students' creativity and improve learning outcomes.

The study emphasized the important influence of student anxiety on academic achievement and engagement in the classroom. Teachers must identify and address these anxieties through appropriate strategies to create a positive learning environment and improve student well-being and success. By understanding how teachers provide attention and the effectiveness of various interventions, educators can better prepare themselves to address the challenges posed by student anxiety in a religious education environment. To help students manage anxiety and maintain engagement in learning, it is important to incorporate various strategies such as relaxation techniques, mindfulness activities, and open discussions about mental health. Given

the urgency of this trend, it is crucial to research "Teacher Attention in Assessing Student Anxiety in Classroom Activities." The findings of such research can directly impact teachers' professional development, equipping them with the skills and strategies necessary to identify and address student anxiety effectively. Furthermore, the focus of this research can contribute to the development of educational policies that prioritize students' mental well-being not only during times of crisis, such as the pandemic but also in regular learning environments. Students can cultivate resilience and coping mechanisms with adequate teacher support and understanding, ensuring their long-term academic success and emotional well-being.

Discussion

To enhance the robustness of this research, we have included information about the theoretical approach employed, the educational setting strategy utilized, and our aspirations for the future.

Theoretical Comparison and Relation with the Personality Traits

The researcher by (Go et al., 2024). Can collaborate and leverage their expertise in educational psychology and measurement to develop a valid and reliable tool for assessing student anxiety and teachers' ability to recognize it. On the other hand, (Pina et al., 2023)can collaborate and combine clinical psychology and educational perspectives to create effective interventions to reduce students' anxiety in the classroom. Additionally, cross-disciplinary collaborations, such as (Pina et al., 2023), can offer valuable insights into contextual factors that influence student anxiety, such as social dynamics or classroom climate, and their impact on "teacher anxiety." Such collaborations can also encourage the development of a more comprehensive theoretical framework for understanding student anxiety and the role of teachers in learning environments.

The author's collaborative analysis emphasizes the importance of an interdisciplinary and collaborative approach when studying "Teacher Attention in Reviewing Student Anxiety in Classroom Activities." Researchers can produce more comprehensive and relevant findings that inform educational practices and policies by integrating expertise from fields such as psychology, education, and measurement. This collaboration also accelerates the sharing and application of best practices in identifying and addressing student anxiety in the classroom, ultimately improving learning outcomes and overall student well-being.

Integrating Big Five personality theories into educational strategies offers a nuanced approach to addressing student anxiety and enhancing classroom dynamics. The Big Five traits—neuroticism, conscientiousness, extraversion, agreeableness, and openness—significantly influence students' and teachers' behaviors and interactions within educational settings (Williams et al., 2023). Students with high levels of neuroticism, for instance, are more susceptible to anxiety, suggesting that educational strategies should foster positive and inclusive environments to mitigate these effects (Meyer et al., 2023). This aligns with findings that neuroticism predicts emotional challenges, while conscientiousness is linked to resilience

and effective stress management (Thalmayer et al., 2022). Conversely, students characterized by high conscientiousness may leverage their intrinsic motivation and cultural resources more adeptly, benefiting from strategies that emphasize competence and autonomy(Kumar & Tankha, 2023)

This trait's association with positive health outcomes and behaviors underscores its role in navigating academic challenges(Kumar & Tankha, 2023). Teachers' personalities also critically impact the implementation of educational strategies. Those with high openness and agreeableness are better equipped to meet students' emotional needs and foster supportive classroom interactions (Duong, 2021; Usslepp et al., 2020). Their approachability and adaptability can enhance the delivery of educational content and engagement strategies (Mitchell et al., 2021). Moreover, conscientious teachers are likely to apply educational interventions systematically, potentially increasing the effectiveness of anxiety-reducing strategies (Schutter et al., 2020). This indicates a potential connection between the conscientiousness of teachers and the use of theory-based interventions, like Keller's ARCS model, to cultivate a less anxiety-inducing learning atmosphere. Integrating Big Five personality theories into educational research and practice can establish a more comprehensive and personalized strategy for addressing student anxiety and fostering involvement, ultimately enhancing educational achievements and emotional wellness.

Educational Setting Strategy

Student anxiety is a frequent issue in educational settings, and teachers have a crucial role in recognizing and applying strategies to lessen its impact on learning results. This systematic review examines different educational and environmental strategies to tackle student anxiety and enhance engagement, motivation, and academic performance. One effective strategy highlighted in the literature is using compelling messages by teachers to motivate students (Yosep et al., 2023). Research has found that autonomous motivation positively impacts academic performance, whereas controlled motivation has a negative effect. Therefore, teachers should focus on practices that support autonomy to improve student outcomes.

Integrating social networks in educational settings has been proven to enhance academic engagement, motivation, and the availability of personalized learning materials (Hawes & Arya, 2023). Using social networks, teachers can create interactive learning environments that captivate students and cater to their needs. Another effective technique for reducing student anxiety and boosting engagement is gamification. This approach incorporates game elements like points, badges, and rankings to create a more immersive and motivating learning experience. However, it is important to note that excessive exposure to gamification can lead to decreased motivation, as students may become reliant on external rewards.

Mindfulness programs have effectively reduced anxiety and enhanced students' creativity (Fagioli et al., 2023). Teachers can help students overcome anxiety and become more engaged in the learning process by creating a positive classroom atmosphere and incorporating

mindfulness techniques. Innovative teaching methods and student-centered approaches can provide a more supportive and engaging learning environment (Flatekval, 2023). In clinical settings, online Objective Structured Practice Exams (OSPEs) and Objective Structured Clinical Exams (OSCEs) have been suggested to assess students' skills while reducing anxiety. Collaborating with technology companies for faculty software training and holding faculty training sessions on effective student engagement is also recommended.

Continuous monitoring of student progress is essential to identify and overcome anxiety and lack of interest. Teachers should explore students' perceptions of silence in the classroom and identify the causes of student silence to increase participation. Proposing effective guidelines for instructing quiet learners can also contribute to a more inclusive and supportive learning environment. The structure of the classroom environment plays an important role in shaping students' goal orientation and cognitive engagement. Teachers should create an environment focusing on mastery and progress goals to foster a growth mindset and reduce anxiety. Structural equation modeling has been used to analyze the mediating role of goal achievement in the relationship between classroom structure and student engagement. Finally, school-based exposure exercises have been proposed as a strategy to overcome anxiety in students. By collaborating with teachers and caregivers to monitor progress and provide support and using fear hierarchies to set exposure goals, students can gradually overcome their anxiety and engage more fully in the learning process.

Recommendations for Future Research: Moving Forward in Addressing Student Anxiety

A systematic review explored educational and environmental strategies for addressing student anxiety. The review identified several promising approaches, such as engaging messaging, social networking, gamification, mindfulness, and supportive classroom environments. However, future research should consider the following recommendations to enhance our understanding of student anxiety and develop more effective interventions.

Firstly, it is crucial to delve into the impact of culture on anxiety treatment for BIPOC youth and address social disparities and barriers to care. This exploration should be expanded to examine the influence of technology on academic achievement among students with disabilities (Cosby et al., 2023), utilizing cross-national data and considering the challenges and benefits of virtual reality (Rizk & Hillier, 2022). Secondly, future research should examine strategies to promote engagement in diverse educational contexts, such as ESL learning environments and native English teacher talk (Aliabadi & Weisi, 2023). These investigations should also consider individual teachers' specific characteristics concerning their engagement strategies. This can offer valuable insights for professional development (Santana-Monagas et al., 2022). Replicating the study with diverse student populations can help validate any demographic differences and enhance the overall applicability of the findings (Santana-Monagas et al., 2022).

Thirdly, it is recommended that longitudinal designs be used to establish causal relationships between variables. Furthermore, it is important to explore the influence of factors such as tone of voice and grades on student motivation (Santana-Monagas et al., 2022). Additionally, there is a need for further investigation into the impact of social networks on academic engagement across different levels of education (Yin et al., 2023). Researchers should also prioritize studying the impact of individual traits on gamification strategies for motivation, as well as exploring the long-term effects and novelty of gamification (Ratinho & Martins, 2023).

Fourthly, several areas warrant further examination, like the impact of mindfulness on students' creativity, anxiety reduction, boredom alleviation, and overall well-being should be explored in greater detail (Aghazadeh & Abedi, 2014; Ratinho & Martins, 2023). Additionally, future research should investigate mindfulness programs' effectiveness in various educational settings and age groups(Cheng, 2023). It would also be valuable to conduct cross-cultural comparisons of students' satisfaction with e-learning and its impact on mental health during the pandemic, as this could offer insights into educational policy and practice(Aghazadeh & Abedi, 2014). It is crucial to assess the preparedness of medical schools in underdeveloped countries for e-learning (Fahim et al., 2022).

Fifth, conducting replication research in various global regions can enhance our comprehension of student anxiety and engagement(Pirhayati, 2012). his research should examine the reasons behind and outcomes of student hesitation across diverse cultural contexts and the influence of linguistic, psychological, and sociocultural factors. Such research can contribute to the development of culturally responsive interventions (Conroy et al., 2022).

Finally, in future research, it is important to consider cultural factors and biases in assessments and adapt strategies accordingly, depending on the understanding and involvement of relevant stakeholders (Han & Hyland, 2015). Additionally, researchers should explore alternative methods of assisting students with anxiety, as not every child may require school consultation (Wang & Zhang, 2021).

Limitation

The article has several limitations that should be considered. These include using specific databases, restricted time frames, a lack of input from other involved parties, a lack of explicit evaluation of research quality, and potential bias in the review process. However, despite these limitations, the article provides a strong foundation for future research. It can guide efforts to enhance support for student well-being and learning in the classroom and inform the development of more effective and culturally sensitive interventions to address student anxiety.

Conclusion

This study aims to present a comprehensive review of recent research conducted between

2010 and 2023 on teacher attention in assessing students' anxiety and engagement in the classroom. This review uncovers some of the key themes that emerge from the literature. These themes include teachers' ability to observe, interpret, and respond effectively to learning situations and future research recommendations.

Teachers are vital in recognizing and addressing student anxiety in the classroom. They need to be aware of signs of anxiety, such as stress, decreased cognitive engagement, and changes in behavior. By understanding and identifying the various aspects of student anxiety, teachers can create effective strategies to help manage anxiety and encourage active participation in learning. Several theoretical models and approaches, including the ritual chain theory of interaction, cultural capital theory, and motivation theory, have been used to understand student anxiety and the role of teachers in educational settings. Comparing these models shows different perspectives and approaches to addressing this multifaceted issue.

Strategies in educational settings to address student anxiety include using engaging messages, integrating social networks, implementing gamification, promoting mindfulness, and creating supportive classroom environments. In addition, ongoing monitoring of student progress, exploring student perceptions, and adjusting classroom structures are crucial for reducing anxiety and increasing engagement.

Future research should consider the influence of culture on anxiety treatment, investigate the impact of technology on students with disabilities, examine strategies to promote engagement in diverse educational contexts, utilize longitudinal design, and explore the role of mindfulness, e-learning, and social networks. It is also recommended that research on replication in different global regions be conducted and cultural factors be considered in the assessment.

These findings provide the foundation for future research on the connection between teacher attention, student anxiety, and classroom engagement. By gaining insight into patterns of teacher attention and the effect of different interventions, educators can effectively address the challenges of student anxiety in various educational environments. This, in turn, promotes student well-being and achievement.

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INFLUENCING FACTORS ON UNIVERSITY STUDENTS' LEARNING EXPERIENCES AND COGNITIVE OUTCOMES IN ONLINE LEARNING ENVIRONMENT IN KOREA

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ABSTRACT

The COVID-19 pandemic has forced higher education institutions to rapidly transition to online learning, significantly changing traditional teaching methods and campus organization. Despite these challenges, universities must prioritize students' learning experiences, changes, and development, as these are key factors in verifying their effectiveness and improving teaching and learning. This study analyzed data from the National Assessment of Student Engagement in Learning (NASEL) in Korea to investigate the effect of personal background and learning experiences on the cognitive outcomes of 2,086 university students in the online learning environment. Results of the study showed significant mean differences by major for the variables of university students' learning experience and performance. It also showed that major, grade, learning attitude, challenging learning experiences, interaction with professors, and interaction with campus community members had significant effects on knowledge acquisition, while major, gender, active class participation, learning attitude, thinking activities, challenging learning, interaction with students from different backgrounds, and interaction with campus community members had significant effects on cognitive capacity. These results highlight the need for universities to identify effective teaching and learning methods in the online learning environment and implement appropriate improvement plans.

Keywords: Online learning environment, Cognitive outcomes, Major, Learning experiences

Introduction

The COVID-19 pandemic has profoundly affected the global education landscape, necessitating significant changes in university education and accelerating the adoption of online learning. Previously, online education was applied to certain subjects. Still, the complete shutdown of face-to-face education forced students and instructors to adapt to various online platforms for emergency remote teaching rapidly (Pokhrel & Chhetri, 2021). Adedoyin and Soykan (2020) highlight that the transition to distance education during COVID-19 was not grounded in established learning theories and models, suggesting that these would have been implemented gradually under normal circumstances. Consequently, the impact of distance education on learning outcomes likely varied depending on students' and instructors' adaptability to the changing environment.

Analyzing learning experiences and outcomes in the context of fully online education during COVID-19, identifying problems, and proposing improvements will significantly contribute to higher education research, especially as distance learning remains a promising educational format post-pandemic. Unlike the pre-COVID-19 era, where online learning was managed on a pilot or policy basis, the pandemic necessitated all professors to engage in distance learning, revealing its advantages and disadvantages and leading to effective integration strategies in their courses. Initially, there was apprehension and a need for adjustment, but now the focus has shifted to evaluating whether online learning enhances the efficiency and effectiveness of university education.

Reflecting on the COVID-19 era, it is evident that the means and speed of the transition to distance education, along with proactive university support and quality control, significantly influenced students' learning experiences and outcomes. Prior research presents mixed results regarding the impact of COVID-19 on learning outcomes and experiences. Some studies indicate a reduction in crucial learning experiences due to course redesign, inadequate preparation for online classes, traditional teaching methods' limitations, and insufficient university support (Bae et al., 2021). In contrast, others suggest that educational effectiveness improved as professors could respond to questions and provide real-time feedback, overcoming time and distance constraints (Oliveira et al., 2021). These findings imply that COVID-19's impact on learning experiences and outcomes is not uniform but varies based on students' backgrounds, university support, and country-specific circumstances.

Earlier studies have demonstrated that students' participation in diverse educational activities and active interactions with university-affiliated individuals significantly influence academic persistence and learning outcomes (Astin, 1993; Pace, 1987; Tinto, 1990). Quality interactions between students and professors, peer cooperation, and an active learning attitude are pivotal learning experience factors that enhance knowledge acquisition and motivate students to engage actively in learning (Chickering & Gamson, 1987). In addition, individual-level variables such as major, gender, and grade level have also been shown to be associated with student engagement and performance (Duke, 2002; Gadzella & Mastern, 1998; Ko et al., 2011; Pike, 2004). This study investigates the relevance of these learning experience factors during COVID-19 and explores necessary preparations for future education.

As higher education evolves, with diminishing time and space constraints, universities must continue focusing on providing effective learning experiences for student learning outcomes. Research primarily discussed in traditional face-to-face education settings must now be diversely analyzed in the online learning context. This study investigates the differences in learning experiences and outcomes according to students' majors in an online education environment. It further examines the factors that affect knowledge acquisition and cognitive capacity, considering students' diverse backgrounds and learning experiences in Korean universities where distance education has become prominent. The study also offers practical implications for improving teaching and learning strategies in online higher education.

Review of Literature

Online Learning in University Education

Online learning, a variant of distance learning, utilizes digital platforms and the Internet, ensuring that at least 80% of instructional material is accessible online (Allen & Seaman, 2008; Shelton & Saltsman, 2005). As personal computers and the Internet became more widely available in the 1990s, information technology became a pivotal educational tool within higher education, leading to the evolution of distance online learning as a new educational paradigm (Madjidi et al., 1999). With ongoing technological advancements, online education tools and platforms have been increasingly incorporated into traditional university education, enhancing the role and significance of online programs. Consequently, instructors have adopted hybrid education models combining face-to-face and fully online instruction (Jaggars & Bailey, 2010; Larreamendy-Joerns & Leinhardt, 2006; Sun & Chen, 2016).

The COVID-19 pandemic in 2020 necessitated a complete transition from traditional face-to-face education to online education, compelling the education system and instructors to quickly adapt to various online platforms and tools for emergency remote teaching. This transition posed several challenges, such as redesigning courses, low readiness among instructors and learners for online classes, and limited university support (Aguilera-Hermida, 2020; Pokhrel & Chhetri, 2021). Additionally, underserved students lacking access to the Internet or online devices faced educational disparities (Jaggars & Bailey, 2010), and overall, students experienced decreased motivation, self-efficacy, and cognitive engagement (Aguilera-Hermida, 2020).

Conversely, online education offers unique advantages in faculty-student interaction. Professors can use more channels for communication, enabling quicker and higher-quality feedback, thus engaging students in more productive educational activities while eliminating travel time (Oliveira et al., 2016). Online platforms like Zoom or LMS allow classes to be conducted regardless of time and location, providing opportunities for repetitive learning and active exploration of materials (Park, 2020). For some students, these new learning environments can increase motivation and the likelihood of meaningful learning (Gonzalez et al., 2020; Lim & Morris, 2009). Therefore, distance education is a viable method for continuing education during emergencies like COVID-19, and the adaptability of instructors

and students to online learning tools, combined with well-designed courses, can enhance higher education effectiveness. To maximize the benefits of online education, it is essential to design thorough courses and employ teaching methods that motivate students and accommodate new technologies (Aguilera-Hermida, 2020; Lim & Morris, 2009).

Cognitive outcomes of university students

Numerous studies have examined students' learning outcomes to address various issues in university education and identify factors affecting the development of cognitive abilities necessary for effective teaching and learning. The focus on students' learning outcomes has intensified due to growing concerns about the underdevelopment of higher-order cognitive skills among university students (Mayhew et al., 2016). Learning outcomes in university education are generally categorized into cognitive and non-cognitive domains. Cognitive outcomes encompass higher-order thinking skills, including knowledge in specific majors, liberal arts, problem-solving skills, analytical skills, critical and logical thinking skills, and communication skills. These outcomes are positively associated with factors such as professors' motivation, effective lectures, active class participation, cooperative learning, and interaction with the campus community (Choi & Lee, 2009; Seo, 2003).

Ko et al. (2011) define knowledge acquisition as a crucial cognitive outcome that indicates students' increased knowledge about specific majors, liberal arts, and social issues. Students perceive the growth of such knowledge when involved in various on-campus learning and social experiences, and studies show that active class participation and both in-class and out-of-class interactions with professors positively impact knowledge acquisition (Choi & Shin, 2010; Ko et al., 2011).

Cognitive capacity, another essential cognitive outcome, involves the development of critical thinking and the ability to reflect on one's thinking activities through judgment. Kuh et al. (2006) emphasized that cognitive competence is a significant higher education outcome determined by the quality of students' individual learning efforts and their psychological and social engagement within the university. Active participation in intellectual and cultural activities and a university culture that promotes learning in various settings contribute to the development of cognitive competence (Astin, 1984; Pascarella & Terenzini, 1991; Yu et al., 2014). This study focuses on knowledge acquisition and cognitive competence as two major cognitive outcomes students are expected to gain in a university setting involving online learning. The importance of cognitive outcomes emphasizes the need for research on the effect of the different educational settings on students' learning experiences and eventual cognitive outcomes.

Major and learning experiences of university students

Majors have been largely treated as individual-level variables, such as gender and grade level, that measure student learning engagement and outcomes. Efforts to measure the effect of student majors on learning outcomes have yielded varied results due to differences in research subjects, types of learning outcomes studied, definitions of majors, and teaching and learning methods. Some studies report significant differences in learning outcomes between majors (Duke, 2002; Gadzella & Mastern, 1998), while others find no significant differences (Money,

1997; Sebrell & Erwin, 1998). Additionally, while some research indicates that major has little effect on cognitive learning outcomes (Ko et al., 2011), other studies highlight significant differences in subject knowledge and competencies, particularly with engineering students showing higher development of academic knowledge and skills compared to humanities students (Ko & Park, 2016). For natural science majors, there is a statistically significant relationship between being in a collaborative classroom and being in a social science classroom (Pike, 2004; Pike & Killian, 2004).

Given the increased importance of online education post-pandemic, it is crucial to explore ways to improve teaching and learning methods to maximize the effectiveness of online learning. Learning experiences encompass academic experiences within the curriculum and social experiences outside the curriculum related to cognitive, emotional, and psychological growth (Astin, 1993; Choi & Lee, 2009). These experiences can be categorized into academic and social engagement, closely linked to students' time on learning and educational activities and how universities structure their curricula and support services (Kuh et al., 2006).

Academic engagement, such as active learning, class participation, and challenging learning activities, significantly impacts university learning outcomes. Hong and Ryu (2020) argue that in a non-face-to-face learning environment, meaningful learning involving active thinking and utilizing learned material greatly affects learning outcomes, including competence in students' majors, core competencies, and communication skills. Studies consistently show that cognitive performance improves when students can apply what they learn in class, perform challenging tasks, and engage in active or collaborative learning (Mayhew et al., 2016).

Social engagement, including participation in student activities, peer interactions, and student-professor interactions, also plays a crucial role in learning outcomes. Pascarella and Terenzini (2005) found that social engagement extends academic knowledge by allowing students to interact with peers and encounter diverse interests, values, and cultures, leading to cognitive outcomes such as analytical and communication skills. Interactions with professors provide feedback and discussion opportunities that directly or indirectly affect students' learning processes and academic achievements (Choi & Shin, 2010; Kuh et al., 2006; Pascarella & Terenzini, 2005). Ko et al. (2011) highlighted that the college environment, student-faculty interaction, and class participation significantly impact learning outcomes, showing the importance of both academic and social engagement.

Conceptual Framework

This study aims to investigate the impact of major and learning experiences on learning outcomes in the online learning environment, providing insights for future educational strategies. In traditional face-to-face learning environments, academic and social engagement variables have been emphasized as key determinants of learning outcomes. Given the shift to virtual settings, examining whether these same engagement factors can still effectively predict learning outcomes in an online learning context is vital. For this purpose, we mainly adopted a research model used by Pike et al. (2003), Pascarella (1985), and Ko et al. (2016). Pike et al. (2003) emphasized two critical features, involvement based on Astin's involvement theory and integration based on Pascarella's integration model, in the relationship between college student engagement and learning outcomes. While Astin's (1991) model emphasized the quality and quantity of student involvement in student experiences, Pascarella (1985) focuses

more on integrating student involvement, educational experiences, and the college environment. Ko et al.'s (2016) work is especially important in a Korean context. They reinforced previous theories by Pike et al. (2003) and Pascarella (1985) and demonstrated that Western theories were useful in an Eastern, particularly Korean context. Based on the previous studies (Pascarella & Terenzini, 2005; Ko et al., 2016), we developed three models for regression analysis. The first model, the base model, consists of only personal background characteristics and major. The second model, the academic engagement model, included active class participation, learning attitude, cooperative learning, thinking activities, active learning, and challenging learning in addition to the variables in the base model regression. The third model, the full model or learning experience model, consists of all independent variables, including social engagement variables.

Methods

Sampling and Data Collection

This study utilized data from the National Assessment of Student Engagement in Learning (NASEL) survey, an annual survey administered by the Korea Educational Development Institute (KEDI), to inform policies to improve the quality of higher education in South Korea. The survey questionnaire developed by the KEDI was distributed to 16,826 students at a large private university in Seoul, and 2,246 students responded. Of these, 69 responses were deleted because the survey was incomplete or major information was missing. In addition, 38 responses from medical schools and 31 responses marked as 5th year or higher were deleted because they may not actively participate in many undergraduate programs. Finally, data from 2,086 students were analyzed by major. The survey was administered online over six weeks from June 14 to July 30, 2021.

Respondent characteristics were as follows: 834 (40.0%) were male and 1,252 (60.0%) were female. The distribution by grade was: 553 (26.5%) first grade, 436 (20.9%) second grade, 556 (26.7%) third grade, and 541 (25.9%) fourth grade. By major, respondents were distributed as follows: 712 (34.1%) in engineering, 602 (28.9%) in social sciences, 296 (14.2%) in natural sciences, 249 (11.9%) in humanities, 150 (7.2%) in arts and physical education, and 77 (3.7%) education.

Measurement Tools

Dependent Variables: The dependent variables in this study are knowledge acquisition and cognitive capacity, which are outcomes of student learning in universities. Knowledge acquisition was measured by the perceived knowledge and skills necessary for the major and the world of work that students are expected to acquire through undergraduate education and was measured by a single question. Cognitive capacity was measured by four items: critical thinking, creativity/integration, problem-solving, and liberal arts knowledge. All items were measured on a 4-point Likert scale (See Table 1).

Independent Variables: Table 1 presents the variables used, the coding scheme, and the composite outcome variables' internal reliability (Cronbach's alpha). Personal background factors included gender (male=0, female=1), major (engineering as the reference group;

humanities, social sciences, education, natural sciences, and arts and physical education), and grade level (ranging from first grade=1 to fifth grade and above=5).

Table 1: Variables and Coding Scheme

Variable	Coding Scheme	*M*	*SD*	Reliability (α)
Dependent Variables				
Learning outcomes	Knowledge acquisition (Single item)	2.709	0.879	
	Cognitive capacity (4 items)	2.833	0.523	.720
Independent Variables				
Gender	0=Male, 1=Female			
Grade Level	5 point scale, 1=first grade, 2=second grade, 3=third grade, 4=fourth grade, 5=fifth grade and above			
Learning experience				
Academic engagement	Active class participation (3 items)	2.240	0.805	.734
	Learning attitude (2 items)	2.776	0.813	.857
	Cooperative learning (3 items)	2.178	0.878	.846
	thinking activities (3 items)	2.578	0.755	.869
	Active learning (5 items)	2.469	0.723	.840
	Challenging learning (13 items)	2.615	0.596	.904
Social engagement	Interaction with students (6 items)	2.073	0.749	.859
	Student activities (4 items)	1.661	0.673	.697
	Study group activities (3 items)	1.715	0.785	.848
	Student-faculty interaction (6 items)	1.571	0.580	.871
	Community member interaction (4 items)	1.983	0.804	.839

The learning experience was divided into academic engagement and social engagement variables. In the academic engagement variable group, active class participation refers to participation in answering questions, asking questions, and participating in discussions; learning attitude refers to falling asleep or being distracted in class; cooperative learning experience refers to discussing class content with peers, helping with test preparation, thinking activities include connecting concepts learned in other classes and doing critical reviews, active learning experiences includes exploring new ideas and seeking feedback, and challenging learning experiences includes applying class material to real-world situations, including diverse perspectives, and understanding the opinions of others. Social engagement variables include interacting with students from diverse backgrounds, being involved in student activities, participating in study group activities, and interacting with campus community members.

Analysis method

This study intended to examine differences in learning experiences and outcomes by students' majors in online education environments and factors affecting knowledge acquisition and cognitive capacity. Post-hoc analysis was conducted using Scheffe's and Tamhane's tests to identify specific differences between majors, depending on the assumption of equal variance. A hierarchical regression analysis was also conducted to examine the factors affecting university students' knowledge acquisition, cognitive capacity, personal background, and learning experience online.

Each regression model was entered stepwise with personal background, major, academic engagement, and social engagement variables as the dependent variables, with knowledge acquisition and cognitive capacity. The Durbin-Watson statistic was checked during this process to determine whether the residuals were independent. A Durbin-Watson statistic close to 2 indicates that the assumption of independence of residuals is satisfied and that there is no autocorrelation.

Results

Results of ANOVA on learning experiences and learning outcomes by major

An ANOVA was conducted to determine whether there were differences in university students' learning experiences and cognitive outcomes during the online learning period. The result shows that differences in group means were statistically significant in all areas except challenging learning, student-faculty interaction, and cognitive capacity (See Table 2).

Table 2: Mean differences in learning experiences and learning outcomes by majors

Variable	Humanities (a)	Social Sciences (b)	Education (c)	Engineering (d)	Natural Science (e)	Arts and Physical Education (f)	*F*	*p*	*Scheffe*
Active class participation	2.581	2.182	2.771	2.095	2.128	2.547	28.081	0.000	a>b, d, e c>b, d, e, f f>b, d, e
Learning attitude	2.823	2.718	2.812	2.801	2.819	2.710	1.305	0.259	-
Cooperative learning	2.047	2.001	2.502	2.221	2.347	2.413	13.187	0.000	c>a, b d>b e>a, b f>a, b
Thinking activities	2.699	2.565	2.541	2.511	2.582	2.749	4.029	0.001	a>c f>c
Active learning	2.640	2.382	2.470	2.427	2.488	2.699	8.224	0.000	a>b, d f>b, d
Challenging learning	2.687	2.621	2.598	2.594	2.596	2.618	1.005	0.413	-
Interaction with students from different backgrounds	2.290	2.020	2.093	2.013	2.111	2.130	6.114	0.000	a>b, d
Student Activities	1.755	1.638	1.698	1.630	1.784	1.480	5.666	0.000	a>f e>f
Study group activities	1.712	1.704	1.675	1.733	1.773	1.582	1.319	0.253	-
Student-faculty interaction	1.567	1.546	1.630	1.550	1.621	1.648	1.549	0.172	-
Student-campus community member interaction	1.942	1.861	2.169	1.972	2.152	2.157	7.899	0.000	e>b f>b
Knowledge acquisition	2.530	2.734	2.753	2.691	2.720	2.940	4.376	0.001	f>a
Cognitive capacity	2.926	2.831	2.808	2.797	2.795	2.947	4.022	0.001	a>d

As a result of Scheffe's test conducted to identify specific differences between the sample groups, the mean for active class participation was higher among education majors than other majors, and cooperative learning was higher for education, natural sciences, and arts and physical education majors than humanities and social sciences majors. The mean for active learning was higher for humanities and arts and physical education majors than social sciences and engineering majors, interaction with students from different backgrounds was higher

among humanities majors than social sciences and engineering majors, and student activities were higher among humanities and natural science majors than arts and physical education majors. The mean for student-campus community member interaction was higher for natural sciences and arts and physical education majors than for social majors. Meanwhile, the mean for knowledge acquisition was higher for arts and physical education majors than for humanities majors.

Regression analysis on knowledge acquisition

The hierarchical regression model with knowledge acquisition as the dependent variable was statistically significant for all three models (Table 3). The explanatory power of the regression model was low at 0.038 (R^2) when the personal background variable was included in Model 1 but increased to 0.197 with the addition of academic engagement variables in Model 2 and further to 0.209 with the inclusion of social engagement variables in Model 3. The independent variables in the final model were estimated to explain approximately 21% of the variance in knowledge acquisition as a learning outcome.

Table 3: Results of hierarchical regression analysis model on knowledge acquisition

Independent variables	Model 1 (Base Model)		Model 2 (Academic Engagement Model)		Model 3 (Full Model)	
	B	β	B	β	B	β
(constant)	2.370		0.667		0.529	
Gender	-0.006	-0.003	0.022	0.012	0.033	0.019
Grade	0.127	0.165***	0.118	0.153***	0.119	0.154***
Humanities	-0.157	-0.058*	-0.231	-0.085***	-0.238	-0.088***
Social Sciences	0.045	0.023	0.049	0.025	0.045	0.023
Education	0.048	0.010	0.004	0.001	0.004	0.001
Natural Sciences	0.036	0.014	0.012	0.005	-0.004	-0.002
Arts and physical education	0.273	0.080*	0.206	0.061**	0.190	0.056*
Active class participation			0.027	0.025	0.005	0.004
Learning attitude			0.105	0.097***	0.100	0.093***
Cooperative learning			0.048	0.048	0.002	0.002
Thinking activities			0.060	0.051	0.063	0.054
Active learning			0.065	0.053	0.048	0.039
Challenging learning			0.366	0.248***	0.346	0.234***
Interaction with students					0.046	0.039
Student Activities					-0.017	-0.013
Study group activities					-0.010	-0.009
Student-faculty interaction					0.138	0.091***
Student-campus community member interaction					0.059	0.054*
R^2	0.038		0.197		0.209	
F	11.605***		39.064***		30.387***	
ΔR^2			0.159		0.012	
ΔF			68.462		6.482	

*Durbin-Watson = 2.045, *p<.05. **p<.01, ***p<.001*

To summarize the regression analysis results with knowledge acquisition as the dependent variable, in the final Model 3, the perceived knowledge acquisition of humanities major was lower than that of engineering major. In comparison, the perceived knowledge acquisition of arts and physical education majors was higher. In addition, higher grades, positive learning attitudes, and challenging learning experiences positively affected knowledge acquisition, and interactions with professors and other campus community members affected learners' knowledge acquisition. On the other hand, when the learning experience variables were introduced, and personal background was controlled, the effects of major and grade variables on learners' knowledge acquisition were significant. The variable with the largest relative effect on learners' knowledge acquisition was a challenging learning experience (β=.234).

Regression Analysis on cognitive capacity

Table 4: Results of hierarchical regression analysis model on cognitive capacity

Independent variables	Model 1 (Base Model)		Model 2 (Academic Engagement Model)		Model 3 (Full Model)	
	B	β	B	β	B	β
(constant)	2.818		1.599		1.490	
Gender	-0.063	-0.059**	-0.038	-0.035	-0.042	-0.040*
Grade	0.003	0.007	-0.004	-0.009	-0.010	-0.022
Humanities	0.146	0.091***	0.065	0.040	0.043	0.027
Social Sciences	0.041	0.036	0.026	0.023	0.024	0.021
Education	0.024	0.009	-0.022	-0.008	-0.020	-0.007
Natural Sciences	0.010	0.007	-0.006	-0.004	-0.022	-0.015
Arts and physical education	0.179	0.089***	0.114	0.056**	0.113	0.056**
Active class participation			0.054	0.083***	0.044	0.067**
Learning attitude			0.049	0.076***	0.049	0.076***
Cooperative learning			-0.002	-0.003	-0.053	-0.089***
Thinking activities			0.080	0.115***	0.079	0.114***
Active learning			0.024	0.033	0.023	0.032
Challenging learning			0.278	0.316***	0.244	0.278***
Interaction with students					0.079	0.112***
Student Activities					0.023	0.030
Study group activities					0.005	0.008
Student-faculty interaction					0.010	0.011
Student-campus community member interaction					0.068	0.104***
R^2	0.013		0.261		0.291	
F	3.870***		56.242***		47.018***	
ΔR^2			0.248		0.030	
ΔF			115.845		17.290	

*Durbin-Watson = 2.003, *p<.05. **p<.01, ***p<.001*

All three hierarchical regression models with cognitive capacity as the dependent variable were statistically significant (Table 4). The explanatory power of the regression model was very low at 0.013 (R^2) when the personal background variable was included in Model 1 but

increased significantly to 0.261 with the inclusion of academic engagement variables in Model 2 and further to 0.291 with the addition of social engagement variables in Model 3. The independent variables in the final model were estimated to explain about 29% of the variance in cognitive capacity.

The regression analysis results with cognitive capacity as the dependent variable(Model 3) show that students in engineering majors have higher perceived cognitive capacity than those in arts and physical education majors have higher perceived cognitive capacity than engineering majors. Male students have higher perceived cognitive capacity than female students, and active class participation, learning attitude, thinking activities, challenging learning experiences, interaction with students from different backgrounds, and interaction with campus community members positively affect cognitive capacity. On the other hand, cooperative learning experiences were found to have a negative effect on students' perceived cognitive capacity. Meanwhile, when the learning experience variables were introduced, and personal background was controlled, the effects of major and gender variables on students' perceived cognitive capacity were significant. The variable with the largest relative effect on students' perceived cognitive capacity was challenging learning experiences (β=.278).

Discussion and conclusion

The COVID-19 pandemic caused inevitable changes in the university education environment, forcing universities to adapt to online education through trial and error. This study aimed to analyze whether the existing learning experience theory is valid in the changed educational settings and examine the factors that affect university students' cognitive outcomes, especially knowledge acquisition and cognitive capacity in the online education environment. Through analysis, this study examined which learning experiences should be focused on regarding learners' growth and development and which elements need to be emphasized in the changing educational environment.

First, this study found significant differences between majors in knowledge acquisition and cognitive performance in the online learning setting attributed to variations in educational content and teaching methods. Notably, majors with a higher proportion of practical exercises, such as engineering and arts and physical education, had higher perceived levels of knowledge acquisition even in an online setting. These results are consistent with previous studies showing that engineering students had higher academic knowledge and skills development compared to humanities students in traditional (Ko & Park, 2016). This finding emphasizes the critical role of course content and instructional methods in knowledge acquisition, particularly in distance education environments.

Second, academic and social engagements are significant influencing factors on students learning outcomes in an online education environment, as previous studies suggested in a traditional educational setting (Ko & Park, 2016; Kuh et al., 2006; Mayhew et al., 2016; Pascarella & Terenzini, 2005). This study confirms that teaching and learning methods, particularly those involving challenging learning experiences, have the most substantial impact on knowledge acquisition and cognitive capacity, even when controlling for other

factors. Developing and applying methods that encourage students to examine course material from multiple perspectives, apply it to real-life situations, and understand diverse viewpoints are essential in online education. In particular, interactions with campus community members and interactions with professors regarding cognitive capacity were found to be significant. This suggests that social participation and interactive learning with diverse individuals should be emphasized in online learning environments to foster cognitive skills such as critical thinking, creativity, integration, and problem-solving.

However, contrary to previous research suggesting that cooperative learning fosters various cognitive skills (Lee, 2013; Park, 2007; Yu, 2014), this study found that it negatively affects cognitive capacity. This discrepancy might be due to the improper planning and application of cooperative learning models in the online education context (Adedoyin & Soykan, 2020). Effective cooperative learning requires appropriate theories and meticulous planning, which may have been lacking during the rapid transition to online education caused by the pandemic. Thus, poorly implemented cooperative learning experiences can adversely impact learning outcomes. Despite the potential benefits of online learning, problem-solving may not be effectively realized without adequate course preparation among cognitive skills (Garris & Fleck, 2020; Hong & Ryu, 2020; Jung & Hur, 2020). However, as collaborative learning can enhance students' self-efficacy and overall learning effectiveness, it is vital to explore innovative ways to improve the effectiveness of academic collaborative learning experiences in online educational contexts. Learning experience, positive learning attitude, active and challenging learning experiences, interaction with professors, and interaction with campus community members positively affected learners' knowledge acquisition. This emphasizes the importance of active engagement and the role of instructional methods in enhancing learning outcomes, even in online environments.

Implications and suggestions

The results of this study found that major factors significantly influence knowledge acquisition. However, further studies are required to investigate the relationship between major and learning outcomes. For example, engineering students demonstrated higher knowledge acquisition levels than humanities students, while arts and physical education students exhibited higher levels than engineering students. Although these results are consistent with previous studies showing that engineering students had higher academic knowledge and skills development compared to humanities students in traditional (Ko & Park, 2016), when we consider online environments, these are somewhat unexpected results because engineering is a field with substantial practical and laboratory components, which may not be suitable through online teaching and learning.

This study also found that the perceived cognitive learning outcomes for humanities and social sciences majors, prioritizing critical thinking, creativity, integration, problem-solving, and liberal arts knowledge, were lower than those for engineering and arts and physical education majors. This discrepancy may result from the curriculum and teaching strategies of humanities and social sciences not being promptly adapted to online educational contexts. Further research is required to analyze the specific course content and teaching methods contributing to these differences.

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BRIDGING THE THIRD-LEVEL DIGITAL DIVIDE: AN EXAMINATION OF DIGITAL INEQUALITIES AMONG DIFFERENT GROUPS IN HIGHER EDUCATION

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ABSTRACT

This research examines digital inequalities in internet competencies among students and educational workers in selected higher education institutions (HEIs) in the northern and southern regions of the Philippines. The study focuses on four dimensions of internet skills: operational, information-navigation, social, and creative skills, and investigates how these skills impact internet usage and tangible outcomes. A survey was conducted with 1160 participants, comprising 782 students and 378 educational workers from 4 colleges and universities. The study employed Partial Least Squares Structural Equation Modeling (PLS-SEM) and Multigroup Analysis (MGA) to compare internet competencies and their effects between the two groups. Results reveal significant differences between students and educational workers. Students demonstrated higher proficiency in creative and social internet skills, while educational workers excelled in information-seeking skills. However, students' lower information-seeking skills were found to hinder their effective use of online resources for academic achievement. Conversely, educational workers' lower creative and social internet skills limited their ability to leverage digital tools for career development. This research highlights the need for targeted interventions to enhance information-seeking skills among students and creative and social internet skills among educational workers. Such interventions could help reduce digital inequalities and improve educational and professional outcomes in Philippine HEIs.

Keywords: multigroup analysis, internet skills framework, educational workers

Introduction

The digital divide, defined as the gap between those who can access and effectively use digital technologies and those who cannot, is a critical issue in contemporary society. This divide reflects broader societal inequalities, including disparities in socioeconomic status, education, and geographic location (OECD, 2001; World Bank, 2024). While early studies on the digital divide focused primarily on access to technology, recent research has expanded to explore digital inequality at multiple levels. These levels include not only access to the internet (first-level digital divide) but also the skills and usage patterns (second-level digital divide) and the tangible outcomes resulting from internet use (third-level digital divide) (Van Deursen & Van Dijk, 2019).

The ability to use the internet effectively is closely linked to positive life outcomes. Hargittai and Hsieh's (2013) study on the "second-level digital divide" supports Van Deursen et al.'s view that it is not just about access to technology but how well people use it. Their focus on internet literacy aligns with Van Deursen's emphasis on information and strategic internet skills, showing how varying digital skills contribute to unequal access to online resources.

Robinson et al. (2020) examined digital capital, the resources gained from internet use, and how it can lead to social and economic benefits, such as better job prospects and social mobility. The study emphasizes the third-level digital divide, linking internet use to educational, career advancement, and social inclusion inequalities.

Digital inequality is a growing concern in the Philippines, especially in education. The country's higher education institutions (HEIs) face challenges in providing equitable access to digital resources and skills development. The National Internet Plan, introduced by the Philippine government in 2017, aimed to bridge the digital gap by ensuring widespread internet access by 2022 (Royandoyan, 2021). However, many regions continue to experience limited internet infrastructure and unequal access to digital technologies. Within the ASEAN region, the Philippines falls behind in internet infrastructure. The country's online connectivity is characterized by higher costs, slower speeds, and limited availability compared to its neighboring nations. This disparity results in unequal opportunities for Filipinos to engage in the digital realm (World Bank, 2024). These issues are further exacerbated by varying levels of digital literacy among students and educational workers in HEIs, affecting their ability to engage with digital tools effectively.

This study focuses on selected private HEIs in the northern and southern regions of the Philippines, where digital inequality may pose a significant concern. It focuses on how differences in internet skills—specifically operational, information-navigation, social, and creative skills—impact tangible outcomes. Van Deursen et al. 's (2015) Internet Skills and Helsper et al.'s (2015) research on tangible outcomes serve as the theoretical foundation for this research, offering a comprehensive view of the specific skills necessary for digital engagement and success. By exploring the linkages between internet skills, their usage, and

the tangible outcomes, this study seeks to provide insights into how HEIs can address digital inequalities and promote greater digital inclusion.

The following question guides the research: How do digital inequalities in internet competencies (information-seeking, social, and creative skills) affect usage and the tangible outcomes among students and educational workers in selected HEIs in the northern and southern regions of the Philippines? Using a survey of 1160 participants (782 students and 378 educational workers) and employing Partial Least Squares Structural Equation Modeling (PLS-SEM) and Multigroup Analysis (MGA), this study provides insights into how HEIs can address digital inequalities and promote greater digital inclusion.

By investigating digital inequality at the level of skills and outcomes, this research contributes to a deeper understanding of the third-level digital divide in the Philippine educational context. The findings will inform policy and program development to foster digital equity and improve educational and professional outcomes for students and educational workers.

Theoretical Background and Literature Review

Introduction to Digital Inequality

Digital inequality, a multifaceted concept, has evolved from simply addressing access to technology (first-level digital divide) to encompassing the skills required to use digital technologies effectively (second-level digital divide) and the tangible outcomes resulting from this use (third-level digital divide) (Van Deursen & Van Dijk, 2019). Helsper et al. (2015) frame this issue through the lens of digital deprivation, which manifests in various forms:

- Access deprivation: Lack of reliable internet connections or devices
- Skill-based deprivation: Insufficient technical knowledge to use digital tools effectively.
- Compound digital deprivation: Combined challenges leading to disadvantages across multiple areas.
- Sequential digital deprivation: A step-by-step process where one form of deprivation leads to others.

These forms of digital deprivation collectively reinforce social and economic inequalities in our increasingly connected world.

Framework of Internet Skills

To address the second-level digital divide, Van Deursen et al. (2015) propose a framework of internet usage skills comprising four key dimensions: operational, information-navigation, social, and creative skills. This study focuses on the latter three:

While operational skills are fundamental, this study assumes a basic level of these skills among higher education students and staff, focusing instead on the more complex skills that directly impact educational and professional outcomes.

Digital Inequality in Education

Research has consistently demonstrated the importance of internet skills in mitigating digital inequalities, particularly in educational settings. DiMaggio et al. (2004) found that individuals with higher information-navigation skills achieve better educational and professional outcomes. Robinson et al. (2005) linked creative skills to improved job prospects and income levels. These findings underscore the need to understand how different digital skills contribute to bridging the digital divide, especially in developing countries like the Philippines.

The Philippine Context

Digital inequality remains a pressing issue in the Philippines due to uneven internet infrastructure development and unequal access to digital resources (World Bank, 2020, 2024). In 2021, there are 2,396 HEIs in the entire archipelago; 246 are public, and 2,150 are private (CHED, 2021). According to a government report, only 39% of students in HEIs have access to devices suitable for online learning, and 55% of faculty members in HEIs need further training in ICT skills (DBM, 2022). The data from the National ICT Household Survey of 2019 indicates that 17.7% of households had access to the internet at home, with higher rates in urban areas (DICT, 2019). However, digital literacy rates lag behind access, with the Department of Education reporting in 2021 that only 41% of public school students possessed basic digital literacy skills. The Functional Literacy, Education, and Mass Media Survey also found that 69.8% of Filipinos aged 10-64 were digitally literate (PSA, 2019).

Asio et al. (2021) revealed varying digital literacy levels among Filipino students and educational workers, with many lacking the skills to leverage digital tools for education and professional growth fully. This disparity is particularly concerning in higher education, where internet skills are crucial for students and educators. The Philippine Institute for Development Studies (PIDS) reported low digital literacy levels among youth and elderly populations, highlighting the need for comprehensive digital literacy programs (Carpena, 2022). While crucial in shaping students' digital competencies, educational workers may themselves require support to develop creative and social skills relevant to digital learning environments. Educational workers in this study refer to the teaching and non-teaching personnel of the academic institutions.

Research indicates that the digital divide—where certain regions and demographics have limited or no access to the internet and digital technologies—poses a significant obstacle to effective distance learning and the integration of technology in education (Joaquin et al., 2020; Salvador, 2022; Lopena et al., 2021).

Conceptual Framework

Figure 1: Internet Skills (Van Deursen et al., 2015) & Tangible Outcomes (Helsper et al., (2015)

This study adapts the frameworks of Van Deursen et al. (2015) and Helsper et al. (2015) to investigate the second- and third-level digital divides among students and educational workers in selected higher education institutions (HEIs) in the northern and southern regions of the Philippines. By analyzing how information navigation, social, and creative skills differ between these groups and how these skills influence educational and professional outcomes, this research aims to identify key areas of digital inequality. These skills serve as the core constructs of the study. They are hypothesized to influence a range of educational, economic, social, and professional outcomes, thereby providing a structure for investigating digital inequalities across different groups. By analyzing how internet skills translate into tangible benefits in these domains, this research hopes to provide insights into how digital inequalities can be mitigated through targeted interventions to improve specific skill sets.

Our conceptual framework (Figure 1) illustrates the link between internet skills and tangible outcomes in education and professional development. We measure these outcomes through:

- Educational outcomes: academic performance, research productivity, and digital resource utilization
- Professional outcomes: career advancement opportunities, professional network development, and digital workplace competencies

By examining these links, this study seeks to provide insights for developing targeted interventions to bridge the digital divide in Philippine higher education.

Internet Skills as Key Constructs

This framework includes operational skills (basic technical functions), information-navigation skills (ability to search and evaluate online information), social skills (interpersonal communication via digital tools), and creative skills (content creation and collaboration) as the main constructs. These skills are crucial in determining how individuals benefit from the internet, as those who lack these skills are less likely to leverage digital opportunities for education, employment, and social integration (Helsper, 2012; Van Deursen & Van Dijk, 2019). The first-level relationship for these constructs is hypothesized to influence these skill variables in hypotheses 1 to 6 in Figure 2.

Linking Internet Skills and its Usage to Outcomes

The study investigates how social and creative skill differences affect usage and outcomes in economic, cultural, social, and personal domains following the digital inclusion measures in Helsper et al. (2015). These hypothesized linkages are summarized in Figure 2.

Economic *use* generally refers to how individuals utilize resources, particularly the Internet, to achieve financial benefits. The critical economic use variables that contribute to tangible economic outcomes generally include income, employment, education, and property-related activities. These variables relate to how people use the Internet to improve their financial situation, find employment, enhance skills through education, or save money by purchasing

goods and services online. Economic use also includes using online platforms to sell products, improve job performance, or access financial services like banking or insurance. These linkages are depicted in hypotheses 7 to 10 for social skills to economic use and hypotheses 11 to 14 for creative skills to economic use.

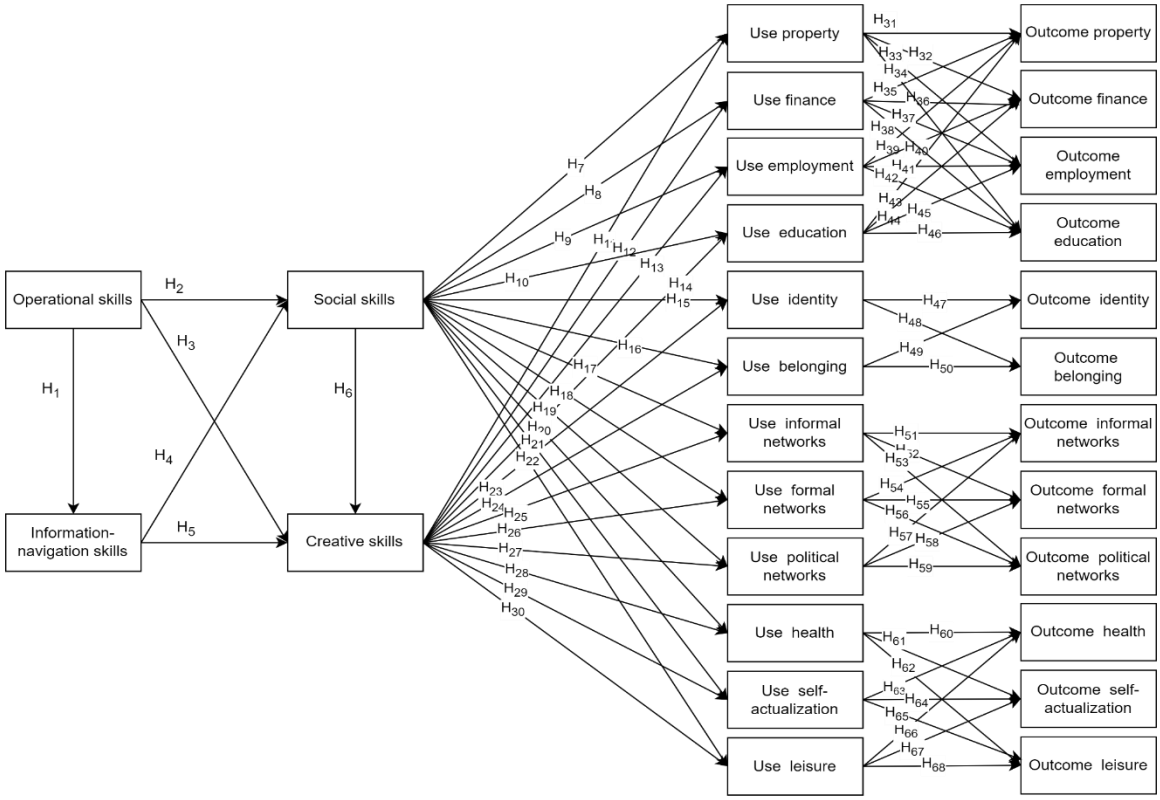

Figure 2**:** Full Model and Hypotheses

Economic *outcomes* refer to the tangible results that impact the financial aspects of an individual's life, often linked to variables such as income, employment, and financial stability. These outcomes can be influenced by access to and the use of online resources, such as job search platforms, online financial services, and educational opportunities. Specific economic outcomes include improvements in financial situation, access to employment opportunities, and the ability to save money by purchasing products or services online. These linkages are depicted in hypotheses 31 to 46 for the economic use to economic outcome domain.

Cultural *use* refers to how individuals engage with digital platforms and technologies to explore, share, and express cultural identities and values. This includes using the internet to learn about one's heritage, connect with others with similar cultural backgrounds, or participate in cultural activities like arts, music, and traditions. It also involves accessing and spreading information that fosters understanding of different cultural perspectives, shaping how people see themselves and others within broader societal frameworks. These linkages are depicted in hypotheses 15 to 16 for social skills to cultural use and hypotheses 23 to 24 for creative skills.

A cultural *outcome* refers to how individuals connect with their identity, beliefs, and group norms, often influenced by their interactions with information and people. When people achieve cultural outcomes, they feel a stronger sense of belonging to specific groups, whether based on shared interests, ethnicity, religion, or gender. These outcomes reflect how online experiences shape one's understanding of social norms and identities, offering insights into how the Internet can influence belonging and identity. These linkages are depicted in hypotheses 47 to 50 for cultural use in the cultural outcome domain.

Social *use* is how individuals utilize digital tools, especially the internet, to connect, interact, and build relationships with others. This includes social networking, communicating with friends and family, participating in online communities, and engaging in civic or political discussions. Social use enhances personal and professional relationships by enabling easier, faster, and more frequent interactions across various social contexts. These linkages are depicted in hypotheses 17 to 19 for social skills and hypotheses 25 to 27 for creative skills to social use.

Social *outcomes* refer to the benefits individuals derive from improved relationships, networks, and interactions due to internet use. These outcomes can include strengthened personal bonds with friends and family (formal networks), enhanced civic participation through joining organizations (informal networks), or increased political engagement via better communication with representatives (political networks). These outcomes humanize online activities by fostering a deeper connection to one's social environment, creating personal fulfillment and broader community ties. These linkages are depicted in hypotheses 51 to 59 for social use to social outcome domain.

Personal *use* refers to how individuals engage with digital technologies, such as the Internet, to enhance their well-being and leisure activities. This may include using online resources for health and fitness, self-improvement, entertainment, or hobbies. Personal use focuses on activities that contribute to an individual's sense of fulfillment, such as gaining knowledge, engaging in creative projects, or improving lifestyle choices, all of which support their personal growth and satisfaction. These linkages are depicted in hypotheses 20 to 22 for social skills for personal use and hypotheses 29 to 30 for creative skills to personal use domain.

Personal *outcomes* are the tangible benefits individuals experience in various aspects of their lives, including health, lifestyle, leisure, and self-actualization. These outcomes often manifest as improvements in well-being, such as enhanced fitness, better decision-making about health, or increased happiness from leisure activities. Personal outcomes are about fulfilling one's potential, leading to a deeper sense of satisfaction with life. They may stem from using information or resources, such as online health advice or lifestyle choices, which help individuals feel more confident and empowered in their daily decisions. These linkages are depicted in hypotheses 60 to 68 for personal skills to personal outcome.

This framework also acknowledges the role of demographic and contextual variables such as age, educational background, institutional type (public or private), and geographic location

(near or within city centers) in shaping digital inequalities. These factors are considered potential moderators that may influence the relationship between internet skills and outcomes. For example, age may moderate the relationship between creative skills and professional outcomes, as older educational workers might be less familiar with digital content creation than younger students. Similarly, the type of institution (public or private) and regional disparities in internet infrastructure may affect participants' ability to develop and use their internet skills effectively.

To test these hypotheses, the study employs Partial Least Squares Structural Equation Modeling (PLS-SEM), which is well-suited for analyzing complex relationships between multiple constructs. Multigroup Analysis (MGA) compares how these relationships differ between students and educational workers, allowing for a detailed examination of how digital inequalities impact these groups differently. The conceptual framework provides the foundation for identifying the key digital skills contributing to disparities in educational and professional outcomes. By analyzing these relationships, the study aims to offer insights into the second-level and third-level digital divides and propose targeted interventions to bridge these gaps in higher education settings.

Research Method

Instrumentation and Construct Measures

The measurement tool used for Internet Skill demonstrated strong reliability and validity across different dimensions. The operational skill dimension had a reliability coefficient of .84, the information-navigation dimension had a reliability coefficient of .88, the social dimension had a reliability coefficient of .87, and the creative skill dimension had a reliability coefficient of .89, indicating high internal consistency within each dimension of the Internet Skill. A 3-item measurement developed by Van Deursen et al. (2015) was employed to assess Internet Usage. It focused on tangible outcomes and educational activities, utilizing a 5-point scale (1 = never to 5 = daily; 1 = strongly disagree, 5 = strongly agree) as an interval-level measure.

The Internet Outcome scale examined outcomes in four domains directly resulting from specific online usage. Additionally, a 7-item scale was used to explore the relationship between internet use and outcomes, employing a 6-point agreement scale (ranging from 1 = strongly disagree to 5 = strongly agree, 0 = never engaged) as an interval-level measure. The reliability and validity of the questionnaire were evaluated through several methods. Pilot tests and cognitive interviews were conducted in the UK and the Netherlands to assess the clarity and understanding of the tangible outcome items across economic, social, cultural, and personal fields. The report highlights that the reliability of the questionnaire was generally supported, mainly for economic and social outcomes. Still, some challenges were noted in measuring cultural and personal outcomes due to the abstract nature of these fields. This reflects a solid attempt to ensure that the questionnaire reliably captures outcomes, but further

refinement was recommended for some areas, especially for cultural variables (Helsper et al., 2015).

Sampling

The participants were selected through convenience sampling, focusing on educational institutions in city centers in the Philippines' Northern and Southern regions. The assumption is that if digital deprivations are manifested in urban centers, they will be more pronounced in rural areas (World Bank 2020, 2024). The sample includes educators from public and private schools, particularly those where the authors are affiliated. This approach allowed the authors to gather data from readily accessible and willing participants across diverse educational settings. While efforts were made to include a variety of contexts, it is essential to note that the sample may not be strictly proportional or statistically representative of the entire Philippine education system. However, this method still enabled the study to capture a range of perspectives and experiences, providing valuable insights into digital inequalities across different educational environments.

The survey was conducted online from April to June of the academic year 2022-2023, and 1,360 participants were involved in the study, including 782 students and 378 educational workers from various private and public higher educational institutions. Data cleaning procedures resulted in a reduction of the sample size to 1,160 valid responses (see Table 1). Students aged 18-25 were included, representing both undergraduate and graduate levels. Educational workers were selected based on their teaching, administrative tasks, or IT support roles within the HEIs. Efforts were made to include a balanced representation of both genders and various age groups to assess whether digital inequalities differ across these demographics.

Table 1: Demographic profile

	Educational Worker	Non-educational worker
Age group		
19 years old and below	4	197
20-30 years old	108	557
31-45 years old	165	27
46-60 years old	90	1
60 years old and above	11	0
School Type		
Private Owned	223	722
Public/Government	155	60
Hours spent online		
<4 hours	94	193
4-8 hours	182	411
> 8 hours	102	178
Location		
Southern PH	166	782
Northern PH	212	0

Statistical Analysis

The complexity of the model structure drives the rationale for choosing PLS-SEM. The conceptual framework posits multiple relationships between internet skills (information-navigation, social, and creative) and various educational and professional outcomes, as depicted in Figure 2. PLS-SEM is well-suited for analyzing complex path models with multiple constructs and indicator variables (Hair et al., 2019). It is also more flexible regarding

sample size and data distribution assumptions than covariance-based SEM. This flexibility is beneficial given the specific sample from selected HEIs in the Philippines. Our model includes formative (e.g., internet skills) and reflective (e.g., some outcome measures) constructs. PLS-SEM can effectively handle both measurement models within the same analysis (Hair et al., 2019). While our study is grounded in established theories (Van Deursen et al., 2015; Helsper et al., 2015), the specific context of Philippine higher education introduces an exploratory element. PLS-SEM's ability to handle confirmatory and exploratory research is advantageous in this case (Sarstedt et al., 2016).

PLS-SEM was employed to examine the connections between Internet Skills, Usage, and Outcome variables in the proposed relationships using SmartPLS 4 for conducting t-tests, correlation analysis, path analysis, and evaluating the equation model (Ringle et al., 2022). The model comprises 28 latent constructs with 82 indicators, which may consider the model complex. Aside from G*Power, post hoc analysis was done to assess the power adequacy of the sample size using the method and formula developed by Kock and Hadaya (2018) in WarpPLS. Following Ghazali et al. (2020), the largest path coefficient (0.60) is fed into the equation with the power level required value of 0.800, resulting in 18 minimum required sample sizes for the inverse-square root method and 11 minimum required sample sizes for the gamma exponential method. The study's sample size adequacy was assessed using two methods: the inverse-square root and the gamma exponential method. Given the minimum absolute significant path coefficient in the model (-0.20) and the required power level of 0.800, the calculations yielded minimum required sample sizes of 155 and 142 for the inverse-square root and gamma exponential methods, respectively. These results prove that the collected samples are suitable and adequate for robust data analysis (Ghazali et al., 2020).

The research question explicitly calls for a comparison between students and educational workers. MGA allows us to statistically test for significant differences in path coefficients between these two groups (Sarstedt et al., 2016). By comparing model relationships across groups, MGA helps us uncover contextual factors that may influence the relationship between internet skills and outcomes. This aligns with our goal of providing targeted insights for different stakeholders in higher education (Henseler et al., 2015). Subsequently, the ability to identify significant differences between students and educational workers can inform more nuanced policy recommendations; addressing the specific needs of each group in bridging digital inequalities provides the rationale for employing MGA.

Although combining students and educational workers within the same sample could introduce potential distortions due to differences in age, role, and internet usage patterns, this challenge was addressed through MGA, which separates and analyzes the two groups independently to account for their distinct characteristics. By using MGA, the study avoids the risk of oversimplification if the groups were treated as a homogeneous population. The differences between the groups are central to the research, as the goal is to explore how digital inequalities affect these two groups differently (Cheah et al., 2020). Therefore, the results will be reported separately for each group, ensuring that the findings remain accurate and reflect the distinct digital realities faced by students and educational workers.

Measurement Invariance of Composite Models

Research on the digital divide often assumes that data in empirical research stems from a single homogenous population, which has failed to assess whether there are significant differences across two or more subgroups in the data. The MGA approach is utilized so that group-related differences in the different model estimates are reported. Following the steps and guidelines in Cheah et al. (2020), a test for measurement invariance is conducted after group generation. Invariance refers to the degree to which the relationships or parameters of a model hold across different groups or conditions. Invariance is the property of consistency or stability of the underlying structure or relationships being examined. In comparative studies or multi-group analysis, invariance is an essential assumption that ensures the validity and reliability of the results.

Measurement invariance of composite models (MICOM) is a vital step in MGA, especially when using PLS-SEM, to ensure that any observed differences between groups are genuine, not artifacts of measurement differences. The procedure in MICOM is done in SmartPLS via Permutation multigroup analysis with a one-tailed test type. In step 2 of MICOM, the resulting values confirmed the compositional invariance, meaning that a partial measurement invariance will be performed where the standardized path coefficients can be compared across groups. Using Bootstrap MGA, the measurement model (factor loadings, indicator reliability, and convergent and discriminant validity assessments) was tested first, followed by the testing of the structural model (path coefficients, significance levels, and indirect or total effects) using check values specified in Hair et al. (2019).

Results and Discussions

The relationship of the different Internet Skills (operational skills, information-navigation skills, social skills, and creative skills) that serve as antecedents to the examination of Internet Usage for the different domains (capital, cultural, social, personal) and the various Outcomes for each domain are revealed with the analysis and comparison of the significant structural paths for both groups (educational workers and students).

Reliability and Validity Analysis

An evaluation was conducted to verify the reliability of the measurement model and ensure that the observed indicators effectively measured their corresponding unobservable latent constructs. This assessment focused on the consistency between the observed indicators and the underlying latent variables (LV). Composite reliability (CR) and average variance extracted (AVE) were examined to determine the internal consistency and convergent validity. The CR for each LV is at least 0.881, supporting the internal consistency of the indicators. The AVE for both models was also substantially above the necessary 0.5 threshold. Indicators with outer loadings between 0.4 and 0.7 are removed. The discriminant validity was assessed using the heterotrait-monotrait (HTMT) ratio of correlation fixed cut-offs and inferential tests (Henseler et al., 2015) using the cut-off value of 0.9. Every HTMT value for every construct

is below the cut-off value, adhering to Ringle et al. (2018) note that a bootstrapping procedure is used to determine whether the HTMT value is statistically significantly lower than one.

Structural Model and Hypothesis Result

A subsample of 5000 is set in the bootstrapping process to validate the inner model in testing the hypotheses (Hair et al., 2011). The significance of each path coefficient is accepted if the t-value is greater than 1.95. Before testing the structural model, fit adjustment with standardized root mean square residual (SRMR) value was evaluated. The result in Table 2 (SRMR=0.047, Chi-Square = 4745 (Group1); Chi-Square = 8024 (Group2) indicates a good fit adjustment since a value less than 0.10 or of 0.08 for SRMR is considered a good fit (Hu & Bentler, 1999; Henseler et al., 2014).

Table 2: SRMR Between Group

	Education Worker		Student	
	Saturated model	Estimated model	Saturated model	Estimated model
SRMR	0.047	0.183	0.047	0.198
d_ULS	4.175	63.337	4.107	74.080
d_G	1.987	3.392	1.527	2.983
Chi-square	4745.432	6837.284	8024.917	13119.183
NFI	0.656	0.504	0.726	0.551

Figures 3 & 4 include the results of the structural model assessment showing the path coefficients, P-value, and T-value for each path following the hypothesized relationship. The MGA results are presented using the permutation test (Chin et al., 2016) and Henseler's bootstrap-based MGA method (Henseler et al., 2015). Henseler's MGA technique uses a significance level of 5%, where a p-value smaller than 0.05 or greater than 0.95 indicates a significant difference in group-specific path coefficients. Hypothesis testing using 5,000 permutations reveals substantial differences between the two groups.

First Level

Figures 3 and 4 illustrate the six hypothesized relationships (H1 through H6) of Internet Skills at the first level. These figures present an analysis of the path coefficient differences, utilizing Henseler's MGA and permutation p-values based on a one-tailed test. This comprehensive approach allows for a rigorous examination of the proposed relationships within the Internet Skills framework, providing insights into each hypothesized connection's statistical significance and comparative strength.

For H1, the path coefficient difference of -0.11 suggests a difference in the relationship between the variables for Group 1 (educational workers) compared to Group 2 (students). However, both Henseler's MGA ($p > 0.05$) and the permutation test ($p > 0.05$) indicate that there is no significant difference in the group-specific path coefficients between the two groups. The same interpretation for H2 (-0.056; p=0.80; p=0.18), H3 (0.05; p=0.80; p=0.18), H5 (-0.06; p=0.81; p=0.22), and H6 (-0.04; p=0.70; p=0.32). For H4, the results indicate a significant difference between Group 1 and Group 2 in terms of the path coefficients. Group 1 has a lower path coefficient than Group 2, suggesting a weaker relationship between the variables for Group 1. This difference is supported by the non-overlapping confidence

intervals and p-values from Henseler's MGA (p = 0.99) and the permutation test (p = 0.00). These findings highlight the distinct nature of the relationships between the variables for each group, implying that digital inequalities exist at level one.

The analysis reveals a complex interplay of relationships among the variables, demonstrating both positive and negative correlations. Hypothesis 2 (H2) stands out as having a strong and highly significant relationship. Hypotheses 6 (H6) and 3 (H3) exhibit moderate relationships, while Hypotheses 1 (H1), 4 (H4), and 5 (H5) indicate relatively weaker associations. Notably, the results suggest a significant association between operational skills and social skills, with the latter also showing a moderate but significant relationship with creative skills. These findings provide a nuanced understanding of the interconnections between various skill sets within the Internet Skills framework.

Second Level

The second-level relationship stems from social skills (SOCSKL) and creative skills (CREASKL) to the different internet use variables that comprise the use of the internet for capital, cultural, social, and personal domains in hypotheses 7 to 30. For H8, the path coefficient difference of 0.14 indicates a significant difference in the relationship between the variables of interest for Group 1 and Group 2. Both Henseler's MGA ($p < 0.05$) and the permutation test ($p < 0.05$) confirm the significant difference in the group-specific path coefficients between the two groups. The same holds for H9 (0.14; p=0.03; p=0.03), H12 (0.13; p=0.03; p=0.04), H28 (0.22; p=0.00; p=0.01), and H29 (0.14; p=0.03; p=0.03) manifesting significant difference in the relationship between the variables of interest for Group 1 compared to Group 2. Both Henseler's MGA and the permutation test show that there is no significant difference in the group-specific path coefficients between the two groups in the relationships examined in H7, H10, H11, H13, H15, H16, H17, H18, H19, H20, H21, H22, H23, H24, H25, H26, H27, and H30. The results indicate meaningful connections between social and creative skills and the four domain variables. The findings reveal that both groups use creative skills in the four domains. However, the social skills of educational workers (Group 1) are primarily limitedly associated with finance use and leisure use. In contrast, for students (Group 2), social skills have significant relationships with use for the economic domain (property, finance, employment), social (formal networks, political), and personal (self-actualization and leisure). Digital natives, particularly young adults, are known for their proficiency in using digital tools such as instant messaging, chatting, and engaging in entertainment and leisure activities like downloading music or casual web browsing (van Deursen et al., 2011).

Research suggests that education shapes internet usage patterns (Robinson et al., 2015; Van Dijk, 2005). Higher levels of education are associated with using the Internet for health information, financial transactions, and research (Howard et al., 2001; Van Djik, 2013). Considering that educational workers generally have higher educational status compared to students, the results of this study align with Quimba et al.'s (2020) assertion that the older group may have less motivation to establish personal and social identities, as their social skills

are mainly related to finance and leisure use. Regarding access, studies theorized that closing digital divides may be possible, but there are marked inequalities in people's capability to use digital resources (Vassilakopoulou1 & Hustad, 2021).

Third Level

The third-level relationships (H31 to H68) explore the connection from economic, cultural, social, and personal domains to the different outcome constructs. This relationship was examined in the 38 proposed relationships between Group 1 and Group 2. For H43, the path coefficient difference of 0.13 indicates a significant difference in the relationship between the variables of interest for Group 1 and Group 2. For example, while both groups use education for outcome education, educational workers use education for acquiring property and improving employment. Both Henseler's MGA ($p < 0.02$) and the permutation test ($p < 0.01$) confirm the significant difference in the group-specific path coefficients between the two groups. The same interpretation is used for H44 (0.14; p=0.02; p=0.01), H45 (0.28; p=0.00; p=0.00), and H46 (0.18; p=0.00; p=0.01) manifesting significant differences in the relationship between the variables of interest for Group 1 and Group 2. For H42 and H64, the results indicate a significant difference between Group 1 and Group 2 regarding the path coefficients. Group 1 has a lower path coefficient than Group 2, suggesting a weaker relationship between the variables for Group 1. This difference is supported by the non-overlapping confidence intervals and p-values from both Henseler's MGA ($p = 0.97$ for H42; $p = 0.96$ for H64) and the permutation test ($p = 0.04$ for H42 and $p = 0.03$ for H64). These findings highlight the distinct nature of the relationships between the variables for each group. Both Henseler's MGA and the permutation test shows that there is no significant difference in the group-specific path coefficients between the two groups in the relationships examined in H31, H32, H33, H34, H35, H36, H37, H38, H39, H40, H41, H47, H48, H49, H50, H51, H52, H53, H54, H55, H56, H57, H58, H59, H60, H61, H62, H63, H65, H66, H67 and H68.

Although combining students and educational workers within the same sample could introduce potential distortions due to differences in age, role, and internet usage patterns, this challenge was addressed through MGA, which separates and analyzes the two groups independently to account for their distinct characteristics. Using MGA, the study avoids the risk of oversimplification if the groups were treated as a homogeneous population. As mentioned earlier, the MGA approach reports group-related differences in model estimates. After generating the groups, measurement invariance testing was conducted following the steps and guidelines outlined by Cheah et al. (2020). In comparative studies or multi-group analysis, invariance is an essential assumption that ensures the validity and reliability of the results. The differences between the groups are central to the research, as the goal is to explore how digital inequalities affect these two groups differently. Thus, the results were reported separately for each group, ensuring that the findings remain accurate and reflect the distinct digital realities faced by students and educational workers.

Summary of Findings for Educational Workers

The PLS-SEM and MGA analysis for educational workers (Group 1) reveals distinct Internet Skills, Usage, and Outcomes patterns. The model demonstrates good reliability, validity, and fit, with an SRMR value of 0.047 and a Chi-Square of 4745.

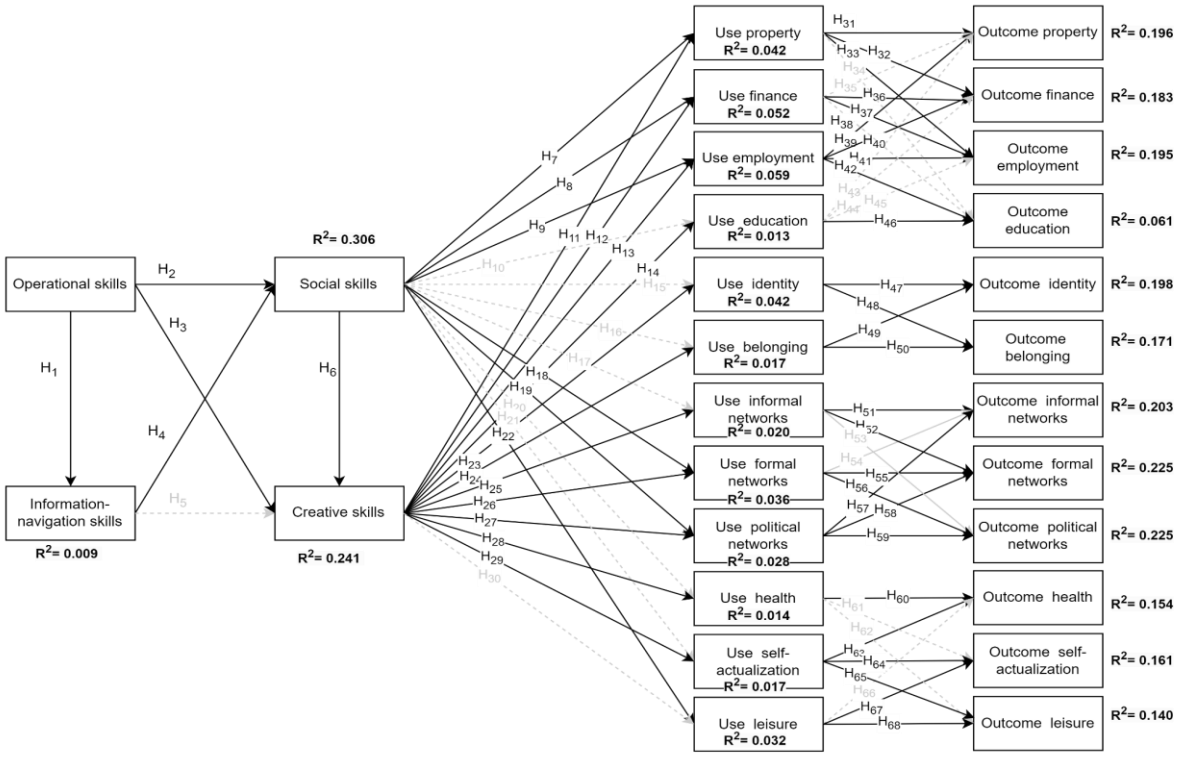

Figure 3: Significant Structural Paths (Group 1: Educational Worker)

As presented in Figure 3, in terms of Internet Skills, educational workers show a weaker relationship between operational skills and information-navigation skills compared to students. Their Internet Use patterns are more focused, with social skills primarily associated with finance and leisure use. This contrasts with students' broader application of social skills across various domains. Like students, creative skills are utilized across all four domains (economic, cultural, social, and personal). However, educational workers demonstrate stronger relationships in leveraging educational internet use for economic outcomes, including property, finance, employment, and income.

The analysis suggests that educational workers, who generally have higher educational status, may be more adept at translating their internet skills and educational resources into tangible economic benefits. This aligns with previous research indicating that higher levels of education are associated with using the Internet for health information, financial transactions, and research.

Summary of Findings for Students

The PLS-SEM and MGA analysis for students (Group 2) reveals several significant findings across the three levels of Internet Skills, Internet Use, and Outcomes. The model demonstrates good reliability and validity, with CR values of at least 0.881 and AVE values above the 0.5 threshold. Discriminant validity is confirmed using the HTMT ratio, with all values below the 0.9 cut-off. The model also shows a good fit with an SRMR value of 0.047 and a Chi-Square of 8024 for the student group.

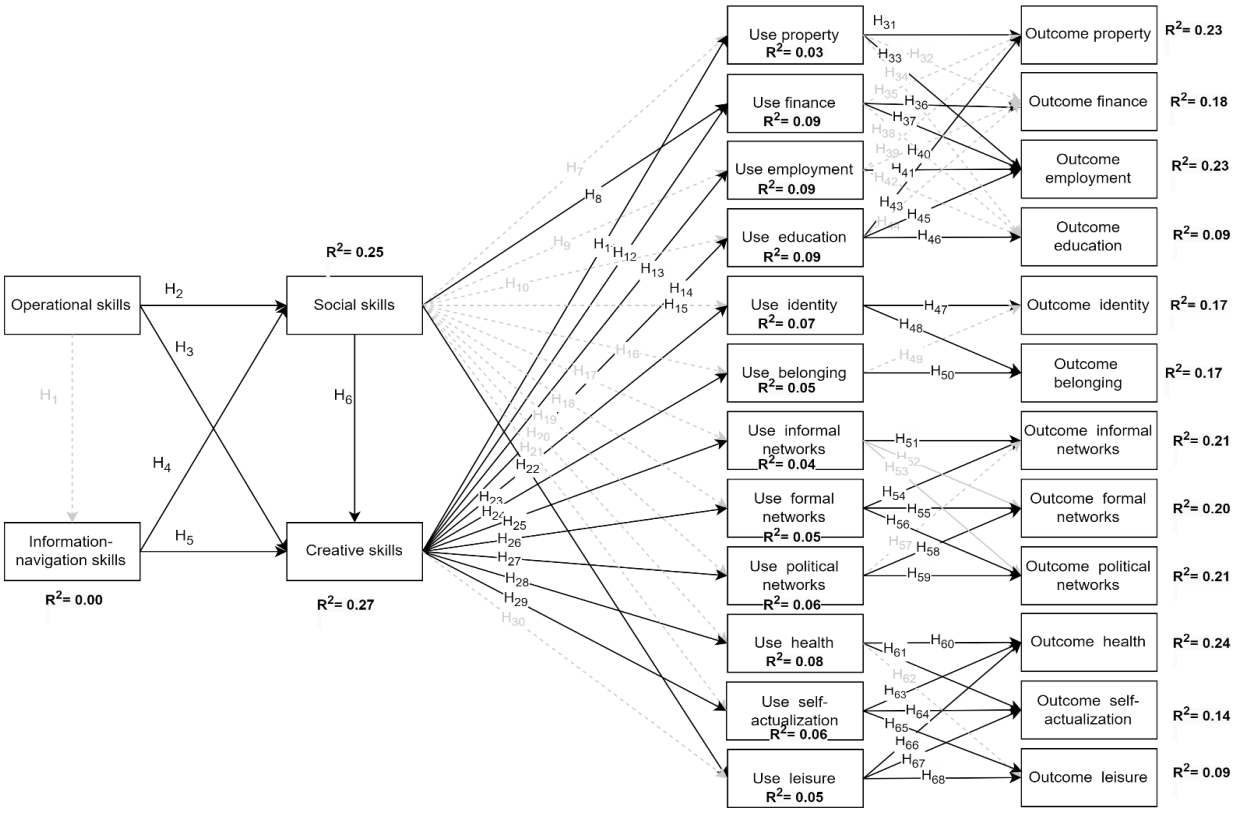

Figure 4: Significant Structural Paths (Group 2: Students)

At the first level, focusing on Internet Skills, students exhibit a significantly more robust relationship between operational and information-navigation skills than educational workers (Group 1). This suggests students have a more integrated approach to basic internet operations and information searching.

The second level, examining Internet Use, highlights that students' social skills are significantly associated with various internet uses. These include economic domain use (property, finance, employment), social domain use (formal networks, political), and personal domain use (self-actualization, leisure). Creative skills are utilized across all four domains (economic, cultural, social, and personal). Notably, there are significant differences between students and educational workers in how social and creative skills relate to various domains of internet use, particularly in cultural, social, and personal areas.

The third level, focusing on Outcomes, reveals interesting patterns. Students show stronger relationships in using education-related internet resources for educational outcomes and leisure-related resources for personal income outcomes. However, compared to educational workers, students demonstrate weaker relationships in leveraging educational internet use for economic outcomes such as property, finance, employment, and income.

As summarized in Figure 4, these findings suggest that while students are proficient in using digital tools for various purposes, including communication, entertainment, and leisure activities, they may need to be more adept at translating their educational internet use into tangible economic benefits. This could indicate a digital inequality in how different groups utilize internet skills and resources for various outcomes.

Group Comparisons

The PLS-SEM and MGA results reveal significant differences between educational workers (Group 1) and students (Group 2) in their internet skills, usage, and outcomes. Students demonstrate a more integrative approach to operational and information-navigation skills, while educational workers show a more compartmentalized approach. In terms of social skills application, students apply these broadly across economic, social, and personal domains, whereas educational workers use them more narrowly, primarily for finance and leisure. Both groups utilize creative skills across all domains, but students show more substantial relationships with social and personal domain use, especially for self-actualization and leisure. Regarding outcomes, while students effectively use educational resources for educational purposes, educational workers are more adept at leveraging these resources for economic outcomes such as property acquisition, finance management, employment, and income generation.

Overall, students exhibit a more versatile and broad application of internet skills, especially social skills. At the same time, educational workers demonstrate a more focused, outcome-oriented approach, particularly for professional and economic purposes. These differences highlight the digital inequalities between the two groups, with students excelling in diverse applications but lagging in economic translations. At the same time, educational workers show more targeted use, leading to more substantial economic outcomes. This comparison underscores the complex nature of digital skills and their applications across different demographic groups.

Implications and Recommendations

The results of this PLS-SEM and MGA analysis comparing educational workers and students have significant implications for digital literacy programs, educational policies, and workforce development initiatives. The findings suggest a need for tailored approaches to bridge digital divides and enhance digital skills across different demographic groups. For students, programs that help translate their diverse internet skills into tangible economic outcomes must be developed. This could involve incorporating more real-world, economically focused digital tasks into the curriculum, such as financial management tools, job search strategies, and

professional networking platforms. Educational institutions should consider partnering with industries to allow students to apply their digital skills in professional contexts, potentially through internships or project-based learning.

For educational workers, the focus should be on broadening their application of social and creative digital skills beyond finance and leisure. Professional development programs could emphasize using social media and collaborative digital tools for networking, knowledge sharing, and creative problem-solving in educational settings. Both groups would benefit from targeted training in emerging technologies and their applications across various domains. Policymakers should consider these digital inequalities when designing initiatives to promote digital inclusion. This might involve creating differentiated digital literacy programs that address the specific needs of each group. For students, this could mean emphasizing the economic applications of their digital skills, while for educational workers, it could focus on diversifying their digital skill set.

Employers and workforce development agencies should consider these differences when designing job training programs or assessing digital competencies. They might consider implementing mentorship programs where educational workers can share their expertise in leveraging digital skills for economic outcomes. At the same time, students could offer insights into more diverse and social applications of digital technologies.

Limitations

This study has several limitations that should be considered when interpreting the results. First, while allowing for diverse participants, the convenience sampling method may not fully represent the entire Philippine higher education landscape. While based on sound assumptions, the focus on urban centers may not capture the full spectrum of digital experiences across the country. Second, the diversity within the student and educational worker groups (e.g., undergraduate vs. graduate students, different roles of educational workers) may introduce variability that is not fully accounted for in the analysis. While MGA helps address some of these differences, future studies could benefit from more granular analyses of subgroups. Lastly, the study's cross-sectional nature limits our ability to draw causal conclusions about the relationships between internet skills, usage, and outcomes. Longitudinal studies could provide more robust evidence of how these factors influence each other over time.

Theoretical Implications and Comparison with Existing Literature

This study's findings contribute to the ongoing discourse on digital inequality, particularly in the context of higher education. Our results both support and extend several key theories and previous studies in this field:

> ***Van Dijk's Resources and Appropriation Theory:*** Our findings align with van Dijk's (2005) Resources and Appropriation Theory, which posits that digital inequalities are rooted in the unequal distribution of resources necessary for technology access and use. However, our study

extends this theory by demonstrating that significant differences in internet skills and their application persist even within groups with similar access levels (students and educational workers in higher education institutions). This supports van Dijk's assertion that closing the access gap alone cannot address digital inequalities.

Second-Level Digital Divide: Our results provide empirical support for Hargittai's (2008) concept of the "second-level digital divide," which focuses on inequalities in skills and usage patterns rather than mere access. The observed differences between students and educational workers in their proficiency with various internet skills (information-seeking, social, and creative) demonstrate that digital inequalities persist even when access is relatively uniform. This underscores the importance of skill-focused interventions in addressing digital inequalities.

Digital Capital Theory: Our findings contribute to the emerging theory of digital capital (Ragnedda, 2018) by demonstrating how different internet skills translate into varied outcomes across economic, cultural, social, and personal domains. The observed differences between students and educational workers in leveraging their skills for tangible outcomes support the idea that digital capital is not uniformly distributed or utilized, even within seemingly homogeneous groups.

Generational Differences in Digital Skills: Our results support and challenge prevailing notions about generational differences in digital skills. While students demonstrated higher proficiency in creative and social internet skills, aligning with theories about "digital natives" (Prensky, 2001, p.1), their lower information-seeking skills contradict the assumption that younger generations are universally more adept with digital technologies. This nuanced finding contributes to a more complex understanding of generational differences in digital competencies.

Context-Specific Digital Inequalities: Our study extends previous research on digital inequalities in developing countries (e.g., Tayo et al., 2016; Quimba et al., 2020) by providing a detailed analysis of skill differences within the Philippine higher education context. The findings highlight the importance of considering local contexts when studying digital inequalities, as patterns may differ from those observed in more developed economies.

Tangible Outcomes of Internet Skills: Building on Helsper et al.'s (2015) work on tangible outcomes of internet use, our study provides empirical evidence of how different internet skills translate into varied outcomes for students and educational workers. This contributes to a more nuanced understanding of the relationship between digital skills and real-world benefits, highlighting the need for targeted skill development to maximize positive outcomes.

Intersectionality in Digital Inequality: Our findings support the growing literature on intersectionality in digital inequality (Robinson et al., 2015; Robinson et al., 2020) by demonstrating how the educational role (student vs. worker) intersects digital skills to produce varied outcomes. This underscores the importance of considering multiple factors when examining and addressing digital inequalities.

Finally, this study corroborates and extends existing theories on digital inequality by providing nuanced insights into skill differences and their outcomes within the specific context of Philippine higher education. Our findings highlight the complex nature of digital inequalities, demonstrating that they persist even in environments with relatively uniform

access. They also emphasize the need for targeted interventions that address specific skill deficits and their applications across domains.

Conclusion

This study provides significant insights into digital inequalities and internet skill utilization among educational workers and students in selected HEIs in the Philippines. The research reveals a nuanced picture of digital inequality: students demonstrate more diverse and integrated internet skills, particularly in social and creative domains, while educational workers excel in translating their digital skills into tangible economic outcomes. These findings challenge simplistic notions of digital divides based solely on access or basic skills, emphasizing the importance of skill application and outcomes.

The study extends existing frameworks of digital inequality, such as van Dijk's resources and appropriation theory, by providing empirical evidence on how different internet skills (operational, information-navigation, social, and creative) translate into varied usage patterns and outcomes across groups. It contributes to developing a more comprehensive theory of digital capital, demonstrating how different internet skills and usage aspects contribute to economic, cultural, social, and personal domains. This study also offers a robust foundation for future research and for developing more sophisticated, context-sensitive models of digital inequality, thus contributing significantly to the field's empirical and theoretical dimensions.

Methodologically, the research showcases the effectiveness of combining PLS-SEM with MGA in capturing and analyzing complex, multi-level relationships in digital skill utilization. These insights fulfill the study's aims of examining digital disparities and their implications, advancing the theoretical landscape of digital literacy studies.

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DESIGNING AND IMPLEMENTING THE UNDERGRADUATE CAPSTONE PROJECT IN THE INFORMATION TECHNOLOGY PROGRAM

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ABSTRACT

This study examines the design and implementation of a capstone project in an undergraduate Information Technology (IT) program at a public university in Malaysia. Using the 2018 Ornstein and Hunkins' curriculum approaches—content, process, and product—this research analyzes the perspectives of both faculty and students. Through semi-structured interviews, five key themes emerged: Articulation of Objectives, Roles, and Responsibilities (Curriculum Approach: Content); Continuation and Sequence (Curriculum Approach: Process); Integration of Theory and Practice (Curriculum Approach: Process); Responsibility of Learning (Curriculum Approach: Product); and Alignment of Technical Guidance and Supervision (Curriculum Approach: Product). The findings reveal significant gaps in course progression, a mismatch between students' skills and assigned projects, and unclear supervisor roles and responsibilities. These issues hinder students' ability to take responsibility for their learning and fully apply theoretical knowledge in practical settings. Recommendations are provided to improve curriculum design, clarify supervisory roles, and ensure better alignment of capstone projects with students' capabilities. This study contributes to the ongoing discourse on capstone project implementation, offering insights into how IT programs can better prepare students for the workforce.

Keywords: HIEPs, SoTL, capstone, curriculum approach, assessment, undergraduate education, computer education, information technology, Malaysia

Introduction

Next-generation learners need an environment that is flexible and adaptable. Such an environment will allow scientific, technologically enhanced, and professionally relevant methods of instruction to take place. Hence, 21st-century lessons require cutting-edge teaching embedded in a thorough and well-structured curriculum design (Ornstein & Hunkins, 2018). Nevertheless, the structures and formats of most course curriculums are most likely to be passed down from one generation of instructors to the next, seldom considering the underlying curriculum design principles (Doolittle & Siudzinski, 2010; Eberly et al., 2001; Fink, 2012) and relevance of the assessment plan. The reality of ongoing information and communication technology (ICT) changes calls upon researchers and practitioners to keep abreast with advancements. A well-designed capstone curriculum prepares graduates to apply the theories and skills accumulated throughout their three- or four-year undergraduate journey.

Capstone projects have long been considered a culmination of students' learning experiences, integrating theoretical knowledge with practical application (Stephen et al., 2002; Zhang et al., 2018). However, in Information Technology (IT), the increasing complexity of digital technologies demands a more focused curriculum design that bridges coursework and real-world problem-solving skills. While many studies have explored capstone design broadly, few have examined the challenges faced in IT-related disciplines, especially in a Malaysian context where technical skills and academic support are critical. This paper addresses this gap by examining the curriculum design of IT capstone projects through the lens of faculty and students. Moreover, discussing how the capstone project is tailored to the curriculum approach remains incomplete in the capstone literature.

Theoretical Framework

Scholarship of Teaching and Learning (SoTL)

The Scholarship of Teaching and Learning (SoTL) represents a systematic, evidence-based approach to investigating teaching practices and student learning outcomes to enhance educational quality across disciplines. SoTL operates on the principle that teaching, like research, benefits from reflective, inquiry-driven approaches and requires rigorous methodologies to explore the impact of pedagogical innovations (Boyer, 1990; Hutchings et al., 2011). By focusing on what works in teaching and learning, SoTL provides a platform for educators to improve their teaching and contribute to the broader understanding of effective educational practices through shared knowledge and peer review.

In the current study context, SoTL provides a relevant framework for understanding the design and implementation of capstone projects in undergraduate Information Technology (IT) programs. Capstone projects are recognized as one of the High-Impact Educational Practices (HIEPs) that engage students in deep learning, problem-solving, and practical application of theoretical knowledge (Kuh, 2008). However, the success of these projects hinges on how well they are integrated into the curriculum and how effectively students and faculty navigate the challenges involved in their execution. By examining both faculty and student experiences, this study aligns with SoTL's focus on improving teaching and learning through systematic inquiry.

This study contributes to SoTL in several ways. First, it provides insights into how curriculum design, particularly in a technical field like IT, can be optimized to support student autonomy

and skill development. Second, it investigates the role of faculty and supervisors in facilitating student learning, which is central to SoTL's focus on the interplay between teaching strategies and student outcomes. Third, the study's findings on the integration of theory and practice in the capstone project speak directly to SoTL's commitment to exploring pedagogical approaches that prepare students for real-world challenges (Felten, 2013).

The application of SoTL in this study is particularly evident in the reflective analysis of the curriculum structure and the identification of key areas for improvement, such as clearer articulation of objectives, enhanced technical guidance, and better alignment of projects with students' skill sets. These findings are valuable not only for the specific IT program examined but also for contributing to broader discussions within SoTL about leveraging capstone experiences to foster deeper learning across various disciplines. SoTL emphasizes the importance of continuous reflection and evidence-based improvements in teaching and learning, particularly in enhancing student engagement and skill development. This approach also underscores the value of structured feedback and active stakeholder involvement in the educational process (Bukhari, 2021).

By situating the study within the SoTL framework, the research emphasizes the importance of continuous improvement in teaching practices, informed by the lived experiences of both educators and learners. This approach ensures that the capstone project, as an educational tool, remains relevant and effective in meeting the evolving demands of the IT industry while also promoting student engagement and success.

Ornstein and Hunkins' Curriculum Approaches

In this study, Ornstein and Hunkins' (2018) curriculum approaches of content, process, and product form the theoretical framework. This framework emphasizes how the curriculum should balance knowledge, practical skills, and professional readiness through three dimensions: the curriculum as content (what is taught), as process (how learning occurs), and as product (outcomes achieved). These principles were used to examine how the capstone project aligns with IT program objectives and the needs of both faculty and students.

Without the faculty and the students' perspectives, our concerns on the design and delivery of the capstone curriculum would not be empirically supported. Therefore, it is important to re-evaluate the capstone project for the IT discipline through the eyes of students and faculty and suggest improvements in the curriculum design and delivery. Specifically, we intend to seek answers to the following research questions: What are the issues in the curriculum design and delivery of the capstone project in the undergraduate-level IT program, and how do the capstone curriculum design approaches measure with the content, process, and product as delineated by Ornstein & Hunkins (2018)?

Literature Review

Capstone Project for the IT Program

A capstone project is one of the high-impact educational practices (HIEPs) for undergraduate students recommended by the American Association of Colleges and Universities (AAC&U). Typically conducted during the program's final year, it provides direct and authentic assessment in which students develop higher-order thinking skills and on-the-job performance. Significant 21st-century skills (Lai & Viering, 2012; World Economic Forum, 2020) such as communication, project management, decision-making, creativity, collaboration, critical thinking, and problem-solving converge well in the capstone literature (Hauhart & Grahe, 2015; McNamara et al., 2012; Schermer & Gray, 2012).

Graduates of IT are expected to not only have sound theoretical and conceptual knowledge of information and digital technologies (Malaysian Qualifications Agency (MQA), 2023, 2024) but also be adept in applying the knowledge to work projects successfully (Arora & Mittal, 2020). The curriculum design of the undergraduate IT program in the 21st century must include a plan to equip students with a capstone experience that allows them to use their knowledge and skills to manage projects and solve complex problems (Lesco, 2009; Lunt et al., 2008). Capstone projects, especially in the fields of IT and computer science, often require students to acquire new knowledge to complete the project effectively, and that too, in a highly compressed and limited timeframe (Perez et al., 2012).

Approaches of Curriculum in the Context of IT Program

In the early phases of curriculum design, curriculum developers should seriously consider how the course components are organized and interrelated. Ornstein and Hunkins (2014) explicate three ways of approaching curriculum: (1) curriculum as a content or body of knowledge, (2) curriculum approach as a process, and (3) curriculum as a product.

Curriculum as a Content

Curriculum developers emphasize topic outlines, subject matter, and concepts appropriate for the syllabus based on important criteria of content selection. Along with the selection criteria, several curriculum design dimensions (O'Neill, 2010; Ornstein & Hunkins, 2018) supposedly shape the conceptualization and design of a given curriculum. The six design dimensions, also known as BASICS principles, are (1) balance, (2) articulation, (3) scope, (4) integration, (5) continuity, and (6) sequence.

1. Balance. To establish balance in curriculum design, the assignment of content, time, experiences, learning outcomes, and other elements should be equal. When developing the content of the IT curriculum, there is a significant need to balance the discipline knowledge (i.e., subjects that use computing in substantive ways) with other, more generic skills (Lunt et al., 2008). The focus of higher educational institutions has been balancing the cognitive, affective, and psychomotor learning domains (MQA, 2024).
2. Articulation. Articulation can be constructed vertically or horizontally when designing the curriculum. In vertical articulation, the content fundamental for developing other crucial skills (Sacks & Barak, 2010) will be introduced earlier in the IT program as it is connected to establishing more advanced skills in the next semester. Lunt et al. (2008) propose that the Computing Platforms be taught in the second year of the program. Horizontal articulation entails courses to be taken at the same level/semester. In the integration-first approach, Lunt and colleagues (2008) suggest that two key courses, IT System and Web-System, should be presented together in a semester. Students should receive guidance on how they will progress through the program or transfer knowledge from one course to another (Kagawa, 2007).
3. Scope. To determine the scope of a curriculum, one must also consider the learners' time, diversity and maturity, complexity of content, and education level. The scope can be described using broad, limited, discipline-specific, simple, and generic terms. With a very wide scope of a curriculum, learners race through and have less opportunity to contrast, analyze, prioritize, and critique ideas (Clark & Linn, 2003). Consequently, learners tend to learn for the test through memorization and rote learning rather than conceptualization and application (Wright, 2011).

4. Integration. The curriculum should be multidisciplined, and subject matters or discipline content should not be isolated (Qing-bin, 2011). Integrative learning varies in several ways: "connecting skills and knowledge from multiple sources and experiences; applying theory to practice in various settings; utilizing diverse and even contradictory points of view; and understanding issues and positions contextually" (Huber and Hutchings, 2004, p. 13).
5. Continuity. Vertical repetition and recurring appearances of the content provide continuity. Learners have to develop and redevelop their ideas in a spiral (Bruner, 1960) fashion, which organizes the course/program into themes that require advanced depth as learners progress or "touches all the bases—experiencing, reflecting, thinking, and acting—in a recursive process that is responsive to the learning situation and what is being learned" (Kolb & Kolb, 2005, p. 194) through the course/program. Continuity can be incorporated in the content as well as in other skills such as teamwork, problem-solving, and writing skills.
6. Sequence. In designing a curriculum, the sequence is related to terms such as plan, process, and pre-requisite (see O'Neill et al. 2014). Contents and experiences are arranged in a sequence, i.e., in a hierarchical manner. The arrangement can be based on the logic of the subject matter or the developmental patterns of growth of the three learning domains. Lunt et al. (2008) propose the following sequence of courses: IT Fundamentals, Programming Fundamentals; Computing Platforms, IT Systems, Web Systems, Networking, Databases, Human-Computer Interaction, and Information Assurance and Security.

Curriculum as a Process

Curriculum as a process concerns the interaction between the instructor and learners. In capstone projects, the synergy between students and supervisors is crucial in determining the success of the projects (Pérez et al., 2012). Learning is geared toward being more learner-centered (Wright, 2011) as learners are demanded to be more critical and involved (Bukhari et al., 2021; Pisarik & Whelchel, 2018) in their academic journey. Weimer (2002) explicates the essentials of the learner-centered approach in terms of (1) the balance of power in the classroom, (2) the function of the course content, (3) the role of the instructor versus the role of the learner, (4) the responsibility of learning, and (5) the purpose and processes of evaluation.

1. The balance of power in the classroom. With learners as key stakeholders, it is necessary to balance the power between instructor and learners when determining the classroom policies and expectations, content and assessment, as well as the learning environment (Eberly et al., 2001). Forming a learning partnership (Magolda, 2005), instructors put together supports, challenges, and reflections to help learners develop complex frames of reference (Baxter et al., 2008) and a sense of autonomy that guide students' capstone endeavors and decisions (Pérez et al., 2012).
2. The function of the course content. This relates closely to the BASICS curriculum design principles. Meticulous design and selection of the content is crucial. Anderson and colleagues' (2010) findings suggest that students from the Computer Science and Engineering program must read sufficient literature and engage in practical projects for more meaningful learning experiences. Essentially, they learn learning strategies

and "keep alive" (Pérez et al., 2012) in their own intellectual development. As a result, learners become enthusiastic and engaged throughout the course/program (Anderson et al., 2010).

3. The role of the instructor versus the role of the learner. As the facilitator, the instructor helps learners clarify their understanding and assimilate the content meaningfully (McCabe & O'Connor, 2014). Learners become active seekers of knowledge who benefit when learning by doing as instructors provide considerable "technological mentoring" (Pérez et al., 2012). Activities that promote active engagement are crucial for learners in the IT program to relate ICT concepts and principles with applications in operational settings (Anderson et al., 2010; Lesko, 2009).
4. The responsibility of learning. As learners gain balanced autonomy, they are expected to remain committed to the policies and mutual expectations in the course agreement (Moxhama et al., 2013; Parkes & Harris, 2010; Pérez et al., 2012); self-regulation is the key (Lawanto & Febrian, 2016; Shah et al., 2019). The instructor plays an equal role and is responsible for designing expectations and content that trigger learners' curiosity. Such effort will produce mature and responsible learners who are continuously engaged throughout the course/program and motivated to probe deeper into the subject matter and related disciplines (Anderson et al., 2010).
5. The purpose and processes of assessment. According to Weimer (2002), assessment in a learner-centered classroom aims to provide grading and promote learning. With clear articulation of objectives and assessment plan (Dennis & Hall, 2007) and proper alignment to the objectives and teaching and learning activities (Biggs & Tang, 2011), assessment components can stimulate meaningful learning and reduce anxiety. Literature (Lesko, 2009; Rowe et al., 2011) has noted assessment practices—such as reflections, practical demonstration of newly developed skills, integration with other disciplines, and balancing conceptual learning and technological training—deemed crucial for graduates to be workforce-ready.

Curriculum as a Product

This is a set of defining documents that delineate what the entering and exiting student should be capable of (MQA 2023, 2024; North, 2007). The documents should describe the related areas to be experienced within the course and the intended results or outcomes of having experienced these activities. Curriculum guidelines for undergraduate degree programs in IT (Lunt et al., 2008) specify the core and advanced outcomes and the criteria that IT graduates should possess.

The Current Study

The Background of the IT Capstone Project

During their final year, students in the IT program at the School of Computing will need to complete a capstone project. This project is divided into two course-based projects: Project 1 and Project 2. The projects cover all topics in the program majors. Currently, there are five majors offered: (1) Software Engineering, (2) Networking, (3) Artificial Intelligence, (4) Applied Data Science, and (5) Information Management. At the beginning of semester 5,

students enrolling in Project 1 must write a proposal to develop a system. The supervisor usually provides a specific topic/system. In Project 2, students must implement the ideas they proposed in Project 1. The skills required for system development are covered in all core courses. However, certain system developments, especially those that align with current trends, are only covered in the courses for Software Engineering and Networking majors. Most of the suggested projects may not always conform with core courses taken by students majoring in Applied Data Science. In the past, it has been observed that students, regardless of their majors, faced difficulties in Project 2, which is the actual development of the project.

Research Objectives and Questions

This study's research objectives are framed by the three curriculum approaches proposed by Ornstein and Hunkins (2018)—content, process, and product. The primary objective of this study is to investigate the design and implementation of the IT capstone project from the perspectives of both students and faculty members. Specifically, the study seeks to (1) Identify the challenges related to curriculum design and alignment in the IT capstone, (2) Explore the roles of faculty and supervisors in facilitating student success, and (3) Assess how effectively the capstone project integrates theoretical knowledge with practical application.

Methodology

This study adopts a collective case study approach (Stake, 1995), focusing on multiple perspectives from students and faculty within the IT program. The use of semi-structured interviews in focus group discussions allows for in-depth exploration of experiences and insights, suitable for understanding the complex dynamics of capstone projects in this context. In conducting the interviews through the focus groups, particular attention was given to informed consent and protecting the rights and interests of research participants, especially student participants. Measures were taken to ensure confidentiality and voluntary participation, following ethical guidelines.

The research objectives of this study are grounded in the three curriculum approaches proposed by Ornstein and Hunkins (2018): content, process, and product. These approaches provide a comprehensive framework for understanding how the IT capstone project is designed and delivered. The primary objective of this study is to investigate the capstone project from the perspectives of both students and faculty members. Specifically, the study aims to (1) Identify issues in the curriculum design of the capstone project in the undergraduate-level IT program, (2) Identify the issues in the curriculum delivery of IT capstone, and (3) Identify the outcomes of the IT capstone curriculum.

The research model is structured through a mapping process that links the curriculum approaches to the research questions and the interview guide. This mapping ensures that the questions posed during the interviews are directly aligned with the curriculum framework, allowing for a focused and systematic exploration of the key elements of content, process, and product. Table 1 provides a detailed representation of this mapping, showing how each curriculum approach is connected to specific research questions and the corresponding elements in the interview guide.

Table 1: The Research Model

Curriculum Approaches	Research Questions	Interview Guide
Curriculum as a Content (1) Balance, (2) Articulation, (3) Scope,	What are the issues in the curriculum design of the capstone project in the	How do you perceive the efficiency of the current capstone project in integrating theoretical

Curriculum Approaches	Research Questions	Interview Guide
(4) Integration, (5) Continuity, and (6) Sequence.	undergraduate-level IT program? How do the capstone curriculum design approaches measure the content?	knowledge gained through coursework into practical application?
Curriculum as a Process (1) The balance of power in the classroom, (2) The function of the course content, (3) The role of the instructor versus the role of the learner, (4) The responsibility of learning, and (5) The purpose and processes of evaluation.	What are the issues in the curriculum delivery of the capstone project in the undergraduate-level IT program? How do the capstone curriculum design approaches measure the process?	Does the capstone project prepare the students for real professional life challenges? Why or why not?
Curriculum as a Product Intended outcomes when exiting the course	What are the outcomes of the IT capstone project? How do the capstone curriculum design approaches measure the product?	What skills would the IT graduates possess at the end of the program?

Participants

Eight faculty members and eight final-year undergraduate students participated in this study. The participants provided their thoughts and experiences in semi-structured interviews and focus group discussions. The faculty members consisted of lecturers teaching two sequential applied courses (Project 1 and Project 2—termed the Capstone project) and the supervisors responsible for endorsing and supervising students' projects. Purposive sampling, while limiting sample size, was chosen to ensure that participants with direct experience supervising and completing capstone projects were included. The faculty members, four females and four males, had at least three years of experience supervising capstone projects in their department, apart from teaching regular computer science courses. Student participants, four females, and four males, were recent graduates who completed their capstone projects the previous semester. The characteristics of all participants are summarized in Table 2.

Table 2: The Demographics of Participants

No.	Pseudonym	Gender	Role	Background	Qualifications
P1	Lecturer DA	Male	Lecturer	Applied Data Science	Ph.D.
P2	Faculty Member DN	Female	Both	Information Management	Ph.D.
P3	Supervisor L	Female	Supervisor	Software Engineering	Ph.D.
P4	Supervisor AH	Male	Supervisor	Software Engineering	Pursuing Ph.D.
P5	Lecturer H	Female	Lecturer	Information Management	Ph.D.
P6	Faculty Member Y	Female	Both	Artificial Intelligent	Ph.D.
P7	Supervisor DS	Male	Supervisor	Networking	Ph.D.
P8	Faculty Member DK	Male	Both	Information Management	Ph.D.
P9	Student W	Female	Alumnus	Software Engineering	Matriculation

No.	Pseudonym	Gender	Role	Background	Qualifications
P10	Student H	Male	Alumnus	Information Management	STPM
P11	Student Na	Female	Alumnus	Applied Data Science	STAM
P12	Student N	Male	Alumnus	Networking	STPM
P13	Student K	Male	Alumnus	Information Management	Matriculation
P14	Student ZK	Female	Alumnus	Information Management	STAM
P15	Student AF	Male	Alumnus	Artificial Intelligence	Diploma
P16	Student NR	Female	Alumnus	Software Engineering	Diploma

*Note. P: participant; STPM: *Sijil Tinggi Persekolahan Malaysia* [Malaysian Higher School Certificate]; STAM: *Sijil Tinggi Agama Malaysia* [Malaysian Religious Higher School Certificate]

Data Analysis

We employed thematic analysis (Braun & Clarke, 2013), which involved three steps: (1) multiple reading of the transcripts, (2) coding, and (3) categorizing them into themes. Initial codes were built from the data through multiple transcript readings. Once the initial codes were created, we individually looked at the evolving themes from the initial codes, compared our analysis, and agreed upon those with common features and patterns. Five primary themes were finalized after the participants refined the data through member-checking discussions. The themes were mapped based on Ornstein and Hunkins' (2014) curriculum design approaches: content, process, and product.

In addition to interviews, observational field notes were used to cross-validate findings. Data from faculty and students were analyzed separately to account for their differing roles. Faculty data highlighted concerns about curriculum continuity and supervision, while student data emphasized the challenges of integrating theory and practice, particularly regarding technical guidance.

Although data from faculty and students were analyzed separately to account for their distinct roles in the capstone project, eventually mixing the data was driven by recognizing that both perspectives contribute to a fuller understanding of the program's strengths and challenges. Faculty provided valuable insights into curriculum design, supervision, and the continuity of learning objectives, while students highlighted the practical application of theoretical knowledge and the technical support needed for success.

By integrating faculty and students' complementary viewpoints, we could identify overlapping themes—such as the alignment of objectives with practical skills and the need for clearer guidance—that may not have emerged as strongly if the data were kept separate. This holistic approach aligns with SoTL's focus on reflective analysis and continuous improvement in teaching and learning, as it recognizes the interconnectedness of the experiences of both educators and learners. Furthermore, it emphasizes the importance of including multiple stakeholders to ensure a more comprehensive and actionable assessment (Bukhari, 2021). Therefore, combining the faculty and student data provided deeper insights and strengthened the validity of the themes that emerged.

Results

In this study, we aimed to investigate the issues in the capstone project for an undergraduate-level IT program offered by the School of Computing. On analysis, we found five primary themes. We also map the themes in the context of the curriculum design approaches by Ornstein and Hunkins (2014), which were discussed earlier. What follows is the elaboration of the findings with selected evidence from the participants' transcripts.

Theme 1. Articulation of the Objectives, Roles, and Responsibilities (Curriculum Approach: Content)

The articulation of clear objectives is crucial to the content approach. Several supervisors and students discussed the lack of clarity in the project objectives, which affects students' ability to deliver. Several supervisors noted that the scope is very broad, and the time is very limited, making it hard for students to manage their projects effectively. Also, articulation is not limited to articulating the subjects offered but includes delineating clear roles and responsibilities between the lecturer and the supervisor. The ambiguous roles between the supervisor and the lecturer have confused the project's supervision. There was no predefined role for lecturers teaching the theory and supervisors overseeing students' projects.

I am not quite clear about the roles of a supervisor … if the students are required to build mobile applications and do not have prior experience [to do that] … do I need to teach [them]? Fortunately, I am teaching mobile programming, so they can just enroll in my class… so they can learn that or to do that … but still, what [are my] roles?

Supervisor AH

One of the students revealed her dilemma,

[t] The communication with my supervisor was very bad…. When I messaged him [the supervisor], he replied that I should see my lecturer. When I contacted my lecturer, he told me he did not want to be involved, that my supervisor should handle it, and that I should see my supervisor.

Student Na

Some lecturers argued that supervisors need to be more proactive, as students tended to consult the lecturers more than their supervisors. More confusion occurred when the supervisor was also referred to as a client. This gave most supervisors the presumption that they had the privilege to demand that students conduct projects based on their desires. A supervisor expressed his concerns when some supervisors literally adopted the client role in their capstone supervision.

…the term client; I do believe… is very misleading. When you are defining your supervisor [as] a client… you tell what you want but [not] necessarily, you guide the students in how to get it done… by hook or crook, [students] do whatever it takes to build an application…

Supervisor AH

Theme 2. Continuation and Sequence (Curriculum Approach: Process)

This theme aligns with the process approach, focusing on how learning experiences are sequenced throughout the capstone project. Faculty expressed concerns about the need for a clear and logical progression from theoretical learning to practical implementation, which is critical for student success in the capstone.

Students in the School of Computing come from diverse educational backgrounds, having entered the program through one of four qualifications: (1) a matriculation certificate from the Ministry of Education, Malaysia, (2) at least three principal passes in the Sijil Tinggi Persekolahan Malaysia (STPM), which is Malaysia's higher school certification, (3) a diploma from a recognized institution in Malaysia, or (4) a high school pass certificate from the Malaysian religious stream, known as Sijil Tinggi Agama Malaysia (STAM). As a result, students begin the IT program with varying levels of academic preparation and prior exposure to IT-related subjects.

Faculty members observed that students with matriculation or diploma qualifications often had an advantage, as many were exposed to critical subjects such as Additional Mathematics and ICT-related courses before entering the program. This prior exposure better prepared them for the challenges of the capstone project. As Lecturer DA explained,

… if the student has a diploma… they will excel a little bit when it comes to projects. They were trained to work on projects before they joined us… For the students … from the matriculation… their ability [differed from other students], maybe they have already learned a small quantity of advanced math and programming before that so maybe there is a small number of advantages to them compared to those who came into the program with STAM.

Lecturer DA

However, there is a noted disconnect between earlier courses and what is required in the capstone, particularly in Project 1 and Project 2. According to Supervisor AH, students often struggle to connect their previous knowledge to the capstone project tasks, especially in technical areas like mobile programming.

Students often struggle to connect previous knowledge with the capstone project tasks as they need to relearn everything in courses like mobile programming…

Supervisor AH

indicating a lack of sequence between courses leading up to the capstone.

Students echoed these concerns, emphasizing the gaps they experienced between different phases of the capstone. These gaps impacted their ability to synthesize knowledge and skills acquired throughout their academic journey, further highlighting the need for a more structured and well-sequenced curriculum that better prepares students for the complexities of the capstone project.

Theme 3. Integration of Theory and Practice (Curriculum Approach: Process)

This theme is best understood through the process approach, which centers on how students apply theoretical knowledge in practical contexts. In addition to concerns about the continuity and sequencing of courses, faculty members pointed out issues related to the disintegration of course content. They felt that if the courses were more cohesively integrated, students would be better able to reinforce their knowledge, understanding, and skills in IT through exposure to varied sources and task-based assessments. However, students often did not see the connections between different skill sets, as lecturers did not adequately demonstrate how these skills interrelate.

One lecturer, Lecturer H, expressed concern over students' lack of readiness when tasked with developing a mobile application, noting that this was due to fragmented learning experiences,

... we work in silo… when [students need to develop] mobile application, they could not synthesize what they have learned… I need to teach them [again] database, … the back-end services, and also front-end… … they could not do GUI even though they have already taken the subjects… Because when developing a mobile application [they] have to request database, [they] need to build [their] own [application programming interface] API, that API needed to be built using [personal home page] PHP tools, Python or whatnot but, they cannot see how that can be done…

Lecturer H

This statement underscores the difficulties students face in connecting disparate pieces of knowledge from their coursework. The isolated teaching of subjects like database management, API development, and front-end design leaves students ill-equipped to understand how these components fit together in a real-world project. This lack of integration in the learning process prevents students from developing a holistic understanding of application development, ultimately hindering their ability to apply theoretical concepts in practice.

Theme 4. The Responsibility of Learning (Curriculum Approach: Product)

This theme is closely tied to the product approach, which emphasizes learning outcomes and the development of student competencies. Both faculty and students acknowledged that cultivating independent learning skills is a key expected outcome of the capstone project. However, students reported that insufficient technical guidance often hindered their ability to take ownership of the learning process fully.

In addition to technical challenges, findings revealed that many students lacked the critical non-technical skills necessary to complete their projects. These included essential skills such as self-regulation, critical thinking, and problem-solving. The absence of these skills contributed to many students struggling to finish their capstone projects successfully. Faculty members observed this gap, noting that students often had difficulty managing their time and resources effectively, which are crucial for independent project work.

As one faculty member remarked,

...soft skills are important, which many students do not have. The right attitude for learning, persistence, and problem-solving are required to do these projects. If they try, they can get many resources to teach them, such as programming, but they do not want to do it independently.

Faculty Member DN

In addition to students' ability to integrate the knowledge and subjects they have learned in meaningful ways, they must be able to communicate their work and findings in writing. One of the supervisors noticed the lack of writing skills among her students in her supervision.

... [the students] are not good at writing; they felt that writing a proposal is challenging. When they took the research method class, they did the proposal in groups, but they did it individually when they wrote for their projects.

Supervisor L

As the projects started, lecturers provided briefings during the first class. Since this was conducted separately for each group taking the project in that particular semester, it is

understandable that the process lacks standardization. Furthermore, students felt that the briefings did not qualify as orientation as they were inadequate. One student stated,

[for] briefings of Project 1 [and] Project 2, there are various types [of briefings] that are not that comprehensive.

Student W

We asked the students for suggestions on how the department could better assist them during the orientation. One student proposed that the orientation include a hands-on workshop to help them revise the skills they need.

First, I will have a workshop where I start on [things we learned earlier] ... not on documentation, but website development. ... even [in] the workshop I [attended], it was not [focusing on how to start] but ... roughly on the outline [of the project] ...And one day is not enough, sir, maybe two days… Something [that the students] will get.

Student H

Theme 5. Alignment of Technical Guidance and Supervision (Curriculum Approach: Product)

Technical guidance is essential for students to produce high-quality capstone work as part of the product approach. Both groups highlighted the need for more direct technical support, with faculty acknowledging the difficulty in providing hands-on supervision due to time constraints and limited resources.

Moreover, students reported a significant mismatch between their skills and the projects assigned to them. The findings revealed that many students reported that the assignment of topics for the capstone project needed to be reconsidered. Projects were assigned on a first-come-first-served basis; hence, the students who registered first got the projects of their liking, while students who got to choose later often ended up getting projects that they did not like or the ones that required skills they did not possess. One of the students reported being assigned a web development project while he was a Networking major. He claimed,

I am a Network[ing] major, but when I chose my project, there were no suitable projects available. So, I chose web development, but it was not easy since I lacked the technical skills needed.

Student N

Only three students interviewed reported getting projects from their field or at least some aspects of their project that were within the area of their specialization.

On the other hand, there were also instances where students were assigned a supervisor who was not an expert in the technology required to carry out the projects. This led to the students not getting suitable technical guidance to carry out their projects properly. For example, a student was assigned a project that required programming skills. However, the supervisor was not from the programming field. One of the students explained,

[W] When I tried to discuss my problems with my supervisor, he would say, "I am sorry, I am not quite familiar with this since I am not into programming." I had to take the help of online tutorials…

Student K

In some cases, supervisors, regardless of background and expertise, tended to request students concentrate their capstone projects on system development based on current trends such as

mobile programming and the Internet of Things (IoT). This has been proven problematic as some of the skills required to develop them were covered in certain majors in the program but not in other majors.

Sometimes, supervisors are also influenced by the trends in technology. Whatever technology comes, people just twist their interests into it [without considering] students' skills, exposure, and the feasibility of achieving the intended goal.

Faculty Member Y

One of the supervisors embeds classroom empathy in his suggestions as he considered students' interests, continuous development of student skills, knowledge, effort, and early mentoring.

... have just one project for students to complete… project that they are interested in [based on] whatever subjects they have taken. [The project that] they have put effort into ... in developing one application.

Supervisor AH

Discussion of Findings

In Theme 2: Continuation and Sequence and Theme 3: Integration of Theory and Practice, both of which relate to the process approach of the curriculum, most of the insights came from faculty, supervisors, and lecturers (North, 2007), with limited input from students. This is expected, as these themes focus on the broader design and flow of the curriculum, areas where faculty play a central role. Faculty are responsible for course sequencing and ensuring that theoretical knowledge is effectively linked to practical skills in the capstone project (Ornstein & Hunkins, 2018).

Faculty raised concerns about gaps in course progression (Theme 2) and difficulties in linking theory to practice (Theme 3). These are curriculum-level issues that impact how they teach and support students. Students may experience challenges related to these themes, such as struggling to apply earlier coursework to their capstone projects. However, they often do not connect these issues to the underlying curriculum structure (Lesko, 2019). This disconnect indicates a need for more explicit communication of how course sequencing and theoretical integration are designed to prepare students for their final projects.

In contrast, students provided more detailed feedback on themes like technical guidance (Theme 5) and independent learning (Theme 4), where they felt the direct impact on their capstone experience. These themes focus on the hands-on support students receive and their ability to take responsibility for their learning. The disparity in feedback between students and faculty highlights their differing perspectives: faculty view the curriculum holistically, while students focus on immediate challenges related to supervision and technical support.

In this context, the MQA (2023, 2024) provides valuable guidelines for evaluating the capstone project. According to the MQA (2023), computing programs must ensure alignment between curriculum design and the industry's evolving demands while fostering student autonomy and developing technical and non-technical skills. The Programme Standards (MQA, 2023) also emphasize the importance of well-structured program development and delivery, clear assessment methods, and continuous improvement in response to student needs and feedback (see also MQA, 2024).

The limitations of this study must be acknowledged. The sample size of 16 participants restricts the generalizability of the findings. Furthermore, the study focuses on a single

institution, which limits its scope to one specific IT program. While the findings provide valuable insights, they may not fully represent the experiences of students and faculty in other institutions or programs. Future research with a larger, more diverse sample must validate these trends.

Curriculum innovation in capstone projects depends heavily on collaboration among key stakeholders—faculty, students, and administrators—who must be willing to adapt to changes (Baxter Magolda, 2005; Perez et al., 2012; Bukhari, 2021). Stakeholders' readiness to implement changes is influenced by how they perceive the challenges and their confidence in addressing them. This study suggests that fostering better collaboration between students and faculty, with clearer communication about curriculum design and expectations, could improve capstone project outcomes.

Reflecting on curriculum models, Ornstein and Hunkins (2018) emphasize that faculty and curriculum development teams should ask critical questions, such as whether foundational concepts are emphasized early enough and whether the curriculum aligns with students' needs and societal trends. Evaluating whether students perceive relevance and continuity throughout the program is essential for improving their learning experience (Anderson et al., 2010). Moreover, the MQA standards stress that program providers should focus on fostering graduates with the skills and competencies that meet current industry needs while allowing for innovation in curriculum design and educational delivery (MQA, 2023).

The findings of this study align with previous research on capstone projects (Hauhart & Grahe, 2015), highlighting the importance of integrating practical skills throughout the curriculum. However, this study offers new insights into the challenges specific to IT programs, where technical skills like programming and database management are essential but unevenly taught across different majors (Lesko, 2019). The ambiguity in faculty roles also reflects broader issues in faculty-student collaboration (Perez et al., 2012), reinforcing the need for clearer supervision and curriculum design guidelines.

Conclusion and Recommendations

This study has gathered valuable perspectives from both students and faculty, demonstrating the significant potential of the IT capstone project to enhance students' learning and skills. However, the current design and implementation of the capstone project lack alignment with core curriculum principles and best practices outlined by Ornstein and Hunkins (2018) and the MQA Programme Standards for Computing (2023). This study provides insights and recommendations that can inform curriculum review and improvement.

High-impact educational Practices (HIEPs) such as capstone projects offer students authentic, real-world experiences that improve their skills and prepare them for the workforce (Baxter Magolda, 2005). However, to realize this potential, capstone projects must offer meaningful, applied learning experiences with clearer roles and expectations for students and faculty.

One key recommendation is to clarify supervisors' and lecturers' roles and responsibilities. The current ambiguity, particularly regarding the supervisor's role as a "client" in some projects, creates confusion and inefficiencies. Clear definitions of roles and responsibilities should be communicated, especially during orientation. Supervisors should also be involved in early interactions with students to build strong relationships and provide continuous guidance throughout the project.

Additionally, aligning project assignments with students' skills and interests is crucial. Allowing students to choose capstone topics based on their strengths and the core courses they

have completed will ensure a better match between their technical capabilities and project requirements. Moreover, offering project options such as web-based or mobile development to students with relevant skills can enhance engagement and learning outcomes.

Another suggestion is for the Course Coordinator to organize workshops focused on the key skills required for Project 1 and Project 2. These workshops would provide hands-on training and help students develop the technical and essential (Bukhari et al., 2021; Lunt et al., 2008) competencies needed for successful capstone completion. This aligns with the MQA's emphasis on ensuring students are equipped with the necessary skills to meet current and future industry demands (MQA, 2023, 2024).

Finally, offering the capstone project as a final-year project or integrating it with industrial training could give students more time to immerse themselves in real-world problems, enabling deeper learning and collaboration with industry partners.

In conclusion, this study identifies several areas where the IT capstone curriculum can be improved. By clarifying roles, aligning project assignments with students' abilities, and providing more practical training, the capstone experience can better prepare students for professional success. These recommendations are consistent with broader discussions in the Scholarship of Teaching and Learning (SoTL) about enhancing student engagement and learning outcomes through well-designed capstone projects (Felten, 2013). Aligning with the MQA Programme Standards for Computing (2023) will ensure that graduates possess the skills and competencies required for academic and industry success.

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Developing Vocational Internship Program Evaluation Instrument

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ABSTRACT

The internship program is momentous in providing practical experience for vocational school accounting students in Indonesia. In practice, however, different evaluation models assess the program's effectiveness. As a sequence, therefore, this study was intended to develop standardized instruments that can be adopted in the internship program evaluation at the vocational school. Initially, 31 items for the internship program evaluation were drafted. Next, by adopting the Aiken validity model, three experts were requested to assess the instrument's feasibility. Besides, an empirical validation was conducted by inviting 180 vocational school students. Finally, by using confirmatory factor analysis (CFA), root mean squared error of approximation (RMSEA), Tucker Lewis Index (TLI), and comparative fit index (CFI), this research has generated a reliable instrument consisting of 23 valid items which can be used as a standard in evaluating the internship program effectiveness for vocational school in Indonesia. The results estimate that 23 valid instruments can be used to evaluate the program of accounting field practice in vocational schools. This tool is effective in evaluating accounting fieldwork practices.

Keywords: Internship, Vocational School, Evaluation, Confirmatory Factor Analysis

Introduction

For students in vocational schools, an internship is a learning process that is carried out through work experience in the working world over a set period per the curriculum and the needs of the working world (*Regulation of the Minister of Education and Culture of the Republic of Indonesia No. 50 of 2020*, n.d.). It is important to provide practical experience for students with the competence of accounting expertise of the vocational school. The internship activity is one of the implementations of the link-and-match policy in vocational schools. It aims to improve the relevance of vocational schools to the needs of the working, business, and industry (Disas, 2018). Thus, the link and match policy is hoped to reduce the unemployment rate of vocational schools (Disas, 2018). The link and match policy is like a dual system in Germany. Dual-system training occurs in educational institutions and workplaces (Remington, 2018). The dual system in Germany is mandatory, unlike other countries, such as the UK, which is voluntary (Deissinger, 2010).

The dual system is a structural and didactic pattern in professional learning. It can be implemented in 3 ways: 1) by attending a full-time internship in a school (professional), college, or higher educational institution that does not have a training or employment contract; 2) by acquiring special skills or competencies in a company which has contract work (training participant or employee) and therefore in a particular work environment (studying while working); or 3) participating in industrial work practices or apprenticeship programs, which use a school-based (part-time) and company-based learning mode (Deissinger, 2010). The dual system aims to offer engaging training for young adults with skills who have completed three and half years of training (Haasler, 2020). However, it becomes challenging for low-achieving young people (including immigrants and refugees) to enroll in vocational and educational training (VET) programs. Germany and Switzerland are countries that have been successful in implementing VET (Deissinger & Gonon, 2021). Germany has a robust dual internship system (Haasler, 2020). The internship is being rebuilt in Germany and Switzerland, leading to the development of a trustworthy institutional internship framework and contemporary vocational training system that emphasizes employability skills (Deissinger & Gonon, 2021). Part-time vocational schools are the most prevalent in the two-country distribution system, and they are now recognized as an institution that not only links the spheres of job and education but is also backed by a solid cross-class consensus in both countries (Deissinger & Gonon, 2021). Unlike Germany, the latest internship model in the UK is STEM, where interns work while learning to earn a degree.

In Indonesia, the link and match policy is the policy of linking (linking) the competence of graduates of education according to the demand and needs of the business and industrial world in terms of quantity, quality, range, qualification, and time of internship (Maulina & Yoenanto, 2022). In the era of Industry 4.0, vocational education is a real link and match and has a huge chance (Sudira, 2019). The existence of link-and-match programs is very helpful in establishing vocational school cooperation with the business and industrial world in the form of competency-based training (CBT), the MoU program, curriculum coordination, industrial work practice, and competence test expertise (Maulina & Yoenanto, 2022).

The internship is one of the policies of link and match, a learning model that combines institutional-based education and work-based training (Astuti et al., 2023) and assists in professional growth (Anjum, 2020). The participants' accounting students are better

equipped because of the internship experience. Work readiness can also be developed and influenced by experience, the educational setting, the pedagogical expertise of the instructors, and their performance in activities related to internships (Saputra & Sukirno, 2020). This activity is followed by vocational school students, one of whom is accounting. The internship is organized in the working world, including the business world, the industry world, state-owned enterprises or regionally owned enterprises, government agencies, or other agencies. At the implementation stage of the industrial work practice, students are placed based on competence, work practice, and mentoring with the internship tutor (*Regulation of the Minister of Education and Culture of the Republic of Indonesia No. 50 of 2020*, n.d.). In addition to the school program, the internship is also organized from the Corporate Social Responsibility (CSR) program of oil and gas manufacturing companies in Indonesia, where the results are competent staff, the characteristics of participants reflect the goals of the program, a synchronous and flexible curriculum, adequate facilities, and fulfilled procedures (Ramadhani & Rahayu, 2020). There are still students whose internship does not match their competence. The level of participation of the business and industrial world in internship activities, the level of involvement in curriculum validation activities, and the participation in recruitment activities still appear insufficient (Ismail, 2022). Students at vocational schools also learn theoretical but less relevant to the needs of the labor market (Suharno et al., 2020).

The promising program still needs evaluation to improve. The study that developed evaluation instrument is from audio video engineering expertise but not for accounting, which showed the product of instruments consisting of context evaluation (based on weaknesses, strengths, and opportunities), evaluation of input (student preparation, curriculum of teacher performance subject, means of practice, support), process assessment (participant performance industrial work practice, teacher performance guide, performance guide business and industrial world, and product evaluation (benefits for students and benefits for business and the industrial world (Yumaroh et al., 2014).

The presence of valid and reliable internship evaluation instruments should support the importance of the internship program for vocational school students. The internship program needs a standard instrument for evaluating the success of the internship program (Rohman et al., 2020) or improving the implementation of the internship program. The existing evaluation tool used by schools in internship programs was the evaluation based on school; any school evaluates an internship program with focus group discussion. The instrument developed in this study provides convenience for schools in evaluating internship programs, especially in accounting expertise, because it consists of three aspects (preparation, implementation, and results).

This research discusses the development of the evaluation instrument of the internship competence of vocational schools in accounting expertise. The internship evaluation instruments can be used by vocational schools in conducting internship programs. The construction development of evaluation instruments needs to test the reliability and validity of the construction. Testing of evaluation instruments is carried out to determine the qualification and consistency of the evaluation instrument to evaluate the internship program of vocational school accounting students.

An instrument's validity and reliability can be tested using factor analysis. Factor analysis is a set of methods used to test how the underlying structure affects the response to several measured variables (A.Pett et al., 2003). The method used in this study is confirmatory

factor analysis (CFA). CFA tests whether a particular set of constructions affects responses predictably (A.Pett et al., 2003). CFA is used to validate factor loads and measurements involved in this study. The researchers use this approach to test the proposed theory (CFA is a form of structural equation modeling and differs from EFA, which has assumptions and expectations based on previous theories about the number of factors and which theory or model of factors is most suitable (Jian et al., 2020). This research aims to develop an evaluation instrument for vocational schools' competence in accounting expertise. The evaluation instruments were constructed based on literature reviews that tested their validity and reliability.

Literature review

Germany was an early founder of dual-system education. Germany had an early vocational education and training system called the "dual system", which many countries worldwide admired and wanted to adopt. However, to transfer this model to other countries, it is not enough to simply copy it. Rather, the transfer should reflect the conditions in the country adopting this system and be adapted according to its unique social, cultural, and economic goals. In addition, while the dual system can serve as an example, no other country can implement the dual system in its entirety or its components individually. Instead, five constitutive elements must be used to transfer the German model's dual spirit properly. The article also discusses some considerations in the transfer process and mentions some German projects that transferred the system to Asian countries (Hummelsheim & Baur, 2014). (2022) have researched the quality of Indonesian vocational-technical education graduates, which is low and does not meet industry requirements and competencies. This happens because the talents or skills the sector requires differ from those currently available. Therefore, developing countries need a practical, dual-system vocational education system. Indonesia has recently attempted to examine its Dual Vocational Education and Training system in more detail. The results show that direct or implementation transfers currently have many challenges and difficulties involving both the public and public-private sectors. On the other hand, for a successful vocational transfer, close cooperation between all stakeholders and a deeper understanding and knowledge of the contextual conditions in the target country is essential.

The implementation of the internship consists of planning and organizing, implementation, and evaluation (Astuti et al., 2023). Planning and organizing include the MoU between vocational school and industry and implementing the Training of Trainers (ToT). The implementation of the internship includes the learning process, curriculum implementation, teaching staff preparation, learning system implementation, and competency tests. The evaluation includes reporting learning progress, obtaining a certificate of competency from the industry, monitoring and evaluation, and periodic evaluations between schools and the industry. The impact of internship programs can increase labor participation, prevent early school leaving (Alegre et al., 2015), relate to continue profession, practical courses, and curriculum together in enterprises (Turan, 2022), and assist work readiness construct (Kapareliotis et al., 2019). The development of internship instruments in vocational schools in accounting expertise has not been carried out, so it is necessary to develop an evaluation instrument for accounting internship programs.

Methodology

This development research aims to prove the construction validity and estimate the

reliability of the evaluation instrument internship competence of accounting expertise in vocational school, based on the literature review, then compile the kits of instruments to continue with the development of the components of evaluation instruments. Three experts subsequently validated the development of this instrument. This instrument is a quantitative instrument. The instrument was a questionnaire filled out by the students totaling 31 items, including 13 items from internship preparation, 14 from internship implementation, and four from the internship results. Then, out of 31 items, seven outlier items and 1 item have an anti-image correlation ≤ 0.5. Thus, the total of the evaluation instruments of the internship program is 23 items consisting of 9 items from the preparation of internship (A1, A2, A3, A5, A7, A9, A10, A12, A13), ten items from internship implementation (B1, B3, B6, B7, B8, B9, B11, B12, B13, B14), and four items from internship results (C1, C2, C3, C4). Purposive sampling techniques were used to conduct the evaluation instruments' trial test at three vocational schools in the Sleman District. The purposive sampling criteria were vocational schools ranked one to three in Sleman District. One hundred eighty students responded to the survey for this evaluation tool. A student survey is used to construct the evaluation instrument for the internship programs. The questionnaire consisted of three evaluation components, including (a) the preparation of the internship(A), (b) the implementation of the internship(B), and (3) the results of the internship(C).

CFA analysis was used to estimate the reliability and validity of the construction of the evaluation instrument using CFA analysis. CFA is a statistical and qualitative process for estimating the reliability of elements, construction reliability, content validity, display validity, quantitative measurement of discriminatory and convergent validity, and goodness of fit (Hair et al., 2020). CFA is used when researchers test the hypothesis that there is a proposed theoretical relationship between the observed variable and its underlying latent structure, as well as to confirm the measurement properties of a set of variables (indicators) to measure a defined and operatively defined latent construction (Hair et al., 2020). The data was analyzed by using R software. Criteria for the conformity index of the CFA model based on test statistic, df, p-value, root mean squared error of approximation (RMSEA), Tucker Lewis Index (TLI), and comparative fit index (CFI). Model compatibility criteria using Gana and Broc criteria (Gana & Broc, 2018), an RMSEA value less than equal to 0.05 indicates a very good fit and an RMEA value smaller than 0.06 and less than equivalent to 0.08 is a good fit. A TLI value greater than 0.9 and less than equal to 0.94 indicates a good fit and a TLI value greater than 0.95 is a very good fit. A CFI value of more than 0.9 and less than equal to 0.94 indicates a good fit and a CFI rating of more than 0.95 indicates a very good fit.

Results

This study tracked variables such as internship preparation, implementation, and actual internship results. This internship evaluation tool uses CFA for validity testing and calculation of construction reliability. The CFA results demonstrate how the measurement construction model and the data from the internship evaluation matched. Additionally, the content validity of these evaluation tools was examined.

Confirmatory factor analysis of the correlation model

Data analysis of internship evaluation instruments uses CFA with a factor correlation model internship assessment. The results of the CFA analysis were then tested using the model matching criteria. Based on the results, the analysis uses the Maximum Likelihood

estimator, with the sum of model parameters 63 and the number of observations 180. The p-value value (chi-square) of the user test model is 0,000, while if the baseline test of the model, the p-value is 0.000. The p-value is not significant due to the small number of respondents. Table 1 shows the results of CFA analysis before and after the modification based on the goodness of fit test criteria. Other CFA results include RMSEA, TLI, and CFI.

Table 1: Goodness fit of test criteria value Criteria.

Criteria	Cut off value	Before modification	Status	After modification	Status
X^2	$\leq 2df$	680.732	Not Fit	346.719	Fit
RMSEA	≤ 0.05	0.105	Not Fit	0.059	Fit
TAG	≥ 0.90	0.691	Not Fit	0.903	Fit
CFI	≥ 0.90	0.723	Not Fit	0.918	Fit

The goodness of fit test can be seen with RMSEA, TLI, and CFI values. RMSEA = 0.059, meaning > 0.05 so, indicating a good fit of the model. The TLI value is 0.903, meaning < 0.95, indicating a good fit model. The CFI value is 0.918, meaning <0.95, indicating a good fit model. Based on the results, the model of evaluation instrument internship competence skills Accounting SMK developed fit.

The latent variables of this study include variable P (internship preparation), variable I (internship implementation), and variable R (internship results). Figure 1 and Table 2 report information about each latent variable's loading factors. The variable P, measured by the element A1, has a load factor value of 0.378. The variable P measured by element A2 has a load factor value of 0.301. The variable P measured by element A3 has a load factor value of 0.364, and so on. The highest load factor value is the variable P measured by element A9, which is 0.805. Variable I, measured by element B1, has a load factor value of 0.265. Variable I, measured by element B3, has a load factor value of 0.376. Variable I, measured by element B6, has a load factor value of 0.482. The highest load factor value is variable I, measured by element B7, which is 0.837. The variable R measured by the element C1 has a load factor value of 0.265. The variable R measured by the element C2 has a load factor value of 0.632. The highest load factor value is the variable R measured by the element C3, which is 0.761. The variable R measured by the element C4 has a load factor value of 0.606. The result of the modification shows that variable element A13 also measures me with a load factor value of 0.311.

The results of instruments that significantly influence the observation variables are seen from the standardized factor load (SFL) values in Table 2. A particle or indicator with good structural validity and a good latent variable if the SFL value is ≥ 0.30 [19]. Based on Table 2, all the seeds meet the requirements; only B1, B9, B11, and B14 have values < 0.30. However, the SFL value of the four grains is more than 0.25 (close to 0.30).

Table 2: Standardized factor load (SFL)

Components	Items	SFL
Preparation of internship	A1	0.378
	A2	0.301
	A3	0.364
	A5	0.545
	A7	0.562
	A9	0.805
	A10	0.764
	A12	0.707
	A13	0.390
Implementation of internship	B1	*
	B3	0.376
	B6	0.482
	B7	0.837
	B8	0.803
	B9	*
	B11	*
	B12	0.779
	B13	0.558
	B14	*
	A13	0.311
Results of internship	C1	0.709
	C2	0.632
	C3	0.761
	C4	0.606

* SFL not meeting the criteria

Information related to covariance or correlation between the seeds and other seeds is shown in Figure 1. The highest covariant value is A10 with A12, which is 0.832. The covariance value of B9 with B11 is 0.586. The covariance value of A7 with A13 is 0.423. The variation value of variable P with variable I is 0.192. The value of variable P for variable R is 0.146. The covariance value of variable I with variable R is -0.021, and so on.

Figure 1 also provides information about variance values. The variance value of A1 is 0.857. The variance value of A2 is 0.910. The variance value of A3 is 0.868. The variance value of A5 is 0.703. The variance value of A7 is 0.684. The variance value of A9 is 0.351, and so on. The highest variance value is B1, which is 0.930. The lowest variance value is B7, which is 0.299. The variables P, I, and R variance values are 1,000. The value of R-square, or (the size of each element's contribution) is shown in Table 3. The highest contribution value is B7, which is 0.701. The lowest contribution value is B1, which is 0.070.

Table 3. R-square

Items	Estimate R-square
A1	0.143
A2	0.090
A3	0.132
A5	0.297
A7	0.316
A9	0.649
A10	0.584
A12	0.500
A13	0.296

Items	Estimate R-square
B1	0.070
B3	0.141
B6	0.232
B7	0.701
B8	0.644
B9	0.073
B11	0.082
B12	0.607
B13	0.311
B14	0.072
C1	0.503
C2	0.400
C3	0.579
C4	0.367

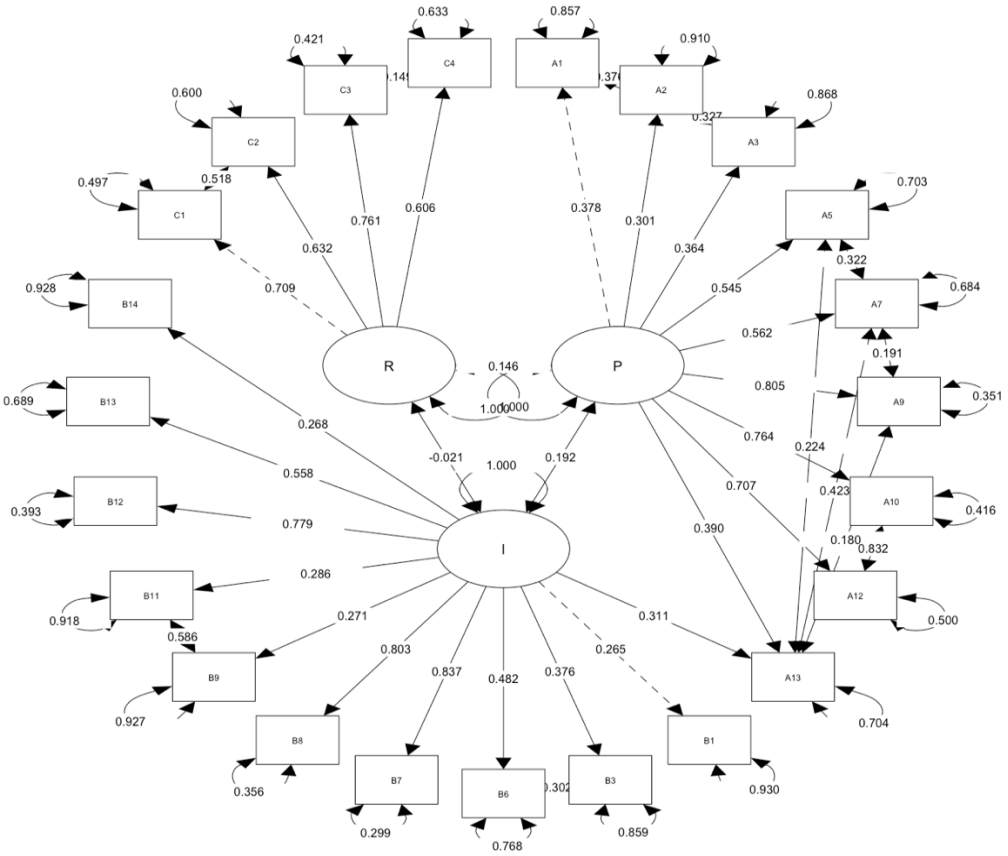

Figure 1. Standardized solution diagram of CFA results

The analysis findings utilizing the CFA factor correlation model are displayed in Figure 1. To modify the outcomes of this CFA analysis, we connected the elements and performed a correlation between items A10-A12, B9-B11, A7-A13, A5-A7, A1-A2, A6-A9, A2-A3, C1-C2, C3-C4, A9-A13 and the component I in the A13 scale.

Construct validity and composite reliability.

The theoretical construction, also known as the validity of the construction, must be consistent with the instrument's development. In order to refer to the meaning of

measurement, construction validation is the process of obtaining evidence (Hair et al., 2020). Once the suitability requirements of the measurement model are met, the developed model needs to be tested for validity and reliability estimates before proceeding with the structural equation model (Hair et al., 2020). The information in Table 1 shows that based on the index of conformity of the measurement model, all index criteria are met in the validation of the construction of the evaluation instrument of the internship program. Therefore, the validity of the construction of the evaluation instrument of the internship program is valid for evaluating the accounting student who follows the industrial work practice.

The average variance extract (AVE) is 0.35. According to Shrestha (Shrestha, 2021), the convergent validity size must have an AVE value greater than 0.50 (Nasution et al., 2020)**.** The result of an AVE value shows that each observed variable has a value less than 0.50. This means that the latent structural variance for each indicator element is lower than the error variant, so the internship program evaluation instrument element is less valid for measuring each observed variable. Therefore, the internship program evaluation instrument has less convergence validity in measuring each variable observed on the internship program evaluation instrument.

The next analysis concerns the validity of discrimination. Discriminatory validity is sometimes presented as the property of construction and as a property of the size built from that size (Rönkkö & Cho, 2022). A discriminatory validity value is used to analyze the relationship between latent variables (Henseler et al., 2015). Discriminatory validity can be defined as the correlation between two constructions. If the correlation value of the two structures is less than 0.85, the instrument's construction meets the discriminatory validity criteria (Noor et al., 2015). The CFA model correlation of the internship program evaluation instrument obtained correlations between the warning variables P-I, P-R, and I-R, respectively, at 0.192, 0.146, and -0.021. The study's results showed that the evaluation instrument of the internship program meets discriminatory validity with a correlation value of less than 0.85. Thus, the evaluation instrument of the internship program has a different warning variable structure than the other warning variables.

Testing continued with the reliability estimate of the evaluation instrument of the internship in the accounting program. An instrument can be said to be reliable if it measures the same ability repeatedly with consistent results. The reliability of compounds is discussed in this study. Composite reliability can also be called internal consistency (Hair et al., 2017), a combination of latent construction reliability that underpins the measurement scale (Ridwan et al., 2023). Composite feasibility can be used as a measurement tool but is not recommended for selecting particles in a structural equation model (Bacon et al., 1995). The reliability criterion of this composite is greater than 0.7 (Hair et al., 2020). The composite reliability of the composite rho value of this study is 0.92. The estimated reliability of this composite is greater than 0.7. This indicates that the evaluation instrument of the internship competence of the vocational school in accounting expertise provides consistent results.

Content validity

Test the validity of the content of this fieldwork practice evaluation instrument using three indicators: preparation for fieldwork practice, implementation of fieldwork practice, and the results of fieldwork practice. The proof of validity uses content validity based on three

experts analyzed using the Aiken formula. Based on the results of proving content validity in Table 3, it shows that the 23 evaluation instruments are feasible or valid for assessing the SMK internship program for accounting expertise competency.

Table 3. Content Validity Results

Items	V	Status
A1	0.8333333	Valid
A2	0.8333333	Valid
A3	0.7500000	Valid
A5	0.8333333	Valid
A7	1.0000000	Valid
A9	1.0000000	Valid
A10	0.7500000	Valid
A12	0.7500000	Valid
A13	0.7500000	Valid
B1	0.8333333	Valid
B3	0.8333333	Valid
B6	0.7500000	Valid
B7	0.7500000	Valid
B8	0.8333333	Valid
B9	0.7500000	Valid
B11	1.0000000	Valid
B12	0.8333333	Valid
B13	0.8333333	Valid
B14	0.9166667	Valid
C1	0.8333333	Valid
C2	0.9166667	Valid
C3	0.7500000	Valid
C4	0.9166667	Valid

Discussion

Previous research related to the evaluation of internship implementation has been conducted. Research on the evaluation of internship activities has been done by Iwa Kuntadi (2023). The results explain the need for a CIPPO evaluation model with context, input, and product aspects. The outcome aspect is necessary for improving the quality of the cooperation program between vocational schools and industry from the vocational school perspective in Western Java. This research is limited to the analysis of CIPPO evaluation needs. Waryono et al. (2023) researched to analyze the evaluation results of implementing training and distribution in IM Japan. The findings showed that context and input aspects were evaluated well, with a percentage value of 22% each; process aspects were evaluated excellently, with percentages of 49%; and product aspects need to be enhanced in the alumni assembly to develop an alumni network or participant training and dissemination related to workforce needs. This study has not discussed the development of its evaluation instruments.

Setiyawan and Kurniawan (2021) researched the usefulness of task-learning information systems and student workforce monitoring-based SMS gateways with Raspberry Pi. The tool used in the testing is the Computer Usability Satisfaction Questionnaire: Psychometric Assessment and Instructions for Use, developed by IBM for software usability measurement standards. The tool for testing usability aspects with the Computer System Usability Questionnaires (CSUQ) questionnaire developed by IBM uses the Likert scale as

its measurement scale. The study results were that the usability aspect had a percentage of 85% or a high-quality scale, and based on alpha calculations, Cronbach had a calculation result of 0.851 or the category “good”. The SMS Gateway system with the Raspberry Pi for internship assignment and monitoring meets the usability aspects. However, this study has not discussed the correlation testing of the instrument's development model.

Research on developing a competence-based performance assessment model for sharing family welfare education (Jubaedah et al., 2017). The result of this research is the planning, instrumentation, and implementation of assessments in developing assessment models based on the competence of work performance in disseminating family welfare education. Assessment planning includes the components of objectives, work performance, and assessment methods. The assessment instrument uses a work demonstration test as an assessment section. Execution of assessments includes the stages of preparation, collection, adjustment, dismantling, and moderation. Based on the validation model through expert judgment, the results of the assessment model developed are suitable for implementation in the performance assessment of the sharing of family welfare education. This development research has not dealt with the matching testing of the developed instrument model. Experts validate the validity test; there are no validity tests of construction or other validity and reliability tests.

Azman et al. (2020) conducted the development of program evaluation instruments used to evaluate the internship program of computer and networking engineering competence in vocational schools, including input components (input), among others: students, productive teachers, curriculum, and facilities, process components, among other things: student preparedness, accompanying teacher performance, business, and industrial world accompaniment performance, the output of the internship program utility for students, as well as business and industrial world. The results of this study were that input components were 98.9%, process 96.6%, and product 96.7%, and the instruments developed were already valid and fit very well. Student questionnaire reliability coefficient: 0.963; productive teacher: 0.981; accompanying teacher: 0.942; associate world of enterprise and industry: 0.961. However, the study did not address the model-matching testing of the instruments developed. So, the conclusion is not strong because considering the development of instruments is only a test of validity and reliability.

Negara & Hidayati (2021) conducted research aimed at developing tools for assessing the performance of internships with the Work-Based Learning (WBL) approach and Learning Innovation Skill (LIS) concerning the Framework of Partnership 21st Century Skills. The study carries out three validity tests: expert validity, content validity, and criteria validity. The results of the content validity analysis using Aiken's V formula obtained for the WBL variable have a 50% high validity percentage and 50% medium validity. In comparison, the LIS variable has 89.74% for high validation and 10.26% for moderate validity. In this test, the number of items for WBL variables was 32, and those for LIS variables were 39. The validity test of the criteria is analyzed using the Product Moment Correlation. For the WBL variable, two elements are declared valid, so both elements are invalid, while the LIS variable for all elements is valid. Furthermore, reliability testing uses Cronbach's Alpha, where the WBL variable has a reliability of 0.942, and the LIS variable has a reliability of 1,000, so it can be concluded that the instrument developed is declared valid and reliable to assess student WBL and LIS activities. However, this study has not tested the matching of the models of the instruments developed.

Research conducted by To (2017) on the program evaluation of the internship program operated by SiemensEnergy, Inc. in Charlotte, North Carolina, based on the Stufflebeam CIPP model. Four questions were developed to align with the CIPP model: (a) context: how the program objectives are tailored to the needs of Siemens and the interns; (b) introduction: what characteristics help traders complete their program? (c) process: Have traders been successfully trained? (d) Product: What results in meeting the program's strategic plan? The research design methodology follows several paths. The evaluation results of this program are effective internship programs and the achievement of the objectives. Researchers have concluded three recommendations, including providing more support to interns, ensuring interns fully understand the curriculum requirements and expectations for their associate degree, and developing a strategic plan with a statement of mission and vision. The research focuses on evaluating internship programs but has not discussed the development of evaluation instruments in detail. Based on various relevant research results, this research contributes to developing the evaluation instrument for the vocational school, especially the accounting program. The development of evaluation instruments has been carried out through CFA analysis and model matching testing, resulting in 23 valid instruments that can be used to evaluate the internship program evaluation in vocational schools. The respondent of this instrument was a student. For further research, researchers can develop an internship evaluation instrument that student mentors or supervisors can fill out at the internship location.

Conclusions

The study uses the CFA with the correlation factor model to prove the validity and reliability of the evaluation instrument construction of the vocational school. Testing of the research data has been modified to obtain a measurement model that matches the evaluation capability data. The evaluation component of the vocational school internship program in accounting expertise consists of internship preparation, internship implementation, and internship results. The content validity test, construction validity, and construction reliability estimate result in 23 valid instruments that can be used to evaluate the internship program evaluation of accounting field practice in a vocational school. This tool is effective in evaluating accounting internships. Recommendations for further research include the development of website-based internship program evaluation instruments so that the instruments are more easily accessible to respondents and more effective in data collection.

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EVALUATING AN ESL TEXTBOOKS EVALUATION QUESTIONNAIRE USING RASCH ANALYSIS

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ABSTRACT

A valid, reliable, and practical instrument is needed to evaluate ESL textbooks in Malaysian community colleges. Thus, a questionnaire guided by the Litz Theory (2005) was designed to evaluate ESL textbooks in Malaysian community colleges. This paper assessed the validation of the questionnaire using the Rasch Model analysis of construct validity and reliability. The questionnaire investigates community college students' perceptions of the ESL textbooks they use in their classrooms. The sample of this study comprised 123 community college students in Malaysia. The Rasch Model produced construct validity and reliability measurements using the dimensionality, item fit, and item polarity parameters and the person and item separation analysis. The results of the Rasch Model Analysis reveal that the construct validity in the study shows the uniformity of the instruments in the good category. This indicates that the items used in this study are related to the material's content. Hence, this questionnaire is valid and reliable to evaluate ESL textbooks in Malaysian community colleges.

Keywords: Evaluation, textbook, textbook evaluation, Rasch model

Introduction

Textbooks are packages with different but interrelated parts. They are the main sources that could convey knowledge and information to the learners in an easy and organized way (Ahour & Ahmadi, 2012; Orfan & Akramy, 2021). According to Prabhu (1987), textbooks are fully specified and preconstructed materials that provide a certain amount of uniformity in what occurs in many different classes with different teachers and students, which serves the interests of accountability. Despite the emergence of recent technologies in the field of education, copies of textbooks are still the most commonly used source material for most instructional situations as it is for language teaching contexts. On the significance of course books, Hutchinson and Torres (1994, as cited in Litz, 2005) suggest that "the textbook is an almost universal element of [English language] teaching. Millions of copies are sold every year, and numerous aid projects have been set up to produce those in [various] countries. No teaching-learning situation, it seems, is complete until it has its relevant textbook" (p. 315). There are different views about the textbook. Cunningsworth (1995), for example, identifies a textbook as a source for presenting the materials and learners to practice and do the activities. Hutchinson and Torres (1994) argue that textbooks have a very important and assertive role in teaching and learning (Gholampour & Mehrabi, 2023).

Sheldon (1988) suggests that "textbooks do not only represent the visible heart of any English Language Teaching program but also offer considerable advantages" (p. 237). The most essential function of a textbook is to motivate students to learn(Liu & Diana Deris, 2023). For Dubin and Olshtain (1986), "the tangible element that gives language course face validity to many teachers and learners is the textbook" (p.167) (Liu & Deris, 2023). Ur (1996) believes that a textbook provides a clear framework. It clarifies what is coming next, and learners know where they are going. Concerning the essential aim of ELT textbooks, Byrd (2001) argues that ELT textbooks include two kinds of information, which are topic content (e.g., family, school, etc.) and linguistic content (e.g., grammar, vocabulary, and skills) and that they help learners to learn the latter from the former. Considering the importance of textbooks, evaluating a book needs a significant interest because it provides useful information for teachers but also leads to helping students in learning settings.

Developing the researcher's instrument requires knowledge about item or question construction, scale development, format, length, validity, and reliability of the instrument and its scores (Sekaran, 2003; Creswell, 2012; Johnson & Christensen, 2012). Many instruments to evaluate ESL textbooks are available in the literature; however, the problem is that most of them have not been validated. Although some instruments have been tested for their validity and reliability, they lack stronger evidence of psychometrics in construct validity. While some are too long, which reduces their economy, others are too sophisticated, which makes it very challenging for novice lecturers to use them. Therefore, there is a need for an instrument that is valid, reliable, and practical in the parlance of psychometrics. Thus, this study aims to evaluate the validity and reliability of the newly developed questionnaire to evaluate ESL textbooks in Malaysian community colleges using the Rasch Measurement Model (RMM). In particular, the study's objective was to develop a measurable questionnaire to evaluate the students' feedback on the suitability of ESL textbooks used at Community Colleges in Malaysia.

Literature Review

ESL Textbook in Malaysian Community Colleges

Currently, Malaysia has some critical issues with ESL. One of the major issues is that it has to find the best method of teaching English to multilingual students. When selecting textbooks, the needs of students must be considered. Students' needs encompass both personal learning and future professional needs. This issue can be solved by selecting a suitable textbook that fulfills the students' needs (Maftukah & Astuti, 2021). Unfortunately, this issue remains unsolved even though the quality of ESL textbooks has improved dramatically in recent years. This is because the lecturers are influenced by publishers' representatives who may provide informed assistance to sell their products (Maftukah & Astuti, 2021).

The latest problem faced by the lecturers and students of community colleges is the lack of core textbooks. This is because according to the English syllabus of Community Colleges, the core textbook recommended by MQA is Collins Easy Learning English Conversation Book 1 (2015): United Kingdom: Harper Collins Publishers. However, it is not available since it is out of publication. So, the lecturers of community colleges are using other reference books to conduct their English lessons. One of the reference books used is Practice Makes Perfect: English Conversation. It is a workbook written by Yates. Even though the particular workbook provided practical exercises for the students to practice, it fails to provide sufficient theory since it is a workbook, not a textbook that usually contains detailed theory concepts. This also leads the lecturers to spend more time preparing their lessons in terms of theory since the theory part is lacking in the workbook.

To improve the quality of teaching and learning in higher education institutions (HEI), the National Higher Education Strategic Plan (NHESP) states that HEIs should conduct curriculum reviews every two or three years, taking into account the perspectives of academics, industry experts, government officials, and members of non-governmental organizations (Weiss, 2014). Moreover, it was emphasized that curricular transformation should aim for English language proficiency (Ramamuruthy et al., 2020). Thus, lecturers are encouraged to review and revise existing teaching modules used as textbooks in classrooms following industry requirements (Amin, 2016; Chinedu & Mohamed, 2017; Rasul et al., 2015 & Wijayanto, 2017; Ramamurthy et al., 2020). This will provide new opportunities for them to effectively deliver the teaching modules used as textbooks using modern community colleges' methods and concepts (Grosch, 2017; Ramamuruthy et al., 2020). Therefore, lecturers should also create teaching modules used as textbooks that are tailored to the industry that the institution wants its graduates to work in after they complete their studies. This will improve their employability because graduates capable of communicating technical information within the industry are regarded as all-rounders. Furthermore, lecturers are encouraged to collaborate with industry experts to design educational programs based on industry input (Grosch, 2017; Ramamuruthy et al., 2020). These statements clearly show the importance of choosing a suitable textbook for classroom use. Therefore, to obtain the most suitable textbook, the lecturers must know the strategies and criteria for selecting suitable textbooks.

Many studies have also shown that textbook selection is an important aspect of learning activity (e.g. Lemmer, 2008; Mijayanti, 2015; Işık & Kurum, 2002; Sikorova, 2004; Watt, 2009; Ho & Hsu, 2011; Yuen & Ting, 2012; Amerian and Khaivar, 2014; Marczak, 2013; Chang, 2002; Huang, 2011; Kim, 2002; Garinger, 2002; Kiai & Maroko, 2013; Frediksson &

Olsson, 2006; Mahmood, 2011; LaBelle, 2010; Deuri, 2012; Maftukah & Astuti, 2021). For the criteria of an appropriate English textbook, researchers discovered a plethora of criteria used by teachers in selecting their textbook (e.g., Rahimpour & Hashemi, 2011; Makgato & Ramaligela, 2013; Rodriguez, 2015; Reid, 2017; Mukundan, 2011; Akbar, 2016; Shabani, 2017; Maftukah & Astuti, 2021).

However, lecturers at community colleges continue to choose inappropriate textbooks because they are unaware of the proper strategies and criteria for selecting appropriate ones to obtain the best ones. Besides, very limited studies concentrate on strategies such as how textbooks are chosen, the steps involved in selecting an appropriate English textbook, and the criteria for selecting an appropriate textbook. The gaps revealed that the research covers a broad range of topics. Most previous studies conducted their research without focusing on a single institution (Maftukah & Astuti, 2021). To limit the scope of the study, it was critical to conduct the study with a focus on a specific institution. Therefore, this study will concentrate on community colleges in Malaysia.

Students' Views and Textbook Evaluation

Earlier research suggested that authors and publishers of textbooks ought to consider students' perspectives during the evaluation process (Anderson, 1989; McDonough et al., 2017). In this context, McDonough et al. (2017) critique studies where researchers gather lecturers' views on students' needs, as these may not accurately represent the true needs of the students. Kumaravadivelu (2006) discusses the concept of "dramatic mismatches" (p. 106) that arise between the perspectives of lecturers and students. Additionally, Preedy (2001) outlines four reasons for including students in the textbook evaluation process. Firstly, students have distinct perspectives on textbooks compared to lecturers and other parties involved. As a result, students can offer insights about textbooks drawn from their own experiences and provide valuable feedback. Secondly, including students in the evaluation process boosts their self-efficacy. This increased sense of efficacy fosters greater motivation towards using these materials and can enhance their dedication to learning (Preedy, 2001). Thirdly, there is considerable theoretical evidence suggesting that discrepancies between students' and lecturers' views on learning and educational resources can create significant barriers when establishing language learning goals and objectives in classrooms (Emelyanova & Voronina, 2014; Van, 2011; Winne & Marx, 1982). Finally, involving students in the evaluation of textbooks promotes reflection and autonomy, encouraging students to take charge of their learning. Thus, this research will concentrate on students' perspectives regarding assessing the ESL textbook's appropriateness.

Checklist as the Method of Textbook Evaluation

There are several techniques for evaluating textbooks. A criterion-based checklist is one of the most used (Abdel Wahab, 2013; McGrath, 2016; Richards, 2016). In the context of English language teaching (ELT), Mukundan et al. (2011) define a checklist as an instrument that assists practitioners in evaluating materials such as textbooks for English language acquisition. According to Brown (2001), textbook evaluation checklists include a thorough list of criteria that enable the review process to be completed methodically. These characteristics could include a textbook's physical appearance, tasks, exercises, and activities, language skill coverage (reading, writing, listening, speaking, grammar, vocabulary), alignment with a syllabus and curriculum, and learner compatibility. There are numerous reasons why ELT textbook evaluators worldwide utilize evaluation checklists. For example, they allow for extensive and in-depth examination, especially when applying qualitative

measurements (Cunningsworth, 1995; Skierso, 1991; Mukundan et al., 2011; Demir & Ertas, 2014). A checklist can also be simply duplicated (Ellis, 1997) and tailored to the demands of future users (Mukundan & Ahour, 2010). Finally, it is thought to be cost-effective, as it allows for recording a large amount of information in a short period. Thus, a questionnaire guided by the Litz (2005) checklist model was designed to evaluate ESL textbooks in Malaysian community colleges.

Instrument and Materials

Litz (2005) Checklist Model

Litz's (2005) checklist model created a set of questionnaires for evaluating textbooks that are designed for both instructors and students to fill out. The questions cover several aspects: a) practical considerations, b) layout and design, c) activities, d) skills, e) language type, f) subject and content, and g) conclusion/overall consensus. Each of these categories includes specific evaluative items for the student and teacher evaluation forms: a) 2 and 5, b) 2 and 8, c) 5 and 7, d) 3 and 5, e) 6 and 6, f) 5 and 5, and g) 2 and 4. The rating scale employs a 10-point system ranging from 1(Highly Disagree) to 10 (Highly Agree). Litz's checklist is structured to highlight several primary categories along with detailed items. The items use straightforward language and are generally easy to understand, making the checklist thorough and well-balanced regarding the various topics it addresses. A crucial aspect is that the checklist was piloted simultaneously, meaning the author provided descriptions that can assist users in understanding which features to consider.

Litz's (2005) checklist model was employed in this research as it serves as a reliable metric, being a standardized checklist recognized globally for evaluating books and is regarded as the most commonly adapted textbook evaluation tool, referenced by six studies (Ahour et al., 2014; Khodabakshi, 2014; Ghezlou et al., 2016; Nourmohammad-Nouri et al., 2015; Monazzah et al., 2016; Ahmad et al., 2019). The newly developed textbook evaluation questionnaire emphasizes eight criteria: student demographics, practical considerations, layout and design, activities, skills, language type, subject matter, and overall consensus. The elements of Litz's (2005) model checklists were structured on a 10-point scale, ranging from 1 (Highly Disagree) to 10 (Highly Agree). For the current research, these 10 scales were simplified to a 5-point Likert Scale for statistical definition and coding (e.g., Strongly Disagree = 1, Disagree = 2, Neutral = 3, Agree = 4, Strongly Agree = 5). This study utilized an evaluation questionnaire (ESL Textbook Evaluation Questionnaire) based on Litz's (2005) checklist model to gather information regarding students' views on the ESL textbook. Consequently, the questionnaire was exclusively designed for student input. The student questionnaire included 41 items.

Questionnaire To Evaluate ESL Textbooks

To gather the required data, a questionnaire was developed to evaluate ESL textbooks following the Litz (2005) checklist model. Two English experts validated the developed questionnaire to evaluate ESL textbook content. The developed questionnaire to evaluate ESL textbooks consisted of sections 1 and 2. Section 1 was used to gather information on the student demographics, which include gender, age, level of education, and cultural background (i.e., Malaysian or others). Section 2 carries 37-point questions categorized into seven sections, namely, practical considerations, layout and design, activities, skills, language types, subject and content, and overall consensus. The developed scale to evaluate ESL textbooks is

in Likert scale format, comprised of "Strongly disagree (1)", "Disagree (2)", "Neutral (3)", "Agree (4)" and "Strongly agree (5)".

Table 1 summarizes the dimensions of the questionnaire developed based on the Litz (2005) Checklist Model.

Table 1: Specification

Section	Dimensions	Operational Definitions	# of Items
1	Students' Demographics	This section covers gender, age, educational background, and race.	4
2 a	Practical considerations	This section focuses on pricing and accessibility.	2
2b	Layout and design	This section includes the layout of the textbook and the content page.	2
2c	Activities	This section pertains to all the activities and tasks featured in the book.	13
2d	Skills	This part evaluates four skills such as listening, speaking, reading, and writing.	3
2e	Language types	This section evaluates language types, such as realistic and authentic.	7
2f	Subject and content	This section addresses all the subjects mentioned in the book.	8
2g	Overall consensus.	General perspective on students' viewpoints.	2
Total Items		41	41

Item Response Theory

Item response theory (IRT) originally became popular in the 1970s, when it was used to create standardized exams like the Scholastic Aptitude exams (SATs) (Lord & Novick, 1969).IRT eventually became the most significant psychometric approach for validating scales since it addresses many of the measurement difficulties that must be addressed when developing a test or scale (Lord, 1980).

The Rasch measurement model

The Rasch Measurement Model (RMM) was used to determine the validity and reliability of the instrument items. According to Planinic et al. (2019), using the Rasch model for data analysis is a concept that has been introduced previously. The Rasch Measurement Model is an effective technique for guaranteeing the instrument's validity and reliability by providing precise data (Bond & Fox, 2015). RMM evaluated each respondent's ability to complete the instrument and measured the difficulty of each item (Green & Frantom, 2002). Furthermore, RMM may detect hidden features, including human thoughts and emotions (Planinic et al., 2019). RMM, which is based on item response theory, is a statistical model that can assess both the difficulty of the item and the skill of the person being tested (Testa et al., 2019). As a result, the RMM was able to determine both the validity and the reliability of the items and the respondents. Rasch analysis can also assess concept validity regarding item polarity, item fit, person fit, and unidimensionality. Rasch analysis takes longer than standard analysis, providing a more detailed insight into an instrument's strengths and flaws (Boone, 2016).

Methods

The research design is quantitative research**.** In this study, the data was collected using the newly developed ESL Textbook Evaluation Questionnaire distributed to students currently taking English courses in Community Colleges. The sample of this study was 123 students who are currently taking English courses at Community Colleges. The study participants were both male and female. The students' age ranges were between 18 and 23. The Rasch Model was used to determine the psychometric properties of the newly developed ESL Textbook Evaluation Questionnaire to test the validity and reliability of the newly developed ESL Textbook Evaluation Questionnaire.

Methodology

Rasch Model Analysis

Item fit and dimensionality analyses were conducted to test the construct validity using the Rasch Model. The reliability of instruments was conducted for this study using the Rasch Model software. The copies of the developed scale in the form of a questionnaire to evaluate ESL textbooks were distributed among the study participants. The questionnaire to evaluate the ESL textbook of this study was given to English learners of Community colleges. Before administering the questionnaire, students were given a complete explanation of the aim of the study, the developed questionnaire, and how they should be answered. The respondents were assured that the results would be used for this study and that their views would be kept completely confidential. They were given a contact number and e-mail address, and they were asked to contact the researcher if they had any questions regarding the scale. This phase of data collection was done for one month. Data were collected and prepared for statistical analysis.

Findings

The Rasch Measurement Model, which is a one-parameter Item Response Theory (IRT), is a contemporary measurement approach frequently employed in the social sciences. The limitations of analytical methods associated with Critical Test Theory (CTT), such as Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) in assessing validity and reliability, justify the selection of the Rasch Measurement Model for the current study. The Rasch Measurement Model has garnered significant interest from researchers globally, particularly in the realm of developing and constructing new assessment tools. Researchers often favor Georg Rasch's model due to its benefits, which include linearity, independence, objectivity, comprehensiveness, and the ability to draw inferences easily (Wright & Stone, 1979). This model posits that an individual's response to an item is determined solely by their ability and the item's difficulty (Bond & Fox, 2015). According to the Rasch model, each item is formulated based only on its difficulty parameter. Given a difficulty logit of 0.00, an individual has a 50% chance of answering the items correctly. Therefore, it can be understood that increasing the difficulty of an item will impact the likelihood of success, leading to a decrease in chances. The sequence of assessment within the model may differ based on the specific requirements of a study. Under the Rasch Measurement Model, eight types of diagnostic data analyses are integral to the instrument development process, which consist of (i) unidimensional, (ii) compatibility (fit) item, (iii) polarities item, (iv) reliability and separation item respondents; (v) appropriateness of the measurement scale based on the use of categories; (vi) value of standardized residual correlation in determining

leaning item; (vii) differential items functioning (DIF) based on gender; and (viii) the distribution of item difficulty levels and abilities of respondents (Hassan, 2012). However, based on the objective and needs of the current study, the following areas of analysis are performed using the Rasch Measurement Model: (i) item polarity, (ii) item fit, (iii) unidimensionality, and (iv) reliability and separation index. These analyses are adequate for establishing the validity and reliability of the newly developed questionnaire. The following section discusses the area of analysis conducted in the current study.

Data Analysis Procedure

The study's findings were examined to establish reliability and validity in terms of construct validity. WINSTEPS software version 3.68.2 is used to assess construct validity and item reliability. This ensures that the instrument is of high quality and that the data collected by the researchers is accurate before being used in a study. To begin, PTMEA-CORR value analysis was used to identify item polarity. A positive PTMEA-CORR score indicates that the item can accurately measure what it wishes to measure, whereas a negative number suggests that it cannot. The values MNSQ Outfit, ZSTD Outfit, and PTMEA-CORR were used to measure item fit (Bond & Fox, 2007; Boone et al., 2014; Zahid et al., 2019). The fit value of this item reflects if it can measure what it is supposed to measure (Sumintono & Widhiarso, 2015). Items not under the Item Fit Index (Table 2) must be altered or eliminated to boost the item fit value (Sumintono & Widhiarso, 2015).

Table 2: Fit Indices for Item Fit Statistics

Statistics	Fit Indices
Outfit mean square values (MNSQ)	0.50 – 1.50
Outfit z-standardized values (ZSTD)	-2.00 – 2.00
Pont Measure Correlation (PTMEA-CORR)	0.40 - 0.85

Source: Boone et al. (2014)

Researchers also assessed the instrument's unidimensionality to guarantee that it could accurately quantify instrument uniformity (Saud et al., 2018; Sumintono & Widhiarso, 2015). The principal component analysis (PCA) gives unidimensionality requirements based on 'raw variance explained by measures' (Sumintono, 2016; Sumintono & Widhiarso, 2015). The Raw variance explained by measures higher than 20% is acceptable, higher than 40% is good, and higher than 60% is excellent. Furthermore, the number for 'unexplained variance in first contrast' cannot exceed 15%. Table 3 illustrates unidimensionality based on raw variance explained by measurements.

Table 3: Unidimensionality based on Raw Variance Explained by Measures

Value	Interpretation
> 20%	Acceptable
> 40%	Good
> 60%	Excellent

Source: Sumintono and Widhiarso (2015)

As regards the reliability, the researcher refers to Sumintono and Widhiarso (2015) for, item and respondent reliability indices as well as item separation and person as shown in Table 4.

Table 4: Reliability in Rasch Analysis

Statistics	Fit Indices	Interpretation
Item and Person Reliability	<0.67	Low

	0.67-0.80	Sufficient
	0.81-0.90	Good
	0.91-0.94	Very Good
	>0.94	Excellent
Item and Person Separation	≤ 2	A high separation value indicates that the instruments are of good quality since they can identify the group of items and respondents.

Source: Sumintono & Widhiarso, 2015

Findings and Discussion

Many studies supported this study's findings by using the Rasch Model to examine construct validity (Fox and Jones, 1998; Forkmann et al., 2009; Wolfe et al., 2009; Mofreh et al.,2014). According to Mofreh et al. (2014), dimensionality, item plurality, calibration scales, and item fit analysis by the Rasch Model were used to examine the construct validity of lecturers' instructional functions instrument.

Instrument Analysis

Measuring the suitability of an ESL textbook requires a measurable instrument to be developed and tested to determine the suitability of an ESL textbook. The developed instrument was analyzed based on the research objective. This study aims to identify the constructs of validity of the ESL Textbook Evaluation Questionnaire. To achieve this objective, psychometric properties were tested for the ESL textbook evaluation questionnaire to determine if this instrument is sufficiently valid and reliable as a measurement tool. Thus, the Rasch Model analysis was used to test the validity and reliability of the ESL textbook evaluation questionnaire. In addition, the Rasch Model analysis was used to answer the research objective as described: To develop a measurable questionnaire to evaluate students' feedback on the suitability of ESL textbooks used at Community Colleges in Malaysia.

The following analysis of the Rasch Model for validity and reliability of the ESL textbook evaluation questionnaire answered the research objective related to the Rasch Model mentioned above.

Validity Analysis

Rasch Model tested the validity of the ESL Textbook Evaluation Questionnaire using item polarity, item fit, and dimensionality as psychometric properties criteria. Item polarity or point measure correlation (PTMEA CORR.) is the early detection of construct validity (Bond & Fox, 2007).

Construct Validity Results

Item Polarity

The purpose of verifying the point measure correlation value (PTMEA CORR.) is to determine the item's polarity and how well the construct's development meets its goal. According to Bond and Fox (2007), a high PTMEA-CORR value, such as 0.4–0.85, means that the item can differentiate between study subjects and that the item construction can calculate what should be measured. However, Bond and Fox (2015) state that the item calculates the desired construct if the PTMEA CORR value is positive (+). On the other side, if the result obtained is negative (-), the generated item did not calculate the measured construct. The item must then be revised or eliminated since it is unsuited to inquiries or is

difficult for the respondent to answer. The PTMEA CORR values are depicted in Figure 1. Figure 1 shows that all items have positive PTMEA-CORR values ranging from 0 to 0.75. Bond and Fox (2007) agree that a positive PTMEA-CORR value shows that the item assesses the desired construct.

Measure	Model	Infit		Outfit		PT-MEASURE		Exact	Match	ITEM
	S.E.	MNSQ	ZSTD	MNSQ	ZSTD	CORR.	EXP.	OBS%	EXP%	
.49	.35	1.16	.6	1.09	.4	0	.26	92.7	92.7	V29_A
1.75	.19	1.37	3.2	1.43	3.2	0.04	.43	67.5	68.1	V22_A
1.26	.14	2.59	6.4	2.34	5.3	0.07	.62	67.5	66.7	V42_A
1.71	.18	1.38	3.3	1.41	3.4	0.1	.45	68.3	65.6	V20_A
-0.75	.15	1.56	3.2	1.62	3.6	0.14	.49	66.7	64.2	ACTIVITI
2.49	.20	1.14	1.5	1.39	2.7	0.15	.39	69.1	70.3	V34_ A
-0.47	.12	1.85	4.9	2.08	5.4	0.17	.55	49.6	56.3	V39 _A
-0.92	.25	1.22	1.2	1.30	1.3	0.18	.39	79.7	84.5	SKILLSQ2
0.79	.20	1.11	1.3	1.15	1.3	0.32	.42	67.5	70.3	V13_A
-0.57	.17	1.17	1.3	1.18	1.4	0.33	.47	63.4	64.9	V32_A
-0.92	.25	1.06	.4	1.07	.4	0.34	.39	82.9	84.5	OVERALLC
0.52	.17	1.15	1.2	1.18	1.4	0.35	.48	69.1	66.3	V40_A
-0.94	.16	1.08	.4	1.23	1.1	0.36	.45	74	72.8	SKILLSOT
-0.64	.16	1.11	.7	1.07	.5	0.4	.47	66.7	68.5	SKILLSQ3
1.64	.24	.89	.7	.89	-.5	0.44	.42	82.9	82.2	V14_A
-1.2	.16	1.05	.4	1.05	.4	0.45	.32	65	65.5	LANGUAGE
-0.89	.17	1.02	.2	1.00	.0	0.45	.48	72.4	68.9	V41_A
0.06	.20	.95	-.3	.95	-.2	0.45	.46	80.5	77.1	V46_A
0.33	.18	.92	-.5	.93	-.5	0.47	.43	75.6	71.6	V45_A
-1.08	.29	.77	-1.1	.83	-.5	0.51	.45	91.1	88.4	SUBJECTA
-0.44	.12	1.15	1.1	1.13	.9	0.53	.36	55.3	52.4	LAYOUTAN
-0.88	.17	.91	-.6	.91	-.6	0.54	.56	73.2	67.4	V44_A
0.35	.18	.90	-.7	.90	-.7	0.54	.47	68.3	69.4	V21_A
0.23	.18	.89	-.8	.89	-.8	0.54	.46	74.8	71.1	V43_A
0.31	.21	.84	-1.0	.80	-.1.2	0.55	.46	78.9	77.9	V15_A
-0.94	.17	.87	-1.0	.86	-1.0	0.58	.41	69.9	66.2	V35_A
-0.26	.14	.91	-.7	.89	-.8	0.59	.48	56.9	56.4	PRACTICA
0.29	.18	.82	-1.4	.81	-1.4	0.6	.54	74.8	70.9	V37_A
-0.92	.16	.82	-1.0	.81	-1.1	0.61	.46	75.6	66.5	V23_A
-0.5	.12	.94	-.3	.94	-.3	0.62	.47	54.5	54.3	V8_A
0.29	.18	.80	-1.5	.79	-1.6	0.62	.55	74.8	70.9	V10_A
0.47	.18	.81	-1.6	.80	-1.6	0.63	.46	71.5	67.7	V36_A
0.44	.17	.80	-1.7	.79	-1.8	0.64	.47	69.1	63.8	V33_A
-0.81	.14	.85	-1.1	.84	-1.2	0.64	.49	61	57.4	V7_A
-0.82	.16	.79	-1.7	.77	-1.8	0.65	.53	71.5	63.7	V25_A
-0.79	.16	.77	-1.7	.74	-1.9	0.66	.49	69.9	66.2	V24_A
0.73	.19	.75	-2.0	.73	-2.1	0.66	.48	74.8	71.4	V31_A
-0.24	.18	.73	-2.2	.70	-2.4	0.69	.44	74.8	70.7	V11_A
0.16	.18	.71	-2.3	.68	-2.5	0.7	.46	76.4	71.2	V16_A
-0.01	.19	.70	-2.4	.66	-2.7	0.71	.45	76.4	72.3	V19_A
0.16	.18	.69	-2.5	.66	-2.7	0.72	.46	76.4	71.2	V17_A
0.51	.18	.66	-3.0	.64	-3.1	0.75	.47	72.4	68.4	V18_A

Figure 1: Item Polarity Value Analysis

Fit Statistics

According to Bond and Fox (2007), the outlier-sensitive statistic (outfit statistic) reveals a large difference between the observed and expected values of an item that is outside the range

of the individual's ability. In contrast, the information-weighted fit statistic (infit statistic) reveals the residual of an item that is within the range of the person's ability. The outfit statistic of Mean Square (MNSQ), according to Planinic et al. (2019), offers a more pronounced calculation than the infit statistics in Rasch analysis. Aside from the MNSQ infit and outfit values, the infit and outfit of Z-Standardized (ZTSD) should be in the -2 to +2 range. However, if the MNSQ value meets item suitability and sample adequacy criteria, the ZSTD value may be ignored (Bond & Fox, 2007; Linacre, 2002). Figure 2 shows the item fit measurement.

Measure	Model	Infit		Outfit		PT-MEASURE		Exact	Match	ITEM
	S.E.	MNSQ	ZSTD	MNSQ	ZSTD	CORR.	EXP.	OBS%	EXP%	
.49	.35	1.16	.6	1.09	.4	0	.26	92.7	92.7	V29_A
1.75	.19	1.37	3.2	1.43	3.2	0.04	.43	67.5	68.1	V22_A
1.26	.14	2.59	6.4	2.34	5.3	0.07	.62	67.5	66.7	V42_A
1.71	.18	1.38	3.3	1.41	3.4	0.1	.45	68.3	65.6	V20_A
-0.75	.15	1.56	3.2	1.62	3.6	0.14	.49	66.7	64.2	ACTIVITI
2.49	.20	1.14	1.5	1.39	2.7	0.15	.39	69.1	70.3	V34_ A
-0.47	.12	1.85	4.9	2.08	5.4	0.17	.55	49.6	56.3	V39 _A
-0.92	.25	1.22	1.2	1.30	1.3	0.18	.39	79.7	84.5	SKILLSQ2
0.79	.20	1.11	1.3	1.15	1.3	0.32	.42	67.5	70.3	V13_A
-0.57	.17	1.17	1.3	1.18	1.4	0.33	.47	63.4	64.9	V32_A
-0.92	.25	1.06	.4	1.07	.4	0.34	.39	82.9	84.5	OVERALLC
0.52	.17	1.15	1.2	1.18	1.4	0.35	.48	69.1	66.3	V40_A
-0.94	.16	1.08	.4	1.23	1.1	0.36	.45	74	72.8	SKILLSOT
-0.64	.16	1.11	.7	1.07	.5	0.4	.47	66.7	68.5	SKILLSQ3
1.64	.24	.89	.7	.89	-.5	0.44	.42	82.9	82.2	V14_A
-1.2	.16	1.05	.4	1.05	.4	0.45	.32	65	65.5	LANGUAGE
-0.89	.17	1.02	.2	1.00	.0	0.45	.48	72.4	68.9	V41_A
0.06	.20	.95	-.3	.95	-.2	0.45	.46	80.5	77.1	V46_A
0.33	.18	.92	-.5	.93	-.5	0.47	.43	75.6	71.6	V45_A
-1.08	.29	.77	-1.1	.83	-.5	0.51	.45	91.1	88.4	SUBJECTA
-0.44	.12	1.15	1.1	1.13	.9	0.53	.36	55.3	52.4	LAYOUTAN
-0.88	.17	.91	-.6	.91	-.6	0.54	.56	73.2	67.4	V44_A
0.35	.18	.90	-.7	.90	-.7	0.54	.47	68.3	69.4	V21_A
0.23	.18	.89	-.8	.89	-.8	0.54	.46	74.8	71.1	V43_A
0.31	.21	.84	-1.0	.80	-.1.2	0.55	.46	78.9	77.9	V15_A
-0.94	.17	.87	-1.0	.86	-1.0	0.58	.41	69.9	66.2	V35_A
-0.26	.14	.91	-.7	.89	-.8	0.59	.48	56.9	56.4	PRACTICA
0.29	.18	.82	-1.4	.81	-1.4	0.6	.54	74.8	70.9	V37_A
-0.92	.16	.82	-1.0	.81	-1.1	0.61	.46	75.6	66.5	V23_A
-0.5	.12	.94	-.3	.94	-.3	0.62	.47	54.5	54.3	V8_A
0.29	.18	.80	-1.5	.79	-1.6	0.62	.55	74.8	70.9	V10_A
0.47	.18	.81	-1.6	.80	-1.6	0.63	.46	71.5	67.7	V36_A
0.44	.17	.80	-1.7	.79	-1.8	0.64	.47	69.1	63.8	V33_A
-0.81	.14	.85	-1.1	.84	-1.2	0.64	.49	61	57.4	V7_A
-0.82	.16	.79	-1.7	.77	-1.8	0.65	.53	71.5	63.7	V25_A
-0.79	.16	.77	-1.7	.74	-1.9	0.66	.49	69.9	66.2	V24_A
0.73	.19	.75	-2.0	.73	-2.1	0.66	.48	74.8	71.4	V31_A
-0.24	.18	.73	-2.2	.70	-2.4	0.69	.44	74.8	70.7	V11_A
0.16	.18	.71	-2.3	.68	-2.5	0.7	.46	76.4	71.2	V16_A
-0.01	.19	.70	-2.4	.66	-2.7	0.71	.45	76.4	72.3	V19_A
0.16	.18	.69	-2.5	.66	-2.7	0.72	.46	76.4	71.2	V17_A
0.51	.18	.66	-3.0	.64	-3.1	0.75	.47	72.4	68.4	V18_A

Figure 2: Measurement of Item Misfit Order

However, if items fulfill one criterion, the item must be retained (Sumintono & Widhiarso, 2015). As shown in Table 5, all the items met at least one criterion except two (V42_A and ACTIVITI). As a result, only two items were removed from this instrument.

Table 5: Item Misfit Order

Item	Outfit MNSQ (0.50-1.50)	Outfit ZSTD (-2.0-2.0)	PTMEA-CORR (0.40-0.85)	Result
V49_A	1.09	0.4	**0**	Retained
V22_A	1.43	**3.2**	**0.04**	Retained
V42_A	**2.34**	**5.3**	**0.07**	Removed
V20_A	1.41	**3.4**	**0.1**	Retained
ACTIVITY	**1.62**	**3.6**	**0.14**	Removed
V34_A	1.39	**2.7**	**0.15**	Retained
V39_A	2.08	**5.4**	**0.17**	Retained
SKILLSQ2	1.30	1.3	**0.18**	Retained
V13_A	1.15	1.3	**0.32**	Retained
V32_A	1.18	1.4	**0.33**	Retained
OVERALL	1.07	0.4	**0.34**	Retained
V40_A	1.18	1.4	**0.35**	Retained
SKILLS	1.23	1.1	**0.36**	Retained
V31_A	0.73	**-2.1**	0.66	Retained
V11_A	0.70	**-2.4**	0.69	Retained
V16_A	0.68	**-2.5**	0.70	Retained
V19_A	0.66	**-2.7**	0.71	Retained
V17_A	0.66	**-2.7**	0.72	Retained
V18_A	0.64	**-3.1**	0.75	Retained

Dimensionality Analysis

Table 6: Dimensionality Analysis Results

	Empirical			Modeled
Total raw variance in observations	68.7	100.0%		100.0%
Raw variance explained by measures	26.7	38.8%		39.4%
Raw variance explained by persons	10.4	15.2%		15.4%
Raw Variance explained by items	16.2	23.6%		24.0%
Raw unexplained variance (total)	42.0	61.2%	100.0%	60.6%
Unexplained variance in 1st contrast	4.6	6.7%	10.9%	
Unexplained variance in 2nd contrast	4.0	5.8%	9.6%	
Unexplained variance in 3rd contrast	2.8	4.0%	6.6%	
Unexplained variance in 4th contrast	2.5	3.7%	6.1%	
Unexplained variance in 5th contrast	2.1%	3.1%	5.0%	

Based on the dimensionality analysis result, the score of raw variance explained by empirical measures is 38.8%, while the Rasch model predicts 39.4%. In this case, the empirical construct validity has almost the same value as the predictions of the Rasch model. The construct validity results have acceptable criteria because they meet the unidimensionality criteria of higher than 20%. The score of the first to fifth unexplained variance is below 15%, which means the instrument uniformity is in a good category. This indicates that the questions used in this study relate to the material's content (Musa et al., 2017). This is supported by Saidi and Siew's research (2019), which states that the Raw variance explained by measures higher than 20% is acceptable, higher than 40% is good, and higher than 60% is excellent. Besides, unexplained variance for 1 to 5 contrast less than 12%, which falls within the ideal range value of less than 15%. The analysis results reveal that the study's construct validity shows the uniformity of the instruments, which are in the good category. This shows that the questions used in this study are related to the material's content.

Reliability Analysis

The Rasch Model analysis evaluates the reliability and separation of items and persons. This statistic demonstrated the items' ability to separate persons with varying levels of the measured concept.

Reliability result

According to Table 7, a person's reliability higher than 0.81 is interpreted as "good." A high separation value indicates that the instruments have good quality since they can identify the group of respondents. In this study, the value of Person Reliability is 0.90, with a Person Separation value of 2.97 based on Table 8. So, the instruments have good quality.

Table 7: Reliability in Rasch Analysis

Statistics	**Fit Indices**	**Interpretation**
Item and Person Reliability	<0.67	Low
	0.67-0.80	Sufficient
	0.81-0.90	Good
	0.91-0.94	Very Good
	>0.94	Excellent
Item and Person Separation	≤ 2	A high separation value indicates that the instruments are of good quality since they can identify the group of items and respondents.

Source: Sumintono & Widhiarso, 2014

Table 8: Person Reliability and Separation Index

	Raw Score	**Count**
Mean	172.0	44
S.D	11.8	0.0
Real RMSE	0.33	
ADJ. SD	0.98	
Separation	2.97	
Person reliability	0.90	
Total person input	123	

According to Table 7, an item's reliability higher than 0.94 is interpreted as "excellent." For an item's separation, a high separation value indicates that the instruments have good quality since they can identify the group of items. In this study, the value of Item Reliability is 0.95, with an Item Separation value of 4.32 based on Table 9. So, the instruments have good quality.

Table 9: Item Reliability and Separation Index

Mean		**480.3**	**123.0**
S.D		37.9	0.0
Real RMSE		0.20	
	ADJ. SD	0.85	
Separation		4.32	
	Item reliability	0.95	
Total item input		42	

Conclusion

To ensure that the developed instrument can be used again, it must be developed accurately and appropriately in terms of validity and reliability. Instruments that have been correctly developed will have no difficulty measuring the variables being researched (Hassan et al., 2019). This condition will surely help researchers in concluding the analysis of the findings. The findings of Rasch for the developed instrument proved that the newly developed ESL

textbook evaluation questionnaire is valid and reliable as the instrument can be used as a measurable instrument to evaluate ESL textbooks in Malaysian community colleges. Furthermore, the analysis conducted using the Rasch Measurement Model to assess the validity and reliability of the newly developed ESL textbook evaluation questionnaire has connected theoretical research with practical application. The investigation into validity and reliability in this research offers a different option for upcoming scholars in English Language Teaching (ELT) textbook evaluation to explore the reliability and validity of tools created through Item Response Theory (IRT) rather than the Critical Test Theory (CTT) measurement model. The elements of validity and reliability are crucial and should be maintained, especially when crafting a new research tool. Essentially, the assumptions validated in this research that utilized the Rasch Measurement Model were Item Fit, Polarity, Reliability, Separation Index, and Unidimensionality. This paper enables researchers, particularly those in language studies, to cultivate a new perspective on incorporating the Rasch Measurement Model, which has been relatively underexplored in ELT textbook evaluation. Additionally, there are eight diagnostic data analyses possible with the Rasch Measurement Model, which encompasses (i) unidimensional, (ii) compatibility (fit) item, (iii) polarities item, (iv) reliability and separation item respondents, (v) appropriateness of the measurement scale based on the use of categories; (vi) value of standardized residual correlation in determining leaning item; (vii) differential items functioning (DIF) based on gender; and (viii) the distribution of item difficulty levels and abilities of respondents. Therefore, future researchers might explore additional assumptions of the Rasch Measurement Model not covered in this study, tailored to specific study goals and objectives.

Implication

This study proposed a valid and reliable instrument to evaluate the suitability of an ESL textbook. As a result, this study could benefit lecturers and institution administrators, enabling them to assess the effectiveness of an ESL textbook. Based on the results of the analysis, student feedback can assist lecturers in selecting the most appropriate ESL textbook that meets students' needs and improves the educational experience.

Recommendations

There are some suggestions for subsequent studies. While this study focused on community college students, future investigations could explore other higher educational institutions in Malaysia. Additionally, this research solely included students from higher educational institutions in Malaysia. Future studies might benefit from involving students at primary and secondary schools, colleges, or universities in Malaysia. Engaging different populations may introduce new variables for exploration.

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VALIDATION OF SCORES ON THE ONLINE HOMEWORK EXPECTANCY VALUE COST SCALE: INVARIANCE ACROSS GENDER AND COLLEGE YEAR

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ABSTRACT

We validated the Online Homework Expectancy Value Cost Scale (OHEVCS) involving 1,192 college students. Results indicated that the OHEVCS consisted of three distinct yet related subscales: online homework expectancy, value, and cost. In addition, results indicated no latent mean differences in the OHEVCS over gender (males vs females) and college year (years 1-2 vs years 3-4). Finally, online homework expectancy and value were associated positively with online homework completion and negatively with online homework distraction and procrastination. Online homework cost was associated positively with online homework distraction and procrastination and negatively with online homework completion. Our results strongly support the idea that the OHEVCS is a valid tool for assessing motivational beliefs in online homework.

Keywords: Expectancy-value theory, homework, online assignment, motivation, college students

Introduction

Due to rapid advancements in information technology and the widespread adoption of computers and mobile devices, online learning has become a conventional offering among higher education establishments across the globe (O'Neil et al., 2021; Seaman et al., 2018). Given this shift toward online education, more and more college students are being asked to do their homework online (Padgett et al., 2021; Xu, 2022a). This is particularly true as recent research has found that online homework assignments can enhance students' learning and performance (Brevik, 2020; Dendir, 2023). While online assignment(s) and online homework are frequently used interchangeably (Motz et al., 2021; Yalçın & Şevik, 2020), this distinction becomes less relevant for fully online students (Xu, 2022a): As these students complete all their coursework remotely, their online assignments literally become online homework by default.

Whereas online homework presents new opportunities, such as getting feedback right away, it also introduces novel motivational obstacles relating to the confidence and value of online assignments (Magalhães et al., 2020; Xu, 2022a). It often requires students to use technology and engage in self-directed learning, which can lead to uncertainty about their technical skills and ability to navigate online platforms. This uncertainty may foster anxiety and self-doubt, ultimately discouraging assignment completion. Struggles with the online learning environment and technical issues can further diminish students' confidence in their academic abilities, leading to procrastination and disengagement.

Additionally, the perceived value of online assignments significantly impacts motivation. If students view these tasks as irrelevant to their educational goals or future careers, their motivation to complete them declines. When assignments are perceived as busy work rather than valuable learning opportunities, students are less likely to invest the effort needed for successful completion.

With the growing prevalence of Internet-connected devices, students can work on online homework assignments at nearly any time from virtually any location (e.g., at home or home-like settings; Beckman et al., 2021; Xu et al., 2020). However, this flexibility introduces connectivity-related motivational challenges, including distractions, unstructured study environments, and self-regulation issues. First, devices that facilitate access to online assignments often come with numerous distractions, such as social media and games. This constant availability can hinder focus, decrease motivation, and increase procrastination. Second, while the ability to work from any location can be advantageous, it often leads to a lack of a structured study environment. In traditional classrooms, students benefit from an atmosphere that fosters engagement, whereas home settings may lack this discipline, making it harder for students to stay motivated. Lastly, increased accessibility places greater responsibility on students for self-regulation. Without the guidance of a structured schedule, many struggle with time management, leading to last-minute cramming and ultimately reducing learning outcomes.

The increased flexibility and decreased face-to-face interactions with instructors pose extra motivational challenges (e.g., cyber-slacking, self-motivation and in-person accountability due to the lack of set class times) for students accustomed to traditional paper-based assignments, thereby undermining their drive to complete online homework (Barrot & Fernando, 2023; Dang et al., 2023; Felker & Chen, 2023; Hassan et al., 2021; Koay & Poon, 2023; Lengkanawati et al., 2021; Noor & Isa, 2023; Ryan & Deci, 2000; Sriwichai, 2020; Zhu et al., 2024). This flexibility can lead to cyber-slacking or cyberloafing, where students engage in non-academic

activities during study times (Dang et al., 2023; Felker & Chen, 2023). The absence of structured environments allows for easy distraction, further diminishing motivation to complete assignments (Koay & Poon, 2023).

Self-motivation and accountability also suffer in online formats. Students who thrive on face-to-face interactions often rely on direct engagement with instructors and peers to foster accountability. Without this, they may struggle to find the intrinsic motivation needed for online assignments (Lengkanawati et al., 2021). Research indicates that limited interaction can lead to feelings of isolation, negatively impacting motivation and academic performance (Barrot & Fernando, 2023; Noor & Isa, 2023; Sriwichai, 2020).

Moreover, the lack of set class times disrupts routines, complicating efforts to establish a consistent study schedule (Sriwichai, 2020). Structured routines are vital for maintaining academic motivation and discipline (Hassan et al., 2021; Ryan & Deci, 2000; Zhu et al., 2024). Transitioning from a structured classroom to a flexible online environment can result in procrastination and disengagement (Barrot & Fernando, 2023; Noor & Isa, 2023).

Research Problem Statement

The transition to online homework has introduced significant motivational challenges that can undermine students' completion of these assignments. Research indicates various motivational barriers, including confidence and the perceived value of online tasks (Magalhães et al., 2020; Xu, 2022a). The flexibility of online learning environments often leads to motivational obstacles stemming from Internet connectivity, such as distractions, the absence of structured study settings, and difficulties with self-regulation (Beckman et al., 2021; Xu et al., 2020). Additionally, factors like cyber-slacking, diminished self-motivation, and the lack of in-person accountability due to the absence of fixed class times further exacerbate these challenges (Barrot & Fernando, 2023; Dang et al., 2023; Felker & Chen, 2023; Hassan et al., 2021; Koay & Poon, 2023; Lengkanawati et al., 2021; Noor & Isa, 2023; Ryan & Deci, 2000; Sriwichai, 2020; Zhu et al., 2024). Moreover, the lack of direct interactions with instructors can weaken students' motivation and their sense of connection to course material (Barrot & Fernando, 2023; Noor & Isa, 2023; Sriwichai, 2020). Collectively, these factors contribute to increased procrastination and decreased engagement, leading to lower homework completion rates and academic performance, underscoring the need to address these motivational challenges.

Despite the increasing prevalence of online homework, the measurement of online homework motivation has largely been overlooked (Magalhães et al., 2020; Xu, 2022a; Xu et al., 2019). Prior studies have emphasized the need for valid instruments to assess motivational constructs in online learning settings, noting that existing tools do not adequately capture the unique aspects of online homework motivation. This oversight limits our understanding of how individual differences (e.g., self-regulation, prior experience) and contextual factors (e.g., course design, technology use) impact students' motivation to engage with online assignments. Without a valid instrument to measure this construct, advancing research that connects online homework motivation to its antecedents (e.g., individual and contextual differences) and outcomes (e.g., online homework completion) is challenging.

This study addresses the critical need to develop a valid and reliable instrument to understand the motivational factors influencing college students' engagement with online homework. By building on existing frameworks, such as the expectancy-value theory (Eccles & Wigfield, 2020; Wigfield et al., 2015) and drawing from relevant literature (Kosovich et al., 2015; Xu,

2023; Xu et al., 2019), we aim to provide a more comprehensive understanding of how motivation operates in the context of online homework. This understanding is essential for developing effective educational strategies that enhance student performance in online learning environments.

Research Aims

This study attempts to bridge the gap in understanding online homework motivation by validating the Online Homework Expectancy Value Cost Scale (OHEVCS) for college students. The specific objectives of this study are to:

a) Test the OHEVCS' structural validity, ensuring that the scale accurately represents the underlying motivational constructs of expectancy, value, and cost,
b) Examine its invariance over gender and college year to determine whether the motivational factors measured by the OHEVCS operate similarly across diverse student demographics,
c) Assess its reliability estimates, confirming that the OHEVCS provides consistent and stable measurements of online homework motivation,
d) Evaluate the validity of the evidence regarding its relationship with homework distraction, procrastination, and completion.

In exploring these objectives, it is vital to clarify how homework distraction, procrastination, and completion relate to the motivational factors measured by the OHEVCS. Homework distraction is non-academic activities diverting students' attention from their online assignments. Research indicates that such distractions can significantly impede students' engagement, negatively affecting motivation and completion rates (Koay & Poon, 2023; Sriwichai, 2020). Procrastination is a common behavior among students, often linked to low motivation and ineffective self-regulation strategies, which can adversely impact academic performance (Hassan et al., 2021). Understanding the relationship between procrastination and online homework motivation is essential for identifying interventions to enhance student engagement. Homework completion measures the extent to which students complete their online assignments. Higher motivation levels are typically associated with greater homework completion rates, making it a critical outcome for the present study (Zhu et al., 2024).

By achieving these objectives, the study seeks to provide a robust tool for measuring online homework motivation. Based on the identified relationships among these key constructs, the findings may contribute to developing strategies that enhance student engagement and performance in online homework assignments.

Literature Review

One theoretical framework that directly applies to online homework motivation is the expectancy-value theory (Eccles, 2005; Wigfield et al., 2015). This theory posits that motivation includes two main constructs that impact achievement-related outcomes (e.g., task persistence and completion): expectancy and value. Expectancy relates to the perceived likelihood of successfully executing an academic task; it addresses the question, "Can I Do This Task?" (Wigfield et al., 2015, p. 659). Value relates to the perceived worth or significance of an academic task. It addresses the question, "Do I Want to Do This Task?" (Wigfield et al., 2015, p. 659). Value can be broken down into four parts – attainment value (related to one's sense of identity), utility value (in terms of usefulness), intrinsic value (such as interest), and cost (about effort and time expenditure).

While attainment value, utility value, and intrinsic value underscore the positive valence of participating in an academic task, cost centers on the negative valence of the task. Whereas certain researchers maintain the view that cost ought to be regarded as part of the value (Perez et al., 2014), other researchers argue that it is imperative to treat cost separately for a more comprehensive comprehension of the motivational forces of what attracts or detracts students from participating in an academic task (Barron & Hulleman, 2015). Recent empirical studies have provided initial evidence that cost is a unique component (e.g., Jiang et al., 2018) in that cost was able to significantly account for extra variance across multiple achievement-related measures, exceeding the predictive power of expectancy and value.

Construct Measures: Expectancy, Value, and Cost

In our present study, we build on insights from three validation studies grounded in expectancy-value theory: (a) Expectancy-Value-Cost (EVC) Scale (Kosovich et al., 2015); (b) Homework Expectancy Value Cost Scale (HEVCS; Xu, 2023); and (c) Homework Expectancy Value Scale (HEVS; Xu et al., 2019). This study operationalizes three constructs based on expectancy-value theory: expectancy, value, and cost.

Expectancy reflects students' beliefs in their ability to complete online homework successfully. It is measured through items assessing self-efficacy, such as "If I do not understand something in online assignments, I often think I will never understand it."

Value pertains to online homework's perceived importance and usefulness for students' academic goals. It is assessed through items such as "Our online assignments are of little use to me" and "It makes barely any difference to me whether I do my online assignments or not."

Cost refers to the perceived drawbacks of completing online homework, including time investment, stress, and distractions. This construct is assessed through items like "My online assignments require too much time" and "I have to give up too much to succeed in my online assignments."

These three constructs are crucial for understanding the motivational dynamics in online homework contexts. Although not examining homework specifically, Kosovich and colleagues (2015) validated the EVC scale involving students in grades 6-8 about their science and mathematics courses (e.g., "I believe that I can be successful in [math or science] class"; "I think my [math or science] class is useful"; and "I am unable to put in the time needed to do well in my [math or science] class"). Empirical evidence from the confirmatory factor analysis (CFA) supported the existence of the three subscales (expectancy, value, and cost) in science (CFI = .99; RMSEA = .04; SRMR = .03) and mathematics (CFI = .99; RMSEA = .03; SRMR = .03). Furthermore, Kosovich et al. reported that their study supported measurement invariance of the EVC over gender and school subject (science vs mathematics).

In the context of mathematics homework, Xu (2023) validated the HEVCS involving students in grades 7-8. CFA findings provided empirical evidence for the three factors of the HEVCS (expectancy, value, and cost; CFI = .973; RMSEA = .046; SRMR = .029). Xu found no latent mean differences over gender and grade level. In line with theoretical predictions, homework expectancy and value were associated negatively with homework procrastination and positively with homework completion, effort, and achievement. Homework cost is positively associated with homework procrastination and negatively correlated with homework completion, effort,

and achievement. Additionally, homework cost remained a significant predictor of variance in homework procrastination, effort, completion, and achievement when accounting for gender, grade level, homework value, and expectancy.

Regarding online homework assignments, Xu et al. (2019) validated the HEVS involving college students. Unlike the two studies discussed above, the HEVS was limited to homework expectancy and value (i.e., without including another subscale relating to cost). CFA findings revealed that online homework value and expectancy were factorially distinct (CFI = .991; RMSEA = .028; SRMR = .030). In addition, there were no latent mean differences across gender. Finally, online homework value and expectancy were associated negatively with homework distraction and positively with homework completion.

To sum up, while two validation studies involving middle school students with science/mathematics classes (Kosovich et al., 2015) and mathematics homework (Xu, 2023) incorporated a subscale relating to the cost component, one validation study involving college students in the context of online homework assignments was limited to expectancy and value (Xu et al., 2019). As online homework becomes a growing and global phenomenon that poses novel motivational challenges for many college students without the social and academic support commonly available in face-to-face environments (Magalhães et al., 2020; Xu, 2022a; Zhou et al., 2017), it is imperative to address this gap by integrating cost, along with expectancy and value, within the landscape of online homework assignments.

Research Framework

Our current study aims to validate the Online Homework Expectancy Value Cost Scale (OHEVCS) for college students. The specific purposes are (a) testing the OHEVCS' structural validity; (b) examining its invariance over gender and college year; (c) assessing its reliability estimates; and (d) evaluating its validity evidence regarding its relations with homework distraction, procrastination, and completion. In line with theoretical predictions (e.g., task engagement, persistence, and completion; Eccles & Wigfield, 2020; Wigfield et al., 2015) and previous studies (Kosovich et al., 2015; Xu, 2023; Xu et al., 2019), the research framework integrates the constructs of expectancy, value, and cost with key variables identified from the literature – homework distraction, procrastination, and completion, which is grounded in the expectancy-value theory and validated by prior research.

First, expectancy is vital because students' beliefs about their ability to succeed significantly influence their motivation. Research shows that higher expectancy leads to greater effort and persistence in academic tasks (Eccles & Wigfield, 2020; Xu, 2022a). By including expectancy, we can examine how confidence impacts online homework completion. Second, value (i.e., the perceived importance of homework) is another essential factor. Students who view their assignments as relevant and beneficial are more likely to engage with them. Eccles and Wigfield (2020) emphasize the roles of intrinsic and extrinsic values in motivation, highlighting the need to understand how students perceive the value of online homework to enhance their motivation and completion rates. Third, the cost reflects the perceived homework challenges, such as time constraints and stress. Research indicates that when students perceive high costs, they may disengage from their assignments (Xu, 2022b; Xu, 2023). Including cost allows us to explore how these perceptions can hinder motivation and completion. Fourth, homework distraction is a significant barrier to focus and engagement in online learning environments. Studies have shown that increased distraction correlates with higher procrastination and lower completion rates (Xu et al., 2020). Understanding how distraction interacts with the other constructs can

help identify specific barriers to homework completion. Fifth, procrastination, a behavioral outcome of motivational challenges, directly affects completion rates. Research indicates that students with poor self-regulation often struggle with procrastination, impacting their homework success (Magalhães et al., 2020; Xu, 2022a). Analyzing procrastination about expectancy, value, and cost provides insights into effective strategies to improve engagement. Sixth, homework completion is the outcome we seek to understand, reflecting students' success in engaging with online homework (Xu, 2022b). This construct is influenced by the other factors in the framework, making measuring completion alongside expectancy, value, cost, distraction, and procrastination essential.

We hypothesize that Online Homework Expectancy and Value will be negatively associated with homework distraction and procrastination while being positively associated with homework completion. Conversely, we expect online homework cost to be positively associated with online homework distraction and procrastination and negatively associated with online homework completion (See Figure 1).

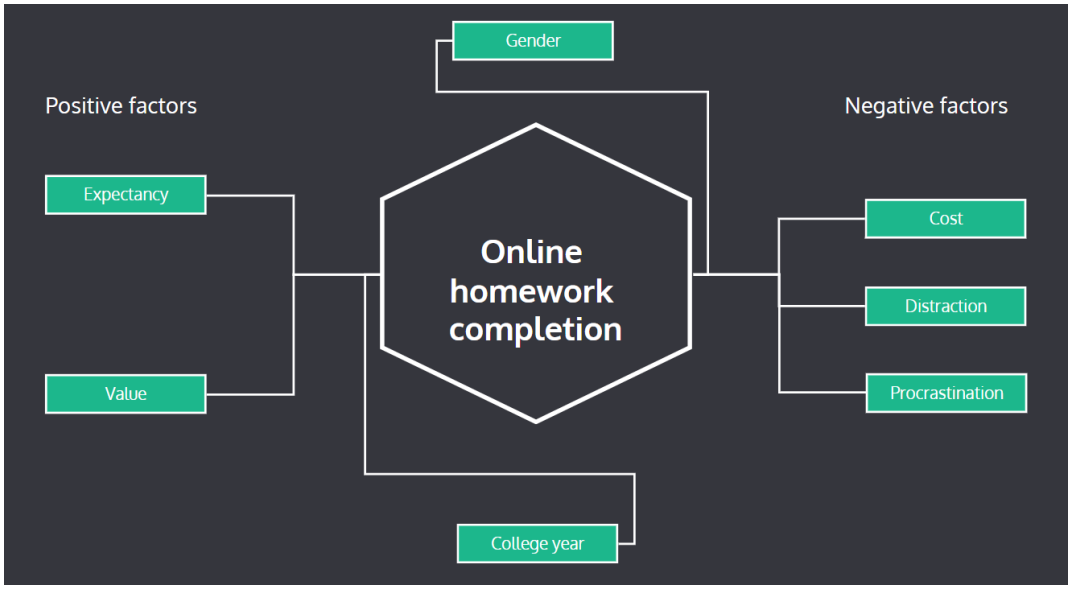

Figure 1: The Research Framework

Regarding gender and college year differences, congruent with a validation study involving college students (Xu et al., 2019), we hypothesize that latent means for online homework value and expectancy will be invariant across genders. Meanwhile, the study by Xu et al. (2019) did not investigate latent mean invariance in (a) online homework cost over gender and (b) online homework cost, expectancy, and value over college years (years 1-2 vs years 3-4). Consequently, it would be desirable to examine these differences; as individuals become increasingly conscious of age-appropriate developmental activities (Eccles, 2005), they might perceive a heightened cost associated with engaging in online homework assignments, for instance.

Method

Participants

Due to logistical reasons such as resources and time constraints, the authors adopted a convenience sampling method, a widely used non-probabilistic sampling technique in social

sciences research (Galloway, 2005). This approach enabled the collection of a diverse range of opinions and attitudes via an online survey form. After receiving ethical research approval from the faculty ethical research committee, the authors sent research participation invitation emails to all students (n = 2,352) in the foreign languages department of a large public university in the South of Vietnam during the 2022-2023 academic year. A total of 1,192 students (a participation rate of 50.8%) volunteered to participate in the study.

In terms of college status, first-year students accounted for 36.2%, second-year students accounted for 24.7%, third-year students accounted for 19.5%, and fourth-year students accounted for 19.6%. The average age among the participants was 20.4 years, with a standard deviation of 1.32 years. Separate analyses were performed for lower-division students (years 1-2) and upper-division students (years 3-4) to account for students' unique experiences and perspectives at different stages of their academic journey, thereby avoiding potential distortions in the analysis and discussion.

Our investigation was part of a larger research project examining various issues relating to online homework assignments (e.g., motivation and self-regulated learning). Participants came from several majors offered at the university (e.g., Business English, TESOL, Business Chinese). Online homework assignments included multiple-choice quizzes, writing tasks, discussion boards, and reflective journals. The survey was conducted online, with participants instructed to concentrate their responses on a single mandatory course in their major.

Instruments: Online Homework Expectancy Value Cost Scale (OHECVS)

The OHEVCS includes items designed to measure students' expectancy, value, and cost beliefs regarding online homework. These items were adapted from validated scales and tailored to the online homework context to ensure content validity. In particular, the development of the Online Homework Expectancy Value Cost Scale (OHECVS) was informed by two existing validated scales: the Homework Expectancy Value Scale (HEVS) for college students (Xu et al., 2019) and the Homework Expectancy Value Cost Scale (HEVCS) for middle school students (Xu, 2023). These scales are rooted in the expectancy-value theory, which is central to understanding student motivation in educational psychology. According to this theory, students' motivation to engage in a task is determined by their beliefs about their ability to succeed (expectancy), the importance they place on the task (value), and their perception of the effort and sacrifices required (cost).

Expectancy reflects students' beliefs about their capabilities to perform specific tasks successfully (Barron & Hulleman, 2015; Eccles & Wigfield, 2020; Jiang et al., 2018; Kosovich et al., 2015; Xu, 2017, 2022a, 2023; Xu et al., 2019; Yang & Xu, 2018). This construct was measured by four items (items 1-4 in Table 1; reverse scored) that assessed students' confidence and self-efficacy regarding online assignments. For example, items gauged whether students felt they could follow through with assignments or whether they anticipated difficulties that would prevent them from completing the tasks.

Value captures the perceived importance and usefulness of online assignments (Barron & Hulleman, 2015; Eccles, 2005; Eccles & Wigfield, 2020; Jiang et al., 2018; Kosovich et al., 2015; Perez et al., 2014; Xu, 2017, 2022a, 2023; Xu et al., 2019; Yang & Xu, 2018). This construct was measured by four items (items 5-8 in Table 1; reverse scored) that assessed how beneficial students found the assignments in helping them understand course materials. Items

in this category evaluated students' intrinsic and extrinsic value beliefs, such as the perceived relevance of assignments to their academic goals and personal interests.

Cost involves students' perceptions of the negative aspects associated with engaging in online assignments, such as the effort required and the potential loss of time for other preferred activities (Barron & Hulleman, 2015; Eccles & Wigfield, 2020; Jiang et al., 2018; Kosovich et al., 2015; Perez et al., 2014; Xu, 2023). This construct was measured by four items (items 9-12 in Table 1), which tapped into the perceived effort needed and the sacrifices students felt they had to make, such as giving up social activities with peers.

A 4-point Likert scale was used for all items, with responses ranging from 1 (strongly disagree) to 4 (strongly agree). Reverse scoring was applied to expectancy and value items to ensure consistency in interpretation, where higher scores indicated higher levels of expectancy, value, and perceived cost. This scoring method helped to accurately reflect the constructs measured and allowed for a clear understanding of students' motivational beliefs, engagement, and performance related to online homework assignments.

Motivational beliefs form the foundation for how students approach online homework. Expectancy, value, and cost significantly impact motivation levels, influencing students' willingness to engage with assignments. Research shows that positive motivational beliefs increase enthusiasm and persistence in academic tasks (Baron et al., 2015; Eccles, 2005; Eccles & Wigfield, 2020; Jiang et al., 2018; Ryan & Deci, 2020).

Engagement refers to students' active involvement and commitment in their learning processes. Higher levels of expectancy and value often lead to increased engagement, as students are more likely to participate fully in meaningful tasks and believe they can succeed. Engaged students generally exert more effort and are less likely to procrastinate, resulting in higher completion rates (Barrot & Fernando, 2023; Koay & Poon, 2023; Noor & Isa, 2023).

Performance encompasses the outcomes of students' efforts, including completing online homework assignments. The literature consistently demonstrates that positive motivational beliefs and higher levels of engagement correlate with improved academic performance (Hassan et al., 2021; Magalhães et al., 2020). Measuring these constructs offers valuable insights into the factors contributing to student's success in online homework contexts.

Table 1: Items and Standardized Coefficients

Latent construct	**Item**	*β*
Expectancy	1. "If I do not understand something in online assignments, I often think I will never understand it."	0.745
	2. "If I do not understand something in online assignments, I am at a complete loss and do not know how to catch up."	0.707
	3. "Whether or not I do my online assignments, I do not understand a thing in the lesson anyway."	0.760
	4. "I sometimes really dread online assignments."	0.553
Value	5. "Our online assignments are of little use to me."	0.770
	6. "I do not learn much from our online assignments"	0.827
	7. "There is no point in my doing online assignments."	0.786
	8. "It makes barely any difference to me whether I do my online assignments or not."	0.835
Cost	9. "My online assignments require too much time."	0.793
	10. "Because of other things that I do, I do not have time to put into my online assignments."	0.852
	11. "I am unable to put in the time needed to do well in my online assignments."	0.813
	12. "I must give up too much to do well in my online assignments."	0.771

[a]Item was reverse scored.

Data Analysis

To achieve the research aims, the OHEVCS was subjected to rigorous analysis. The structural validity of the scale was first tested using CFA to assess the fit of a three-factor model comprising expectancy, value, and cost constructs. Latent mean invariance was examined across (a) online homework cost, expectancy, and value by gender and (b) online homework cost, expectancy, and value by college year (years 1-2 vs. years 3-4).

The reliability of the OHEVCS was evaluated using both alpha and omega coefficients. For validity assessment, correlations between OHEVCS constructs and key variables were examined. Multiple regression analyses were conducted to explore predictive relationships. Detailed data analysis is presented in the following four stages.

Stage 1: Analyses were performed in Mplus, using robust maximum likelihood estimation. Our data featured low missing values (less than 1%), resolved through full information maximum likelihood.

CFAs were performed to empirically examine whether online homework expectancy, value, and cost were loaded on separate factors. The fit across five rival models was compared: one one-factor model (12 items loading on a single factor; Table 2), three two-factor models (12 items loading on two of the three constructs), and one three-factor model (12 items loading on respective constructs of online homework expectancy, value, and cost).

Table 2: Comparing Alternative Models

Model	*MLR*χ^2	*df*	RMSEA	RMSEA 90% CI	SRMR	CFI	TLI	AIC	BIC
One-factor model									
1 F1 (items 1-12)	1433.228	54	.146	.140 - .153	.114	.718	.656	27525.825	27708.827
Two-factor model									
2 F1 (items 1-8); F2 (items 9-12)	970.320	53	.120	.114 - .127	.105	.813	.767	26870.987	27059.072
3 F1 (items 1-4, 9-12); F2 (items 5-8)	992.108	53	.122	.115 - .129	.108	.808	.761	26905.347	27093.432
4 F1 (items 5-12); F2 (items 1-4)	658.188	53	.098	.091 - .105	.054	.876	.846	26442.679	26630.764
Three-factor model									
5 F1 (items 1-4); F2 (items 5-8); F3 (items 9-12)	182.371	51	.046	.039 - .054	.035	.973	.965	25785.971	25984.223

To assess model fit, we employed conventional goodness-of-fit indices based on recommended cutoffs by Hu and Bentler (1999): CFI of 0.95 or greater, SRMR of 0.08 or less, and RMSEA of 0.06 or less. Additionally, we evaluated model fit by generating the Dynamic Fit Index cutoffs, as this approach takes into account the specific characteristics of a factor solution (e.g., sample size, number of latent factors, number of items, loadings, error variance, and the correlation between latent factors; McNeish & Wolf, 2023).

Stage 2: Invariance tests were carried out over gender (males vs. females) and college year (years 1-2 vs. years 3-4) – configural, factor loading, intercept, and factor means invariance. Given the sensitivity of the chi-square test to sample size (Peugh & Feldon, 2020), we followed the following recommendation (Chen, 2007): a change in RMSEA < 0.015 and CFI < 0.01 indicated invariance.

Stage 3: As previous validation studies used the alpha coefficients (e.g., homework value; Xu, 2017; Yang & Xu, 2018), as recent research suggests that alpha may underestimate reliability (Deng & Chan, 2017), the present investigation encompassed both alpha and omega estimates to provide a comprehensive assessment of the reliability for the OHEVCS subscales.

Stage 4: When validating the OHEVCS, we considered three external indicators: homework distraction, procrastination, and completion.

Online Homework Distraction. Drawn from prior research (Xu et al., 2020), four items measured online homework distraction (e.g., "Stop online assignments to send or receive text messages"; α = .87; ω = .88). Participants made responses applying 5-point format (1 = *never*; 5 = *routinely*). CFA findings indicated that the four items formed a unidimensional measure of online homework distraction (CFI = 1.000; TLI = 1.000; RMSEA =.000; SRMR = .004).

Online Homework Procrastination. Based on extant literature (Xu, 2022b; Yockey, 2016), this scale assessed students' tendency to procrastinate on online assignments (4-item; e.g., "I put off online assignments until the last minute"; α = .80; ω = .81). Participants responded applying 4-point format from 1 (*strongly disagree*) to 4 (*strongly agree*). CFA findings indicated that the four items formed a unidimensional measure of online homework procrastination (CFI = 1.000; TLI = .997; RMSEA =.020; SRMR = .006).

Online Homework Completion. Guided by previous studies (e.g., Xu et al., 2019), students responded to a single item, assessing the extent to which they completed their online homework, with response options ranging from 1 (*none*) to 5 (*all*). As theorized, Xu (2023) showed that homework completion was negatively related to homework distraction and procrastination.

Validity evidence was assessed by examining zero-order correlations between the OHEVCS, homework distraction, procrastination, and completion. Additionally, multiple regression analyses were performed to test if online homework cost significantly predicted online homework distraction, procrastination, and completion when accounting for gender, college year, online homework value, and expectancy.

Results

Stage 1: OHEVCS' Structural Validity

The means of all items (Table 1) fell within the range of 2.33 to 3.00 ($0.69 \leq SD \leq 0.84$). In addition, all skewness and kurtosis values for these items were below an absolute value of 1.00. Results showed that, compared with the one-factor model ($MLR\chi^2$ = 1433.228; df = 54; CFI = .718; TLI = .656; RMSEA = .146; SRMR = .114; AIC = 27525.825; BIC = 27708.827), the fit of the three-factor model was significantly superior (Table 2; $MLR\chi^2$ = 182.371; df = 51; CFI = .973; TLI = .965; RMSEA = .046; SRMR = .035; AIC = 25785.971; BIC = 25984.223). Whereas the general fit of Models 2-4 showed improvement compared to Model 1 ($.090 \leq \Delta CFI \leq .158$; $.024 \leq \Delta RMSEA \leq .048$), Model 5 exhibited a further improvement compared to Models 2-4 ($.097 \leq \Delta CFI \leq .165$; $.052 \leq \Delta RMSEA \leq .076$). Hence, online homework cost, value, and expectancy were empirically distinguishable.

Our hypothesized model (Model 5) met the commonly used criteria recommended by Hu and Bentler (1999) as well as the ideal cutoff values based on the Dynamic Fit Index (SRMR = .098; RMSEA = .069; CFI = .960; McNeish & Wolf, 2023). The standardized factor loadings for all items, spanning .553 to .852, were substantial, lending further support to the three-factor model (Table 1). The correlations between the factors reached significance at the $p < .001$ level: 'Online Homework Expectancy' with 'Online Homework Value', .359; 'Online Homework Expectancy' with 'Online Homework Cost', −.321; and 'Online Homework Value' with 'Online Homework Cost', −.767.

Stage 2: Tests of Invariance

Measurement invariance across gender was tested. The configural invariance model indicated a good fit (CFI = .972; RMSEA = .048; Table 3). Imposing equality constraints on factor loadings maintained good fit (CFI = .972; RMSEA = .046), with minimal change in fit (ΔCFI < .001; ΔRMSEA = .002). Intercept invariance was further supported (CFI = .969; RMSEA = .046), with negligible change in fit (ΔCFI = .003; ΔRMSEA < .001). Finally, latent mean invariance held (CFI = .968; RMSEA = .047), with trivial declines in fit (ΔCFI = .001; ΔRMSEA = .001), signifying invariant latent means across gender.

Table 3: Tests of Invariance Across Gender and College Year

Invariance models	*MLRχ^2*	*df*	*RMSEA*	*RMSEA 90% CI*	*SRMR*	*CFI*	*TLI*	*Model Comparison*	*Δdf*	*ΔCFI*	*ΔRMSEA*
Gender											
1. Configural	240.109	102	.048	.040 - .056	.037	.972	.964	----	----	----	----
2. Factor loading	251.749	111	.046	.039 - .054	.040	.972	.967	2 vs. 1	9	< .001	.002
3. Intercept	274.022	120	.046	.039 - .054	.040	.969	.966	3 vs. 2	9	.002	< .001
4. Latent factor mean	282.686	123	.047	.040 - .054	.045	.968	.966	4 vs. 3	3	.001	.001
College year											
1. Configural	241.132	102	.048	.040 - .056	.038	.972	.964	----	----	----	----
2. Factor loading	250.846	111	.046	.038 - .054	.040	.972	.967	2 vs. 1	9	< .001	.002
3. Intercept	267.157	120	.045	.038 - .053	.041	.971	.968	3 vs. 2	9	.001	.001
4. Latent factor mean	271.453	123	.045	.038 - .052	.041	.970	.968	4 vs. 3	3	.001	< .001

Invariance was examined across college years, comparing lower (years 1-2) and upper (years 3-4) division students. The configural invariance model showed a very good fit (CFI = .972; RMSEA = .048). Constraining the factor loadings to be equal for both groups did not meaningfully worsen model fit (CFI = .972; RMSEA = .046), with minimal change in fit statistics (ΔCFI < .001; ΔRMSEA = .002). Intercept invariance also supported (CFI = .971; RMSEA = .045), with negligible decline in fit (ΔCFI = .001; ΔRMSEA = .001). Finally, latent mean invariance was supported (CFI = .970; RMSEA = .045), with trivial changes in fit (ΔCFI = .001; ΔRMSEA < .001), indicating invariant latent means over college year.

Furthermore, we conducted sensitivity analysis by constraining the loadings of different items: first, the loading of the second item of each factor; second, the loading of the third item; and third, the loading of the fourth item. We found negligible declines in model fit between Model 4 (the most constrained model) and Model 1 (the least constrained model). This indicates that gender and college year invariance are held, irrespective of the chosen anchor item.

Stage 3: OHEVCS' Reliability

The reliability estimates for the OHEVCS subscales were adequate and very good. The alpha coefficients were: .78 for online homework expectancy (.76 - .80), .88 for online homework value (.87 - .99), and .88 for online homework cost (.87 - .89). The corresponding omega coefficients were: .79 for expectancy (.76 - .80), .88 for value (.87 - .89), and .88 for cost (.87 - .89). By conventional standards (Nunnally, 1978; Watkins, 2017), these estimates indicate sufficient to very good reliability for research use.

Stage 4: OHEVCS' Validity Evidence

The relationships between the OHEVCS and the constructs of homework distraction, procrastination, and completion were examined (Table 4). As theorized (Eccles & Wigfield, 2020; Jiang et al., 2018), online homework completion was associated positively with online

homework value and expectancy and negatively with cost. Online homework distraction and procrastination were associated negatively with online homework value and expectancy and positively with cost. Additionally, online homework cost significantly predicted homework distraction, procrastination, completion, and mathematics when accounting for gender, college year, online homework expectancy, and value (Table 5). To provide evidence for the external aspect of construct validity, we examined the relationships between the OHEVCS and the constructs of homework distraction, procrastination, and completion (Table 4).

Tables 4*: Univariate Statistics and Bivariate Pearson Correlations*

Variables	M	SD	S	K	1	2	3	4	5	6	7
1 Gender (female = 0)	0.23	0.43	1.26	−0.41	–						
2 College year (Years 1−2 = 0)	0.39	0.49	0.45	−1.80	−0.08**	–					
3 Homework expectancy	2.68	0.64	−0.26	0.00	−0.04	−0.02	–				
4 Homework value	2.76	0.61	−0.40	0.40	−0.08**	−0.05	0.30**	–			
5 Homework cost	2.40	0.65	0.15	0.08	0.09**	0.03	−0.28**	−0.68**	–		
6 Homework distraction	2.69	0.96	0.36	−0.24	0.12**	−0.01	−0.37**	−0.30**	0.29**	–	
7 Homework procrastination	2.36	0.65	0.22	0.05	0.15**	0.05	−0.60**	−0.30**	0.30**	0.51**	–
8 Homework completion	4.22	0.76	−0.99	1.21	−0.13**	0.00	0.12**	0.19**	−0.20**	−0.12**	−0.26**

Note: N = 1,192. S = Skewness. K = Kurtosis. ***p* < .01.

Table 5: Using Hierarchical Regression Analyses to Predict Online Homework Distraction, Procrastination, and Completion

Variables	Homework distraction		Homework procrastination		Homework completion	
Gender (female = 0)	.09***	.09**	.12***	.12***	−.12***	−.11***
College year (Years 1−2 = 0)	−.02	−.02	.04	.04	.00	.00
Homework expectancy	−.31***	−.30***	−.56***	−.55***	.07*	.06*
Homework value	−.20***	−.12**	−.12***	−.07*	.16***	.08*
Homework cost		.12**		.09**		−.12***
Explained variance	18.1%	18.8%	39.1%	39.5%	5.1%	5.8%

Note: N = 1,192. **p* < .05. ***p* < .01. ****p* < .001.

To summarize, the results indicate significant relationships between online homework expectancy, value, cost, and other constructs such as online homework distraction, procrastination, and completion. These results underscore the importance of addressing motivational factors in online homework assignments.

Discussion

The present investigation validated the OHEVCS for undergraduates relating to online homework assignments. Results revealed that the OHEVCS possessed good psychometric properties. Specifically, the three-factor model demonstrated a significantly superior fit to the four alternative models, indicating that online homework expectancy, value, and cost represent distinct constructs. This distinction is crucial as it highlights the unique contributions of each construct to students' motivational dynamics in online homework settings.

Furthermore, in line with theoretical expectations (Wigfield et al., 2015), online homework value and expectancy exhibited a positive correlation but were inversely related to cost. Specifically, as indicated in Table 4, higher homework value positively correlated with homework completion (r = .19, p < .01) and negatively correlated with both homework distraction (r = -.30, p < .01) and procrastination (r = -.30, p < .01). This suggests that when students perceive high value in their assignments, they are more likely to engage effectively and less likely to procrastinate or become distracted. Conversely, perceived costs were positively associated with homework distraction (r = .29, p < .01) and procrastination (r = .30,

$p < .01$), highlighting that students who feel overwhelmed by the demands of their assignments are more likely to struggle with completion. This finding underscores the complex interplay between these motivational factors, where higher perceived value and expectancy can mitigate the negative impact of perceived costs.

Our study found no latent mean differences over gender and college years in the OHEVCS. The findings on the invariance of online homework expectancy and value align with the outcomes of a previous validation study involving Chinese undergraduates (Xu et al., 2019). However, the study by Xu et al. did not incorporate a subscale on Online Homework Cost, nor did it examine latent means difference in online homework expectancy and value across college years. Therefore, the current investigation extends previous studies by revealing that there was support for latent mean invariance in (a) online homework cost over gender and college and (b) online homework value and expectancy over college years. This invariance indicates that the OHEVCS can be reliably used across different demographic groups (e.g., gender, college year), providing a robust tool for measuring online homework motivation.

Regarding the OHEVCS' validity evidence, our results showed that consistent with theoretical expectations and previous studies (Eccles & Wigfield, 2020; Kosovich et al., 2015; Xu, 2023; Xu et al., 2019), online homework value and expectancy were associated positively with online homework completion, negatively with online homework distraction and procrastination. Conversely, online homework cost was positively associated with online homework distraction and procrastination and negatively associated with online homework completion. These findings provide a nuanced understanding of how motivational beliefs impact student behaviors. For instance, students who perceive high value and expectancy in their online homework are likelier to complete assignments and less likely to procrastinate or be distracted. On the contrary, high perceived costs can deter online homework completion and increase homework procrastination and distraction.

In addition, each subscale of the HEVCS (such as online homework cost) significantly predicted online homework distraction, procrastination, and completion, even when accounting for gender, college year, and the remaining two OHEVCS subscales (e.g., online homework expectancy, value). The OHEVCS appears to be a valid tool for assessing college students' motivational beliefs regarding online homework assignments, providing a comprehensive measure that can inform both research and practice.

Implications and Recommendations

This study provides several important implications for both research and practice. It contributes significantly to the literature by emphasizing the necessity of comprehensively considering online homework expectancy, value, and cost to understand college students' motivation toward online homework assignments. Our results, specifically the significant correlations found between the OHEVCS constructs and variables such as online homework distraction and procrastination, indicate that researchers can explore how these relationships may vary across different contexts and populations.

Understanding the relationships among constructs (e.g., online homework value positively correlating with completion and negatively with distraction) suggests that higher value and expectancy can mitigate the negative impact of perceived costs. This insight can lead to a deeper understanding of how various educational practices influence students' motivational beliefs and behaviors. Researchers might benefit from examining potential precursors of the OHEVCS,

such as the quality of teacher homework involvement (e.g., autonomy support and feedback quality; Yang & Xu, 2019). These investigations could help identify educational practices that enhance or detract from students' motivational beliefs and behaviors.

Motivational beliefs influence task engagement, persistence, and completion (Eccles & Wigfield, 2020; Xu, 2023). Given that our findings demonstrated a significant association between the OHEVCS and online homework distraction, procrastination, and completion, instructors may benefit from utilizing the OHEVCS as a useful tool for teaching and assessing students. By using the OHEVCS, instructors can better comprehend undergraduates' motivational beliefs about online homework assignments and assist in recognizing students struggling with distraction and procrastination regarding online homework completion.

In practice, utilizing the OHEVCS can inform instructors about engagement strategies that resonate most with their students. For instance, group discussions, peer collaborations, and interactive assignments can enhance the perceived value and expectancy while reducing distractions and procrastination.

Furthermore, the OHEVCS can help instructors design targeted interventions that address specific motivational challenges based on individual motivational profiles. For example, suppose students exhibit low expectancy beliefs (i.e., low confidence in completing online homework). In that case, instructors can enhance these beliefs by providing clear, positive feedback and recognizing students' past efforts and improvements. This could involve regular check-ins and personalized encouragement to boost students' self-efficacy. If students perceive low value in their online homework (i.e., they do not see its relevance or usefulness), instructors can connect homework tasks to students' personal goals and interests. This might involve explaining how the assignments contribute to broader learning objectives or future career opportunities. Incorporating real-world applications and examples can also help students see the practical value of their assignments.

To address high perceived costs (i.e., students feel that online homework requires too much time or effort), instructors can implement time management strategies and provide support to help students balance their workload. This could include breaking assignments into smaller, more manageable tasks, offering flexible deadlines, and providing resources for efficient study habits. Additionally, interventions should be designed to mitigate perceived costs by offering time management strategies and support. For example, instructors can teach students how to schedule their time effectively, set priorities, and develop a study routine that reduces the perceived burden of online homework. Providing tools such as online calendars (e.g., Google Calendar), reminder apps (e.g., Microsoft To-Do), time management methods (e.g., the Pomodoro Technique), and study groups can also help students manage their assignments more effectively.

Moreover, educational institutions can use the findings from this study to inform policy decisions and resource allocations. For example, universities might invest in professional development programs that train instructors to apply the OHEVCS in their teaching practices. By understanding the specific motivational challenges faced by their students, institutions can develop targeted support services, such as skill-building workshops, tutoring centers, counseling services, and mentorship opportunities that connect academic tasks with career pathways to enhance student motivation and academic success.

In conclusion, the OHEVCS is a valuable tool for understanding and improving college students' motivation toward online homework assignments. By addressing the distinct constructs of expectancy, value, and cost, educators and researchers can develop more effective strategies to enhance student engagement, reduce procrastination and distraction, and ultimately improve academic outcomes.

Conclusion

This study validates the OHEVCS as a reliable and valid instrument for assessing motivational beliefs related to online homework among college students. The scale offers a robust framework for understanding three key factors – online homework expectancy, value, and cost – influencing students' engagement with online assignments. Notably, online homework value and expectancy demonstrated positive correlations and were inversely related to cost. Latent mean differences across gender and college years were not found in the OHEVCS.

Additionally, online homework value and expectancy were positively associated with completion rates and negatively correlated with distraction and procrastination behaviors. Conversely, online homework cost showed positive associations with distraction and procrastination and negative associations with completion rates. These results underscore the utility of the OHEVCS in capturing motivational dynamics surrounding online homework among college students.

As motivational beliefs can be shaped by cultural variation (e.g., perceived competence, cost, and value of academic tasks such as online homework; Eccles & Wigfield, 2020; Wigfield et al., 2015), it would be beneficial to validate the OHEVCS in diverse national contexts. Future research should aim to replicate this study with more diverse samples, including students from different universities and various academic disciplines. This will enhance the generalizability of the findings and provide a broader understanding of student motivation in online homework contexts.

Moreover, further investigations of the OHEVCS could also focus on college students with unfavorable motivational beliefs about online homework assignments (high perceived cost and low perceived expectancy/value) and test interventions to improve their motivational beliefs and behaviors around online homework distraction, procrastination, and completion. Finally, since increasingly more online instructors have included online collaborative learning activities in their classes (Awuor et al., 2022; Xu et al., 2013), and since online collaborative homework poses unique challenges for undergraduates (e.g., social loafing and free-riding; Du et al., 2015; Greenhow et al., 2022), it is imperative to validate the OHEVCS in online collaborative environments.

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COMMUNICATION AND CONNECTION IN SOLVING DIFFERENTIAL EQUATION: ANALYSIS OF FACTORS AFFECTING UNDERSTANDING OF MATHEMATICAL CONCEPTS AND KNOWLEDGE IN SOLVING DIFFERENTIAL EQUATION

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ABSTRACT

This study emphasizes the significance of connections and communication in solving differential equation problems, highlighting their impact on meaningful learning. The National Council of Teachers of Mathematics (NCTM) emphasizes these process standards, advocating for curricula that interlink various mathematical topics and underscore their practical applications. Similarly, the Islamic Republic of Iran's curriculum incorporates these principles. Despite their recognized importance, educators and students often overlook these concepts, leading to superficial understanding and inadequate preparation for advanced challenges. The participants in this study are 30 engineering students from the Islamic Azad University who attended a course on differential equations during the first semester of the 2022-2023 academic year. Over six consecutive weeks, the students were taught how to solve first-order differential equations, and their learning was assessed. The findings revealed that most students struggled to apply previously learned material to differential equations, indicating a deficiency in connecting new concepts with prior knowledge, such as simplifying algebraic expressions and factoring.

Keywords: Connections and communication, problem-solving, differential equations, conceptual learning in mathematics.

Introduction

Conceptual knowledge is one of the essential elements and necessary skills for students to become familiar with and solve various challenges they will face in the future. Conceptual knowledge in mathematics helps individuals understand and master social, economic, and natural issues (Van De Ville, 2003). The National Curriculum Document of the Islamic Republic of Iran (2016) clearly states that one of the important aspects of mathematics is to empower individuals to describe and control complex material, natural, economic, and social situations. Strengthening the learner's conceptual mathematical knowledge is essential to achieve this goal.

The National Council of Teachers of Mathematics (NCTM) in the United States also emphasizes that students should learn mathematics based on conceptual understanding and actively construct new understandings from their previous experiences and knowledge. This principle is based on two main ideas: first, that learning mathematics with understanding is necessary, and second, that students can learn mathematics based on conceptual understanding. One way to increase conceptual knowledge is to pay attention to understanding the connections between mathematical concepts; understanding is the quantitative and qualitative connection between ideas an individual makes with their ideas. The benefits of this type of understanding include memory growth, creativity and development, problem-solving ability, reduced need to memorize information, helping to learn new concepts and patterns, and improved beliefs (Van De Ville, 2003). To achieve meaningful learning, it is necessary to relate new knowledge to previously learned concepts and use those (Karimi et al., 2017).

In new teaching-learning approaches, meaningful learning is emphasized. According to this theory, first proposed by Ausubel in 1963 (Seif, 2002), meaningful learning occurs when the learner can relate new knowledge to the existing cognitive network in their mind (Yew, 2018). Research shows that in developing the cognitive structure of the mind, students are forced to establish connections between concepts. Through these connections, their understanding of mathematics improves, and they understand mathematics as a set of coordinated and not separate concepts (Bartletz, 1995). By gaining their own experiences, students develop various mathematical concepts, some of which can be expanded as new ideas, links between concepts, and even the connection between one concept and concepts in other subjects; this ability is called mathematical communication skill. Students who connect mathematical ideas and concepts will achieve deep and lasting understanding (NCTM, 2000).

The ability to establish mathematical connections and communication between mathematical topics and mathematics and other disciplines by students is one of the main goals of the

mathematics learning process. Because mathematics is related to the real world and everyday life, teachers should allow students to discover these relationships; in this way, students will be more successful in learning mathematics (Rohendi & Dalpaja, 2013). To achieve the deep and broad understanding we expect, establishing connections between mathematical topics and other learning areas is important (Butler, 2005). The National Council of Teachers of Mathematics (NCTM) has introduced connections and communication as one of the main standards in mathematics education. This council has stipulated that educational programs from preschool to twelfth grade should enable students to identify and use the connections between mathematical ideas, understand how these ideas relate to each other to form a coherent whole, and recognize the presence of mathematics in structures and contexts outside the school environment and use it.

According to these standards, educational programs should be designed so that learners can recognize and utilize the connections and communication between mathematical topics. They should understand the role and connection of each mathematical concept in forming a coherent whole and use mathematics outside the school environment. In this way, they can understand mathematics more broadly and practically and use it in daily life and other disciplines (Kilpatrick, 2002).

Butler (2005) believes connections often do not occur by chance, and many students cannot recognize them independently. Therefore, teachers should have appropriate programs to identify these connections. These programs can help improve learning and enhance teaching efficiency. Engineering is one of the branches of science that has a serious connection with mathematics (Khiat, 2010). Therefore, the quality of mathematics education in the engineering education system is expected to receive more attention. Despite the strengths of engineering education in Iran, there are numerous shortcomings (Memarian, 2011). Despite the importance of mathematics education in the quality of engineering education, only a few studies have been conducted on university mathematics education, especially studies related to teaching differential equations to engineering students (Araújo, 2010). In the Iranian university education system, teaching the differential equations course, due to its prerequisite nature for specialized courses and its practical application, is of great importance for the academic success of many engineering students (Karimi & Fardinpour, 2012). Enthusiasts of engineering education and academic mathematics education specialists have also emphasized student-centered education to reduce student's indifference to education (Memarian & Hossein, 2011).

In this study, the researchers intend to track the weaknesses of engineering students in the differential equations course and, by evaluating their performance in solving differential equations, help clarify the points where students have problems connecting and relating to

prerequisite concepts. Various studies have examined the role of the standard of the connection in students' self-confidence (Sudia & Muhammad, 2020), self-regulated learning, problem-solving, and mathematical problem-posing (Najoan et al., 2024). However, in the present study, the researchers intend to examine the conceptual knowledge of several engineering students from the perspective of the connections and communication of mathematical concepts in the differential equations course. For this purpose, the students' performances are evaluated from four perspectives: recognizing the method of solving the differential equation, Accuracy in mathematical relationships, Proper use of mathematical relationships, and maintaining coherence in solving the differential equation.

Research Background

Various studies have investigated student's conceptual knowledge by assessing connections between mathematical concepts. Most of these studies are dedicated to school mathematics education. For example, a study titled "The Role of Mathematical Connections in Mathematical Problem Solving" claimed that mathematical connections play an important role in students solving mathematical problems. This research emphasizes that students with appropriate mathematical communication skills solve mathematical problems well, while those with weak ones fail to solve them (Pambudi et al., 2020). However, the study of Kenedi et al. (2019) aimed to determine the mathematical connection ability of elementary school students to solve mathematical problems, and the results showed that the mathematical connection ability of elementary school students to solve mathematical problems is low.

Putri & Wutsq (2017) examined in their study titled "Student's Mathematical Connection Ability in Solving Real-world Problems" that the mathematical connection ability of eighth-grade students in solving real-world problems is at a low level. Most of their issues in solving real-world problems are limited to understanding the problem and connecting it to mathematical concepts. The target group for another study is also junior high school (ninth-grade students). This research examines the effectiveness of Think Talk Write (TTW) learning in improving students' mathematical communication Ability. The result showed that for students to think critically, calculate, reason, and be able to analyze a problem, they must enhance their mathematical communication skills, which are related to everyday life through mathematics learning (Kamaruddin et al., 2023).

In addition, Karakoç and Alacac (2015), in their research "Real World Connections in High School Mathematics Curriculum and Teaching," examined the reasons for using real-world connections in mathematics education based on experts' opinions. They reported on the advantages, disadvantages, and examples of real-world connections. The article titled "Efforts to Improve Mathematical Communication Skills in Mathematics Learning in

Indonesia" explores various methods and strategies for enhancing mathematical communication. It employs the PRISMA method to review 30 publications and identifies Realistic Mathematics Education (RME), cooperative learning models, and media use as the most common approaches. It highlights middle school education and geometry topics as frequently researched areas. This study provides valuable insights for educators aiming to enhance mathematical communication (Epih, 2024).

Examining conceptual mathematical knowledge using connections and communication is not limited to school education and has also attracted the attention of researchers in higher education. For example, Widjajanti (2013), in a case study on mathematics education students at Yogyakarta State University in Indonesia, has examined the ability of fourth-semester students in the discrete mathematics course in writing expressions, reasons, and explanations, as well as using terms, symbols, tables, charts, diagrams, and mathematical models. The results show that students have weaknesses in writing reasons and using charts and mathematical models.

Junarti et al. (2019), also in this field, in their research about the profile of structure sense in abstract algebra Instruction in Indonesian Mathematics Education, examined the inability to recognize the structure of set elements, operation symbols, and the characteristics of binary operations in group proof structure. They concluded that structural sense should be learned to help understand and create connections in abstract algebra.

The closest study to the aim of this research is one conducted by Camacho et al. (2012). The authors of this article consider one of the fundamental challenges for engineering students in the algebraic approach to teaching differential equations to be the selection of the most appropriate solution method for solving equations. After correctly identifying the type of a differential equation, sometimes it is necessary to transform the differential equation from one form to another, both of which are equivalent. This is because some differential equations can be solved more easily and quickly than others. Camacho refers to the error of "transforming a differential equation from one form to another" and the error of "knowing the solution algorithms but lacking sufficient knowledge on how and when to use these algorithms." The combination of these two errors is equivalent to what Vat calls a "second-stage error," known as "recalling the most appropriate solution." In other words, students have weaknesses in connecting and linking the main concepts of differential equations. This means that while they might be able to identify the appropriate algorithm for a differential equation, they have weaknesses in solving it using algebraic methods. This weakness stems from a deficiency in the connections and linkages of concepts among engineering students in differential equations courses (Moradi et al., 2023).

Moradi et al. (2023) examined the errors and misunderstandings of first-year engineering students in a case study. They concluded that most errors were algebraic and conceptual, rooted in an inadequate understanding of mathematical concepts from high school. In other words, if students do not have weaknesses in mathematical connections and communication, they will make fewer algebraic and conceptual errors.

A review of the above studies shows that most research in connection and communication has been conducted in school education. Therefore, in the present study, the researchers intend to focus on higher education and aim to explore the conceptual understanding of several engineering students through the lens of connections and communication of mathematical concepts in a differential equations course. The students' performances will be evaluated based on four key aspects: identifying the method for solving the differential equation, accuracy in mathematical relationships, appropriate application of mathematical principles, and maintaining coherence throughout the solution process. They will examine the reasons for students' weaknesses in solving differential equations.

Methodology

This research was conducted within a quantitative paradigm designed to identify the weaknesses of engineering students in conceptual knowledge of solving differential equations. The participants in this study were a convenient sample of 30 undergraduate engineering students (both male and female) from various engineering disciplines at Islamic Azad University during the second semester of the 2022-2023 academic year. The data collection tool was a test comprising six questions on differential equations, designed in collaboration with mathematics education specialists and mathematicians, and their content validity was confirmed (Appendix 1).

The first three questions used common differential equation methods, such as homogeneous, exact, and first-order, requiring students to apply concepts from high school and university-level calculus. The remaining three questions involved non-homogeneous, inexact, and Bernoulli methods, building upon the fundamental concepts and methods of the earlier questions.

Students underwent six consecutive weeks of instruction on first-order differential equations, and their performance was evaluated using the test. The test was graded by two scorers for consistency, and the results were analyzed and categorized to identify weaknesses in four key areas based on the framework of Junarti (2019):

1. Correctness in using the method to solve differential equations.

2. Accuracy in mathematical relationships (precision in writing mathematical relations and formulas).
3. Proper use of mathematical relationships.
4. Coherence in solving differential equation problems (consistency in solving differential equation problems).

Each question was scored on a scale of 1. Table 1 shows the analytical framework for the test questions.

Table 1: Analytical Framework for Test Questions

Question	S-1	S-2	S-3	S-4
1: Homogeneous differential equation	Recognition of homogeneity	Apply variable change $u = \frac{y}{x}$	Convert to separable differential equation	Solving the integral
2: Complete differential equation	Determining dx and dy coefficients	Partial derivative and detection of completeness	The method of obtaining u(x,y)=c as the solution of the equation	Solving the integral
3: First-order differential equation	First order diagnosis	Find p(x), q(x)	Placement in the solution formula of the first-order equation	Solving the integral
4: Nonhomogeneous differential equation	Heterogeneous diagnosis	Convert nonhomogeneous to homogeneous	Transform into a separable differential equation	Solving the integral
5: Incomplete differential equation	Incomplete diagnosis	Find the right invoice.	Placement in the integral factor formula and solving the following integral expression	Solving the integral
6: Bernoulli differential equation	Identifying the type of equation and obtaining n	Convert Bernoulli's equation to first order equation	Placement in the solution formula of the first-order equation	Solving the integral

In the table, S1, S2, S3, S4 represent the stages of solving differential equations.

- S1: Stage of identifying the type of equation.
- S2: Accuracy and precision of mathematical relationships.
- S3: Maintaining coherence in the process of solving differential equation problems.
- S4: Correct use of mathematical relationships.

The test questions were designed to be interrelated, and the student needs to identify this connection and communication in the questions. For example, question 1, which is about solving a homogeneous equation, is related to question 4, which is about solving a non-homogeneous equation. To solve it, the student must first transform the non-homogeneous equation into a homogeneous one.

Table 2: Mean Scores of Differential Equations Questions

Question		S-1			S-2			S-3			S-4		
		Q-1	Q-2	Q-3	Q-1	Q-2	Q-3	Q-1	Q-2	Q-3	Q-1	Q-2	Q-3
Homogeneous differential equation	Number	29	0	1	13	12	5	10	6	14	9	6	15
	Average	97%	0	3%	43%	40%	17%	33%	20%	47%	30%	20%	50%
Complete differential equation	Number	26	0	4	23	4	3	15	8	7	17	3	10
	Average	87%	0	13%	77%	13%	10%	50%	27%	23%	57%	10%	33%
First-order differential equation	Number	28	0	2	18	7	5	12	10	8	5	5	20
	Average	93%	0	7%	60%	23%	17%	40%	33%	27%	17%	17%	66%
Nonhomogeneous differential equation	Number	26	0	4	4	21	5	0	15	15	0	13	17
	Average	87%	0	13%	13%	70%	17%	0	50%	50%	0	43%	57%
Incomplete differential equation	Number	21	1	8	12	4	14	14	5	11	12	1	17
	Average	70%	3%	27%	40%	13%	47%	47%	17%	36%	40%	3%	57%
Bernoulli differential equation	Number	19	2	9	9	9	12	7	8	15	5	2	23
	Average	63%	7%	30%	30%	30%	40%	23%	27%	50%	17%	7%	76%

Research Findings

This study aimed to analyze the conceptual knowledge of some engineering students from the perspective of the connection and communication of mathematical concepts in differential equations. The scoring from the data analysis based on the framework mentioned in Table 1 is recorded in Table 2.

1. Q1: Number of students who gave the correct answer fully adhered to all four aspects.
2. Q2: Number of students who gave a partially correct answer, meaning they adhered to three of the four aspects at most.
3. Q3: Number of students who gave an incorrect answer, meaning they did not adhere to any of the four aspects correctly.

Analysis of Exam Questions:

Analysis of Question 1: Homogeneous Differential Equation

In solving the homogeneous differential equation, the student must first correctly identify the type of equation, apply the variable substitution, transform the equation into a separable differential equation, and finally solve the integral.

As shown in Table 2, 17% of students successfully applied the variable substitution $= \frac{y}{x}$. However, 47% of students were unsuccessful in transforming the equation into a separable differential equation. This stage demonstrates the student's weakness or failure in connecting and linking the concept of separable equations. Furthermore, 50% of students failed to solve the integral related to their previous mathematics course. This indicates that students struggle to connect the concepts from their first-year calculus course when dealing with integrals. In other words, while students were successful in the first stage of identifying the type of equation, they failed in the second and third stages (accuracy of mathematical relations and correct use of mathematical relations), particularly in substituting the variable u and solving the integral. Figure 1 shows an example of an unsuccessful student response.

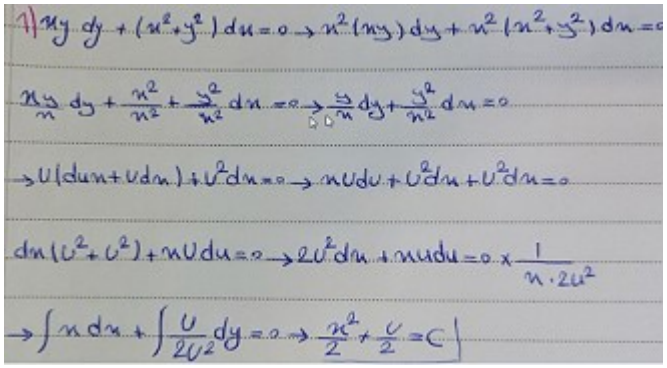

Figure 1: An example of an unsuccessful answer in solving a homogeneous differential equation

In other words, it can be said that the student failed in the following steps:

$$\frac{y}{x}dy + \left(1 + \frac{y^2}{x^2}\right)dx = 0$$

$$\left(u = \frac{y}{x}\right) \quad \Longrightarrow \quad u(xdu + udx) + (1 + u^2)dx = 0$$

$$uxdu + u^2dx + (1 + u^2)dx = 0$$

$$(u^2 + 1 + u^2)dx + uxdu = 0$$

$$(2u^2 + 1)dx + uxdu = 0$$

$$\frac{udu}{2u^2 + 1} + \frac{dx}{x} = 0$$

$$\int \frac{u}{2u^2 + 1}du + \int \frac{1}{x}dx = 0$$

$$\frac{1}{4}ln\,|2u^2 + 1\,| + ln\,|x\,| = c$$

Analysis of Question 2: Exact Differential Equation

In solving a complete differential equation, the completeness of the equation is first examined. Assuming that the following equation is a differential equation:

$$p(x,y)dx + q(x,y)dy = 0$$

If we have**:**

$$\frac{\partial p}{\partial y} = \frac{\partial q}{\partial x}$$

In this case, the differential equation is complete**.**

Students performed relatively well in solving the exact differential equation. According to Table 2, students correctly identified the type of equation and then partially correctly determined the partial derivatives of coefficients dx and dy, followed by finding $u(x,y)$. Therefore, it can be claimed that students could establish connections and communication regarding partial derivatives and polynomial integration. In other words, students successfully solved exact differential equations (identifying the type of equation, accuracy of mathematical relations, coherence in solving differential equation problems, and correct use of mathematical relations).

Analysis of Question 3: First-Order Differential Equation

The general form of a first-order differential equation is as follows:

$$y' + p(x)y = q(x)$$

Which is calculated using the following formula:

$$y = e^{-\int p(x)dx}\left(\int e^{\int p(x)dx}\, q(x)dx + c\right)$$

In solving question 3, which involves solving a first-order differential equation, students first needed to identify the type of equation, then find $P(x)$ and $Q(x)$. Finally, these are substituted into the formula to solve the integral. Figure 2 provides an example of an unsuccessful student response.

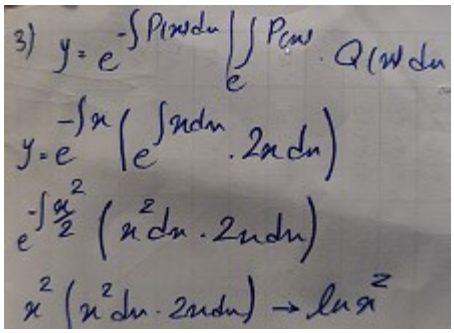

Figure 2: An example of an unsuccessful answer in solving the first-order differential equation

As shown in Table 2, in solving the first-order differential equation, students were somewhat successful in identifying P(x) and Q(x) Moreover, substituting them into the formula. However, 66% of students failed to solve the integral, indicating a significant weakness in connecting and linking the concepts from their first-year calculus course related to integrals and their integration methods. In other words, students successfully identified the equation and the accuracy of mathematical relations, meaning they correctly identified it as a first-order differential equation. However, they failed to use mathematical relations, specifically in integration methods, correctly.

In other words, it can be said that the student failed in the following steps:

$$y = e^{-\int x dx}(\int e^{\int x dx} 2x dx + c)$$
$$= e^{\frac{-x^2}{2}}(\int e^{\frac{x^2}{2}} 2x dx + c)$$

At this stage, the student should use the method of variable change.

$$y = e^{\frac{-x^2}{2}}\left(2\int e^u \, du + c\right)$$
$$= e^{\frac{-x^2}{2}}(2e^u + \mathrm{c})$$
$$= e^{\frac{-x^2}{2}}\left(2e^{\frac{x^2}{2}} + c\right)$$
$$= 2 + ce^{\frac{-x^2}{2}}$$

Analysis of Question Four: Non-Homogeneous Differential Equation

The general form of a non-homogeneous differential equation is as follows:

$$(a_1x + b_1y + c_1)dx + (a_2x + b_2y + c_2)dy = 0$$

First, it is converted to the following homogeneous equation:

$$(a_1X + b_1Y)dX + (a_2X + b_2Y)dY = 0$$

Then, it is solved like a homogeneous equation. In solving a non-homogeneous differential equation, students must first identify it as non-homogeneous, then convert it to a homogeneous equation, transform it into a separable differential equation, and finally solve the integral. Figure 3 shows an example of a student's response.

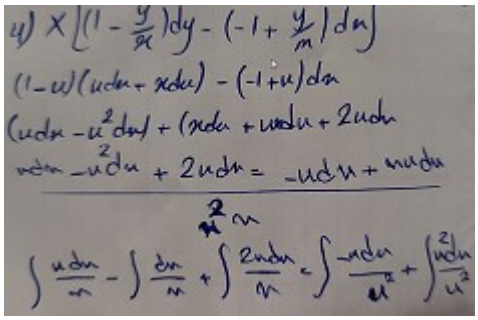

Figure 3: Example of an unsuccessful response to solving a non-homogeneous differential equation

According to Table 2, students successfully converted the non-homogeneous differential equation to a homogeneous one when solving the non-homogeneous differential equation. However, they were unsuccessful in converting to a separable differential equation (50%) and solving the integral (70%). Therefore, the student's weaknesses relate to solving separable differential equations from their first-year calculus course. The findings of this question about students' inability to convert non-homogeneous equations to homogeneous ones support the results from Question 1. It can be analyzed that students struggled to connect Question 1 (homogeneous equation) with Question 4 (non-homogeneous equation). In other words, while students were successful in the initial identification stage, they lacked coherence in the problem-solving process in the stages of verifying mathematical relations and correctly applying mathematical methods, indicating insufficient precision in solving algebraic relations.

In other words, it can be said that the student failed in the following steps:

$$(1-u)(u\,dx + x\,du) - (1+u)dx = 0$$
$$(1-u)u\,dx + (1-u)x\,du - (1+u)dx = 0$$
$$(u - u^2 - 1 - u)dx + (1-u)xdu = 0$$
$$-(1+u^2)dx + x(1-u)du = 0$$

Ultimately, the method should be a separable differential equation where:

$$\frac{dx}{x} - \frac{(1-u)du}{(u^2+1)} = 0$$

Then, both sides should be integrated.

$$\int \frac{dx}{x} - \int \frac{(1-u)du}{(u^2+1)} = c$$

$$ln\ |x\ | + arctg\ u + \frac{1}{2} ln\ |u^2 + 1\ | = c$$

However, students performed incorrectly at all stages.

Analysis of Question Five: Incomplete Differential Equation

Method for solving an incomplete equation:

If the following equation is a differential equation:

$p(x,y)dx + q(x,y)dy = 0$

This equation is incomplete if it satisfies the following condition:

$$\frac{\partial p}{\partial y} \neq \frac{\partial q}{\partial x}$$

In this case, it must be completed, which can be done using one of the following formulas:

$$F(x) = e^{\int h(x)dx} \quad \text{where} \quad h(x) = \frac{\frac{\partial p}{\partial y} - \frac{\partial q}{\partial x}}{q(x,y)}$$

$$F(y) = e^{\int h(y)dy} \quad \text{where} \quad h(y) = \frac{\frac{\partial q}{\partial x} - \frac{\partial p}{\partial y}}{P(x,y)}$$

$$F(z) = e^{\int h(z)dz} \quad \text{where} \quad h(z) = \frac{\frac{\partial p}{\partial y} - \frac{\partial q}{\partial x}}{yq(x,y) - xP(x,y)}$$

In solving an incomplete differential equation, students must first recognize it as incomplete, then convert it to a complete equation, find the appropriate integrating factor, substitute it into the formula, and solve the integral. Figure 4 shows an example of a student's response.

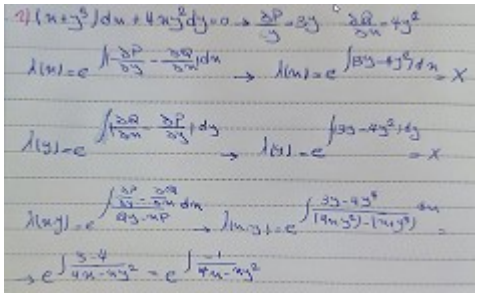

Figure 4: Example of an unsuccessful response to solving an incomplete differential equation

According to Table 4, 47% of students were unsuccessful in finding the appropriate integrating factor when solving the incomplete differential equation.

36% of students were unsuccessful in substituting into the integrating factor formula and solving the expression. Simplifying the fraction and factoring the resulting expression requires connecting to high school algebra. 57% of students were unsuccessful in solving the integral, indicating a lack of connection with their first-year calculus course and integration methods. In this question, since most students did not correctly find the integrating factor, they failed to solve the resulting complete differential equation. On the other hand, students were somewhat successful in solving Question 2, which involved a complete differential equation $u(x, y)$. This suggests that if faced with a complex problem in the final integration stage, students would be unable to obtain the correct answer. Therefore, it can be concluded that while students were successful in the initial identification stage, they were weak or unsuccessful in subsequent stages (verification of mathematical relations, coherence in solving differential equation problems, and correct application of mathematical methods).
In other words, it can be said that the student failed in the following steps:

$$\frac{\partial p}{\partial y} = 3y^2 \quad , \quad \frac{\partial q}{\partial x} = 4y^2$$

$$e^{\int \frac{3y^2 - 4y^2}{4xy^2} dx} = e^{\int -\frac{dx}{4x}}$$

$$= e^{-\frac{1}{4} ln\, |x|}$$

$$= \frac{1}{\sqrt[4]{x}} + c$$

Analysis of Question Six: Bernoulli Differential Equation

Method for solving Bernoulli's differential equation:
If the following equation is a Bernoulli equation:

$$y' + p(x)y = q(x)y^n$$

Which has been transformed from the following equation initially:

$$u' + p(x)u = q(x)$$

It is transformed into a first-order equation and then solved like a first-order one.
In solving the Bernoulli differential equation, students must first recognize it as a Bernoulli equation, then transform it into a first-order equation, substitute it into the formula, and solve the integral. Figure 5 shows an example of a student's response.

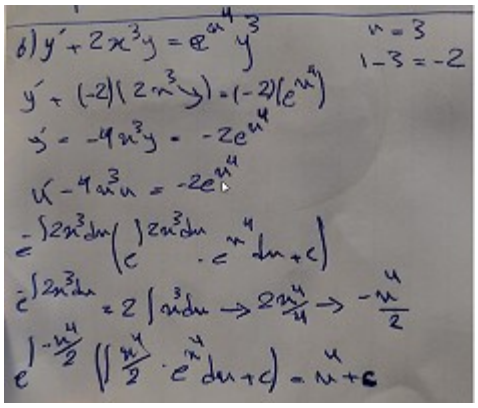

Figure 5: Example of an unsuccessful response to solving the Bernoulli differential equation

According to Table 2, in solving the Bernoulli differential equation, 40% of students were unsuccessful in converting the Bernoulli equation to a first-order equation. This indicates a lack of connection and understanding of first-order differential equations. Additionally, 50% of students were unsuccessful in substituting into the first-order equation formula, reflecting their weaknesses in handling algebraic expressions from high school. Furthermore, 76% of students were unsuccessful in solving the integral, showing their inability to connect with their first-year calculus course material.

From the analysis of Question 6, it can be inferred that due to the inadequate ability to transform the Bernoulli equation to a first-order equation, the results obtained in the later stages of this question corroborate the conclusions drawn in Question 3. In other words, while students were successful in the initial recognition stage, they were weak or unsuccessful in stages 2, 3, and 4 (verification of mathematical relations, coherence in solving differential equations, and correct application of mathematical methods).

For instance, in the expression:

$$u = y^{-2} \quad \Rightarrow \quad u' - 4x^3u = -2e^{x^3}$$

Students were unsuccessful in substituting into the first-order equation formula.
In other words, it can be said that the student failed in the following steps:

$$u = e^{-\int -4x^3 dx}\left(\int e^{\int -4x^3 dx}\left(-2e^{x^4}\right)dx + c\right)$$

$$u = e^{x^4}\left(-2\int e^{-x^4}\, e^{x^4} dx + c\right)$$

$$= e^{x^4}\left(-2\int dx + c\right)$$

$$= e^{x^4}(-2x + c)$$

Ultimately, they were unsuccessful in solving the integral and obtaining the correct answer.

Conclusion

Academic success is a key component of social status, significantly influencing an individual's position regarding job structure and income (Khodaie, 2010). Success in mathematics courses is a prerequisite for academic achievement in specialized engineering subjects, to the extent that Kite (2010) considers student's academic success in engineering courses dependent on their abilities in mathematics. Concerns about academic decline sometimes adversely affect students (Lopes, 2012). The course on differential equations is crucial for many engineering students, both as a prerequisite for specialized courses and as an application in the second step of the modeling process (Karimi Fardinpour, 2012). However, various factors contribute to student's academic decline in this course.

One significant factor contributing to student's discouragement and academic decline in differential equations is their inability to connect and relate mathematical concepts to solving differential equations. The researchers of this study aimed to identify student's weaknesses, which stem from a lack of connection with previously learned concepts, by examining their performance in solving several differential equations. To this end, student's responses were evaluated in a few aspects: identifying the method for solving differential equations, accuracy in writing mathematical relationships and formulas, and maintaining coherence in solving differential equation problems. The results showed that the most significant weaknesses were in the stages of mathematical accuracy and the application of mathematical relationships (such as simplifying algebraic expressions, factoring, using integration methods, and solving integrals). Most students struggled with algebraic expressions related to high school mathematics and the integration methods taught in their prerequisite university course, Calculus 1. This suggests that student's weaknesses relate to university-level topics or indicate a foundational deficiency in their high school mathematics education.

The weaknesses in university-level mathematics are linked to previously taught topics in differential equations, such as separable differential equations. Additionally, students struggle to connect and relate to high school topics such as simplifying algebraic expressions, factoring, and using algebraic identities. These foundational weaknesses in high school algebra lead to difficulties connecting these concepts to more advanced topics.

Furthermore, the study found that students had difficulties using mathematical relationships correctly. They struggled with integration methods and, ultimately, with solving integrals, which hindered their ability to solve differential equations effectively. This weakness is traced back to their Calculus 1 course. The student's inability to solve even simple integrals,

such as polynomial integrals that do not require special integration techniques, highlights their lack of proficiency. Consequently, they faced even greater challenges with more complex integration methods. Students who cannot correctly handle algebraic expressions will likely struggle to connect the necessary concepts for integration and select the appropriate integration method. It can be argued that students understand the concepts of differential equations well, as solving differential equations often follows algorithmic methods, which they can handle. However, when it comes to other mathematical relationships, such as algebraic manipulation, analysis, identities, and integration, they fail to connect these concepts properly, leading to errors.

The results of this study highlight the critical role of connection and communication in mathematics education, a focus emphasized by key educational frameworks such as the National Curriculum Framework in Iran and the National Council of Teachers of Mathematics (NCTM). Assessing students by emphasizing these factors is essential for fostering conceptual understanding. Supporting evidence from research demonstrates similar issues: Widjajanti (2013) identified struggles in connecting expressions with mathematical models, Putri and Wutsq (2017) found difficulties in applying mathematical concepts to real-world problems, and Pambudi et al. (2020) highlighted the importance of linking mathematical skills to problem-solving. Junarti et al. (2019) also reported that students fail to relate mathematical elements within structures like group theory. Conducting studies to identify weaknesses in students' connections and coherence in other mathematics courses can complement this research. Additionally, school mathematics teachers should emphasize prerequisite concepts for university courses to reduce student's challenges in higher education. Professors can help students by emphasizing mathematical connections and coherence, enabling them to see mathematics as an interconnected web of concepts and skills rather than isolated topics, thus fostering meaningful learning. Considering students' weaknesses in the integration part of Mathematics 1, it would be beneficial for instructors to review integration methods at the beginning of the semester. This would enable students to connect better and apply these methods, ultimately improving their ability to establish a link between integration and solving equations.

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Appendix 1:

Differential equations test questions

Question	Differential equation type
1) $xy\,dy + (x^2 + y^2)\,dx = 0$	Homogeneous differential equation
2) $(2xy + 5)\,dx + (x^2 + 6y^3)\,dy = 0$	Complete differential equation
3) $y' + xy = 2x$	First-order differential equation
4) $y' = \frac{2 + x + y}{x - y}$	Nonhomogeneous differential equation
5) $(x + y^3)\,dx + 4xy^2\,dy = 0$	Incomplete differential equation
6) $y' + 2x^3y = e^{x^4}y^3$	Bernoulli differential equation

MOTIVATION AND INVESTMENT OF FILIPINO LGBTQ+ LEARNERS IN LEARNING ENGLISH: A CASE STUDY

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ABSTRACT

This case study explores the motivations and investments in English language learning among Filipino LGBTQ+ students. Through qualitative interviews with 11 self-identified LGBTQ+ individuals, the research reveals how societal pressures influence language learning and identity negotiation. The thematic analysis highlights participants' resilience and ambition in overcoming discrimination and affirming their identities through language proficiency. Despite challenging environments that sometimes undermined their confidence, their strong investment in educational aspirations remained steadfast. These findings emphasize the critical need for inclusive educational practices that support and empower LGBTQ+ students. Moreover, the study's insights extend beyond the Philippines, contributing to international discussions on language education and LGBTQ+ inclusion. The universal relevance of these experiences suggests that understanding and addressing the complexities faced by LGBTQ+ learners can inform broader educational strategies, promoting inclusivity across diverse cultural contexts.

Keywords: gender; sexual identity; Identity Approach to Second Language Acquisition; L2 Motivational Self System

Introduction

As the field of Gender Studies continues to evolve, a more nuanced understanding of gender as performative and socially constructed has emerged. This progressive view has extended to the domain of second language acquisition, sparking interest in sociocultural factors' role in shaping language education. Amid these developments, the interconnection between identity categories—specifically gender and sexuality—and language learning processes has come into sharper focus. The negotiation of complex identity constructs during language acquisition is a multifaceted phenomenon shaped by learners' social histories and cultural narratives (Norton, 2010, 2012). An exploration of these dynamics is thus essential for comprehending how identities shape language learning experiences.

At the intersection of language education and gender identity, this research probes the experiences of 11 Filipino LGBTQ+ students in their pursuit of English language proficiency. The overarching aim is to identify their motivations for and investments in language learning to recognize their challenges and the support they require. Guided by Norton's Identity Approach to Second Language Acquisition and Dörnyei's L2 Motivational Self System, the research gives considerable attention to identity negotiation, investment in language learning, the construct of imagined communities, and the facets of motivation (ideal L2 self, ought-to self, L2 learning experiences) as central to the educational experiences of LGBTQ+ students.

Among student populations, LGBTQ+ (Lesbian, Gay, Bisexual, Transgender, Queer/Questioning, plus) individuals face distinct challenges in educational settings. The "+" (plus) represents additional sexual orientations and gender identities beyond the primary categories. In this study, LGBTQ+ refers specifically to the identities of the 11 Filipino participants. While the researchers initially aimed for a broader participant base, only 11 Filipino LGBTQ+ students—four gays, three bisexuals, three transgender people, and one queer—willingly participated after a thorough three-month recruitment effort. This delimitation was not intentional but resulted from the challenges of gathering participants from a marginalized community where trust and confidentiality are critical. Nevertheless, by focusing on these 11 cases, the study provides an in-depth, qualitative examination of their language learning experiences within the Filipino context.

Although this study is grounded in the Philippines, the overarching themes manifest cross-cultural pertinence, underscoring the universal challenges faced by LGBTQ+ individuals in education. It bears broader implications for developing inclusive educational models that transcend national boundaries and invite international dialogue. Therefore, the lessons drawn from this inquiry have potential applications reaching well beyond the local context,

advocating for a collective endeavor toward education that embraces diversity and promotes empowerment.

The (in)visibility of LGBTQ+ and cisgenders in language education

Research increasingly highlights the importance of social context and identity in second language acquisition. Inclusive curricula and materials that reflect diverse identities can significantly enhance learning environments and empower students. Despite this, a critical examination of language education in the Philippines and globally reveals a troubling trend: the near invisibility of LGBTQ+ identities. This invisibility perpetuates heteronormativity, which is a pervasive social construct positioning heterosexuality as the norm, thereby marginalizing LGBTQ+ students.

Analyses of textbooks in the Philippines demonstrate a troubling pattern. Junior high school English materials display a conspicuous overrepresentation of male characters and stereotypical portrayals of females, with a complete absence of LGBTQ+ representation (Briones, 2019; Manalo, 2018). This situation reinforces heteronormativity, a pervasive social construct that positions heterosexuality as the norm (Paiz, 2015). This trend extends beyond the Philippines. Global analyses of English Language Teaching (ELT) materials expose similar patterns, highlighting the mainstreaming of heteronormativity in textbooks across continents, from the UK (Gray, 2013) to Iran (Salami & Ghajarieh, 2016), Poland (Pakuła et al., 2015), Spain (Ruiz-Cecilia et al., 2021), and Turkey (Selvi & Kocaman, 2021).

While academic discourse has increasingly focused on gender inclusivity in language education materials (Java & Parcon, 2016; Mante-Estacio et al., 2018; Tarrayo, 2014), the crucial issue of LGBTQ+ representation remains unexamined in the Philippines (Curaming & Curaming, 2020). Regrettably, this oversight has significant consequences. The invisibility of LGBTQ+ identities in learning materials reinforces heteronormative assumptions and contributes to the marginalization of LGBTQ+ students within educational spaces.

The marginalization extends beyond textbooks. Analyses of popular English learning resources, such as websites and picture books, reveal a tendency to depict heteronormative family structures and relationships (McClure, 2010; Sunderland & McGlashan, 2015). Furthermore, a school-based study highlights the prevalence of heteronormative practices within classrooms (Dalley & Campbell, 2006); and the educators' lack of awareness and sensitivity can create a hostile learning environment for LGBTQ+ students.

The consequences of invisibility are far-reaching. Research sheds light on the detrimental impact of internalized heteronormativity on the well-being of LGBTQ+ individuals (Evripidou, 2018; Pollitt et al., 2021). By failing to represent diverse identities, there is a risk that educational environments perpetuate societal biases, excluding and marginalizing LGBTQ+ students. With this, the current state of language education necessitates a paradigm shift. Challenging heteronormativity within ELT is essential for creating inclusive and empowering learning environments. For curricula and materials to truly reflect the richness of human experience, including that of LGBTQ+ identities, they must be re-envisioned to ensure that all students have the opportunity to thrive.

LGBTQ+ students' motivation in learning English

Research on LGBTQ learners' motivation and investment in English language learning has garnered increasing attention, highlighting the unique and complex factors influencing their educational experiences. This review synthesizes findings from various studies to comprehensively understand how learners' sexual and gender identities, motivation, and investment intersect.

Based on a recent study, LGBTQ+ students seek overseas education because their motivation is to develop themselves, express their identities more freely, and be in more welcoming and safer environments (Campbell et al., 2024). Nguyen and Yang (2015) also highlight the same reasons for motivation as they studied how a Korean transgender student's desire to live authentically and achieve professional success fueled her motivation to learn English, seeking opportunities she felt were limited in her home country. Similarly, queer learners in Thailand showed how their identities positively influenced their motivation to learn English. These learners often view proficiency in English as a means to gain societal acceptance and improve their speaking skills (Suebkinnon & Sukying, 2021). Four immigrant LGBTQ+ English for Speakers of Other Languages (ESOL) learners in the San Francisco Bay Area also shared similar reasons for learning the language, such as professional advancement, independence, and identity affirmation. One LGBTQ+ participant wanted to pursue education so she could contribute to society by conducting research that is fundamental to the creation of inclusive social policies for the LGBTQ+ community. Another participant emphasized that he had to achieve more, so his professional achievements would be more important than his gender or sexual identity. Similarly, one participant stressed the importance of English proficiency because she could not be successful in her business in a city where English is a native language (Kaiser, 2017). It can be culled from these studies that LGBTQ learners want to learn English for personal and professional advancements, to express their identity, and to gain acceptance.

However, as much as LGBTQ+ students want to learn, the expectations of others may negatively influence their learning. For instance, some teachers set the same expectations for everyone, and the (un)intentional non-recognition or non-acknowledgment of gender identity and the non-existence of designated programs for LGBTQ+ students make them feel like they do not belong in any group, thus leading to being double marginalized (Campbell et al., 2024). On the other hand, other LGBTQ+ students used the heteronormative expectations of others to look for more inclusive communities. The expectations of his hometown, such as having a stable job, being married, and having children, caused an LGBTQ+ student to dream of escaping and being in a society where he can construct and perform his definition of masculinity (Kaiser, 2017). In contrast, other LGBTQ+ people have to conform to the expectations and cultural norms such as getting married, having children, and walking more macho, because if not, they will be alienated and not be part of familial and communal ties (Peña-Talamantes, 2013).

Apart from others' expectations, LGBTQ+ learners also have to face several issues in their language learning environments, which affect their motivation and engagement in learning. Some of them encountered difficulties in asserting their gender identities within their heteronormative classroom context (Kaiser, 2017; Nguyen et al., 2015). Queer Filipino young adults also had to face discrimination, rejection, and other forms of microaggression in families, schools, or local churches (Cornelio & Dagle, 2022). Additionally, curricular materials are part of the language learning environment. As previous research indicates, the persistence of heteronormativity and lack of LGBTQ+ representation in global ELT materials can marginalize LGBTQ+ learners and negatively impact their well-being (Gray, 2013; Paiz, 2015; Pakuła et al., 2015; Ruiz-Cecilia et al., 2021; Salami & Ghajarieh, 2016; Selvi & Kocaman, 2021). This predicament highlights the importance of fostering inclusive learning environments that support the diverse identities and aspirations of LGBTQ+ students. Creating supportive and inclusive spaces promotes engagement, well-being, and optimal learning outcomes for all students, including LGBTQ+ youth (Hanson et al., 2019; Lim, 2018).

LGBTQ+ students' investment in learning

Motivation is complemented by investment. Students may be motivated but may not invest or engage in language learning. Likewise, students may not be motivated but choose to still engage in language learning. Ultimately, they may not be motivated and invested at the same time. In any case, within these contexts, LGBTQ+ students negotiate their identities and construct their imagined identities and communities.

For instance, Chinese lesbian and bisexual women had to negotiate their identities in different contexts. In the student clubs where they belong, they feel secure and confident, so they can freely express themselves. Contrastingly, due to increasing segregation and discrimination in the whole university, they were not able to freely express their identities. Similarly, they concealed and repressed their gender identities in their families because of traditional cultural norms and values (Hang & Zhang, 2023).

Another example is when an LGBTQ+ student overheard her classmate saying that they should avoid a certain neighborhood because there were gay people there who were described to be weird and crazy. So, she decided to make gay marriage the topic of one of her presentations to challenge the assumptions of her classmates (Kaiser, 2017). This shows how she asserted her identity by challenging the prejudice. This action of the participant is aligned with the result of another previous study (Rondón Cárdenas, 2012), where LGBTQ+ students shift their positions through different discourse strategies.

After analyzing short-range narratives, Rondón Cárdenas (2012) concluded that LGBTQ+ students shift their positions from powerful to powerless and vice versa in various ways. One strategy is through emancipatory discourse to resist heteronormative discourses in the classroom. However, the consequence of this, at least in the context of Rondón Cárdenas's study, is that the participant had to come out of the closet. Because of the lack of knowledge and personal assumptions, people tend to (un)intentionally position the LGBTQ+ members in heteronormative circumstances. Thus, the people from the rainbow community stand against these biases through emancipatory discourse, which in turn compels them to disclose their gender and sexual identities. The second strategy, on the one hand, is through using a discourse of vulnerability where the LGBTQ+ students had the urge to resist but eventually remained silent and accepted their minority role due to the fear of being victimized and rejected. The last strategy, on the other hand, is through taking up overt homophobic discourse to put LGBTQ+ members as abnormal. With all these, Rondón Cárdenas' (2012) study showed that LGBTQ+ students constantly shifted positions and performed their gender, assuming simultaneously powerful and powerless stances in the EFL classroom. On a side note, it implies that Rondón Cárdenas' respondents faced various challenges like other students in other countries.

These complex power dynamics and positioning strategies directly influence how LGBTQ+ students engage with language learning. As LGBTQ+ students negotiate their identities in various ways, they still must make a choice – to invest or not in language learning. In a study, a seemingly neutral question, "What did you do last weekend?" caused two LGBTQ+ students to be demotivated because they felt unsafe sharing their lives in their language classroom.

This led them to quit their English classes (Moore, 2016). Despite facing challenges such as marginalization and conflict in language classrooms, LGBTQ+ students also actively resist oppression through critical literacy practices and language use that creates safe spaces and promotes agency (Schreuder, 2021). For some queer language learners, their marginalized sexual identities can actually facilitate access to certain language communities, aiding their learning process (King, 2008). Investment in language learning, both individually and within communities, significantly impacts learners' identity development and influences their decisions to continue language studies when faced with challenges. They try to find and go to the communities or environments where they can freely express their identities.

Given these challenges with investment and participation, it is unsurprising that LGBTQ+ learners dream of having learning environments where they feel accepted. For example, they want learning communities that allow them to speak honestly as themselves, although inclusivity is not guaranteed (Moore, 2016). Some even migrate to other countries because these countries are more welcoming and safer than their homes (Campbell et al., 2024). Interestingly, a South Korean trigender student said that she went to the US to be a successful professional, but she believed she could not have stayed in her native country (Nguyen et al., 2015). Many of these pull factors are opposites of the learning environments the LGBTQ+ students experience. As shared in the previous section, many LGBTQ+ individuals experience discrimination and the inability to express themselves, which leads them to aspire to more inclusive, safer, and more welcoming environments.

Lee (2022) emphasizes the role of learners' aspirations of what they want to be and their envisioned or imagined communities in stimulating language learning. The concept of imagined identities plays a critical role in motivation, highlighting the importance of balancing actual and imagined identities in educational contexts. This balance is crucial for maintaining learners' motivation and ensuring sustained investment in language learning. Mushtaque et al. (2022) identify various investment practices among ESL learners, such as reading newspapers, sending text messages, learning vocabulary, and watching movies. The medium of instruction significantly impacts investment levels, indicating that language policies and instructional methods need to be carefully considered to maximize learner investment. Others also use social media as new language platforms to construct their envisioned safe space communities to express their desires and identities (Schreuder, 2021).

In conclusion, the literature demonstrates the multifaceted challenges and strategies LGBTQ+ students employ in language learning contexts, often influenced by their need to negotiate identity, secure investment, and envision inclusive communities. For LGBTQ+ learners, motivation alone is often insufficient for sustained engagement; the concept of investment,

involving their choices and efforts to engage with language despite challenges, plays a pivotal role. This investment is strongly tied to their identity negotiation as they navigate environments that may either support or marginalize them. Studies reveal that LGBTQ+ students must often balance between asserting their identities and facing marginalization or adapting to heteronormative spaces, sometimes through resistance or silence, depending on the context (Hang & Zhang, 2023; Kaiser, 2017; Rondón Cárdenas, 2012). These identity negotiations illustrate the complexities of maintaining motivation and investment in learning. Additionally, LGBTQ+ students seek or imagine communities where they can freely express themselves, which becomes a powerful driver of both language learning motivation and investment. Imagined identities and inclusive environments provide these learners with a vision of a supportive future, often fueling their language-learning journey despite adverse circumstances (Lee, 2022; Schreuder, 2021). However, inclusivity remains a challenge in many educational settings, pushing some learners to seek safer learning spaces abroad or construct supportive communities online (Campbell et al., 2024; Nguyen et al., 2015). Ultimately, this literature underscores the importance of creating educational policies and practices that foster inclusive and affirming environments, allowing LGBTQ+ students to fully invest in language learning and envision themselves as active, accepted members of their learning communities.

Theoretical framework

This study investigates the motivations and investments of 11 Filipino LGBTQ+ students in English language learning through the lens of two complementary frameworks: the Identity Approach to Second Language Acquisition (Norton & McKinney, 2011) and the L2 Motivational Self System (Dörnyei, 2009). Recent research demonstrates how these frameworks intersect in the unique experiences of LGBTQ+ language learners.

The L2 Motivational Self System illuminates how LGBTQ+ learners' identities shape their language learning aspirations and experiences through three key components – the ideal L2 self, the ought-to self, and the second language (L2) learning experience. The ideal L2 self reflects learners' aspirations tied to language proficiency. Research shows that LGBTQ+ learners often envision English proficiency as a pathway to personal authenticity and professional success (Nguyen & Yang, 2015; Kaiser, 2017). Their ideal L2 selves frequently incorporate desires for self-development, identity expression, and career advancement in more accepting environments (Campbell et al., 2024; Suebkinnon & Sukying, 2021). Meanwhile, the ought-to self captures external pressures and expectations. Studies reveal how LGBTQ+ learners navigate heteronormative expectations in their learning environments (Campbell et al., 2024). Some learners use these expectations as motivation to seek more inclusive

communities (Kaiser, 2017), while others feel compelled to conform to cultural norms to maintain social connections (Peña-Talamantes, 2013). Lastly, the L2 learning experience encompasses immediate learning environment factors. Research highlights how heteronormative classroom contexts (Kaiser, 2017; Nguyen et al., 2015), discrimination (Cornelio & Dagle, 2022), and lack of LGBTQ+ representation in materials (Gray, 2013; Pakuła et al., 2015) significantly impact learners' motivation and engagement.

The Identity Approach to Second Language Acquisition, on the other hand, complements Dörnyei's framework by examining how learners' social identities influence their language learning through investment, identity negotiation, and imagined communities and identities. Investment extends beyond motivation to explain learners' commitment despite challenges. Studies demonstrate how LGBTQ+ learners' investment decisions are deeply tied to identity expression and safety (Moore, 2016). Some learners resist oppression through critical literacy practices (Schreuder, 2021), while others leverage their identities to access certain language communities (King, 2008). Identity negotiation, meanwhile, reveals how learners navigate different contexts. Research shows LGBTQ+ learners constantly shift between expressing and concealing their identities depending on the environment (Hang & Zhang, 2023). They employ various strategies, from emancipatory discourse to silence, in response to heteronormative pressures (Rondón Cárdenas, 2012). Finally, imagined communities and identities represent learners' aspirational spaces and selves. Studies indicate that LGBTQ+ learners often envision communities that offer acceptance, safety, and freedom of expression (Moore, 2016; Campbell et al., 2024). These imagined communities can motivate learning even in challenging circumstances (Lee, 2022).

This integrated theoretical framework guided our research instrument development, ensuring interview questions captured the complex interplay between LGBTQ+ learners' identities, motivations, and investments. The questions systematically probe how participants' sexual and gender identities influence their ideal and ought-to selves, negotiate their identities in various learning contexts, and how their imagined communities shape their language learning investments. This approach allows us to examine not just what motivates LGBTQ+ learners but how their identities and experiences fundamentally shape their language learning trajectories.

Research Questions

The primary objective of this research is to identify the motivations and investments in English language learning of 11 Filipino LGBTQ+ students. Specifically, it would like to answer the following questions:

- What are the participants' ideal L2 selves, ought-to selves, and L2 learning experiences?
- How can identity negotiation, investments, and imagined communities and identities of the participants be described?

By exploring these aspects, this study addresses a critical gap in understanding the experiences of some Filipino LGBTQ+ students in English language learning contexts. While the findings may not represent all Filipino LGBTQ+ learners, the insights gained contribute valuable perspectives to the growing literature on language learning motivation, identity, and investment among marginalized communities. Although previous studies have examined L2 motivation and identity in various contexts, research on LGBTQ+ language learners in the Philippines remains scarce. This study thus aims to address this gap by centering the voices and experiences of Filipino LGBTQ+ students, contributing to both theoretical understanding and practical applications in inclusive language education. Furthermore, on an international scale, this research holds significance as it contributes to the global discourse on inclusive language education and intersectional approaches to second language acquisition. The findings can inform language teaching practices and policies beyond the Philippines, particularly in other multilingual societies where LGBTQ+ students navigate complex linguistic and identity landscapes.

Methods

Research Design

A qualitative case study approach was employed to achieve the objectives. This approach allows for an in-depth exploration of the participants' experiences and perceptions, providing rich, detailed data that can address the research questions effectively. In addition, a case study as a research design thoroughly examines typical and/or exemplary cases (Tight, 2022) that are contemporary phenomena happening in a real-world context (Yin, 2018). This means that case studies can best understand an issue or a problem by collecting and integrating qualitative data gathered through interviews, analyzing documents, and making observations (Creswell & Poth, 2018). In the context of this work, the cases of 11 LGBTQ+ members were the subjects of thorough examination through interviews, which were then thematically analyzed.

We chose a qualitative case study approach because it provides rich, contextual data on the lived experiences of LGBTQ+ learners. This method aligns with our research objectives by

allowing for in-depth exploration of individual narratives and the complex interplay between investment, motivation, and language learning.

Sampling and Participants

The study employed a snowball sampling technique to recruit 11 self-identified LGBTQ+ participants aged 18 to 25. Snowball sampling leverages existing social networks to identify potential participants, which was deemed appropriate for this study due to the topic's sensitive nature. Initial participants were selected from the researchers' former students, ensuring familiarity and trust, facilitating confidentiality, and minimizing the risk of gender stereotyping. These initial participants then referred other potential participants from their social circles, resulting in a diverse group representing various backgrounds and experiences. This diversity is crucial for capturing a wide range of experiences and perspectives within the LGBTQ+ community.

After an extensive three-month recruitment period, only 11 individuals willingly volunteered to participate in the study. This limited number reflects both the sensitive nature of the research topic and the personal choice of potential participants to maintain their privacy. The researchers respected these boundaries and proceeded with those who expressed genuine interest and willingness to share their experiences.

The final sample was composed of three bisexuals, three transgender individuals, four gay individuals, and one queer participant. All participants had completed junior high school, were not current students of the researchers, and fell within the age range of 18 to 25 years. Given the sensitive nature of the research, this age range ensured that participants had experiences relevant to the study's focus and simplified logistical considerations.

Finally, we acknowledge the limitations of our small sample size in terms of generalizability, potential bias, and lack of representativeness. However, the depth of qualitative data obtained provides valuable insights into individual experiences. Our sample includes diverse representations within the LGBTQ+ spectrum, allowing for the exploration of both shared and unique experiences. While we recognize that each subgroup may have distinct characteristics, our analysis focuses on identifying common themes across LGBTQ+ experiences in language learning. Future research with larger samples could further examine subgroup-specific patterns.

Informed Consent

Before the interviews, the research ethics committee of a university reviewed the proposal, the informed consent form, and the interview guide. After securing clearance to proceed, the researchers gave participants a copy of the informed consent outlining the research focus, purpose, data use, participation reasons, expected interview duration, and potential risks. Confidentiality was assured; the participants' identities would remain anonymous even if the findings were published. After completion, the ethics committee reviewed the study for compliance and issued a certification confirming adherence to the institution's code of research ethics.

Data Collection

The researchers conducted individual semi-structured interviews, which allowed for more personalized and detailed responses. The first part of the interview, which lasted approximately 30 minutes, involved reviewing the informed consent form and establishing rapport with the participant. The second part, focused on in-depth discussions about the participants' English language learning experiences during high school, lasted approximately 90 minutes. The interview questions were systematically developed to address specific variables identified in our research questions:

For Research Question 1 (What are the ideal L2 selves, ought-to selves, and L2 learning experiences of the participants?):

The ideal L2 self was explored through questions about participants' aspirations as English language users about their LGBTQ+ identity
The ought-to self was examined through a question about perceived expectations from teachers and classmates
The L2 learning experience variable was investigated through questions about supportive and challenging classroom experiences, participation patterns, and representation in learning materials.

For Research Question 2 (How can identity negotiation, investments, and imagined communities and identities of the participants be described?):

Identity negotiation was probed through questions about adopting or asserting different personas in the classroom and managing expectations versus identity expression.

Investment was examined through questions about continued participation despite demotivation and engagement levels in various classroom activities

Imagined communities and identities were explored through questions about desired LGBTQ+ representations in learning materials and aspirations as English users

To better explain the connection between the variables and their theoretical underpinnings, Table 1 presents a detailed mapping:

Table 1: Interview Questions and Their Theoretical Underpinnings

Theoretical Underpinning	Interview Guide
Dörnyei's Ideal L2 Self (What kind of language user one would like to be)	Relative to being an LGBTQ+ member, what kind of English language user would you like to be?
Dörnyei's Ought-to Self (What people believe are their duties, obligations, and responsibilities to meet others' expectations)	What do you think are your teachers' and classmates' expectations of you as an English user?
Dörnyei's Ought-to Self + Norton's concept of (multiple) identity	Are these expectations aligned with your identity as a member of the LGBTQ+ community?
Dörnyei's L2 learning experience (What is the kind of immediate learning environment and experience that influenced one's L2 learning)	Have you had any experience inside the classroom that you were supported/respected as a member of the LGBTQ+ community? - If so, can you tell me how it was? Have you also had any bad experience inside the English classroom that caused you to lose your motivation to learn English because of being an LGBTQ+ member?
Dörnyei's L2 learning experience + Norton's concept of investment	Did you still participate in that class even though you already lost your motivation? If yes, what caused you to still participate? How engaged were you in that activity? Did you adopt a "straight-like" persona or did you assert your identity as LGBTQ+ member? Can you further tell me how you dealt with it?
Dörnyei's L2 learning experience + Norton's concept of (multiple) identity	
Dörnyei's L2 learning experience	If no, can you tell me why you chose not to participate? How did you feel about the situation?
Dörnyei's L2 learning experience	Do you remember any LGBTQ+ representations in the textbooks or any instructional materials that your teachers used when you were studying English in high school? If there are, what are they? Would you still like LGBTQ+ to be included/represented? If yes, what kind of representation would you like LGBTQ+ to be portrayed as? If no, why would you not want LGBTQ+ community to be represented?
Dörnyei's L2 learning experience + Norton's concept of imagined communities	If you do not remember any LGBTQ+ representations, would you like them to be represented in the textbook? If yes, what kind of representation would you like LGBTQ+ to be portrayed as? If no, why would you not want LGBTQ+ community to be represented?

The interview guide included open-ended questions that were directly derived from our theoretical framework, ensuring alignment with both our research objectives and the specific variables we aimed to investigate. The systematic connection between our research questions, theoretical constructs, and interview questions strengthens the methodological rigor of our thematic analysis approach. Furthermore, these questions

Data Analysis

The qualitative data gathered from the interviews with LGBTQ+ participants were meticulously analyzed using a thematic analysis approach, adhering to the framework of Braun and Clarke (2006). The analysis was structured to address the specific variables outlined in the research questions: ideal L2 selves, ought-to selves, L2 learning experiences, identity negotiation, investments, and imagined communities and identities. The specific steps undertaken were:

- Step 1: Familiarization. The researchers transcribed the interviews verbatim and conducted a thorough reading to engage with the participants' experiences deeply.
- Step 2: Initial Coding. The data were systematically segmented and coded according to theoretical frameworks: Dörnyei's L2 Motivational Self System (addressing ideal L2 selves, ought-to selves, and L2 learning experiences) and Norton's concepts (addressing identity negotiation, investments, and imagined communities).
- Step 3: Theme Searching. Researchers identified patterns within the codes, constantly refining and grouping them into potential themes. For instance, responses about LGBTQ+ identity in English learning contexts were analyzed for themes related to ideal L2 selves, while questions about classroom participation and engagement focused on investment and identity negotiation.
- Step 4: Theme Review. Tentative themes were assessed to ensure coherence, consistency, and distinctiveness. Each theme was aligned with core data segments to represent participant insights accurately.
- Step 5: Defining Themes. The researchers clarified how each theme related to the specific variables, ensuring each connection was well-defined within the theoretical frameworks.
- Step 6: Writing the Analysis. Refined themes informed the report's structure, supported by vivid data extracts illustrating the connections between themes and the research variables. For instance, participants' reflections on LGBTQ+ representation in learning materials were analyzed for insights into L2 learning experiences and imagined communities. This analysis offers a nuanced portrayal of LGBTQ+ students' motivational trajectories and strategic investments in English learning, addressing all key research variables.

To validate the interpretations, the researchers shared the analysis with the participants through email, allowing them to affirm or contest the themes derived from their narratives. This triangulation step enhanced the credibility and trustworthiness of the study's findings, particularly in ensuring that the themes accurately represented the participants' experiences across all variables.

Results

Our analysis revealed several key themes directly addressing our research objectives regarding LGBTQ+ students' motivation and investment in English language learning. These themes include (1) proficient and sensitive users of English, (2) neutral to high-performing expectations, (3) supportive and hetero-cis-normative learning experiences, (4) conforming to expectations and asserting authenticity, (5) sustained investment despite adversities, and (6) inclusive L2 communities and empowered individuals. Each theme is explored below, explicitly connecting to our research questions and existing literature. Our findings both confirm and extend previous research, offering new insights into the unique experiences of some LGBTQ+ learners in the Philippine context.

LGBTQ+ students' motivation in learning English

Ideal L2 selves: Proficient and sensitive English users

The concept of the Ideal L2 Self is vividly illustrated by LGBTQ+ participants' aspirations to achieve both English language proficiency and sensitive communication skills.
The experience of Participant B, a bisexual participant in this study, exemplifies the impact of social interactions on language learning motivation. Driven by encounters with verbal bullying and microaggressions related to his sexual orientation, he aspired to become a sensitive English user. His experience of a prejudiced comment after portraying a female character in a performance motivated him to use gender-sensitive language. His anecdote highlights how discriminatory incidents can have a profound impact on LGBTQ+ students' motivations to learn English, shaping their desire for language skills that promote inclusivity and understanding.

Beyond sensitivity, some participants desired general English proficiency to connect with diverse people and counteract prejudice and stereotyping. This goal aligns with the Identity Approach by showcasing how language proficiency can empower LGBTQ+ students to negotiate their identities within a broader social context. As Participant F articulated,

achieving proficiency in the English language is seen as a way to 'connect to different people,' highlighting the potential of language skills to facilitate broader social engagement. To quote, *I would want to become a proficient English language user because I feel like if I am proficient enough in speaking English language, I could connect to different people.*

Proficiency becomes a bridge for LGBTQ+ individuals to overcome negative perceptions and build connections by utilizing English as a tool for communication and understanding. However, other participants revealed motivations linked to societal perceptions of English language prestige. 'Bakla' is a term in Filipino generally referring to gay men, which Participant I feels is perceived more negatively in the local context compared to using its English translation or counterpart.

It seems like we have the belief that if you are bakla [gay]… it seems negative in Filipino, and we should eliminate that. But I'm more comfortable when I use English. It seems like it is higher. Like, 'I'm gay, and I'm intellectual because I can speak English.'

The association of English proficiency with intelligence and superiority motivated some LGBTQ+ students to study harder, potentially finding a sense of pride and accomplishment in mastering English to compensate for negative stereotypes encountered in Filipino. While this belief underscores the perceived prestige of English, it also highlights an underlying challenge to LGBTQ+ identity in the local culture, suggesting a complex interplay between language proficiency and societal acceptance.

In conclusion, this analysis demonstrates the multifaceted nature of LGBTQ+ students' aspirations. These motivations encompass a desire for sensitive language use, the need to connect with diverse people, and the allure of social prestige associated with English proficiency. Through the lens of the Ideal L2 Self, these findings reveal a complex tapestry of motivations that drive LGBTQ+ students towards English language acquisition, with implications for educators to create more inclusive and identity-affirming learning environments.

Ought-to selves: Neutral to high-performing

The interview data revealed a spectrum of expectations surrounding LGBTQ+ students' English language use, impacting their Ought-to Selves. Some participants, like Participants C and A, reported experiencing neutral treatment from teachers, fostering non-discriminatory classroom environments. However, they still perceived high academic and English proficiency expectations from their classmates. This experience suggests that peer expectations can significantly influence how LGBTQ+ students perceive their Ought-to Selves, shaping their motivations and goals for English language learning.

In contrast, other participants described external pressures stemming from broader societal stereotypes. Participant D's narrative exemplifies this, highlighting the pressure to uphold perceived notions that LGBTQ+ individuals inherently possess exceptional intellect and creativity:

They (referring to society at large) think that LGBTQ+ members are naturally intelligent and creative. This thought also impacted the pressure I felt in using the English language.

This pressure to live up to such stereotypes can create a significant burden on LGBTQ+ students' Ought-to Selves.

Similar societal expectations emerged concerning leadership roles. Participant F's statement describes the assumption from both teachers and classmates that queer students should actively participate, display strong communication skills, and lead group tasks:

Even outside the school environment, this has been the general expectation… so my classmates, my teachers, [they often] appoint me as leader of the group as they are expecting that if you are part of the LGBT, you need to perform well; you need to be good.

While these expectations might align with some students' internal motivations for leadership, they can also create significant distress for others who might not possess or desire such roles.

In conclusion, navigating the classroom environment presented a complex landscape of expectations for the LGBTQ+ participants. While some experienced neutral or even supportive environments, others faced significant pressures shaped by peer expectations and broader societal stereotypes. These external factors significantly impacted their perceptions of their Ought-to Selves, highlighting the multifaceted nature of their experiences within the English language learning context.

L2 learning experiences: Supportive and hetero-cis-normative

The LGBTQ+ participants recounted diverse L2 learning experiences, ranging from supportive and affirming environments to those marked by challenges and microaggressions. One key aspect influencing these experiences was the role of language in negotiating support within the classroom.

Participant B's experience of being called "Barbie" by a close classmate exemplifies this point. He highlighted that the classmate's seeking consent before using the term transformed a potentially offensive term into a playful one within their specific friendship dynamic. This anecdote illustrates how LGBTQ+ students navigate language use based on interlocutor familiarity and relational context to create more inclusive learning spaces.

Supportive learning environments were crucial for participants like G, A, and D, who thrived academically and emotionally due to positive interactions with classmates, teachers, and

friends. This significance of allyship and representation underscores the importance of diverse role models in fostering positive L2 learning experiences, especially for Participant G, who felt safe expressing his sexuality because of a teacher with a shared LGBTQ+ identity.

Despite these pockets of support, many LGBTQ+ students still faced significant adversity as they were subjected to hetero-cis-normative environments. Instances of smart shaming, stereotyping, and limitations on portraying diverse characters highlighted the difficulties in creating genuinely inclusive educational spaces.

Smart shaming, a form of anti-intellectualism, emerged as a common obstacle. Participant H described being mocked by classmates despite academic excellence:
They smart shamed me… I was the Top 1… I actively participated in the discussion. Every time I answered, I saw a group of straight guys [copying] me. I know [that] their way of looking at me, they were mocking me.

This derogatory behavior even targets students when they achieve high standards, undermining their 'Ought-to Self'—the expectation for LGBTQ+ students to excel academically. In tandem with smart shaming, bullying was identified in various forms. Several participants recalled verbal abuse where terms such as *"bakla", "bading",* and *"binabae"* (*Bakla, bading*, and *binabae* are all Tagalog words synonymous with gay) were used pejoratively, subverting words that should neutrally denote gender identity or sexual orientation. Additionally, physical aggression was reported. For instance, Participant J shared a traumatic experience during a flag ceremony where classmates repeatedly punched them.
It was a flag ceremony. I was the smallest in class, so I was the first in the line. Some of the male classmates plotted to punch in my nape. They took turns in punching me… Because I was weak, they tried to belittle me.

Meanwhile, Participant F offered a poignant insight into the emotional environment within the classroom:
For me, I haven't experienced [being] supported or respected inside the classroom, but I would say tolerated… Teachers have already a standard that if you're a queer kid, you must be [good]. For me, it feels like it is a normal thing that you have to be okay; you have to be good. So, I don't really feel supported or respected, only tolerated.

This perspective highlights the difference between tolerance and genuine acceptance from the viewpoint of an LGBTQ+ participant. Participant F's statement suggests a double standard, where LGBTQ+ students feel pressured to excel in English proficiency and communication skills to gain a semblance of acceptance within the classroom. This experience connects to the

concept of the Ought-to Self, where external pressures shape students' perceptions of their desired L2 selves.

These testimonies illustrate not only the overt aggression faced by LGBTQ+ students but also the subtle psychological pressures that affect their learning experience. They emphasize the need for significant shifts in attitude and policy to transform classrooms into spaces where every student's identity is affirmed and educationally supported.

In summary, the L2 learning experiences of LGBTQ+ participants were multifaceted. While some thrived in supportive environments, finding encouragement that fueled their language proficiency and engagement, others faced challenges related to microaggressions, tolerance versus genuine acceptance, and the pressure to conform to hetero-cis-normative expectations. These negative experiences can adversely affect their motivation and participation, which are crucial for successful language acquisition. It underscores the importance of fostering inclusive classrooms that celebrate diversity and create a safe space for all students to learn, express themselves authentically, and fully realize their language learning potential.

LGBTQ+ students' investment in learning English

Identity negotiation: Conforming to expectations and asserting authenticity

Norton's concept of identity as positioned, multiple, and dynamic serves as a valuable lens through which to examine the experiences of LGBTQ+ participants in this study. Their narratives reveal a complex negotiation between conforming to dominant expectations and asserting authentic selfhood within the classroom environment.

Some participants described a sense of dissonance when attempting to adopt "straight" personas to navigate social spaces. Participant D's statement, *"It felt like it was not me; I felt caged whenever I tried to do so,"* exemplifies the inauthenticity and discomfort associated with such strategies. Similarly, Participant E highlights the internal conflict: "*I am very true to myself; I've never pretended to be someone that I'm not... because I feel like it affects my inner self, and it feels wrong."* These experiences underscore the psychological strain associated with suppressing one's authentic identity.

In contrast, other participants, like Participants F, J, and I, emphasized the importance of asserting their identities within the classroom, regardless of external pressures. Participant J's statement exemplifies this perspective*: "I do not have to change myself for others. I have accepted my identity."* By openly expressing their LGBTQ+ identities, these participants challenge heteronormative expectations and contribute to a more inclusive classroom environment.

These contrasting narratives highlight the multifaceted nature of identity exploration for LGBTQ+ students. While some navigate the pressures to conform and potentially experience psychological distress, others prioritize self-acceptance and actively resist assimilation. Understanding these complexities is crucial for fostering inclusive L2 learning environments that celebrate diversity and empower LGBTQ+ students to express their authentic selves.

Investment: Sustained despite adversities

Asserting LGBTQ+ identities within the classroom environment was not without consequences, particularly impacting participants' language learning experiences. The acceptance or rejection that they encountered influenced demonstrably their investment in English learning.

Despite facing negative experiences such as bullying, many participants invested substantially in their learning. Some, like Participant C, described coping through increased studying: *"Through reading, I was able to divert myself to another dimension."* Similarly, Participant J highlighted using effort as a strategy:
I did not pay attention to them [bullies]. I told myself that I would strive harder in my studies so that I would not be bullied again. That's why I became more active and participative. If they see me like that, they will change their perception of me.

These narratives indicate that participants employed various coping mechanisms, including focusing on academic pursuits, to navigate challenges and maintain investment in their learning. Norton's identity approach helps to understand this phenomenon. When LGBTQ+ students experience acceptance within the classroom, it can foster a sense of belonging and motivate them to invest more in their L2 learning. Conversely, negative experiences create a sense of alienation, potentially leading to decreased motivation. However, the participants' narratives in this study also reveal resilience. Despite facing challenges, their commitment to learning persisted, showcasing their determination to excel academically.

Imagined communities and identities: Inclusive and empowered

Participants' narratives powerfully illustrate how the interconnected concepts of imagined communities and imagined identities serve as forms of resistance and empowerment. Constrained by societal expectations, LGBTQ+ students envisioned not only inclusive learning environments (imagined communities) but also empowered and successful selves (imagined identities) within those communities. These combined visions served as sources of motivation and inspiration, especially for those marginalized within mainstream society.

The desire for imagined communities of acceptance emerged as a critical theme. Participants yearned for classrooms that embrace diversity, celebrate LGBTQ+ experiences, and openly discuss LGBTQ+ issues. This longing for acceptance transcended the immediate classroom and reflected a desire for broader societal change. For instance, participants expressed a need for educational materials that represent LGBTQ+ stories and diverse family structures, highlighting their potential to foster a sense of belonging and to challenge heteronormative narratives.

Moreover, envisioned identities reflected aspirations to be inspirational leaders, empowered individuals, and socially conscious citizens, countering negative stereotypes and showcasing the potential of LGBTQ+ individuals. *"We can serve our country... We can be successful... Up to this very day, there is discrimination. However, LGBTQ+ members have a lot to offer society,"* one participant asserted, conveying the desire to dismantle discriminatory assumptions and affirm the positive contributions of LGBTQ+ individuals.

Participants' imagined identities were also tied to positive role models, emphasizing success, empowerment, and societal contributions. These narratives stemmed from a profound desire to challenge societal perceptions and enact positive change. Participant C shared,
I want someone who will inspire and motivate all students to succeed despite their gender identity. There are many successful LGBTQ+ members.
Likewise, Participant J stated,
I want LGBTQ+ members to be positive role models and successful in life. When I hear positive representations, I'm happy because they can change how people view us. I hope we will inspire others someday.

Through envisioning inclusive learning spaces (imagined communities) and empowered, successful selves (imagined identities), LGBTQ+ students find the motivation to face challenges within L2 learning environments. The concept of imagined communities and identities emphasizes the critical need for educational spaces that celebrate diversity and empower LGBTQ+ students to express their authentic selves while dismantling discriminatory stereotypes. In conclusion, creating learning environments that reflect these imagined communities can empower LGBTQ+ students to thrive academically and contribute meaningfully to society. These environments enable LGBTQ+ individuals to visualize a future where their contributions are valued, their identities are affirmed, and their aspirations are attainable — transforming the education landscape into a catalyst for wider societal acceptance and inclusion.

Discussion

We acknowledge that the case study design helped us identify the motivation and investment of the 11 LGBTQ+ students; however, we have to note that their experiences may not be the same as others. Nevertheless, these findings enhance the understanding of LGBTQ+ students' experiences in L2 learning environments, corroborating and expanding upon previous research.

A primary point of agreement concerns the “ideal L2 selves” or the aspirations of LGBTQ+ participants to become proficient and sensitive English language users. This goal resonates with Kaiser's (2017) study, in which LGBTQ+ individuals sought to contribute to inclusive social policies and nurture communities that encourage gender expression. They would also like to improve themselves for personal and professional reasons similar to the motives of other LGBTQ+ students (Campbell et al., 2024; Nguyen et al., 2015; Suebkinnon & Sukying, 2021). What is striking about this study’s participants is their deep desire to be sensitive or inclusive. Due to the pressure of their ought-to selves (expectations of others) and their L2 learning experiences, they then strive to combat the negative ideologies shaping their ideal L2 selves. In addition, the cases of the 11 participants expand the discourse about ideal L2 selves as they notably want to learn English to connect to different peoples and prove that they are better due to the language prestige accorded to English. They believe that if they can use English fluently, they can be accepted in the society.

In connection to this, the "ought-to selves" of participants find parallels in Teodoro's (2021) description of LGBTQ+ students in the Philippines as commendable and skilled. People expect them to be high-performing or achieving; if they are not, they risk not being accepted. This shapes their ideal L2 selves, where they aspire to be proficient, which will help them feel a sense of belonging. This echoes the experiences of some Thai queer learners who view learning English as a means to gain social acceptance (Suebkinnon & Sukying, 2021). Furthermore, this research deepens the narrative by showing that while some participants felt compelled to embody the "good student" archetype, others mirror the experiences of LGBTQ+ students in California who did not perceive exceptional expectations (Hanson et al., 2019). However, as demonstrated in another study (Campbell et al., 2024), This neutral expectation may lead to double marginalization. Thus, there is indeed a need to reflect on classroom practices to account for the diversity of these insights, which emphasizes the complexity of expectations within different educational settings.

Concerning L2 learning experiences, this study corroborates the diverse experiences of LGBTQ+ students. Echoing Teodoro (2021) and Tarrayo et al. (2021), some participants

reported feeling accepted by teachers in supportive classrooms. Nevertheless, many also faced difficulties such as hetero-cis-normative environments, unsupportive family relationships, smart shaming, and bullying. These adverse experiences are consistent with Evripidou's (2018) observations of LGBTQ+ disengagement due to heteronormative pressures. This study's findings further elucidate the prevalence of heteronormativity, a theme recurrent in numerous studies (Dalley & Campbell, 2006; Gray, 2013; Paiz, 2015; Sunderland & McGlashan, 2015; Salami & Ghajarieh, 2016; Ruiz-Cecilia et al., 2021). Moreover, the challenge of smart shaming appears as a significant impediment for participants striving to succeed academically.

The influence of personal characteristics, school community, broader social milieu, and macro-context factors on motivation, as discussed by Assalahi (2019), is evident among the participants. Their motivation to learn English was intertwined with their aspirations for future success, societal acceptance, and potential migration to more inclusive environments. A particularly nuanced understanding emerged around the concept of acceptance. An LGBTQ+ participant distinguished acceptance from tolerance, offering a nuanced interpretation of acceptance from the LGBTQ+ perspective—a distinction that merits further exploration. This echoes the insights from Lee (2022) on the importance of acceptance over mere tolerance in fostering a supportive environment for LGBTQ+ individuals.

From this idea of establishing a supportive environment, the 11 LGBTQ+ participants in this study have imagined communities characterized by inclusivity and empowerment. As discussed in this paper, these participants have many negative experiences that shaped or influenced their desire to create imagined communities where they can feel safe and freely express themselves. They want to be empowered and represented in these communities since they feel disempowered and mis/underrepresented in their immediate milieu. These findings, therefore, draw parallels to the experiences of other LGBTQ+ students from different countries. (Campbell et al., 2024; Lee, 2022; Nguyen et al., 2015; Schreuder, 2021).

In the nexus of their ideal L2 selves, ought-to selves, L2 learning experiences, and imagined communities and identities, the 11 LGBTQ+ participants negotiated their identities to convey their gender identity in the classroom. With their ought-to selves, they conformed to the expectations in exchange for acceptance but highlighted that they bargained through asserting identity as they also prioritized self-acceptance. The strategies employed by these LGBTQ+ participants in language classrooms offer valuable additions to the existing body of knowledge. Echoing Dalley and Campbell (2006) and Rondón Cárdenas (2012), some participants adopted "straight-like" personas, perhaps as a protective response to fears of outing, isolation, bullying, or stigma. In contrast, others resisted harmful ideologies and

affirmed their gender and sexual identities, drawing parallels with Kaiser (2017) and Hang and Zhang (2023). These contrasting approaches illustrate the intricate identity negotiation within L2 learning environments.

Finally, despite the pressuring ought-to selves, negative L2 learning experiences, and adoption of straight-like personas (identity negotiation where they have to disconnect from their authentic selves), the LGBTQ+ participants invested in their language learning, albeit to varying degrees. They pursued and showed resilience because they wanted to be proficient (ideal L2 and ought-to selves) and sensitive (ideal L2 selves). This again mirrors similar experiences. (Hang & Zhang, 2023; Kaiser, 2017; Rondón Cárdenas, 2012) implying that the cases of 11 Filipino LGBTQ+ students can contribute to the ongoing and expanding discourse on motivation and investment.

Implications

The results of this study on the motivation and investment of 11 Filipino LGBTQ+ learners in learning English reveal significant implications for educators, curriculum developers, and policymakers. Understanding these learners' unique motivations and investments is essential for fostering an inclusive and supportive educational environment.

First, the participants' ideal L2 selves include being proficient and sensitive. They view L2 as a pathway to building supportive communities, personal and professional development, gaining social acceptance, and connecting with diverse groups of people. Thus, language learning programs should incorporate inclusive practices and materials that validate these aspirations while providing opportunities for students to develop linguistic and cultural competence.

Second, the ought-to selves face high-performance expectations in exchange for acceptance. Some also experience neutral expectations. With this, educators must be mindful of the pressure these expectations create and work to establish balanced, supportive environments that do not tie acceptance to academic performance.

Third, the L2 learning experiences vary significantly, but all participants shared negative experiences inside the classroom. Therefore, comprehensive teacher training on creating inclusive environments and addressing various forms of discrimination is needed, as is developing support systems that extend beyond the classroom.

Fourth, the participants have imagined communities described by their safety, proper representation, and inclusivity. Hence, educational institutions should work towards creating these envisioned spaces by implementing inclusive policies, promoting representation, and fostering safe environments for all students.

Fifth, the LGBTQ+ participants employ various strategies for their identity negotiation. Some adopt straight-like personas for protection, while others resist through gender identity assertion. In this light, language learning environments must be structured for authentic self-expression while ensuring student safety and comfort.

Sixth, despite challenges, the participants still invested in their language learning. They showed resilience in order to achieve their aspirations/motivations. Educational programs should acknowledge and support this resilience while working to remove barriers that might hinder full investment in language learning.

Finally, the implications of this study extend beyond the Philippines, highlighting the potential for international scalability. The experiences and insights gained from Filipino LGBTQ+ learners draw parallels with the experiences of other LGBTQ+ participants from different countries. Therefore, this paper can help inform global educational practices. By understanding and addressing the unique needs of LGBTQ+ students in different cultural contexts, educators worldwide can develop more inclusive and supportive learning environments. This study underscores the universal importance of inclusivity and equity in education, providing a valuable framework that can be adapted to various educational settings internationally.

Recommendations

Based on this study's findings and implications, several key recommendations are proposed to address the unique needs and experiences of LGBTQ+ learners in English language education and the limitations experienced in conducting this research.

Firstly, future studies should include larger and more diverse samples of LGBTQ+ students to represent the community's spectrum better. Given that there were only 11 participants, this study cannot fully account for the experiences of Filipino LGBTQ+ learners. Additionally, other researchers may consider longitudinal studies to track how LGBTQ+ students' L2 motivations and investments evolve.

Secondly, teacher training programs should include comprehensive modules on LGBTQ+ sensitivities and inclusive classroom strategies. These programs should encourage fostering inclusive dialogue and the establishment of respect guidelines to create supportive learning environments. Teachers equipped with this training will be better prepared to support LGBTQ+ students and create a more inclusive classroom atmosphere.

Thirdly, LGBTQ+ learners shared their negative stories about their L2 learning experiences. Hence, schools should implement clear anti-discrimination policies and provide targeted support groups and resources for LGBTQ+ students. Engaging the broader community is crucial to promoting a culture of acceptance and inclusivity. These policies and support systems can help mitigate the negative impact of heteronormative pressures on LGBTQ+ learners.

Additionally, classroom environments should be revisited. Considering their identity negotiation, classrooms should allow flexible identity expression, implement gender-neutral language practices, and create opportunities for authentic self-expression. Thus, there should be activities that celebrate diversity. As for the ought-to selves, classrooms should avoid linking acceptance to academic performance, celebrate various forms of achievement, and create collaborative rather than competitive environments.

Lastly, further research is needed, particularly longitudinal studies involving more extensive and diverse populations, to track changes over time and deepen the understanding of the elements required to create universally supportive educational environments for LGBTQ+ students. Such research will provide valuable insights into the long-term effectiveness of inclusive educational practices and policies.

Conclusion

This study identified the complexities of 11 Filipino LGBTQ+ students' motivation and investment in English language learning. Addressing our first research question about ideal L2 selves, ought-to selves, and L2 learning experiences, the findings revealed that LGBTQ+ students aspire to become not only proficient but also sensitive users of English. Their ideal L2 selves are shaped by a desire to contribute to inclusive communities and gain social acceptance through language proficiency. The ought-to selves of these students reflect a spectrum of expectations, ranging from neutral to exceptionally high academic performance, which can motivate and pressure learners. Their L2 learning experiences encompass supportive environments and challenging hetero-cis-normative contexts, highlighting the complex dynamics they navigate in their language learning journey.

In response to our second research question regarding identity negotiation, investments, and imagined communities, the study uncovered that LGBTQ+ students employ various strategies in negotiating their identities, primarily through conforming to expectations while simultaneously asserting their authentic selves. Despite facing adversities, these students demonstrated a sustained investment in their language learning, driven by personal aspirations (ideal L2 selves) and social pressures (ought-to selves). Their imagined communities reflect a vision of inclusive L2 spaces where they can emerge as empowered individuals, free from discrimination and marginalization.

These findings have significant implications for L2 education in the Philippines. The participant's preference for self-affirmation over identity concealment speaks to their resilience in addressing power disparities within the educational system. However, the ongoing challenges affecting their self-confidence and motivation underscore the urgent need for more inclusive learning environments. The varied experiences reported by participants - from supportive classrooms to heteronormative pressures - emphasize the critical role of educators and institutions in creating spaces that acknowledge and support LGBTQ+ learners' diverse needs and experiences.

This research calls for a fundamental shift in how educational institutions approach LGBTQ+ inclusion in L2 learning contexts. Stakeholders, including educators, policymakers, and community leaders, must work collaboratively to implement policies and practices that celebrate diverse identities and experiences. By fostering environments where LGBTQ+ students can authentically express themselves while pursuing their language learning goals, we can move closer to the inclusive and empowering communities these students envision. Future research should expand upon these findings by examining larger and more diverse samples of LGBTQ+ students, potentially exploring how these experiences vary across different Philippine contexts and how supportive practices can be effectively implemented in L2 classrooms.

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ENHANCING ENGLISH AS A FOREIGN LANGUAGE ACADEMIC WRITING THROUGH AI AND PEER-ASSISTED LEARNING

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ABSTRACT

This study investigates the integration of artificial intelligence (AI), specifically ChatGPT, and peer-assisted learning (PAL) in enhancing academic writing skills among English as a Foreign Language (EFL) learners. Employing a participatory action research design, the study utilized a mixed-methods approach, combining quantitative and qualitative data collection. The research involved 143 EFL students in the experimental group participating in a 15-week academic writing course, with peer mentors actively engaging in the intervention process. Quantitative data were collected through pre- and post-tests assessing writing proficiency and questionnaires, while qualitative data were gathered via individual semi-structured interviews to explore participants' perceptions and experiences. Peer mentors in a PAL center used ChatGPT to provide personalized, immediate feedback on writing tasks. The results indicated substantial improvements in writing scores and increased student confidence and engagement. This research provides empirical evidence on the synergistic effects of AI and PAL in EFL pedagogy, offering practical insights for educators. Future recommendations include exploring diverse AI tools across various linguistic and cultural settings and conducting longitudinal studies on the enduring effects of these interventions.

Keywords: AI in Education, ChatGPT, EFL Writing Pedagogy, Peer-Assisted Learning, Academic Writing Skills

Introduction

In recent years, integrating artificial intelligence (AI) into educational settings has revolutionized teaching methodologies, particularly in English as a Foreign Language (EFL) instruction. Due to its complex nature and the limitations of traditional teaching methods, EFL learners often face significant challenges in mastering academic writing. As globalization continues to bridge cultural and linguistic gaps, the demand for proficient English communicators has surged. (Tsuneyoshi, 2013), propelling educational institutions to explore innovative approaches to language teaching. One promising approach is the combination of AI-driven tools and peer-assisted learning (PAL), which offer a powerful means of addressing these challenges and enhancing the writing proficiency of EFL learners.

The advent of AI technologies, particularly those involving natural language processing (NLP), has opened new avenues for language learning and teaching. AI-powered tools such as ChatGPT provide immediate, personalized feedback, allowing students to identify and correct grammar, coherence, and vocabulary errors in real time. (Dempere et al., 2023). These capabilities align well with data-driven learning (DDL) principles, which facilitate the discovery of linguistic patterns and promote adaptive language use. (Pérez-Paredes et al., 2019). However, AI's true potential is best realized when integrated with human-centered learning approaches, such as PAL, emphasizing student collaboration and mutual support.

PAL is a pedagogical approach where learners alternate between roles as teacher and learner, engaging in structured peer interactions that foster critical thinking and language development (Qiu & Lee, 2020). PAL's collaborative framework enhances academic writing by encouraging students to engage with their peers in meaningful discussions, provide constructive feedback, and develop writing strategies together. When combined with AI, PAL can be further enhanced, as AI-generated feedback can guide peer discussions and make the collaborative process more focused and productive. This integration supports an iterative learning cycle in which students draft, receive AI-supported insights, discuss improvements with peers, and revise their work, creating a dynamic and supportive environment for writing development.

In addition to quantitative measures of writing proficiency, this study also explores students' perceptions of the AI and PAL interventions, focusing on how these innovative approaches

impacted their academic writing experiences. The qualitative component is essential for understanding the learners' subjective experiences. (Denzin & Lincoln, 2005), particularly how they interacted with the AI-driven feedback and peer collaboration and how these interventions influenced their confidence, engagement, and development as academic writers. By integrating both quantitative and qualitative analyses, this research provides a comprehensive view of the impact of AI and PAL on EFL academic writing.

The synergy between AI and PAL creates a comprehensive approach to EFL writing instruction, merging the strengths of technology-driven precision with the benefits of peer collaboration. For example, while ChatGPT offers immediate feedback on writing tasks (Dever et al., 2020), identifying issues related to coherence or grammatical accuracy, peers can provide more nuanced suggestions regarding argumentation, style, or cultural appropriateness. This combination addresses surface-level writing concerns and higher-order skills, making it a holistic strategy for enhancing writing proficiency. The iterative nature of this integration aligns with process-oriented writing pedagogies, which emphasize the importance of feedback and revision in developing writing skills (Widodo, 2008).

Research Objectives

The objectives of this study are to investigate the impact of integrating AI, specifically ChatGPT, and PAL, on enhancing academic writing skills among EFL learners. To achieve this, the study aims to:

1. Evaluate the effectiveness of AI-supported PAL on writing proficiency among EFL learners, emphasizing improvements in coherence, cohesion, lexical resources, and grammatical accuracy. Additionally, the study aims to assess participants' experiences and perceptions using a 12-item questionnaire that explores support, resources, training preparedness, and personal development dimensions related to the interventions.
2. Identify the challenges and benefits of integrating AI and PAL in academic writing instruction, including insights gathered from participants' feedback through a structured questionnaire to understand the implementation comprehensively.
3. Examine students' and instructors' perceptions and attitudes toward using AI and PAL, specifically emphasizing the support, resources, training preparedness, and personal development aspects explored in the questionnaire.

4. Develop best practices for incorporating AI and PAL into EFL instruction, informed by quantitative improvements in writing skills and qualitative feedback from the questionnaire results. These best practices enhance writing pedagogy and support diverse learner needs in globalized educational contexts.

Research Questions

The study addresses the following research questions to guide the investigation into the effectiveness and impact of AI and PAL integration in EFL academic writing:

1. How effective is AI-supported peer-assisted learning (PAL) in improving writing proficiency among EFL learners?
2. What are the perceived challenges and benefits of integrating AI and PAL in academic writing instruction?
3. How do students and instructors perceive using AI and PAL to enhance academic writing skills?
4. What best practices can be developed for integrating AI and PAL into EFL instruction to optimize writing pedagogy and cater to the diverse needs of learners?

Literature Review

This literature review discusses five key constructs—writing proficiency, feedback effectiveness, student engagement, peer collaboration, and data-driven learning—that support the integration of AI and PAL in English as a Foreign Language (EFL) writing instruction. These constructs provide a comprehensive framework for understanding the theoretical and practical implications of combining AI tools and peer-assisted learning strategies in enhancing EFL writing skills.

The conceptual framework (Figure 1) illustrates the relationships between these key constructs and their combined impact on enhancing academic writing skills among EFL learners. This framework highlights the synergy between AI tools and PAL strategies as a guide for the research design, data collection, and analysis processes.

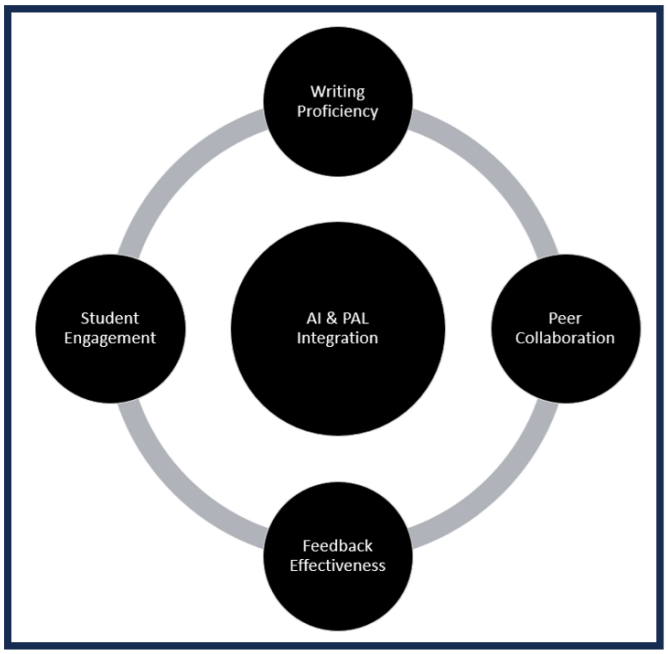

Figure 1: Research Model Framework

Writing Proficiency

Writing is a multifaceted and cyclical activity incorporating cognitive awareness, emotional engagement, and strategic actions. (Sun & Zhang, 2023). Among the four fundamental English skills—listening, speaking, reading, and writing—writing is regarded as the most challenging for learners, influenced by a variety of both objective and subjective factors (Anh, 2019). Writing proficiency is typically assessed through grammatical accuracy, lexical range, coherence, and task response, reflecting a learner's ability to produce clear and persuasive writing. (Ngubane et al., 2020).

Interventions such as iterative writing processes and targeted feedback have shown promise in improving EFL writing skills (Chen et al., 2022). AI tools like ChatGPT facilitate these improvements by providing real-time, personalized feedback that helps learners refine their drafts through multiple revisions (Dempere et al., 2023). Integrating AI with PAL allows students to engage in collaborative discussions about writing, leading to deeper understanding and incremental gains in writing proficiency. This approach aligns well with data-driven learning principles, discussed further in section 2.5, which support identifying and analyzing language patterns through repeated practice and feedback (Boulton & Cobb, 2017).

Feedback Effectiveness

Feedback is essential for improving writing skills, especially for EFL learners who may require detailed guidance to address language challenges. Traditional classroom feedback often suffers from delays, limiting its effectiveness in facilitating timely learning. (Carless, 2016). AI-driven tools, such as ChatGPT, have transformed feedback processes by providing instant, tailored suggestions that enable learners to correct grammar, coherence, and content organization errors as they arise. (Ibrahim, 2024).

Research suggests that AI-enhanced feedback identifies surface-level issues and offers deeper insights by explaining suggested changes and providing alternative phrasings. Thus, it supports learners in understanding the rationale behind each suggestion. (Schillings et al., 2023). When combined with PAL, AI-generated insights guide peer discussions on higher-order writing concerns, such as argumentation and style, enhancing the overall effectiveness of the feedback process. This aligns with DDL principles, emphasizing the importance of immediate feedback and pattern recognition in improving language skills. (Pérez-Paredes et al., 2019).

Student Engagement

Student engagement significantly influences learning outcomes in EFL settings, where learners may face motivational challenges due to language barriers. Engaging students in writing tasks can be difficult, as they may lack confidence or feel discouraged by language limitations. (Fredricks et al., 2004). Integrating AI tools and PAL strategies helps increase engagement by creating an interactive and supportive learning environment.

AI-powered tools like ChatGPT foster engagement by providing instant feedback, allowing students to see the immediate impact of their revisions, which motivates them to stay actively involved in the writing process. (Achour et al., 2024). The dynamic nature of AI-enhanced feedback encourages iterative revision, where students can explore different writing strategies and receive continuous input. Moreover, PAL promotes social interaction and collaborative learning, which are crucial for sustaining engagement. Peer discussions centered on AI-generated insights create a more reflective learning experience, improving writing quality. (Comer et al., 2014).

Peer Collaboration

Peer collaboration is pivotal in language learning by promoting structured interactions where students alternate roles as learners and peer mentors. PAL has been found to support the development of critical thinking, self-regulation, and writing skills through collaborative activities (Qiu & Lee, 2020). Integrating AI with PAL extends these benefits by providing AI-generated insights during peer review sessions, which can guide discussions and make the collaborative process more focused and productive.

Vygotsky's social constructivism, which emphasizes cognitive development through social interaction within a zone of proximal development (ZPD), supports the combined use of AI and PAL. (McCarthy & Armstrong, 2019). In this context, AI tools like ChatGPT act as more capable peers, offering scaffolded feedback that enables students to undertake challenging writing tasks. The feedback from AI can serve as a springboard for deeper exploration during PAL sessions, where peers engage in discussions that address both linguistic accuracy and higher-order writing skills, such as argumentation and cultural appropriateness.

Data-Driven Learning (DDL)

Data-driven learning (DDL) involves using authentic language data to uncover patterns and promote language awareness. Traditionally, DDL approaches have been associated with corpus-based instruction, which requires specialized tools and resources. (Godwin-Jones, 2021). However, advancements in AI, particularly in natural language processing, have made DDL principles more accessible to learners by enabling them to engage dynamically with language data.

ChatGPT's integration with DDL goes beyond conventional tools by allowing students to interact with language patterns in real time. Rather than merely checking for errors or paraphrasing text, ChatGPT helps learners explore various writing styles and linguistic structures by providing contextually relevant examples and suggestions. This aligns with DDL's inductive learning principles, where students experiment with language use and observe the effects on clarity, coherence, and tone. (Boulton & Cobb, 2017). The tool’s ability to facilitate real-time analysis of language choices enables learners to internalize writing strategies and develop a more nuanced understanding of language use.

Integrating DDL with PAL and AI tools such as ChatGPT offers a multifaceted approach to EFL writing instruction. Data-driven exploration of language patterns complements peer feedback and AI-generated insights. This combination supports learners in developing a more comprehensive skill set that addresses surface-level accuracy and deeper cognitive engagement with writing tasks.

Purpose and Scope of the Study

This study addresses the significant challenge that EFL learners face in mastering academic writing, given its complex nature and the limitations of traditional teaching methods. Although AI and PAL have shown potential in enhancing education, their combined impact on EFL academic writing proficiency is under-explored. This study specifically focuses on the unique contributions of ChatGPT, an AI-powered tool, in improving writing skills beyond conventional grammar-checking and paraphrasing.

The research aims to evaluate how ChatGPT's interactive feedback and iterative revision support, when integrated with PAL strategies, can enhance academic writing skills among EFL learners. By leveraging ChatGPT's capabilities to provide real-time, context-aware feedback, the study investigates its role in addressing linguistic challenges and fostering deeper engagement with the writing process. This approach distinguishes ChatGPT from other AI tools and positions it as a novel solution for democratizing high-quality writing instruction in EFL contexts.

Methodology

Research Design

This study employed a participatory action research design to explore the integration of AI, specifically ChatGPT, and PAL, in enhancing EFL academic writing skills. The design facilitated a collaborative and iterative approach, where the researchers and participants worked together to refine the educational intervention. A mixed-methods approach was used, combining quantitative and qualitative data collection to understand the research problem comprehensively. The study measured writing proficiency improvements through pre- and post-tests while exploring participants' experiences and perceptions through questionnaires and individual semi-structured interviews.

Participants

The participants in this study were selected to align with the study's purpose of evaluating the integration of AI-powered tools and PAL strategies in enhancing academic writing skills among EFL learners. The total population consisted of 245 undergraduate students enrolled in various General Education English writing courses at an international college in Thailand. These courses were offered to students across different academic programs and years, primarily within their first and second years. The students' grades ranged from freshmen (Year 1) to sophomores (Year 2), ensuring representation of different levels of writing experience and familiarity with academic writing practices.

A stratified random sampling method was employed to ensure a representative sample, resulting in a total sample size of 143 participants, all of whom were part of the experimental group. There was no control group in this participatory action research study. All students participated in the intervention, which integrated ChatGPT and PAL. The sample was stratified according to English proficiency levels, as determined by scores on a standardized in-house English placement test. The participants selected for the study all had a CEFR proficiency level of B2 or higher, indicating an upper-intermediate to advanced level of English. This sampling approach allowed for the inclusion of a diverse group of students in terms of language proficiency and academic background.

Cultural diversity was a significant feature of the sample, with participants coming from various cultural and linguistic backgrounds. The cohort included students from Thailand, Myanmar, China, Vietnam, and Japan and fewer students from European and Middle Eastern countries. This cultural diversity added dimension to the study, allowing for the exploration of how AI and PAL strategies could cater to students with different linguistic and cultural experiences.

Research Model Framework

The research model framework for this study integrates AI-powered tools, specifically ChatGPT, with Peer-Assisted Learning (PAL) strategies to enhance EFL academic writing skills. The framework incorporates key constructs such as Writing Proficiency, Feedback Effectiveness, Student Engagement, and Peer Collaboration, which are essential for understanding the impact of AI and PAL on writing development. These constructs are

discussed in detail in the Literature Review, where their theoretical foundations and significance in language learning are elaborated. The framework guides the research design, data collection, and analysis processes, highlighting the interactions between AI tools and PAL strategies in improving students' writing.

Data Collection Procedures

This study employed a mixed-methods approach to collect quantitative and qualitative data, ensuring a thorough understanding of the integration of AI and PAL in EFL academic writing instruction.

Quantitative Data Collection

The qualitative part of this study is pre-and post-tests and questionnaires. They were designed to complement the quantitative analysis by exploring the participants' subjective experiences. Specifically, the qualitative study aimed to gain deeper insights into how EFL learners perceived and experienced the integration of AI, particularly ChatGPT and PAL, in their academic writing processes. This approach aimed to explore the impact of these interventions on writing proficiency and the challenges, perceptions, and benefits students encountered throughout the course.

Quantitative Data Collection

The qualitative data were collected through individual semi-structured interviews administered at the end of the intervention. The semi-structured interviews were conducted with 50 randomly selected participants from diverse cultural and linguistic backgrounds, ensuring representation across different writing proficiency levels and academic programs. These interviews allowed students to share their experiences, detailing how they interacted with AI-generated feedback and engaged in peer-assisted learning sessions. Key areas of focus included their perceptions of AI feedback, the role of peer collaboration, and the perceived value of these tools in developing their academic writing skills.

The qualitative study sought to provide a comprehensive understanding of the students' subjective experiences, particularly about their diverse cultural and linguistic contexts. This was critical for understanding how the combination of AI and PAL catered to students from

different backgrounds and how factors such as language proficiency, cultural expectations, and prior exposure to technology influenced their engagement with the interventions.

The interviews were analyzed using thematic analysis to identify recurring patterns, challenges, and themes related to using AI and PAL in academic writing instruction. The goal of the qualitative study was to assess the effectiveness of AI and PAL from a technical perspective and understand how students perceived these tools as part of their learning experience. This qualitative analysis provided nuanced insights into the learning process's social, emotional, and cognitive dimensions, offering a richer context for the study's overall findings.

By integrating qualitative data, the study examined the broader implications of AI and PAL for diverse groups of students, highlighting both the strengths and areas for improvement in the application of these innovative teaching methods.

Integration of AI and PAL in EFL Writing

The methodology employed in this study expands the traditional PAL approach by integrating ChatGPT, an AI-driven tool, to provide personalized and real-time feedback during the writing process. ChatGPT's AI capabilities allow it to identify issues related to language use, coherence, and argument structure, offering insights that may not be immediately evident to peers. This feedback supports an iterative writing process where students draft, receive AI-enhanced feedback, and revise their work before engaging in PAL sessions.

The integration aligns with theoretical perspectives, such as the process-oriented approach to writing, which emphasizes iterative drafting, feedback, and revision as central components of writing development. (Widodo, 2008)In this study, ChatGPT is used to provide immediate, detailed feedback on language mechanics and content organization. Students then bring this feedback to PAL sessions for deeper discussions on higher-order writing concerns such as argumentation and style. This multi-step process helps students holistically refine their writing, addressing linguistic accuracy and cognitive development.

Moreover, Vygotsky's social constructivism provides a foundation for combining AI and PAL. According to Vygotsky, learning occurs through social interaction within a zone of proximal development (ZPD), where learners benefit from the guidance of more capable peers

or tools. (McCarthy & Armstrong, 2019). In this context, ChatGPT acts as a more capable peer, offering scaffolded support that guides students through challenging writing tasks. The PAL sessions then build on this support by allowing students to interact with their actual peers, who provide social reinforcement and additional perspectives, further enhancing the learning process.

The methodology also incorporates a learner-centered approach, recognizing that ChatGPT's feedback can be personalized based on student input. Unlike traditional grammar-checking tools, ChatGPT adapts its feedback according to the prompts, enabling a customized learning experience. The PAL framework complements this by encouraging peer mentors to engage with AI-generated feedback and provide supplementary advice, making the feedback process richer and more multidimensional. This approach addresses surface-level issues like grammar and deeper aspects such as content development and cultural appropriateness in writing.

Procedures

The academic writing course, which served as the context for this study, was designed to improve students' academic writing proficiency according to IELTS standards. Over fifteen weeks, the course covered ten modules, including thesis statements, topic sentences, providing evidence, achieving coherence, synthesizing main points, and writing conclusions. The curriculum emphasized a student-centric approach, fostering independent learning, collaborative endeavors, and critical thinking.

Each week, participants attended a three-hour class comprising approximately 1.5 hours of teacher-led instruction, followed by one hour dedicated to writing an in-class paragraph or short essay of about 250 words. Instructors provided individual feedback on these writing tasks. The lesson procedures were systematically designed to integrate ChatGPT, reflecting the study's focus on leveraging AI technology to enhance writing skills.

The experimental group received targeted treatment that combined ChatGPT and PAL. An instructional session was initially conducted to familiarize students with the platform, including guidance on using ChatGPT for paraphrasing texts, refining questions for more detailed feedback, and utilizing the tool alongside traditional resources such as textbooks and grammar manuals. The AI feedback was used as a starting point for PAL sessions, where

students discussed AI suggestions with their peers, focusing on higher-order writing concerns like argument structure and cultural context.

Following the day's writing tasks, students in the experimental group used ChatGPT to paraphrase their work. They were provided with a Microsoft Forms worksheet containing questions designed to help them compare their original writing with the output generated by ChatGPT. These questions were aligned with the official IELTS essay writing rubric, focusing on coherence and cohesion, lexical resources, and grammatical range. This reflective practice was intended to deepen students' understanding of effective writing strategies and improve their writing skills, aligning with the study's objective of evaluating the benefits of AI integration.

In addition to the in-class activities, participants in the experimental group acted as peer mentors in the university's PAL center. For ten weeks, each participant spent one hour per week helping students in the Thai program with their English essay-writing skills. The mentoring role provided an additional layer of practice, reinforcing the experimental group's learning by requiring them to articulate and apply their writing skills in a mentoring context. This methodology aspect underscored the study's emphasis on combining AI tools with collaborative learning strategies to enhance academic writing proficiency.

Data Analysis

Quantitative Data Analysis

Pre- and Post-tests

To evaluate the effectiveness of the AI (ChatGPT) and PAL interventions on EFL academic writing skills, pretests and posttests were administered to the participants. These tests were designed to assess the student's proficiency in writing IELTS-style opinion essays, which align with the study's objective of enhancing academic writing skills. Each participant's writing was evaluated based on the IELTS Task 2 Writing band descriptors.

The pretest was administered at the beginning of the course to establish a baseline for each student's writing ability. The posttest was conducted at the end of the course to measure any improvements in writing skills. Scores ranged from 1 to 9, with each band representing a specific level of writing proficiency. The scores from these tests were compared using a paired

samples t-test to determine the statistical significance of the observed changes. This approach ensured a comprehensive assessment of the impact of AI and PAL on writing proficiency, directly aligning with the study's purpose.

Pre-test Procedure

The pretest was administered during the first week of the course to establish a baseline for each student's writing ability. Participants were informed in advance about the pretest schedule and were provided with guidelines on the test format. The pretest involved writing an IELTS-style opinion essay within a 40-minute timeframe under standardized exam conditions to ensure consistency and minimize external variables. Each participant's essay was evaluated based on the IELTS Task 2 Writing band descriptors, which assess various aspects of writing, including coherence and cohesion, lexical resource, grammatical range and accuracy, and task response.

Post-Test Procedure

The posttest was conducted during the course's final week to measure any improvements in writing skills after the intervention. Like the pretest, the posttest required participants to write an IELTS-style opinion essay under standardized exam conditions. The same evaluation criteria and band descriptors were used to ensure consistency in scoring. The posttest essays were assessed by the same team of trained evaluators who scored the pretests, ensuring reliability and reducing potential biases.

Scoring and Analysis

Scores for pretests and posttests ranged from 1 to 9, with each band representing a specific level of writing proficiency. To ensure accuracy, two evaluators independently scored each essay, and any discrepancies in scoring were resolved through discussion and consensus. The pretest and posttest scores were then compared using a paired samples t-test to determine the statistical significance of the observed changes. This statistical analysis allowed for a comprehensive assessment of the impact of the AI and PAL interventions on writing proficiency, directly aligning with the study's purpose.

Ensuring Validity and Reliability

A pilot test was conducted with a small group of participants before the main study to ensure further the validity and reliability of the pretest and posttest procedures. Feedback from this pilot test was used to refine the test administration procedures and ensure that the instructions and conditions were clear and consistent for all participants. Additionally, regular training sessions were held for the evaluators to standardize the scoring process and maintain high inter-rater reliability.

Questionnaires

A carefully designed questionnaire was administered to gather comprehensive data on participants' perceptions of the AI (ChatGPT) and PAL interventions. This questionnaire assessed various dimensions of participants' experiences, including support and resources, training and preparedness, and personal development and impact.

The 12-item questionnaire was developed through a multi-step process to ensure its relevance and clarity. Initially, items were generated based on a thorough literature review on AI in education, peer-assisted learning, and EFL writing instruction. Three experts in the field then reviewed the draft questionnaire to ensure content validity. An Index of Item-Objective Congruence (IOC) score of 1.0 was achieved, indicating high congruence among the assessors. A pilot test was conducted with a small group of participants to refine the questionnaire, leading to minor adjustments for clarity and coherence.

The final version of the questionnaire was administered to all participants at the end of the course after completing the post-tests. Participants were given clear instructions on completing the questionnaire, which was distributed in paper form during class and electronically via a secure online platform. The questionnaire included a cover letter explaining the purpose of the study, ensuring anonymity, and emphasizing that participation was voluntary. Participants were assured that their responses would be kept confidential and used solely for research purposes.

The questionnaire was divided into three sections. The first section, Support and Resources, included items that assessed the availability and accessibility of AI tools and PAL sessions, and the perceived adequacy of these resources in supporting participants' learning. The second

section, Training and Preparedness, evaluated participants' perceptions of the training they received on how to use ChatGPT and engage in PAL activities, as well as their preparedness to use these tools effectively. The final section, Personal Development and Impact, focused on participants' perceptions of the impact of the AI and PAL interventions on their writing skills, confidence, and overall academic development. Each item was rated on a Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree).

All responses were collected and stored securely to ensure confidentiality. The questionnaire data were then analyzed using descriptive and inferential statistics to identify trends and patterns. The reliability of the questionnaire was assessed using Cronbach's Alpha, which yielded a high-reliability coefficient of 0.949, indicating strong internal consistency.

To further ensure the validity and reliability of the questionnaire, feedback from the pilot test was incorporated to refine the wording and structure of the items. Additionally, regular follow-ups with participants during the course ensured that any ambiguities or concerns regarding the questionnaire were promptly addressed. By detailing the development, administration, and analysis procedures for the questionnaire, this revised methodology ensures a transparent and rigorous approach to collecting and interpreting data on participants' perceptions of the AI and PAL interventions. This addresses the reviewers' concerns and strengthens the overall research design.

Qualitative Data Analysis

Individual Semi-structured Interviews

Following the treatments, a random sampling of 50 individuals from the experimental group was selected for an individual semi-structured interview, with consideration given to gender representation and a diverse range of English language proficiency levels. Each interview, based on 17 initial questions, spanned between 10 to 15 minutes. Interview sessions were video recorded, transcribed, and analyzed.

These interviews aimed to gather in-depth qualitative data on participants' experiences with the AI and PAL interventions. The questions were designed to explore themes such as increased confidence, enhanced writing skills, and attitudes towards AI tools. This qualitative approach provided a nuanced understanding of the participants' perspectives, complementing

the quantitative data and aligning with the study's objective of evaluating the comprehensive impact of AI and PAL on EFL academic writing skills.

Results

Quantitative Findings

Pretests and Posttests

The results of the writing pretests and posttests showed a significant improvement in the posttest scores compared to the pretest scores. The mean pre-test score was 5.44, while the mean post-test score increased to 6.34. This improvement was statistically significant, with a p-value of less than 0.05, indicating that the intervention positively affected the students' writing skills.

Table 1 Comparison of the pre-test and post-test between the experimental group

Group	Pre-Test		Post-Test		Mean Difference	SD	P-value
Experimental	($\bar{x}$)	SD	($\bar{x}$)	SD	6.34 – 5.44 = 0.9	1.70	0.00**
	5.4	1.47	6.34	1.23			

Significance level (p): ≤ 0.05 – significant

A detailed analysis of individual scores revealed that 75% of the participants showed an improvement in their writing proficiency. Notable improvements were observed in areas such as coherence and cohesion, lexical resource, and grammatical range and accuracy. For instance, one participant showed a 100% improvement, increasing from a pre-test score of 3.5 to a post-test score of 7. Similarly, another participant demonstrated a 125% increase, moving from a score of 4 to 9.

Questionnaires

The questionnaire results showed a very high overall satisfaction level, with mean scores of 4.0 (SD = 0.79) for support and resources, 4.0 (SD = 0.80) for training and preparedness, and 4.0 (SD = 0.80) for personal development and impact. All participants (n = 31) completed the questionnaire, and the results indicated that 100% of the responses were classified as 'high' satisfaction levels.

In the support and resources section, students appreciated the availability and accessibility of AI tools like ChatGPT and the PAL sessions. Participants reported feeling adequately prepared to use the AI tools effectively in the training and preparedness section. The personal development and impact section highlighted the positive influence of the intervention on students' confidence and motivation in academic writing.

Qualitative Findings

Individual Semi-structured Interviews

The qualitative data, collected through semi-structured interviews, provided a deeper understanding of how EFL learners experienced integrating ChatGPT and PAL in their writing development. The thematic analysis of the interview data revealed several key themes related to confidence, collaborative learning, and the perceived value of AI-generated feedback.

Patterns Related to Cultural and Linguistic Backgrounds

Cultural and linguistic backgrounds significantly shaped students' experiences with the AI and PAL interventions. Participants from collectivist cultures (e.g., Thailand, Myanmar, China) strongly preferred the collaborative elements of PAL, often viewing the peer feedback sessions as an extension of their cultural emphasis on group work and mutual support. These students reported that discussing AI-generated feedback with peers enhanced their understanding of writing issues and fostered a more supportive learning environment. One participant from Myanmar noted, *"Discussing my writing with my peers and the AI feedback together helped me see things I couldn't on my own."*

In contrast, participants from more individualistic cultures preferred to engage with the AI feedback independently. ChatGPT provided immediate, personalized feedback for these students, allowing them to revise their writing without the need for extensive peer discussion. As a participant from a European background stated, *"I liked that I could use the AI feedback on my own time and focus on improving my writing without having to rely on others."*

Variations Based on English Proficiency Levels

English proficiency levels also significantly influenced how participants interacted with AI and PAL. Higher-proficiency students (CEFR B2 or above) could engage more critically with

the feedback provided by ChatGPT, focusing on refining higher-order aspects of writing, such as argumentation and coherence. These students reported feeling more confident using AI feedback to address complex issues in their drafts, reflected in their greater posttest score improvements. One higher-proficiency participant stated, *"The AI feedback helped me think about how to make my arguments clearer and stronger."*

In contrast, lower-proficiency students focused more on surface-level corrections, such as grammar and vocabulary, and struggled to utilize the AI feedback for more complex revisions. These students often relied on peer discussions to better understand the AI's suggestions, indicating that the combination of AI and PAL was especially helpful for those with less advanced English skills. A student from Thailand noted, *"I found it hard to understand some of the AI feedback at first, but talking with my classmates made it clearer."*

Attitudes Toward Technology and Prior Exposure to AI

Participants' prior exposure to AI tools influenced their attitudes toward ChatGPT and their ability to integrate AI-generated feedback into their writing process. Those who had prior experience with AI-assisted technologies, such as automated grammar checkers, adapted quickly to ChatGPT's feedback, using it to make targeted revisions to their essays. These participants expressed confidence in the AI's ability to identify areas for improvement and were more independent in applying the feedback. A participant with prior AI experience said, *"I've used AI tools before, so I knew how to make the most of ChatGPT's suggestions."*

On the other hand, participants who were less familiar with AI tools initially found it challenging to interpret the feedback, requiring additional time to understand and apply the suggestions effectively. For these students, the PAL sessions were crucial in helping them navigate the AI feedback. As one lower-exposure student noted, *"At first, I wasn't sure how to use the feedback, but discussing it with my peers really helped."*

Discussion

Summary of Key Findings

The findings from this study demonstrate a clear improvement in academic writing proficiency among EFL learners who engaged in the AI-supported PAL intervention. Both quantitative and qualitative results indicated substantial gains in coherence, grammatical

accuracy, and overall writing quality. However, the effectiveness of the intervention was not uniform across all participants. It was influenced by various participant characteristics such as nationality, English proficiency levels, and prior exposure to AI tools. These characteristics played a crucial role in shaping how learners interacted with the AI feedback and PAL, ultimately impacting the success of the intervention.

Interpretation of Quantitative Findings

The quantitative results from this study demonstrate a notable improvement in writing proficiency among EFL learners who utilized AI-enhanced tools such as ChatGPT in combination with PAL. The average pretest score of 5.44 significantly increased to 6.34 in the posttest, showing substantial enhancement in various dimensions of academic writing. However, as explored in more depth below, participant characteristics such as nationality and English proficiency affected how these gains were realized across the cohort.

Coherence and Cohesion

ChatGPT's real-time feedback proved especially valuable in improving the coherence and cohesion of students' writing. The AI tool was particularly effective in identifying disjointed or unclear connections between sentences and paragraphs, prompting students to reorganize their ideas into more logically structured essays. The improvement in students' writing coherence and cohesion aligns with previous findings by (Dempere et al., 2023), who also found that AI tools can significantly enhance organizational aspects of writing. This suggests that AI-supported interventions can address structural weaknesses in student writing by offering immediate and targeted feedback on the flow of ideas.

However, nationality and cultural background appeared to influence how students engaged with this feedback. Learners from collectivist cultures (e.g., Thailand, Myanmar, and China) were more likely to use PAL sessions to discuss these AI-generated insights in-depth, often working collaboratively to improve their text structure. In contrast, students from more individualistic cultures tended to rely on AI feedback alone, which may have limited the peer-driven exploration of coherence and cohesion issues.

Grammar and Vocabulary

Significant advancements were observed in grammar and vocabulary use, as ChatGPT provided instant corrections on grammatical errors and suggested alternative word choices. The immediacy of the AI feedback allowed students to address issues as they arose, contributing to their overall improvement in writing proficiency. This study's findings echo those of (Carless, 2016), who emphasized the importance of immediate feedback in improving writing skills. However, these improvements were not experienced equally across all participants. English proficiency levels played a crucial role, with higher-proficiency learners (CEFR B2 or above) showing greater gains in vocabulary variety and grammar accuracy.

Argumentation and Critical Thinking

Regarding argumentation and critical thinking, ChatGPT played a crucial role in helping students enhance their reasoning skills. The AI tool prompted students to clarify their arguments, provide more evidence, and address counterpoints. However, the collaborative aspect of PAL further supported this development by enabling students to engage in discussions that deepened their understanding of these higher-order skills. These results support Vygotsky's (1978) Theory of social constructivism, particularly the concept of learning within the Zone of Proximal Development, as PAL sessions enabled students to benefit from collaborative interactions. Through PAL, students could explore different perspectives, improving their ability to construct and defend more sophisticated arguments.

Personalized Feedback and Engagement

One of the key advantages of integrating ChatGPT was its ability to provide personalized feedback, which significantly boosted student engagement. The immediate nature of the feedback allowed learners to act on suggestions. At the same time, the writing process was still fresh, leading to higher levels of motivation and a greater investment in refining their drafts. However, cultural factors played a role in how students engaged with this feedback. Students from cultures that emphasize collaboration and group learning were more likely to use AI feedback as a starting point for peer discussions. In contrast, students from more individualistic cultures preferred to revise their drafts independently. This difference in approach underscores the need to tailor AI and PAL interventions to the cultural contexts of the learners in order to maximize engagement and effectiveness.

Adapting Interventions for Different Demographics

Given the influence of participant characteristics such as nationality**,** English proficiency, and prior exposure to AI tools, AI and PAL interventions should be adapted to suit the needs of diverse student demographics. For example, students from collectivist cultures may benefit from incorporating more structured peer collaboration into PAL sessions. In contrast, students from individualistic cultures may prefer more autonomous tasks that allow them to engage with AI feedback independently. Additionally, students with lower English proficiency levels may require more scaffolded support when using AI tools like ChatGPT to ensure that they can engage with the feedback effectively.

To ensure the effectiveness of AI and PAL interventions across different cultural contexts, educators should consider providing targeted training that addresses students' familiarity with AI tools and their preferred learning styles. This could include offering workshops on how to use AI to improve different aspects of writing, as well as incorporating culturally responsive teaching strategies that align with the learning preferences of students from diverse backgrounds.

Integration of AI and PAL in EFL Writing

Integrating AI tools, particularly ChatGPT, with PAL in EFL writing instruction proved to be an effective strategy for improving both the technical and cognitive aspects of academic writing. The combination of real-time, AI-generated feedback and peer collaboration created a multi-layered support system that benefited the learners in different ways. However, the success of this integration was not uniform across the entire sample, and participant characteristics such as nationality**,** English proficiency, and prior exposure to AI tools played critical roles in shaping these outcomes.

Effectiveness Based on Cultural Context

Students from collectivist cultures, such as those from Thailand, Myanmar, and China, demonstrated a strong affinity for the collaborative aspects of PAL. The AI-generated feedback provided by ChatGPT served as a starting point for peer discussions, which enabled these students to refine their writing collaboratively. For these students, the combination of AI and PAL aligned with their culturally ingrained values of group work and mutual support. This

synergy between AI and PAL created a feedback loop that was particularly effective in improving higher-order skills like argumentation and critical thinking, as peers could build on the AI feedback to offer culturally relevant insights.

In contrast, students from more individualistic cultures tended to engage with AI feedback more autonomously, often focusing on technical corrections such as grammar and vocabulary. For these learners, the PAL component was less integral to their success, as they preferred to make revisions independently based on the AI's suggestions. This highlights the importance of adapting PAL interventions to cultural preferences, as not all students benefit equally from peer collaboration.

Differential Impact Based on English Proficiency

The integration of AI and PAL also had varying levels of effectiveness depending on students' English proficiency levels. Higher-proficiency students could maximize the benefits of AI and PAL by engaging in more complex revisions and discussions, using AI feedback to tackle nuanced aspects of academic writing such as coherence, cohesion, and argument development. These students thrived in the PAL sessions, where they could discuss AI feedback more deeply with their peers.

However, for lower-proficiency students, the AI-PAL integration primarily focused on surface-level issues, such as grammar and basic sentence structure. While the AI feedback helped them correct errors, these students often struggled to engage with the higher-order feedback on content organization and style. In these cases, the PAL sessions were less about refining complex ideas and more about understanding and applying the technical feedback from ChatGPT. This suggests that, for lower-proficiency students, more scaffolding may be needed to help them engage fully with the AI feedback and the peer-assisted discussions.

Role of Prior AI Exposure

The study also revealed that students who had prior exposure to AI tools were better able to integrate ChatGPT feedback into their writing process. These students confidently approached the AI feedback, using it to make targeted improvements to their drafts. In contrast, students with little prior experience with AI tools were slower to adapt, requiring more time to understand how to interact with the AI feedback and apply it effectively. This indicates that future iterations of AI-PAL interventions should include training sessions that familiarize

students with the capabilities and limitations of AI tools like ChatGPT, particularly for those new to such technologies.

The Holistic Impact of AI and PAL

Overall, integrating AI and PAL supported a more dynamic and interactive learning environment for EFL students. The AI provided personalized, immediate feedback, while PAL facilitated deeper reflection and peer support. However, the extent to which students benefited from this dual approach was closely tied to their cultural backgrounds, proficiency levels, and prior exposure to AI tools. To maximize the effectiveness of these interventions, educators must consider these variables and tailor the AI-PAL integration to meet the specific needs and preferences of diverse student populations.

Addressing Dependency and Unfair Advantage

While the advantages of incorporating AI tools in EFL writing instruction are clear, several challenges must be addressed. One significant concern is the potential for students to become overly dependent on AI tools, which may impede the development of their independent critical thinking and problem-solving abilities. As noted by (Johnston et al., 2024), the over-reliance on AI tools may impede the development of independent critical thinking, which remains a challenge in technology-enhanced learning environments. To mitigate this risk, educators should promote a balanced approach, utilizing AI tools as supplementary aids rather than primary solutions for academic tasks.

Implications of the Study

The findings of this study have several significant implications for EFL writing pedagogy, aligning closely with the study's goal of integrating AI and PAL strategies. These implications highlight the potential benefits and necessary considerations for effectively incorporating AI and PAL into EFL instruction.

Firstly, incorporating AI tools like ChatGPT can markedly enhance the effectiveness of writing instruction by offering immediate and personalized feedback. This approach can resolve delayed feedback in traditional classroom settings, enabling students to learn and improve their writing skills more efficiently. The ability to provide real-time corrections and

suggestions helps students promptly address their mistakes, fostering a more effective learning process.

Secondly, combining AI tools with PAL can create a more interactive and engaging learning environment. PAL programs have shown substantial improvements in learner confidence and overall comprehension, particularly in traditionally challenging subjects. By leveraging the strengths of both AI and PAL, educators can establish a supportive and effective learning environment that caters to the diverse needs of EFL students. The collaborative nature of PAL, when enhanced by AI, can significantly boost student engagement and motivation.

Thirdly, the study underscores the potential of AI tools to enhance intercultural competence. As the globalized world necessitates individuals to navigate and understand different cultural contexts, integrating AI tools that provide culturally relevant feedback can help students develop this essential skill. Understanding cultural nuances in writing is crucial for EFL students, and AI tools can facilitate this understanding, preparing students for effective communication in diverse settings.

While the benefits of integrating AI tools into EFL writing instruction are clear, several challenges must be addressed. One significant concern is the potential for students to become overly dependent on AI tools, which may impede the development of their independent critical thinking and problem-solving abilities. To mitigate this risk, educators should promote a balanced approach, utilizing AI tools as supplementary aids rather than primary solutions for academic tasks. Encouraging students to critically engage with AI feedback and develop their own problem-solving strategies is essential.

Another challenge is the risk of creating an unfair advantage for students with better access to AI tools. This issue can exacerbate existing inequalities within educational institutions. To ensure equitable access, schools and universities must provide the necessary resources and training to all students, enabling them to benefit from AI tools regardless of their socio-economic background. Addressing this disparity is vital to fostering an inclusive and fair learning environment.

Recommendations for Future Research

Expanding AI Integration

Although ChatGPT has demonstrated significant potential in enhancing academic writing skills, future research should investigate additional AI-driven technologies, such as intelligent tutoring systems and adaptive learning platforms. Moreover, future research should examine the long-term effects of AI integration, as suggested by (Boulton & Cobb, 2017), to understand its sustained impact on academic writing development. Comparative studies evaluating the effectiveness of different AI tools could provide valuable insights into their specific benefits and limitations, aligning with the study's objective of optimizing AI integration in EFL academic writing instruction.

Impact on Various Student Demographics

Future research should investigate the impact of AI tools on different student demographics, including varying levels of language proficiency, cultural backgrounds, and learning styles. Examining how AI tools can be tailored to meet the needs of diverse learners will aid in developing inclusive educational strategies that ensure equitable access to quality education. This research could involve studying the varying effects of AI-assisted learning on younger versus older students, as well as on students from different socioeconomic backgrounds. Such studies would align with the study's objective of enhancing EFL academic writing skills for a diverse student population.

Ethical Considerations and Best Practices

Given the ethical concerns associated with AI in education, such as data privacy, academic honesty, and the potential for over-reliance on technology, future research should comprehensively address these issues. Studies should develop and test frameworks for ethical AI integration that ensure data security and uphold academic integrity. Establishing best practices for using AI tools in education can help mitigate risks and maximize their educational benefits, directly supporting the study's goal of effectively integrating AI into EFL instruction.

Broader Contexts and Demographics

Future research should broaden the scope of AI-assisted writing instruction to include diverse linguistic and cultural contexts. Studies should evaluate the effectiveness of AI tools in non-English language learning environments and explore how these tools can be adapted to address specific linguistic challenges faced by learners with different native languages. Ensuring cultural sensitivity and the ability of AI tools to understand and respect cultural nuances in writing are crucial. Developing inclusive AI-driven educational models that provide equitable access for marginalized or underrepresented groups is essential, aligning with the study's aim of supporting diverse learner needs.

Additionally, research should examine the impact of AI on various demographic groups, including age, gender, and socioeconomic status, to identify and address potential disparities. Encouraging international collaborations and piloting AI-assisted writing programs globally can yield valuable data on their effectiveness and scalability. This information will inform policy recommendations for inclusive and effective AI integration in education worldwide, supporting the study's goal of enhancing EFL academic writing skills through innovative approaches.

Longitudinal Studies

Prolonged research is essential to fully understand the lasting effects of AI and PAL on students' writing skills. While short-term studies offer initial insights into the benefits of integrating AI tools like ChatGPT into academic writing pedagogy, they do not capture the complete impact over time. Future research should involve extended study periods to assess how sustained use of AI tools influences students' writing proficiency, confidence, and overall academic performance. This research should track the progress of students over several semesters or academic years to evaluate the long-term retention and application of writing skills developed through AI-assisted learning. Additionally, longitudinal studies can uncover potential shifts in students' attitudes towards writing and their self-efficacy, providing a comprehensive understanding of the educational and psychological impacts of integrating AI and PAL into writing instruction.

By focusing on these long-term effects, educators and researchers can better evaluate the true value and effectiveness of AI technologies in enhancing EFL writing pedagogy. These efforts

will contribute to a more balanced understanding of AI's role in EFL academic writing pedagogy, ultimately improving teaching practices and learning outcomes in alignment with the study's purpose and scope.

Limitations of the Study

Sample Size and Generalizability

The study's sample size and specific EFL context present notable limitations. Although the sample size was adequate for preliminary analysis, it restricts the generalizability of the findings to broader contexts. This study primarily focused on a specific group of EFL learners using AI-driven tools for academic writing. Consequently, the conclusions drawn may not be applicable to different linguistic or cultural settings. Additionally, the reliance on ChatGPT, a relatively new technology in education, further limits the generalizability of the findings. Therefore, caution is advised when applying these insights to other educational environments, as the unique characteristics of the sample and the specific implementation of AI tools could yield different results in varied contexts. This limitation underscores the need for future research to include larger and more diverse participant groups to validate and extend the applicability of the study's outcomes, directly supporting the study's aim of enhancing EFL academic writing skills.

Technological Constraints

The study encountered several challenges due to the evolving nature of AI technology during the research period. As AI tools like ChatGPT advanced, significant improvements in their capabilities affected the consistency and reliability of the feedback provided to students. This evolution required continuous adaptation and recalibration of the AI tools used in the study to ensure that the feedback remained relevant and effective. The rapid pace of AI development highlighted the difficulty in maintaining a stable research environment, as new updates and features could unexpectedly alter the dynamics of AI-student interactions. For example, newer versions of ChatGPT introduced more advanced feedback mechanisms that were not available at the beginning of the research, thus affecting the comparability of results over time. These technological constraints underscore the importance of considering the fluid nature of AI advancements in future research designs and the potential need for ongoing adjustments to leverage the full benefits of AI tools while maintaining methodological integrity, aligning with the study's aim of effectively integrating AI into EFL instruction.

Duration of the Study

The study's duration, confined to a 10-session program, presents specific considerations and limitations. Conducting the research over this relatively short period provided a snapshot of the impact of AI-assisted writing instruction. However, it restricted the ability to observe long-term effects and sustained changes in writing skills. This brief duration may not have allowed participants to fully integrate and adapt to the new learning tools and strategies, potentially underestimating the intervention's benefits. Consequently, while the findings offer valuable initial insights, they should be interpreted with caution regarding their long-term applicability and sustainability. Future research should consider longer study periods to capture more comprehensive data on the enduring effects of AI integration in EFL writing pedagogy, directly supporting the study's aim of enhancing EFL academic writing skills through sustained interventions.

Reliability and Consistency of AI Feedback

Integrating AI tools like ChatGPT into academic writing instruction presents several reliability challenges that could impact educational outcomes. A significant issue is ChatGPT's occasional generation of incorrect or irrelevant content, which can mislead students and compromise the quality of their assignments. These errors undermine the credibility of AI as an educational tool and disrupt the learning process, potentially spreading misinformation. ChatGPT's inconsistent ability to apply advanced critical thinking or handle nuanced academic arguments adds complexity, especially in higher education, where deep understanding is crucial. These concerns necessitate a cautious approach to integrating AI technologies, ensuring they enhance rather than replace traditional academic rigor in alignment with the study's objective of enhancing EFL academic writing proficiency.

Dependency on AI Tools

Another significant limitation is the potential dependency on AI tools among students. Over-reliance on AI assistance could detract from essential academic skills, such as independently sourcing and evaluating information foundational to scholarly work. This dependency may lead students to bypass rigorous conceptual understanding and critical analysis processes, opting for the convenience of generated responses. Such reliance impacts the depth of their learning and reduces their ability to engage deeply with complex material. Continuous reliance on AI for academic tasks might diminish students' intrinsic motivation to explore and

articulate original ideas, ultimately eroding critical skills and academic standards. Addressing this concern is crucial to ensure that AI tools complement and enhance traditional learning methods rather than replace them.

Ethical Concerns and Academic Integrity

The integration of AI tools into academic writing pedagogy raises ethical concerns, particularly regarding the potential for creating an unfair advantage among students. Some students might use these technologies to bypass traditional learning processes, leading to work submissions that do not fully reflect their own efforts. This discrepancy can distort academic achievements, making grades an inaccurate representation of a student's knowledge or effort and undermining the integrity of educational assessments. Additionally, differences in access to and proficiency with AI tools among students can exacerbate existing inequalities within educational institutions. Educators must implement strategies to ensure fair and equitable use of AI tools while supporting the development of critical thinking and writing skills. Establishing guidelines and best practices for ethical AI integration will be essential to uphold academic integrity and promote equitable educational outcomes, aligning with the study's aim of fostering an inclusive and effective learning environment.

Conclusion

This study demonstrated that integrating AI tools, specifically ChatGPT, with PAL significantly improves academic writing proficiency among EFL learners. The findings showed clear advancements in coherence, grammatical accuracy, and overall writing quality. However, the effectiveness of these interventions was not uniform across the entire sample group, as characteristics such as nationality, English proficiency, and prior exposure to AI tools played crucial roles in shaping students' engagement and the degree to which they benefited from the interventions.

The diversity of the sample group, which included students from a range of cultural and linguistic backgrounds (e.g., Thailand, Myanmar, China, and other countries), enriched the study by offering insights into how AI and PAL function within different educational and cultural contexts. For example, students from collectivist cultures were more likely to engage deeply in the collaborative elements of PAL. In contrast, those from individualistic cultures preferred to work more independently with the AI feedback. Additionally, higher-proficiency

students leveraged AI feedback to refine higher-order writing skills, while lower-proficiency students focused on surface-level improvements. This diversity underscores the importance of adapting AI and PAL interventions to suit different cultural preferences and proficiency levels.

However, this diversity also presents certain limitations regarding the generalizability of the findings. While the results provide valuable insights into how AI and PAL can enhance writing proficiency in a culturally diverse EFL context, they may not be fully applicable to more homogeneous groups or to learners from different regions where cultural attitudes toward peer collaboration and technology use differ. The varying degrees of familiarity with AI tools among the participants further highlight the need for targeted training and adaptation when implementing AI-based learning strategies across different learner groups.

In conclusion, while the integration of AI and PAL shows great potential for improving EFL academic writing, educators must consider the specific needs and characteristics of diverse student populations to optimize these interventions. Future research should continue to explore how AI and PAL can be tailored to address the unique challenges and preferences of students from varied cultural, linguistic, and educational backgrounds, ensuring that all learners can fully benefit from these innovative approaches to language learning.

Acknowledgments

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Ethical Statement

This study was conducted per ethical standards and guidelines for research involving human participants. Ethical approval was obtained from the relevant institutional review board at the participating university. Informed consent was obtained from all participants, who were assured of the confidentiality and anonymity of their responses. Participation in the study was voluntary, and participants had the right to withdraw at any time without any repercussions. The data collected was used solely for this research and was securely stored to ensure privacy and confidentiality. Additionally, the study adhered to the ethical principles of honesty, integrity, and transparency in reporting research findings.

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THE EFFECTIVENESS OF PEER TEACHING METHODS IN MINDFULNESS TRAINING TO ENHANCE STUDENT MINDFULNESS

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ABSTRACT

The objective is to determine the effectiveness of peer teaching methods in mindfulness training to enhance student mindfulness. This study is quasi-experimental with a pre-test-post-test control group design followed by 92 students. They were divided into peer tutor, treatment, and control groups using a cluster sampling technique. The respondents' mindfulness level was measured using an online Mindfulness Awareness Scale (MAAS) questionnaire at three different measurement times. The data were analyzed using the Repeated Measure ANOVA test. The results indicated that the peer teaching method is effective and influential in increasing mindfulness in the peer tutor group (p-value <.001, f = 5.0). The effect size is moderate ($\eta^2p = 0.10$). The results showed that only the peer tutor group had significant results between observations one and 3 (p-value = 0.03). This paper concludes that peer teaching training can increase mindfulness in peer tutor groups. However, there was no significant difference between the peer and control groups. Suggestions for further research are to involve a larger sample, use a variety of training methods, longer duration of training, and pay attention to motivational factors.

Keywords: Mental Health, Peer Teaching, Mindfulness, University students

Introduction

Mental health problems among college students are a significant concern, particularly within the age group of 17 to 29 years, which includes the student demographic (Segal et al., 2002). A 2018 Basic Health Research report revealed that depressive disorders often emerge during adolescence (15-24 years), with a prevalence of 6.2%. Notably, the East Nusa Tenggara (NTT) province experienced a high prevalence of depression in individuals under 15 years old (9.7%), ranking third nationally, compared to the average national prevalence of 6.7% (KEMENKES RI, 2019). A survey conducted by the Universitas Nusa Cendana Health Promoting University (HPU) Team in Kupang found that 21.5% of respondents felt disappointed or tense, 20.4% felt gloomy and sad, and 32.4% felt deeply down (Ndun et al., 2021). These findings underscore the need for interventions to address students' mental health, and one promising approach is mindfulness.

Mindfulness is a valuable tool in mitigating mental health issues, offering techniques to reduce stress and depression. By training individuals to cultivate awareness and focus through daily activities or meditation (Kabat-Zinn, 2003), mindfulness aids in regulating emotions. It has been associated with reduced stress, anxiety, and depression, thereby preventing various health problems (Williams & Kabat-Zinn, 2011). The American Psychological Association recognizes mindfulness as effective in alleviating anxiety and stress.

Previous research, such as Savitri and Listiyandini's study on "Mindfulness and Psychological Well-being in Adolescents," has demonstrated the positive impact of mindfulness on various dimensions of psychological well-being (Savitri, 2017). Given the high prevalence of mental health issues among students, teaching and training in mindfulness emerge as strategies to address this pressing concern.

Despite the recognized benefits of mindfulness, there is limited research on the effectiveness of peer teaching methods in enhancing student mindfulness, especially in resource-constrained settings. This gap is particularly significant in areas with high mental health needs, such as the NTT province. This study investigates the effectiveness of peer teaching in mindfulness training on enhancing university students' mindfulness levels in a resource-constrained setting. It explores the impact of peer teaching on the development of mindfulness skills in peer tutors. The research seeks to answer two key questions: (1) Is the peer teaching method effective in increasing students' mindfulness in a university setting? (2) How does this method impact the development of mindfulness skills in peer tutors?

Peer teaching is a collaborative learning method where students, often those with greater

expertise, act as instructors to their peers. This approach aims to enhance comprehension, concentration, and meaningful learning by providing guidance, assistance, instructions, directions, and motivation using a more relatable language (Yulianto, 2019). Peer teaching reinforces what has been learned as students take on the role of educators. Moreover, peers receiving instruction tend to grasp the material better because it is presented from a perspective more aligned with their own. Peer teaching, therefore, holds the potential for imparting mindfulness skills to university students.

However, previous research presents mixed evidence regarding the effectiveness of peer teaching in mindfulness training. While some studies have shown positive outcomes, others have not demonstrated statistically significant effects (Moir et al., 2016). This study aims to assess the efficacy of the peer teaching method in teaching mindfulness to university students in a resource-constrained rural setting.

Methods

A research framework was developed based on the identified constructs from the literature review. The framework hypothesizes that the peer teaching method (independent variable) will positively influence student mindfulness (dependent variable), with possible mediating variables such as confidence in teaching mindfulness skills, self-efficacy, and perceived helpfulness of peer teaching.

The study was conducted at Universitas Nusa Cendana, involving 92 participants selected from a population of 2,973 students. The sampling method was purposive, focusing on three faculties: the Faculty of Public Health (FKM), the Faculty of Teacher Training and Education (FKIP), and the Faculty of Cultural Knowledge (FKKH). The rationale for selecting these faculties includes:

1. Representation of Diverse Student Populations: These faculties encompass a range of disciplines, providing a diverse sample reflective of the university's student body.
2. Feasibility of Data Collection: These faculties were chosen for logistical reasons, ensuring that data collection was manageable within the research timeframe and resources.
3. Sample Size Justification: A sample size of 92 was determined based on feasibility and power analysis considerations, ensuring sufficient statistical power to detect significant effects in the study.

The study employed a quasi-experimental design with a pre-test and post-test control group.

Participants were randomly assigned to either the intervention group, which received peer-taught mindfulness training, or the control group, which received no intervention during the study period. In the intervention group, participants received mindfulness training delivered by extensively trained peer tutors. The peer tutors were trained in mindfulness techniques through a two-day intensive session. This training included breathing exercises, meditation, and techniques to maintain full awareness during daily activities. The tutors were then asked to convey these skills to their peers through interactive and reflective approaches, aiming to create a learning environment that fosters mindfulness development. The training program spanned six weeks, consisting of weekly sessions that focused on various aspects of mindfulness practice, including meditation techniques and strategies for cultivating awareness.

Measures for this study included the Mindful Attention Awareness Scale (MAAS) to assess mindfulness levels before and after the intervention. The MAAS is a validated tool widely used in mindfulness research. Additionally, potential mediating variables were evaluated: (a) confidence in teaching mindfulness skills, which was assessed using a self-efficacy questionnaire specific to teaching mindfulness, and (b) perceived helpfulness of peer teaching, measured through a survey administered post-intervention to gauge participants' perceptions of the peer teaching method.

Data were analyzed using SPSS software, employing the following statistical methods: Descriptive statistics were used to summarize the sample's demographic characteristics and the distribution of key variables. For inferential statistics, the methods included (a) paired t-tests to compare pre-and post-test scores within each group, (b) independent t-tests to compare changes in mindfulness scores between the intervention and control groups, and (c) regression analysis to examine the influence of mediating variables on the relationship between the peer teaching method and student mindfulness.

Procedure

The study's procedures were meticulously organized and executed to ensure clarity and reliability throughout the research process. The initial step involved disseminating the Google Form link, which was achieved through online platforms, primarily using WhatsApp. This approach effectively engaged student bodies across all three faculties: the Faculty of Medicine and Veterinary Medicine (FKKH), the Faculty of Public Health (FKM), and the Teaching and Education Faculty (FKIP). Enthusiastic student participation commenced once they met the specified inclusion criteria and formally registered their involvement by signing the informed consent forms.

Following this, a careful and systematic participant selection process was undertaken. The inclusion criteria and faculty-specific quotas were rigorously adhered to, guaranteeing a well-rounded and representative sample from each academic unit. To minimize potential bias, students were randomly allocated to either the peer tutee or control group, with an unwavering commitment to blinding during this allocation process.
Subsequently, a comprehensive data collection phase unfolded, involving the administration of an electronic questionnaire for Observation 1. This initial assessment served as the pre-test evaluation and encompassed all study groups, providing an essential baseline for subsequent analyses.

To equip the peer tutor group with the essential skills and knowledge required, a dedicated two-day Training of Trainers (TOT) program was organized. This rigorous training, expertly conducted by a panel of three distinguished psychology and medical education specialists, centered on the crucial topic of Psychological First Aid (PFA). This training was designed to incorporate online and offline components, ensuring maximum accessibility and effectiveness.

The heart of the research journey lies in implementing peer teaching. The adeptly trained peer tutors assumed the role of instructors, transferring their acquired PFA knowledge to the peer tutee group. This transformative process unfolded over two days, characterized by engaging offline interactions that fostered a highly conducive learning environment.

Following the intensive training received by the peer tutor group, participants' mindfulness levels were evaluated. This evaluation was facilitated through the administration of a meticulously crafted e-questionnaire, intentionally designed to include 30% distractor statements. This inclusion enhanced the robustness of the assessment tool, enabling a comprehensive examination of mindfulness levels.

In summary, this study meticulously navigated various phases, beginning with participant enrollment and randomization and followed by comprehensive training and evaluation. Each step was carefully designed to uncover the impact of peer teaching on mindfulness, ensuring precision and integrity throughout the research process.

In this study, data analysis was conducted using repeated measures of the ANOVA test in the JASP application to determine the effectiveness of peer teaching methods in mindfulness training in improving students' mindfulness.

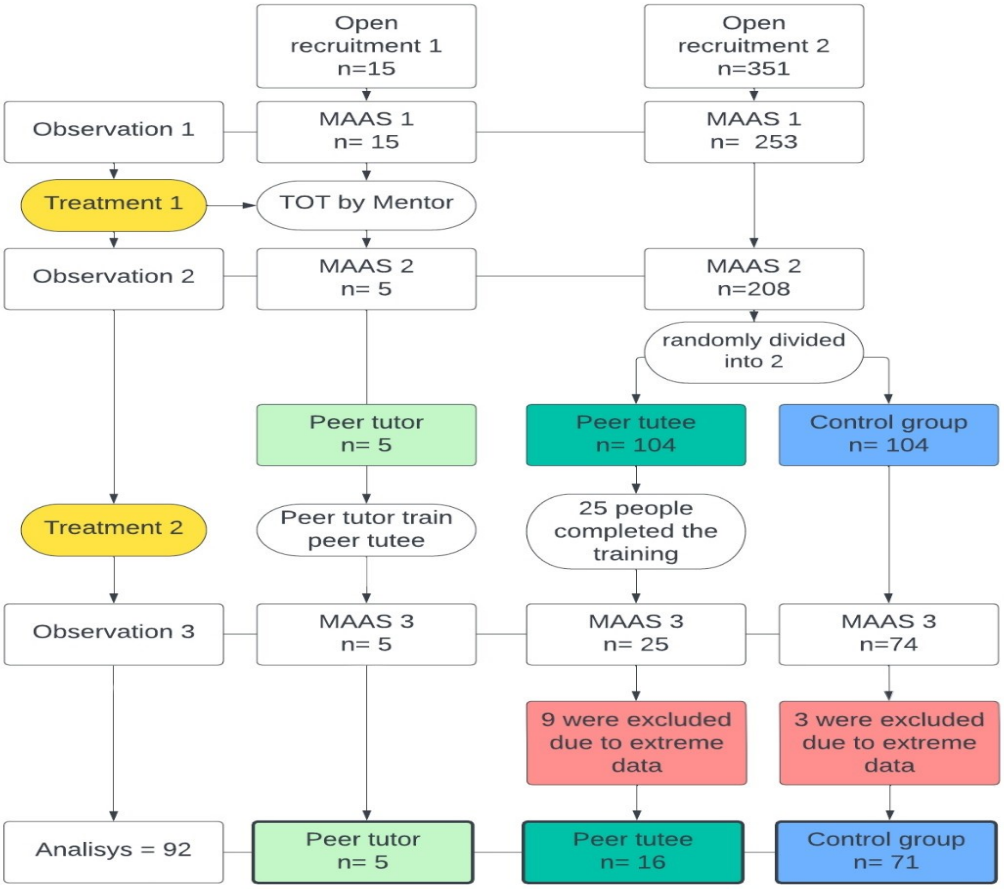

Figure 1: Research Flow

Data analysis was conducted using a repeated measure ANOVA test in the JASP application to determine the effectiveness of the peer teaching method in mindfulness training in improving students' mindfulness. The participant count in the peer tutee group amounted to 25 individuals who actively engaged in the training and diligently completed the comprehensive questionnaires. Conversely, the control group boasted a larger contingent, totaling 74 respondents who conscientiously filled out the entire set of questionnaires. A meticulous data screening process was undertaken utilizing both Excel and the JASP application. This rigorous scrutiny excluded nine outliers (extreme values) from the peer tutee group and three from the control group, ensuring the statistical analysis maintained its integrity.

The measurement of participants' mindfulness levels relied upon the Mindfulness Attention Awareness Scale (MAAS), a renowned instrument developed by Brown and Ryan in 2003. Comprising 15 statement items, the MAAS utilizes a scoring scale from 1 to 6, capturing responses ranging from "very often" to "rarely." This scale is adept at assessing the degree of attention and awareness related to various everyday life conditions. The cumulative score of

these 15 MAAS statement items yielded the mindfulness trait score, wherein higher scores indicated a more pronounced mindfulness trait in the participant. Notably, the MAAS underwent a meticulous translation process into Indonesian by the Placebo Research Club, hailing from the Psychology Department of Brawijaya University in Malang, Indonesia. This research group, known for conducting behavioral studies employing experimental designs and large-scale data surveys, played a pivotal role in ensuring the linguistic and cultural validity of the MAAS (Brown & Ryan, 2009).

A systematic scoring categorization process was meticulously executed to discern the participants' mindfulness categories, encompassing high, medium, and low classifications. This categorization was premised on the fundamental assumption of a normal distribution within the population's scores (Brown & Ryan, 2009). A rigorous assessment of the MAAS measuring instrument's validity and reliability was conducted using the JASP and IBM SPSS 25 applications. The comprehensive evaluation confirmed the MAAS's robustness, with the reliability test revealing a Cronbach Alpha coefficient (α) of 0.885, indicative of its high internal consistency. Furthermore, the MAAS instrument item validity test, underpinned by the Corrected-Item-Total Correlation analysis, demonstrated item correlation coefficients spanning from 0.280 to 0.721. These findings unequivocally validated the instrument's utility and reliability, bolstering its suitability for deployment in this study.

The pivotal training sessions commenced with an initial mentoring session, during which participants were introduced to a mindfulness exercise known as the "3-Minute Breathing Space" (3-MBS). This exercise was thoughtfully incorporated into the training regimen, with participants engaging in it twice a week. The peer teaching methodology came to the forefront in the subsequent training phase. Peer tutors, who had themselves undergone comprehensive training in the 3-MBS exercise, assumed the role of instructors, imparting their newfound knowledge to a designated group of peers. This intervention group was strategically divided into ten smaller groups, each comprising three to four individuals. Within these cohorts, participants actively engaged in the mindfulness intervention, putting theory into practice under the guidance of their peer tutors.

Conversely, the control group continued their regular educational activities without any intervention during this period. This clear demarcation ensured the intervention group received the requisite training and mindfulness practices. In contrast, the control group served as a valuable benchmark for comparison, undergoing no alterations to their usual routines.

Results

Table 1: Characteristics of Respondents

Characteristic	Peer tutor Group (n= 5)	Peer tutee Group (n = 16)	Control Group (n = 71)
	n (%)	n (%)	n (%)
Gender			
Man	3 (60)	0 (4.0)	5 (7)
Woman	2 (40)	16 (100)	66 (93)
Age		19	19
Mean	20	0.7	1.0
Standard Deviation	0.7	19	18
Minimum	19	21	22
Maximum	21		
Faculty			
FKIP	0 (0)	5 (18.8)	26 (36.6)
FKKH	3 (60)	2 (12.5)	8 (11.3)
FKM	2 (40)	11 (68.8)	37 (52.1)
Academic Year			
2021	0 (0)	2 (12.5)	16 (22.5)
2020	5 (100)	10 (62.5)	31 (43.7)
2019	0 (0)	4 (25.0)	24 (33.8)

As shown in Table 1, this study involved 25 participants who underwent mindfulness training as the peer tutee group and 74 participants who did not undergo training as the control group. After screening, only 16 participants from the peer tutee group and 71 participants from the control group were included in the statistical analysis. The study considered participant characteristics such as age, gender, faculty of origin, program of study, and semester. The results indicated that most participants were female (91.3%), with an average age of 20. The most common faculty of origin was FKM (50%), followed by FKIP (29%) and FKKH (15%), while the most common program of study was IKM (34.7%), followed by Counseling (27.1%) and Psychology (19.5%). Most of the participants were in semester 4 (50%), while the lowest was in semester 2 (19.5%).

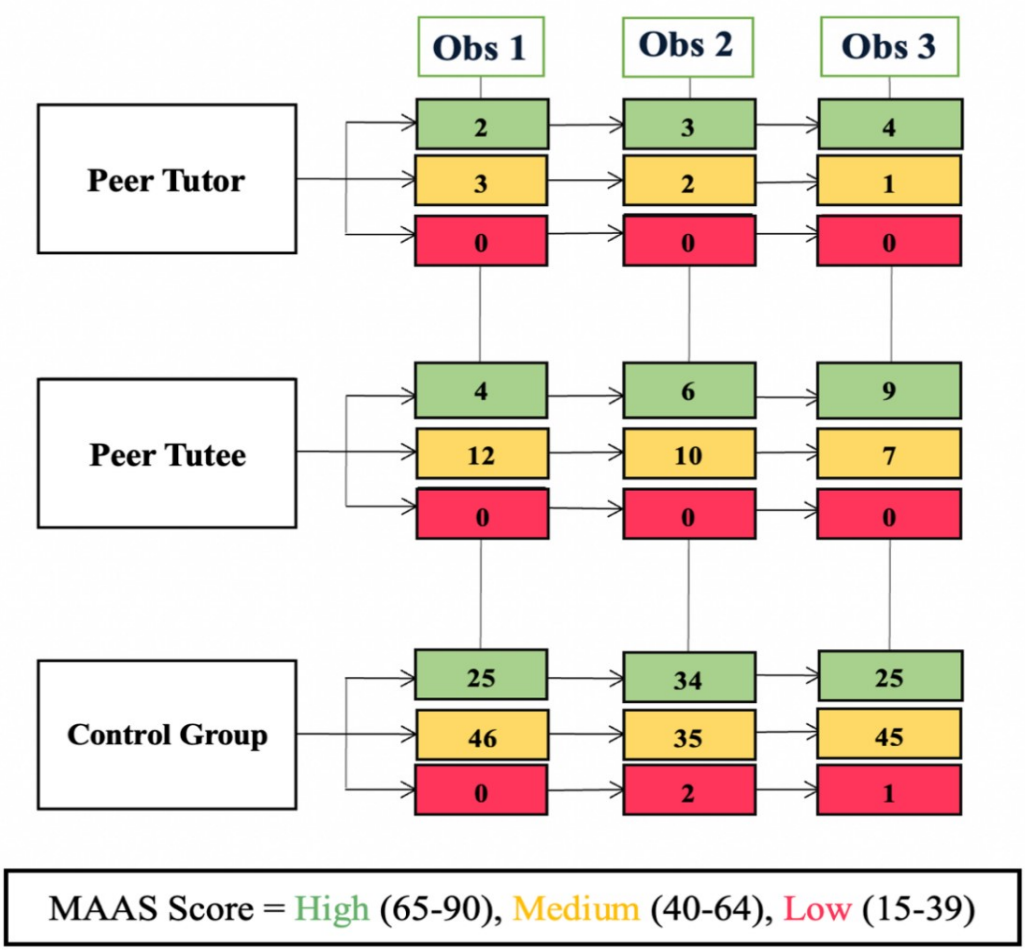

Figure 2: Overview of MASS Before and After Treatment and Categorization of the Scores

In Figure 2, data was obtained to categorize MAAS scores before and after treatment. In observation 1, the majority of respondents in the peer tutor and peer tutee groups had high mindfulness, while the majority of respondents in the control group had moderate mindfulness. No respondents with low mindfulness were found in observation 1. After training the peer tutors, observation 2 showed an increase in the number of respondents with high mindfulness levels in the peer tutor and peer tutee groups. However, the control group showed a decrease in the number of respondents with high mindfulness levels. Overall, it can be concluded that the treatment (training) positively affects mindfulness levels in the peer tutor and peer tutee groups but not in the control group.

The effect of the peer teaching method on mindfulness training was analyzed by comparing the mindfulness level between groups of the peer tutors, the peer tutee, and the control groups, as well as between pre- and post-interventions within groups. Before conducting data analysis, the data were checked for their normal distribution using the Shapiro-Wilk normality test. In addition to the increase in mindfulness among students who received instruction, the results

also showed that peer tutors experienced a significant improvement in their own mindfulness skills (p = 0.03). This improvement may be attributed to the 'learning by teaching' process, in which tutors apply the skills they have learned and reinforce their understanding by teaching them. Since the results showed normal distribution, the data were analyzed using repeated measure ANOVA (Table 2).

Table 2: Repeated Measure Anova test results.

Group	N	Training ✻ Group			*Within-subject*			*Between subject*		
		F	*p*	η^2_p	F	*p*	η^2_p	F	*p*	η^2_p
all groups	92	5.0	**<.001**	0.10	3.4	**0.03**	0.04	0.9	0.39	0.02

The results of the data analysis showed that the peer teaching method effectively increased students' mindfulness, with an F value of 5.0 and p = <.001, and a moderate effect size η^2p = 0.10. It is significant between observations in the same group (F value = 3.4, and p = 0.03 with a small effect size of η^2p = 0.04. However, the difference between groups was insignificant, with an F value of 0.9 and p = 0.4, and a small effect size η^2p = 0.02. To find out which group had a significant difference, a post-hoc analysis was performed using the Tukey test.

The posthoc results showed that only the peer tutor group had significant results (Table 3), namely between observation 1 and observation 3, with a value of p = 0.03, an effect size (Cohen's d) = -1.18, and a mean difference (MD) of -12.0. The other groups showed no significant differences. The results indicate that only the peer tutor group got a significant benefit from the peer teaching method.

Table 3: Peer Tutor Group Post Hoc Test Results

Group	Post Hoc Comparisons		
Peer Tutor	p-Tukey	Cohen's d	Mean Difference
Obs 1 vs. Obs 2	0.95	-0.43	-4.40
Obs 1 vs. Obs 3	**0.03***	-1.18	-12.0
Obs 2 vs. Obs 3	0.48	-0.75	-7.60

Discussion

The primary objective of this study was to investigate the impact of peer teaching in mindfulness training on enhancing student mindfulness. The research findings indicate several key observations.

Firstly, it is noteworthy that the peer tutor group experienced a substantial increase in their Mindfulness Attention Awareness Scale (MAAS) scores throughout the study. Specifically, their scores progressed from 61.8 in Observation 1 to 66.2 in Observation 2, eventually reaching 73.8 in Observation 3. This increase was statistically significant (p-value = 0.03) between Observation 1 and Observation 3. A plausible explanation for this significant improvement lies in the dual treatment they received. Initially, they were trained by mentors, and subsequently, they had the opportunity to train their peers. This pattern aligns with previous research that suggests peer leaders, when equipped to provide mindfulness-based mental health support programs, experience heightened resilience and self-efficacy.

It is worth noting that the concept of "learning by teaching," as illustrated by Edgar Dale's "The Cone of Experience," supports these findings. This educational framework posits that individuals gain a deeper understanding of material when explaining it to others. Such an approach enhances comprehension and memory retention, which aligns with the observed improvements in the peer tutor group's mindfulness scores (Susilowati, 2016).

Furthermore, studies on peer-assisted learning have demonstrated that peer tutors often consolidate their knowledge, gain confidence in teaching and presentation skills, and develop a better understanding of teamwork and roles within a team. These findings underscore the positive impact of peer teaching (Jawhari et al., 2021).

The peer tutor group experienced a substantial increase in their Mindfulness Attention Awareness Scale (MAAS) scores throughout the study. Specifically, their scores progressed from 61.8 in Observation 1 to 66.2 in Observation 2, eventually reaching 73.8 in Observation 3. This increase was statistically significant (p-value = 0.03) between Observation 1 and Observation 3. This improvement may be due to the 'learning by teaching' process, in which tutors apply the skills they have learned and reinforce their understanding by teaching them. This pattern aligns with previous research that suggests peer leaders when equipped to provide mindfulness-based mental health support programs, experience heightened resilience and self-efficacy. Although this increase was not statistically significant, it is worth highlighting that all respondents transitioned from a moderate level of mindfulness to a high MAAS score category following the intervention. These results suggest that the peer teaching method

positively affected the peer tutee group, albeit not reaching statistical significance.

In a broader context, these findings resonate with previous studies that have indicated the need for interventions to enhance students' mental health and resilience. While not all interventions result in statistically significant improvements, they nonetheless contribute to students' overall well-being (Moir et al., 2016).

The findings of this study have important implications for mindfulness training and peer teaching in an educational context. Firstly, it is evident that mindfulness skills require time to develop and teach effectively. Therefore, researchers and educators employing mindfulness with peer tutors should consider longer training programs to support mindfulness-based interventions, particularly given that peer leaders/tutors may not be sufficiently trained. Additionally, future studies should explore the effectiveness of mindfulness interventions on specific subpopulations, such as those with poorer mental health, and consider using more intensive interventions or larger sample sizes to strengthen their findings.

Incorporating mindfulness-based interventions into university settings, including awareness and peer support components, seems promising. This approach can potentially enhance student well-being and resilience, offering a valuable addition to medical education curricula or student services (Jawhari et al., 2021).

To further advance our understanding of the relationship between peer teaching and mindfulness training, it is recommended that future research should explore the following areas:

1. Longer Training Programs: Investigate the impact of extended training programs for peer tutors to maximize the effectiveness of mindfulness interventions.
2. Targeted Interventions: Explore the effectiveness of mindfulness interventions on specific student populations with varying levels of mental health.
3. Sample Size and Study Design: To reduce the risk of cross-contamination between intervention and control groups, consider conducting studies with larger sample sizes and randomized cluster designs.
4. Incorporating Mindfulness: Evaluate the integration of mindfulness-based interventions into university settings, focusing on their impact on student well-being.

Conclusion

In summary, this study investigated the effectiveness of peer teaching in mindfulness training in enhancing student mindfulness levels. The findings revealed significant improvements in mindfulness scores among peer-led training participants. Specifically, the peer tutor group demonstrated a notable increase in their Mindful Attention Awareness Scale (MAAS) scores, indicating a positive impact of the peer teaching method. This study has several limitations, including the small sample size and relatively short training duration. Future research is recommended to use larger samples and explore the impact of longer training durations on the effectiveness of peer teaching. Additionally, the tutors' motivational factors and personal characteristics should be considered to understand the impact of this method fully. This aligns with the concept of "learning by teaching," suggesting that individuals gain a deeper understanding and mastery of material when they teach it to others.

Furthermore, although the increase in mindfulness scores among the peer tutee group was not statistically significant, all participants transitioned to a higher MAAS score category following the intervention. This suggests a positive trend in mindfulness levels among peer tutees, emphasizing the potential benefits of mindfulness training facilitated by peer teaching methods.

These findings underscore the importance of incorporating mindfulness-based interventions into educational settings, particularly through peer-led initiatives. However, to maximize the effectiveness of mindfulness interventions, it is essential to recognize the need for longer training programs for peer tutors. Additionally, future research should explore the impact of mindfulness interventions on specific student populations with varying mental health levels and consider larger sample sizes and randomized cluster designs to strengthen the evidence base.

In conclusion, integrating mindfulness training facilitated by peer teaching holds promise for enhancing student well-being and resilience. By further exploring and refining these interventions, educational institutions can better support the mental health needs of their students, ultimately fostering a healthier and more resilient learning environment.

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ETHICS, VALUES, AND THE PROMOTION OF LIFE SKILLS AMONG UNIVERSITY STUDENTS

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ABSTRACT

This study explores students' awareness of life skills and highlights their importance across various academic specializations. While not directly acquired from specialized courses, life skills enhance student motivation and foster Creativity. The research investigates life skills awareness among students at the University of Jordan (UJ) by measuring students' awareness of life skills. A questionnaire was distributed to a random sample of 1,224 students enrolled in the Ethics and Human Values course, ensuring representation across gender, academic specialization, and academic level. The sample was selected to comprehensively cover the studied variables, with demographic characteristics such as age, gender, educational background, and geographic distribution detailed. Data were analyzed using SPSS, calculating arithmetic means and standard deviations and applying ANOVA to identify statistically significant differences between variables. The analysis focused on differences in life skills awareness based on gender, academic specialization, academic level, and the completion of the Ethics and Human Values course. The results revealed a high overall average score on the life skills scale, indicating a strong level of awareness among UJ students. Statistically significant differences were found between students who had completed the Ethics and Human Values course and those who had not, with the former group exhibiting higher levels of life skills awareness. This study emphasizes the need to develop learning activities, instructional approaches, and assessment methods to promote life skills acquisition. It highlights the importance of expanding curricular and extracurricular opportunities within the university, recognizing that life skills development extends beyond academic pursuits. The study fills a critical gap by providing insights into student life skills awareness and offers recommendations for enhancing these skills in university education.

Keywords: *Ethics, Human Values, Life Skills, University Requirements*.

Introduction

Once overlooked in education, the concept of life skills gained prominence following UNESCO's "Education for All" conference in 1990 in Thailand, where the critical importance of teaching life skills was underscored. This focus was reinforced at UNESCO's 2000 conference in Senegal, where life skills were acknowledged as essential to modern education. Although largely unrecognized before the 1990s, interest in life skills can be traced back to the mental health field in the 1960s (Nasheeda et al., 2023). International organizations and scholars have since provided diverse definitions of life skills. UNESCO defines them as a "set of cognitive, personal, and interpersonal abilities" that enable individuals to make informed decisions, solve problems, think critically and creatively, communicate effectively, and build healthy relationships. The World Health Organization defines life skills as the "ability to adopt positive and adaptive behavior" in response to life's challenges.

Life skills encompass an array of psychological, behavioral, and social competencies that empower individuals to navigate life's demands, make sound decisions, communicate effectively, and foster a strong sense of self-esteem. These skills are influenced by culture, context, upbringing, and education (Na Ayudthaya et al., 2019). They include communication, problem-solving, leadership, teamwork, responsibility, self-confidence, diversity acceptance, and decision-making, forming the backbone of student personality development (Kumar, 2017). Acquiring life skills is critical for university students, directly affecting self-esteem and career preparedness (Kazemi et al., 2014). Knowledge alone is insufficient for success in today's rapidly evolving world. Creativity, problem-solving, and innovation are equally essential, enabling students to adapt and thrive in professional environments (Rahman, 2019). Extracurricular activities, cultural or sporting events, and volunteer work are pivotal in life skills development. Community service involvement equips students with good citizenship skills and empowers them to address societal challenges. While impacting the economy, universities must prioritize fostering social engagement and community awareness. By harnessing student energy through service initiatives, universities can profoundly influence societal well-being (Carl & Menter, 2021).

This study defines life skills as cognitive, personal, and interpersonal abilities that enable university students to manage daily challenges, take responsibility, and engage effectively in

both personal and professional environments. These skills include problem-solving, decision-making, Creativity, innovation, and personal traits like self-confidence, responsibility, and self-esteem. Interpersonal abilities such as communication, teamwork, and empathy also play a crucial role in helping students adapt, collaborate, and interact meaningfully with others.

This study aims to elevate awareness of life skills, targeting students and university administrators alike. It urges the integration of both curricular and extracurricular activities into academic programs. This initiative transcends the university under examination, extending to all higher education institutions. Developing life skills, beginning early in life, is fundamental to personal excellence and success.

Research problem

The importance of life skills in students' transition to the job market is widely recognized. The number of university graduates is growing, and labor market comparisons among graduates are increasingly based on their skills. This poses a problem due to students' lack of sufficient awareness about the necessity of acquiring these skills from the first year of university enrollment. The study aims to explore this aspect to understand the reasons that limit students' possession of these skills, which is linked to some students' weak awareness of them. Additionally, the study seeks to enhance this awareness and motivate students to acquire more skills that complement practical knowledge, ensuring they are at least on par with others in competing for opportunities.

The University of Jordan offers courses addressing this aspect from the first year, utilizing a quantitative approach by using surveys to collect information from students enrolled in one of these mandatory courses, specifically the Ethics and Human Values course, which includes skill development and capacity building. Additionally, these findings can be shared with *universities for mutual benefit.*

Research Questions

The study poses the following:

1. What is the awareness level of students at the University of Jordan (UJ) about life skills?

2. Are there statistically significant differences at the level ($\alpha = 0.05$) in the awareness level due to the student's gender, academic specialization, academic level, and enrollment in the Ethics and Human Values Course (EHVC)?

Literature Review

This section defines life skills and identifies their importance for university students. It also highlights the significance of extracurricular and additional academic activities in fostering students' life skills in the educational context. The section presents previous studies on life skills, which generally serve the research topic.

Definition of Life Skills in general and life skills for University students in particular

As outlined earlier, UNESCO characterizes life skills as a comprehensive set of cognitive, personal, and interpersonal competencies that empower individuals to make sound decisions, solve problems, think critically and creatively, communicate effectively, establish healthy relationships, and manage both their personal and social lives in a productive and balanced manner (Taute, 2007). Similarly, the World Health Organization describes life skills as the capacity to adopt constructive and adaptive behaviors that allow individuals to navigate the challenges of daily life with resilience.

Based on these definitions, the researchers view life skills for university students as a broad spectrum of behavioral, psychological, and social abilities. These competencies enable students to respond positively to life's demands, make informed decisions, communicate effectively, and cultivate healthy self-esteem and self-worth.

Life skills extend beyond the classroom, encompassing extracurricular activities (ECAs) and additional academic activities (EAAs), often called cultural activities. These voluntary and social engagements occur outside formal academic programs and typically involve peer collaboration. Under faculty supervision, students and staff often manage these activities, though in many cases, students initiate and lead their projects, such as independent campus publications. School administrators and faculty may also introduce these activities to foster holistic student development (Shaiju & John, 2018).

Furthermore, life skills can be effectively integrated into university curricula through dedicated courses like the "Ethics and Human Values" course at The University of Jordan.

This practical approach underscores the researchers' first-hand experience and highlights universities' critical role in equipping students with essential competencies for personal growth and professional success.

The Importance of Life Skills for University Students

Life skills are instrumental in the development of students, particularly university students, equipping them with essential competencies for academic success and personal growth. Studies such as Gim (2021) demonstrate that students involved in extracurricular activities (ECAs) outperform their non-participating peers academically. Moreover, Taute (2007) underscores the profound impact of ECAs in fostering a sense of community responsibility, which is integral to character building and personal growth. Alajmi (2019) further emphasizes the value of these activities in productively utilizing leisure time, fostering self-learning and continuous learning skills, and promoting physical health.

Extracurricular activities in educational settings cultivate students' physical, intellectual, and creative capabilities. They provide opportunities for building strong friendships, enhancing teamwork, and developing problem-solving skills. Additionally, ECAs contribute to emotional regulation, boost academic performance, and increase high school students' chances of being accepted into universities (Umamah & Hartono, 2020). These activities range from sports and scouting to performing arts, contributing to personal growth, self-confidence, and forming meaningful relationships (Shaiju & John, 2018; Alajmi, 2019).

Active involvement in community service also nurtures leadership skills and facilitates personal connections while positively influencing academic performance. Similarly, participation in academic clubs like sports, chess, and debate fosters intellectual engagement, deepens understanding of school subjects, and enhances cognitive abilities (Jaworski et al., 2022). Student councils, often established in higher education, empower students to elect representatives who advocate for their interests, teaching them the value of civic engagement and collective decision-making (Petrini, 2022).

Student-run media platforms, such as newspapers, literary magazines, and educational publications, are vital in familiarizing students with emerging technologies and opening doors to career opportunities post-graduation (Maddah et al., 2023). These activities enrich students' educational experiences and prepare them for future roles in an ever-evolving, tech-driven world.

One of the most significant advantages of life skills education is the enhancement of Creativity, an essential component of both cognitive and emotional development. Creativity is fundamental in innovative thinking processes, making it indispensable in academic and professional contexts (Melur Sukumar et al., 2023). It involves generating and applying new ideas, techniques, and perspectives, often through collaborative efforts and is crucial for fostering lifelong learning and self-directed education (Falconi, 2023; Yabunaka et al., 2023).

Encouraging Creativity in academic and extracurricular environments enables students to discover and hone their talents across various domains, enhancing their ability to think divergently and adapt to life's diverse challenges (Cecalupo & Di Donato, 2023). According to Russ & Fiorelli (2010), key success factors for nurturing Creativity include providing opportunities for children to explore diverse activities, creating supportive environments where unconventional ideas are valued, and promoting independence in problem-solving.

Kaufman & Beghetto (2009) identify four dimensions of Creativity:

1. *Cognitive Dimension (Learning for Knowledge):* This dimension shapes learning outcomes through innovative and divergent thinking, analysis, and synthesis.
2. *Effective Dimension (Learning for Work):* This dimension emphasizes collaboration, teamwork, productivity, and risk-taking, contributing to professional success.
3. *Individual Dimension (Learning for Self):* This dimension prioritizes self-development, self-efficacy, and adaptability, building perseverance, self-respect, and self-esteem.
4. *Social Dimension (Learning for Living with Others):* This dimension addresses problem-solving in social contexts, fostering comprehensive citizenship, self-development, and critical thinking for improved health and adaptability.

These dimensions highlight the multifaceted nature of Creativity as a life skill, underscoring its significance in shaping well-rounded, resilient, and successful individuals.

Promoting Life Skills in Educational Contexts

In today's rapidly evolving world, characterized by unprecedented knowledge advancement and technological breakthroughs, individuals face significant challenges that demand the

ability to adapt and stay aligned with global developments. Addressing these challenges necessitates elevating students' performance, as Valand et al. (2022) emphasized. Modern university systems have increasingly focused on developing life skills, viewing them as an essential combination of environmental awareness, knowledge acquisition, values, and attitudes. These skills are systematically taught and intentionally integrated into various practical applications and educational activities. The ultimate goal is to shape students into well-rounded, responsible citizens capable of meeting life's demands, navigating modern challenges, and cultivating meaningful social relationships (Rubino et al., 2023).

Around the world, many countries have adopted educational frameworks centered on life skills to prepare young people for emerging global challenges. As UNICEF notes, this type of education is crucial for fostering resilience and adaptability in students, making it one of the most critical forms of learning (Petrini, 2022). It is an interactive process aimed at imparting knowledge and shaping behavioral patterns. According to UNICEF (2022), two fundamental pillars define successful education systems based on life skills. First, they must focus on knowledge transfer and behavioral change, ensuring students are informed and equipped to act on that knowledge. Second, curriculum development must transcend traditional models of education, which focus solely on disseminating information. Instead, modern curricula should aim to change behavior alongside knowledge acquisition (Shtembari & Elgün, 2023).

Universities play a pivotal role in cultivating life skills among their students. This begins by identifying the essential psychological, social, and personal skills for young people to thrive. Educational institutions must ensure curricula balance knowledge, attitudes, and practical skills. Effective teaching methods, such as cooperative and active learning, are essential for engaging students in skill-based learning. Additionally, skill development techniques such as peer support, role-playing, and modeling are crucial in fostering students' capacity to apply these skills in real-world scenarios (Lu, 2023).

Lenzen, Buyck, and Bouvier (2023) argue that the essential life skills students must acquire today include problem-solving, self-directed learning, social relationship-building, responsibility-taking, decision-making, critical thinking, creative thinking, and technological proficiency. These competencies are increasingly viewed as non-negotiable for success in an interconnected and technologically driven world.

Several studies further emphasize the importance of life skills in higher education. Mona Omar's (2017) research, *The Role of the University in Developing the Life Skills of Its Students*, highlights that students exhibit strong communication skills, which play a vital role in conflict resolution. This underscores the university's role in enhancing students' social and personal competencies (Omar, 2017). Similarly, Nasser Al-Zahrani's (2021) study on the role of educational institutions in Saudi Arabia revealed that both public and university education institutions significantly contribute to developing students' social skills, equipping them for effective participation in society.

Wurdinger and Qureshi's (2015) exploration of project-based learning (PBL) further demonstrates the effectiveness of innovative pedagogical approaches in cultivating life skills. Their study, based on student surveys and interviews, revealed that with minimal changes in time management, collaboration, and work ethics, students showed marked improvement in responsibility, problem-solving, self-direction, communication, and Creativity. These findings suggest that PBL fosters a comprehensive skill set essential for students' future success.

Moreover, Marasi's (2019) research bridges the gap between academic knowledge and life skills, focusing on enhancing students' employability. Training on teamwork was particularly effective in building team dynamics and fostering positive attitudes toward collaboration. This highlights the role of life skills education in preparing students for the workforce and increasing their career success. Similarly, in computer programming, Sancho-Thomas et al. (2009) demonstrated the importance of integrating technical skills with essential life skills such as communication, leadership, and team management, preparing students for successful careers in software development.

Additionally, Lisa et al.'s (2019) study, *Comparison between Employers' and Students' Expectations in Respect of Employability Skills of University Graduates*, underscores a disconnect between what employers and students prioritize. While employers pointed out deficiencies in practical skills among graduates, students emphasized domain-specific knowledge and leadership. This expectation gap further reinforces the importance of life skills education in aligning students' competencies with workplace demands.

In light of this extensive research, it is evident that incorporating dedicated life skills courses in university curricula is crucial. Such courses benefit not only students but also employers

and society. Teaching life skills equips students with the tools they need to succeed in an increasingly complex and competitive world while also meeting the expectations of the modern workforce. Universities must continue to play an active role in fostering these critical competencies, ensuring that graduates are knowledgeable and capable of adapting, leading, and contributing to society.

Methodology

The methodology employs a quantitative approach to gather information from students enrolled in the Ethics and Human Values course by asking multiple questions through a survey in the 2020/2021 academic year. This course was selected based on its blended format and appropriate content for studying the main objectives. One key goal of offering this course is to equip students with life skills by encouraging their participation through content that includes group initiatives and self-assessment.

Participants

The survey included students enrolled in the Ethics and Human Values course, with each registered student allowed to complete the survey once. The sample comprised a suitable number of participants to achieve the study's objectives, selected using random sampling based on gender, academic specialization, and academic level to ensure a comprehensive representation of the studied variables. The study also detailed the sample's demographic characteristics regarding age, gender, educational background, and geographic distribution. A random sample of 1,224 student responses was collected.

Course description and evaluation methods

The Ethics and Human Values course seeks to introduce students to the importance of morals and human values and their role in building positive behavior and constructive personality, as well as in promoting citizenship and belonging to the principle of rights and responsibilities. The course addresses the importance of the complementary relationship between laws and regulations on the one hand and ethics, values ,and principles of transparency and integrity on the other hand. It also includes self-development, evaluation, character-building, and self-expression methods. The course also encourages students to succeed and promotes team spirit. It also encourages students to participate in initiatives and activities within and outside

the university to contribute to developing and building students' personalities on one side and contribute to the development and building of society on the other.

The ethics and human values course's evaluation methods encompass a comprehensive approach that includes self-evaluation, group initiatives, active participation, interactive assignments, and a final exam. Students will self-evaluate and reflect on their understanding and application of ethical principles, fostering personal growth and accountability. Group initiatives will encourage peer collaboration, allowing them to explore complex ethical dilemmas and present their findings. Active participation in discussions and activities will be essential, as it promotes critical thinking and the exchange of diverse perspectives. Interactive assignments will challenge students to apply ethical theories and concepts to real-world scenarios, enhancing their practical understanding of human values. Finally, the course will culminate in a final exam that assesses students' comprehension of the material, ensuring they can effectively integrate and articulate the core principles of ethics and human values.

Measurement Tools

Measurement tools were specifically developed to measure students' life skills. The tools included (40 items) that measure several main life skills. A five-point Likert scale was used for response, where 1 reflects complete disagreement, and 5 reflects complete agreement. Skills were evaluated based on specific criteria for each skill, and scores were calculated according to the participants' responses. The tools used showed a high level of validity and reliability, as the psychometric properties were verified through previous studies that confirmed their reliability and validity.

The tool consists in its final form of (40) paragraphs, whereby the respondent puts a mark in front of each paragraph to indicate the extent to which what is stated in the paragraph matches what suits him on a scale consisting of five degrees according to the five-point Likert scale, which are: always, given (5) degrees, often, given (4) degrees, sometimes, given (3) degrees, rarely, given (2) degrees, never, given (1) degree, and vice versa for negative paragraphs. Accordingly, the highest degree the examinee obtains in each paragraph is (5). The lowest degree is (1), and to judge the level of the trend, which will be divided in this study into three levels, which are (high, medium, low), by subtracting the highest degree from the lowest degree, the result is (4), then dividing this degree by (3), which are the levels of the trend, the result becomes (1.33), and this number will be adopted as the length of the category that

determines the level of the trend, which is as in Table No. (3), and Table No. (4). Table No. (5) shows this.

Table 1: The level of the trend

Level	Score
Low	1-2.33
Medium	2.34-3.67
High	3.68-5

Research Instrument Life Skills Scale (LSS)

This section explains how the study tool was designed and verified to demonstrate the validity and reliability of this study's procedures. Figure (2) shows how we will discuss this subject.

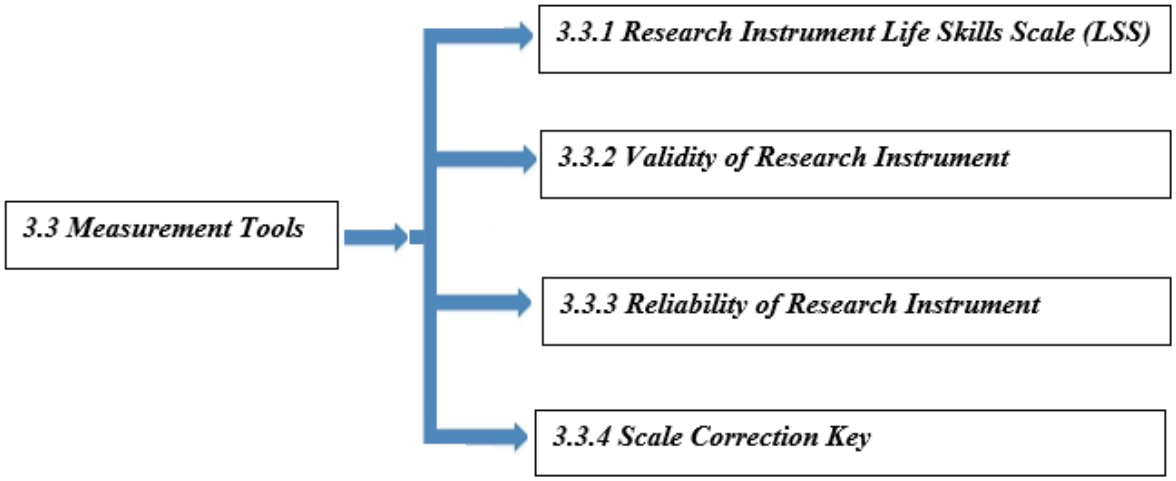

Figure. 1**:** Concept map for LSS (prepared by researchers)

Validity of Research Instrument

Face Validity

The validity was checked by presenting it to a group of specialized academics at different Departments in the UJ to obtain their feedback, opinions, and comments on the appropriateness of the sub-domains of each scale, the clarity of language, the validity of the items in measuring the ideas of the items and their suitability for students. Notes focused on amending the linguistic wording of some items. All feedback was considered, and (80%) of the questions were approved.

Internal Construct Validity

The internal construct validity of a scale is pivotal in ensuring its reliability and accuracy. It assesses the coherence between individual items and the overarching dimension they are intended to measure. In essence, it determines whether each item accurately reflects what it is supposed to measure without introducing extraneous factors. Typically, this is evaluated through statistical measures like the Pearson correlation coefficient, which gauges the relationship between each item's score and the scale's total score. Table (2) visually represents these correlation coefficients for the items comprising the (LSS). This analysis elucidates the degree of alignment between individual items and the overall construct, offering valuable insights into the scale's internal consistency and validity.

Table 2: Correlation Coefficients of the Items of (LSS) with the Total Score

Item	Correlation Coefficient of Total Score	Item	Correlation Coefficient of the Total Score
1	.317**	21	.743**
2	.685**	22	.733**
3	.585**	23	.701**
4	.686**	24	.736**
5	.584**	25	.501**
6	.613**	26	.585**
7	.581**	27	.662**
8	.632**	28	.704**
9	.706**	29	.576**
10	.683**	30	.677**
11	.630**	31	.746**
12	.598**	32	.731**
13	.696**	33	.753**
14	.653**	34	.556**
15	.754**	35	.669**
16	.721**	36	.293**
17	.700**	37	.677**
18	.583**	38	.613**
19	.757**	39	.738**
20	.759**	40	.669**

As shown in Table (2), all the correlation coefficients of the scale items with the total score of the scale range between (.293) and (.759), where all these values are statistically significant

and indicate the consistency of the internal structure of the scale; therefore, the scale consists of (40) items in its final form.

Reliability of Research Instrument

To check the reliability of (LSS), the reliability coefficient value is computed using Cronbach's Alpha. Table (3) illustrates these findings.

Table 3: Reliability Coefficient Value Using Cronbach's Alpha Coefficient for Items of Scale (LSS)

Scale	Reliability Coefficient Value (Cronbach's Alpha)
Life Skills Scale (LSS)	0.96

As shown in Table (3), Cronbach's alpha coefficient for the total score of the scale is (0.96), indicating that the (LSS) has an accepted and good degree of reliability "that can be relied upon in the implementation according to the Nunnally scale, adopting (.70) as a minimum reliability level" (Nunnally & Bernstein, 1994, pp. 264- 265).

Scale Correction Key

The 5-point Likert scale used in the study is graded as follows:

Always	Often	Sometimes	Rarely	Never
5	4	3	2	1

To answer the questions of the study, means and standard deviations of individual responses to each item of the research instrument are used. To evaluate the level of awareness of the UJ students of life skills and the level of the contribution of the Ethics and Human Values Course (EHVC) to develop life skills among UJ students, the degree of availability is divided into three levels (Low, Medium, High) by finding the Mean as follow:

Length of One category = (the Highest Value of the Alternative - the Minimum Value of the Alternative) ÷ Number of Levels = (5-1) ÷ 3 = 1.33

Moreover, by adding (1.33) to the Minimum Value of the alternative (the minimum), the criterion for expressing those levels is: The Mean ranging between (1) and (2.33) indicates a Low Degree, the Mean ranging between (2.34) and (3.67) indicates a Medium Degree, and the Mean ranging between (3.68) and (5) indicates a High Degree.

Data Collection Procedures

Data were collected over an academic year through a questionnaire distributed to participants after explaining the study objectives and obtaining their consent to participate. All ethical standards were adhered to, including maintaining the confidentiality of participants' information and ensuring that data would only be used for scientific research purposes.

Data Analysis

The data were analyzed using SPSS to meet study requirements, extracting arithmetic means and standard deviations and applying (ANOVA) to identify statistically significant differences between variables. These variables were categorized by gender, academic specialization, academic level, and the study of ethics and human values, with results interpreted based on the statistical values obtained.

Table 4: The Distribution of the Study Sample for the Study Variables

Variable	Category	Number	Percentage
Gender	Male	286	23.4%
	Female	938	76.6%
	Total	1224	100%
Academic Specialization	Humanities Schools	845	69%
	Scientific Schools	257	21%
	Health Schools	122	10%
	Total	1224	100%
Academic Level (Year)	1st	472	38.6%
	2nd	439	35.9%
	3rd	95	7.8%
	4th	218	17.8%
	Total	1224	100%
Have you studied the Ethics and Human Values Course (EHVC)?	Yes	799	65.3%
	No	425	34.7%
	Total	1224	100%

Findings & Discussion

This section provides detailed insight into the results related to the study questions, which identify the level of UJ students' awareness of life skills and the level of the Ethics and Human Values Course (EHVC) 's contribution to developing life skills among students.

Findings related to the first research question

What is the UJ students' awareness level of life skills?

The means and standard deviations for the student's responses to the (LSS) are calculated to answer this question. Table (3) illustrates those findings.

Table 5: Means and Standard Deviations of Students' Responses to the Dimensions of the (LSS) Arranged in Descending Order According to the Means

Rank	Dimension	Mean	Standard Deviation	Degree
1	Accepting the Difference	4.39	0.72	High
2	Taking Responsibility	4.38	0.72	High
3	Cooperation and Teamwork	4.29	0.78	High
4	Self-confidence	4.23	0.71	High
5	Making Decision	4.04	0.73	High
6	Leadership	4.03	0.81	High
7	Problem-Solving	4.02	0.80	High
8	Communication	4.02	0.74	High
The Overall Scale Score		4.18	0.63	High

High Score out of (5)

As shown in Table (5), the overall mean score for the life skills scale is high, with a mean of (4.18). In detail, the dimension of accepting the difference is ranked first with a high degree and a mean value of (4.39). However, the dimension of taking responsibility is ranked second with a high degree and a mean value of (4.38). The dimension of cooperation and teamwork is ranked third with a high degree and a mean value of (4.29). The dimension of self-confidence is ranked fourth with a high degree and a mean value of (4.23), while the dimension of making the decision is ranked fifth with a high degree and a mean value of (4.04). Also, the dimension of leadership is ranked sixth with a high degree and a mean value of (4.03). Moreover, the dimension of problem-solving is ranked in the penultimate with a high degree and a mean value of (4.02). The dimension of communication is ranked in the eighth and last rank with a high degree and a mean value of (4.02). The following is a breakdown of the scale items.

The study's results in Table (5) clearly show a weakness in problem-solving and communication skills, with a value of (4.02) for each. This indicates a strong relationship between these two skills. The ability to communicate effectively is part of problem-solving, and the absence of communication implicitly weakens the ability to solve problems.

The reasons can be attributed to the fact that the students have not yet studied the subject of communication skills. This is an indication of the necessity of focusing on engaging in group

work and working in a team spirit while increasing the number and diversity of participation, especially with participation that includes the participants' differences and specializations, which prompts them to focus on communication in order to achieve goals, especially since the students' skills in accepting difference were High (4.39), which guarantees the success of this mission. Also, solving problems requires the actual practice of this type of skill, and we cannot be limited to the theoretical or academic aspect. However, this must be reflected in the practical reality as well.

Based on this result, the student's skills complement each other. The student can strengthen the weak skills by constantly practicing these skills and engaging in the practical aspect.

Table 6: Means and Standard Deviations of Students' Responses to the Item of (LSS) Arranged in Descending Order According to the Means

Rank	Dimension	Mean	Standard Deviation	Degree
1	I appreciate and respect others.	4.61	0.82	High
2	I reflect a positive image of myself while dealing with the Internet	4.57	0.83	High
3	I appropriately hand in the required assignment.	4.56	0.87	High
4	I decently and responsibly act in life.	4.54	0.84	High
5	I understand the significance of fulfilling my obligations while carrying out the necessary duties.	4.51	0.86	High
6	I do not hesitate to help others, even if they are different.	4.46	0.88	High
7	I act with love and compassion for others.	4.44	0.89	High
8	I respect and accept other people's ideas.	4.44	0.91	High
9	I carefully listen to the teacher's instructions.	4.41	0.93	High
10	I take the initiative to help others.	4.40	0.89	High
11	I am satisfied with the way I deal with others.	4.38	0.87	High
12	I make sure to build bonds of trust with the team members.	4.36	0.93	High
13	I accept everyone's opinions.	4.32	0.90	High
14	I accept positive criticism.	4.31	0.91	High
15	I work as hard as I can.	4.29	0.92	High
16	I have a sense of belonging to the group.	4.29	1.01	High
17	I admit my mistakes while I do assignments.	4.29	0.91	High
18	I confidently act when dealing with Moodle.	4.27	0.95	High
19	I can think independently.	4.27	0.93	High
20	I have a sense of responsibility.	4.26	0.99	High
21	I help the group in making decisions.	4.24	0.94	High
22	I can motivate and encourage others.	4.14	1.03	High
23	I avoid blaming anyone for the wrong performance.	4.13	0.98	High
24	I took the initiative to do assignments on Moodle even though I did not know them in advance.	4.12	1.06	High
25	I can make accurate judgments about my performance and others.	4.10	0.96	High
26	I check the credibility of information sources.	4.08	1.05	High
27	I can offer alternative solutions to the problem.	4.08	0.96	High
28	I praise others.	4.06	0.97	High
29	I can handle all practical applications on Moodle.	4.02	1.04	High
30	I like to learn by myself.	4.01	1.13	High

31	I use verbal and non-verbal communication to communicate information about the requested content.	3.98	1.08	High
32	I trust my teammates.	3.97	1.05	High
33	I put the interest of the group first before my interest.	3.96	1.06	High
34	I can direct my colleagues so that they can achieve their goals or answer their assignments.	3.92	1.05	High
35	I make the best use of my time.	3.91	1.05	High
36	I understand other people's emotions.	3.89	1.01	High
37	I care about the strengths and weaknesses of the topic at hand.	3.86	1.06	High
38	I offer constructive criticism about the problems presented to me.	3.80	1.09	High
39	I work without supervision.	3.68	1.19	High
40	I communicate with colleagues on the Moodle system.	3.11	1.26	Medium
The Overall Scale Score		4.18	0.63	High

High Score out of (5)

As shown in Table (6), the general Mean of the overall score of the life skills scale is high, with a mean value of (4.18). The means of the items range between (3.11) and (4.61), where the item (1) stipulating "I appreciate and respect others" is ranked first with a high value of (4.61). Item (2), stipulating "I reflect a positive image of myself while dealing with the Internet," is ranked second with a high score and a mean value of (4.57). Also, item (3), stipulating "I appropriately hand in the required assignment," is ranked third with a high score and a mean value of (4.56). Item (39), stipulating "I work without supervision," is ranked thirty-ninth and penultimate with a high score and a mean value of (3.68), while item (40) stipulating "I communicate with colleagues on the Moodle system" is ranked forty and last with a medium score and a mean value of (3.11).

Additionally, as seen in Table (6), items No. 1 and 2: "I appreciate and respect others (4.61)" and "I reflect a positive image of myself while dealing with the Internet (4.57)" are both high, and this shows the great interest in the ethical aspect among students, which prompts students to acquire more skills or improve them. The relationship that governs the team is the relationship between them based on respect, and this is confirmed by the high grade that came in each of the following statements: "I do not hesitate to help others, even if they are different from me (4.46)" and "I act with love and compassion for others (4.44)."

Findings related to the second research question

Are there statistically significant differences at the level ($\alpha = 0.05$) in awareness due to student gender, academic specialization, academic level, and study of Ethics and Human Values Course (EHVC)?

To answer this question, what are the means and standard deviations for students' responses to the (LSS) according to their gender, academic specialization, academic level, and study of Ethics and Human Values Course (EHVC)? Analysis of variance (ANOVA) is used to determine the significance of the differences, as shown in Table (7).

Table (7): Means and Standard Deviations of Students' Responses to the Dimensions of the Life Skills Scale (LSS) Arranged in Descending Order According to the Study Variables

Variable	Category	Number	Mean	Standard Deviation
Gender	Male	286	4.11	0.62
	Female	938	4.20	0.63
	Total	1224	4.18	0.63
Academic Specialization	Humanities Schools	845	4.18	0.66
	Scientific Schools	257	4.16	0.60
	Health Schools	122	4.18	0.46
	Total	1224	4.18	0.63
Academic Level (Year)	1st	472	4.22	0.59
	2nd	439	4.17	0.61
	3rd	95	4.11	0.58
	4th	218	4.13	0.75
	Total	1224	4.18	0.63
Have you studied the Ethics and Human Values Course (EHVC)?	Yes	799	4.27	0.71
	No	425	4.00	0.38
	Total	1224	4.18	0.63

The above results show apparent differences in the means of the student's answers to the life skills scale (LSS) according to gender, academic specialization, academic level, and Ethics and Human Values Course (EHVC). An analysis of variance (ANOVA) is performed to determine the significance of the differences. Table (8) illustrates those findings.

Table (8): The Findings of the Analysis of Variance Test (ANOVA) to Find out the Significance of the Differences in the Responses of the UJ Students to (LSS) According to the Study Variables

Source of Variation	Sums of Squares	Degrees of Freedom	Mean Square	F	Statistical Significance
Gender	0.498	0.498	0.498	1.316	0.251
Academic Specialization	0.009	0.004	0.004	0.012	0.988
Academic Level	1.528	0.509	0.509	1.347	0.258
Studying Ethics and Human Values Course (EHVC)	18.506	18.506	18.506	48.949	0.000*
Error	459.745	0.378	0.378		
Adjusted Total	481.663	1223			

*** Significance level (α = 0.05)**

Table (8) indicates no statistically significant differences at the level (α = 0.05) in the means of the study sample responses on (LSS) for gender variable, as the F-value is (1.316) and the level of significance is (.251), which is a statistically insignificant value. Additionally, Table (8) shows no statistically significant differences at the level (α = 0.05) in the means of the study sample responses on the (LSS) for the academic specialization variable, as the F-value is (0.012) and the level of significance is (988), which is a statistically insignificant value. Moreover, Table (7) designates no statistically significant differences at the level (α = 0.05) in the means of the study sample's responses to the (LSS) according to the academic level variable, as the F-value is (1.347). The significance level is (.258), a statistically insignificant value. However, Table (8) demonstrates the presence of statistically significant differences in the means of the responses of the study sample on the (LSS) to the variable of studying Ethics and Human Values Course (EHVC), where the F-value is (48.949) with a level of (.000). In other words, the Mean of the responses of those studying Ethics and Human Values Course (EHVC) is higher than the Mean of the responses of students who do not study Ethics and Human Values Course (EHVC).

The research focuses on promoting the awareness of practical life skills among UJ students. It tackles the significance of social life skills in enabling students to understand better the cultural background behind the courses and how it influences the overall educational performance. To capture students' perceptions, the researchers adopted a quantitative approach that yields statistical analysis of the obtained responses. The students' questionnaire answers reflect their impression of studying social skills. As the answers being statistically analyzed, the following conclusions have been made:

The literature reviewed supports the researchers' argument regarding the importance and necessity of using practical social skills in the university curriculum and study plan. The researchers have presented some of the studies above as they tackle the ethics and human values modules. In light of the students' responses and perceptions, the literature review revision, and the statistics results, the researchers set the needed assumptions as conclusions followed by appropriate recommendations.

The results of the ANOVA analysis showed that there were no statistically significant differences in gender differences, as shown in Omar (2017). This can be explained by the fact that the university environment is a common factor for all students, which may lead to

homogeneity in the level of awareness among students regardless of their gender or specialization. As for academic specialization, the opportunities available to students in some specializations to develop certain life skills may differ from others, as Al-Zahrani (2021) indicated that students of scientific specializations may be exposed to different practical challenges than students of theoretical specializations, which leads to differences in their level of awareness of life skills.

In addition, the study level may impact students' awareness of life skills, as students in advanced years may have greater awareness due to their accumulated academic and social experiences Lisa et al. (2019). As for studying the subject of ethics and human values, the effect may appear greater among students who received this subject compared to their peers who did not study it due to the focus of the subject on promoting human values and skills for dealing with daily life, which in turn affects their level of awareness of life skills. Although the results showed high scores in the level of life skills among the study sample, there is an urgent need to enhance these skills. It is important to clarify that high scores may reflect theoretical knowledge rather than practical application of these skills. In some cases, students may reflect sufficient awareness of life skills and their importance, but they may lack the ability to apply them effectively in daily life.

There is also a gap between theoretical knowledge and practical application of life skills, as traditional education may focus on providing knowledge without providing sufficient opportunities to apply this knowledge in real-life situations. Therefore, enhancing life skills requires educational and training programs that focus on practical aspects and provide students with educational environments that simulate reality and allow them to practice these skills.

Rapid developments in the educational environment and society may require the development of new life skills compatible with modern challenges. Students need advanced skills such as critical thinking, flexibility, and solving complex problems, which may not be sufficiently available within traditional curricula.

Consequently, enhancing life skills should be an essential part of the educational system to ensure that students can face future challenges and apply what they have learned in practical life.

Conclusion

The findings of this study underscore the necessity of integrating practical life skills into the university curriculum to enhance the educational experience and prepare students for real-world challenges. As evidenced by the statistical analysis of student perceptions, there is a clear consensus on the significance of social life skills in fostering a deeper understanding of cultural contexts and improving overall academic performance. The research aligns with existing literature that advocates incorporating practical social skills within university study plans, particularly within ethics and human values modules.

The analysis revealed that while there are no significant gender differences in life skills awareness, variations exist among academic specializations. Students in scientific disciplines often encounter distinct practical challenges, influencing their exposure to life skills compared to their peers in theoretical fields. Moreover, advanced students demonstrate a heightened awareness of these skills, reflecting their accumulated academic and social experiences. Those who have engaged with courses on ethics and human values particularly benefit from the emphasis on human values and everyday life skills, enhancing their overall awareness.

Despite the high scores in life skills awareness among participants, the study identifies a critical gap between theoretical knowledge and practical application. This disparity indicates that while students may recognize the importance of life skills, they often lack the opportunity to implement them effectively in their daily lives. To address this issue, it is essential to develop educational and training programs that prioritize experiential learning and provide environments conducive to practicing life skills in realistic scenarios.

The rapidly evolving educational landscape necessitates reassessing life skills that align with contemporary challenges. Students must be equipped with advanced competencies such as critical thinking, adaptability, and complex problem-solving—skills often insufficiently addressed in traditional curricula. Therefore, integrating life skills into the educational framework is imperative to ensure that students are aware of these skills and capable of applying them effectively in real-world contexts, thus preparing them to navigate the complexities of modern life successfully.

Recommendations

To foster a holistic educational environment that equips students with essential competencies, the following recommendations aim to enhance extracurricular activities and promote awareness of life skills within the university community:

- *Enhance Extracurricular Activities:* Extracurricular activities should be strongly emphasized, as they are vital for students to develop various life skills.
- *Invest in Extracurricular Programs*: Universities should allocate resources to expand extracurricular programs, which would provide students with opportunities to apply theoretical knowledge in real-world contexts.
- *Promote Awareness of Life Skills:* Increasing awareness within the university community about acquiring life skills is essential.
- *Implement Informative Initiatives:* Universities should organize campaigns, informational sessions, and collaborative projects to highlight the role of life skills in improving academic performance and preparing students for modern life challenges.

Limitations and Future Directions

Similar to prior studies, the present research faces several limitations. Therefore, future investigations must adopt diverse methodologies, including interviews and other innovative data collection techniques. While this study concentrated exclusively on universities, specifically the University of Jordan, there exists significant potential to broaden its scope to include the wider education sector, encompassing various universities and institutes. Moreover, subsequent research efforts should delve into a more comprehensive array of life skills, thereby revealing diverse perspectives within this field and paving the way for rigorous scientific inquiry to refine educational strategies, promote life skills development, and heighten awareness about their importance.

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An Investigation of Vocabulary Learning Strategies Employed by Engineering Students

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ABSTRACT

In today's digital age, the English language plays a vital role in various fields and aspects of life. For engineering students, they need a thorough command of English to update their knowledge and make the most of innovative technology in their expertise. Those non-major English students are likely to have a great demand for an appropriate and effective vocabulary learning strategy, which may enhance their chances of further education or employment. A study was conducted to identify the most and least commonly used techniques by engineering students to expand their linguistic range. A total of 126 participants were involved in the research at Ho Chi Minh City University of Technology, and data collection was carried out through questionnaires and interviews. According to the findings, students exhibit a preference for employing Cognitive Strategies and express a desire to engage in vocabulary acquisition actively. Teachers, students, and curriculum designers can benefit from this study in developing effective methods to enhance vocabulary learning.

Keywords: EFL, Vocabulary teaching and learning, Vocabulary learning strategies

Introduction

In the words of Wilkins (1972, p.11), "Without grammar, very little can be conveyed. Without vocabulary, nothing can be conveyed." McCarthy (1990) likewise points out that students cannot communicate effectively in the second language (L2) without words to express a broader range of meanings, regardless of how well they learn grammar or sounds. In fact, mastering vocabulary is one of the most significant components of enhancing L2 proficiency. It is estimated that a foreign language (EFL) learner should be able to understand more than 95% of the words in a text in order to comprehend the text or acquire vocabulary (Nation, 2001). Gan et al. (2004) also emphasize that vocabulary learning is one of the most challenging tasks that students are required to undertake.

There is, however, little emphasis placed on vocabulary development in the non-major curriculum of Asian universities (Fan, 2003). A language teacher may use vocabulary learning activities only as an element of other language learning tasks, such as listening to stories, interpreting the meanings of words via contexts, and conducting information gap drills (Coady & Huckin, 1997). To put it another way, vocabulary teaching and learning takes place seemingly incidentally (Fan, 2003; Catalan, 2003), resulting in the gradual accumulation of lexis-based knowledge.

At Ho Chi Minh City University of Technology (HCMUT), students are required to not only handle a large number of English materials associated with their majors but also pass high-stakes exams such as TOEIC and IELTS before they graduate. Even at some of the faculties in this university, the English language is being used as a medium of instruction for the courses offered. However, many students find it difficult to meet the required English skills they need to succeed in their studies, with English proficiency levels ranging from low to upper intermediate. In addition, due to the limited number of lexicons that a teacher can directly teach his or her students, it will be necessary, sooner or later, to prepare students to learn vocabulary on their own. Ultimately, it is the individual learners who do most of the vocabulary acquisition, not the teachers. To bridge the vocabulary gap, students must work individually on improving their vocabulary knowledge. After all, learners are active processors of information, and they process information in a variety of ways. However, as Ellis (1995) illustrates, irrespective of how much target vocabulary becomes clear, it is still important to think about how learners approach language learning. Therefore, it is important to consider the strategies students employ for learning and using vocabulary so that they can gain a better understanding of how language functions and how to use it effectively.

Literature Review

Vocabulary learning strategies (VLS)

According to McCarthy (2014), a language learner cannot fully master a language without developing effective techniques and strategies for learning vocabulary, which is essential for success in foreign/second language learning (Schmitt, 2000). It is on the journey of language acquisition that learners will discover how to expand and enhance their vocabulary knowledge. There are five distinct phases in the process of vocabulary acquisition identified by Brown and Payne (1994, as cited in Hatch & Brown, 1995, p. 373). They involve recognizing sources where new words are encountered, creating a clear mental representation of these new words through visual or auditory means, comprehending the meanings of the words, forming a strong memory association between the words and their meanings, and effectively using the vocabulary in appropriate contexts. In this way, all strategies for learning L2 vocabulary can be viewed as part of these five stages to some degree.

Scholars in the field of linguistics have defined the term "vocabulary learning strategies" (VLS) in a variety of ways. According to Nation (2001), a vocabulary strategy should provide multiple options, have several steps to learn, require knowledge and training, and increase the efficiency of vocabulary learning and vocabulary use. Catalan (2003) defines VLS as “knowledge about the mechanisms (processes and strategies) used in order to learn vocabulary as well as steps or actions taken by students to (a) find out the meaning of unknown words, (b) to retain them in long-term memory, (c) to recall them at will, and (d) to use them in oral or written mode” (p. 56). To put it another way, these learning styles refer to the steps, actions, or mental processes employed by learners to facilitate the acquisition of vocabulary.

Vocabulary acquisition strategies are considered important and have received significant attention in EFL contexts. As Oxford and Nyikos (1989) point out, strategies enhance "learner autonomy, independence, and self-direction." In this way, they enable learners to take charge of their own learning so that they are able to take responsibility for their education (Schmitt, 2000). Additionally, VLS allows L2 students to acquire a large number of new vocabulary items (Nation, 2001). A study by Gu and Johnson (1996) indicates that learners employing selective attending strategies are able to determine which words are important to learn and essential for them to get through the passage. In the case of learners employing self-initiation strategies, a variety of methods can be employed to help them comprehend the meaning of words encountered. With a variety of VLS at their disposal, learners might be able to handle any unfamiliar or new words they come across with relative ease.

The classification of VLS

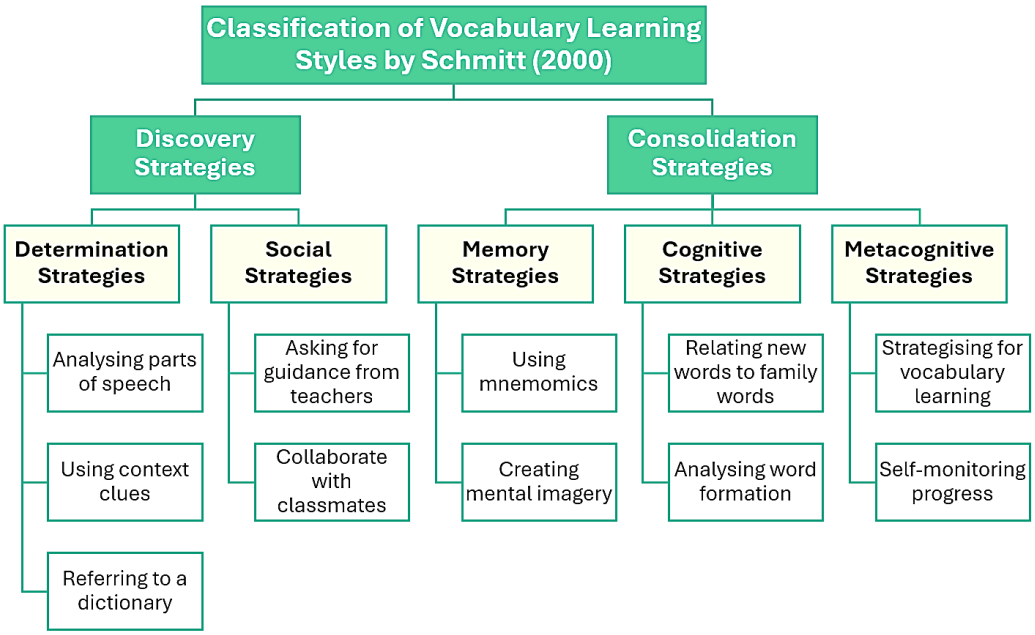

Figure 1: The classification of VLSs by Schmitt (2000)

Despite different ways of classifying VLS, this study adapts Schmitt's taxonomy (2000) to explore how students use VLS to learn vocabulary. The VLS taxonomy, developed by Schmitt (2000), provides a framework for understanding how learners come up with new words and how they acquire them through two main categories: Discovery Strategies and Consolidation Strategies.

Discovery strategies enable learners to discover the meaning of unfamiliar words they come across for the first time. These strategies can be further divided into two subcategories. *Determination Strategies* encourage learners to work independently in order to interpret word meanings. The process might involve analyzing parts of speech, using context clues to make a guess, or referring to a dictionary (bilingual or monolingual) for clarification. Alternatively, learners can utilize *Social Strategies* to comprehend meaning through interactions. Seeking guidance from teachers or classmates when faced with challenges is an effective approach.

Following the initial comprehension of a word's meaning, ***Consolidation Strategies*** come into play to ensure retention. This involves the use of *Memory Strategies* such as mnemonics (memory aids) or imagery (creating a mental picture) in order to establish a connection between the newly acquired word and something familiar. Learners can also employ *Cognitive Strategies* to relate the new word to other words that they already know or to think about the way the word is formed. Additionally, *Metacognitive Strategies* involve a reflection on the learning process itself. Planning a strategy for learning new vocabulary and monitoring their

progress will help learners become more strategic and self-aware in their effort to acquire new vocabulary.

The factors affecting VLS

Many research publications on VLS have identified factors that contribute to variation in learners' VLS use, which can be divided into two categories: individual differences and learning contexts.

Individual differences

A study by O'Malley et al. (1985) suggests that more effective learners use a variety of VLS throughout their language learning process, whereas learners who demonstrate less competency use VLS that are inappropriate for their needs. It is not clear whether using more strategies is better or which specific strategies are most effective. There is widespread agreement, however, that learning styles and strategies vary from one learner to another, and individual differences have a significant impact on the learning process.

Belief

According to Fan (2003), learners use strategies they perceive as being useful more frequently. O'Malley et al. (1985) report that Asian students are reluctant to apply imagery and grouping strategies to learn vocabulary even though they perform more efficiently than the experimental group with rote memorizing. In the study carried out by Schmitt (1997), it was found that learners who regard dictionary and repetition strategies as the most useful VLS prefer to utilize them and consider imagery and semantic grouping strategies the least effective.

Exposure

A word's frequency of occurrence plays an important role in determining whether it is observed and selected for learning. According to Ellis (2002), words that appear often are easier to recognize than words that appear infrequently. In light of this, it seems that learners are more likely to memorize and learn certain words when they are exposed to them on a frequent basis. In other words, the frequency with which students encounter these words impacts their ability to remember and understand them as they are repeated.

Language proficiency

In comparison with their less advanced counterparts, more advanced learners tend to employ more sophisticated and meaning-focused strategies. As Loucky (2003) observes, students with a high level of language proficiency in college display a greater tendency to utilize VLS than

those with a lower level. Likewise, Chang and Chang (2009) showed a positive correlation between students' use of VLS and their language proficiency. In addition, among language learners, the extent to which they are exposed to natural English input within their learning environments influences the use of a variety of VLS (Kojic-Sabo & Lightbrown, 1999). According to Nassaji (2006), the depth of vocabulary knowledge has a direct correlation with lexical inference strategies, such as inferring meaning from unknown words. Nassaji's findings also reveal that learners with a greater knowledge of vocabulary use VLS more effectively.

Learning contexts

There is strong evidence suggesting that the use of VLS correlates significantly with a student's field of study. The use of VLS by science students differs from that of arts students, according to Gu (2002), while Liao (2004) indicates that English majors use VLS differently from non-English majors. Bernardo and Gonzales (2009) note that Filipino students use VLS differently across different fields of study. A study by Asgari and Mustapha (2011) also demonstrates that the influence of supportive and unsupportive parents varies in terms of the options available to students. Moreover, Kamali et al. (2012) conclude that the use of VLS by Malaysian ESL students is influenced by the interaction between teachers, peers, and the classroom environment.

The effects of VLS instruction

According to Catalan (2003), learning and teaching vocabulary is primarily focused on empowering learners to understand the meaning of unknown words, retain them in long-term memory, recall them at any time without difficulty, and use them orally and in writing. However, deliberate vocabulary teaching is considered to be less efficient in that only a limited number of words and a limited percentage of what makes a word can be taught (Nation, 2005). Hence, VLS instruction should be supported by teachers in order to provide students with direct instruction on how to adopt and use appropriate VLS. As summarized by Nyikos and Fan (2007), "(1) the integration of VLS into instruction appears to be more effective than non-integration, (2) significantly better vocabulary performance is possible with VLS instruction, and (3) that combination of metacognitive and specific VLS seems to work better than either in isolation" (p. 273).

VLS instruction has been demonstrated to enhance vocabulary knowledge in numerous studies. Mizumoto and Takeuchi (2009) find that effective teaching strategies can alter the learners' frequent usage of Memory Strategies, which is positively correlated with participants' language performance. Rahimi's (2012) study confirms the positive effect of VLS instruction on the depth of vocabulary knowledge among Iranian learners. According to Naeimi and Voon

Foo's (2013) study on the effects of direct VLS instruction on reading comprehension skills among Iranian university students, the experimental group that was taught direct VLS performed better than the control group. Additionally, Yang and Liu (2013) report that VLS instruction has a positive effect on vocabulary acquisition and strategy use among Chinese university students majoring in English.

In this paper, the author will explore the current trends in vocabulary learning strategies (VLS) among engineering students at Ho Chi Minh City University of Technology (HCMUT) in light of the never-ending process of vocabulary learning, which often poses overwhelming challenges to EFL learners.

To fulfill the research purpose, three underlying questions shall guide the present study:

1. How do students view vocabulary learning?
2. Which vocabulary learning strategies are the most and least commonly used by students?
3. What are some of the problems students face when learning vocabulary?

Methods

Participants

The study took place during the second semester of the 2023-2024 school year and involved 126 students at HCMUT who are in their first or second year at the university. All of them were native Vietnamese speakers who were proficient in intermediate English. In the beginning, participants were not informed of the research objectives or processes to ensure that data collection would not adversely impact lessons, learning outcomes, or student learning outcomes. During the research, these students actively participated and provided feedback on how they learned vocabulary in their English learning process.

Design of the study

A mixed-methods sequential explanatory design employed in this research involved collecting both quantitative and qualitative data. As a first step, the researcher collected the quantitative data from the participants using the online survey. In accordance with Dörnyei and Csizér's recommendation (1998), conducting research using quantitative methods is a way to maintain objectivity in the sense that it contributes to the validity of results and reduces the risk of researcher bias in the research results.

The second phase of the research process involves collecting qualitative data through a semi-structured interview. This will provide an opportunity to elaborate on the quantitative results obtained in the first phase and provide a general understanding of the research problem. The qualitative results are believed to offer excellent opportunities for further exploration of the quantitative results (Creswell, 2003).

Data collection

For this study, a questionnaire was adapted from Vocabulary Learning Questionnaire Ver. 3 (Gu & Johnson, 1996) and translated into Vietnamese in order to avoid misunderstandings. These questions were designed to evaluate students' perceptions of vocabulary learning and their strategies for approaching new words. Responses were recorded using a five-point Likert scale, ranging from 1 (never) to 5 (always). The questionnaire was administered online through Google Forms, with 126 HCMUT students participating during the midpoint of their semester. After the data had been collected, it was analyzed using SPSS 20.0 and presented in Microsoft Excel for further analysis.

As the next step, 15 out of the 126 samples were chosen at random to participate in a follow-up semi-structured interview to acquire supplementary information and clarifications regarding the questionnaire data. Subsequently, the researcher translated the final extracts obtained from Vietnamese interviews into English. The interview transcripts and notes were then converted into a digital format and carefully classified in line with the research questions.

Findings

In this study, descriptive statistics were used to determine the central tendency results for VLS used by students. According to Cronbach's Alpha values, this scale exhibited a high level of internal consistency, ranging from 0.9 to over 1.0. Accordingly, it can be concluded that the scale is reliable and valid for determining the frequencies and preferences of students' VLS. Additionally, the interview findings underwent meticulous analysis in alignment with the research questions. To gain a comprehensive understanding of the findings and draw meaningful conclusions, the analysis involved comparing the results with those obtained from the questionnaires.

Quantitative data

Table 1 presents a fascinating insight into the strategies students utilize when confronted with unfamiliar vocabulary.

Table 1: Strategies used for discovering the meaning of new words

Discovery Strategies	Mean	S.D.
Determination Strategies		
Analyzing parts of speech	3.36	0.99
Guessing from context	3.54	1.03
Using a dictionary	3.56	1.19
Social Strategies		
Asking teachers	2.57	0.99
Asking friends	2.93	1.08

When encountering new words, students are likely to rely on dictionaries (mean: 3.56) and deduce meanings through context clues (mean: 3.54). In addition, analyzing the word's structure through its parts of speech appears to be another popular method. It is interesting to note that asking for clarification from teachers and classmates seems to be less prevalent than independent strategies, despite the fact that it remains a popular strategy.

Table 2: Strategies used for consolidating vocabulary learning

Consolidation Strategies	Mean	S.D.
Memory Strategies		
Use mnemonics		
- Stick words on a wall for retention	2.37	1.18
- Repeat the words aloud	3.25	1.09
- Keep a vocabulary note	3.53	1.08
Use imagery (make a mental image)	3.22	1.17
Cognitive Strategies		
- Use flashcards	2.67	1.19
- Write a paragraph	2.94	1.01
- Make their own definition	3.27	1.03
- Connect it to an experience	3.29	1.08
- Make a sentence	3.33	0.98
- Use synonyms/antonyms	3.41	1.08
- Use semantic mapping	3.41	0.94
- Use media	3.51	1.06
Metacognitive Strategies		
- Test oneself	3.16	0.98

Table 2 illustrates all of the strategies used by students to review and recite the words they encountered. The strategies yielding the highest mean scores involved reciting for memorization, such as maintaining a vocabulary notebook (with a mean score of 3.53), repeating words aloud, and creating mental images. Additionally, students made use of media (3.53), semantic mapping (3.41), and synonyms/antonyms (3.41) to connect newly acquired words with their existing knowledge. While students displayed a less enthusiastic attitude

toward composing a paragraph with new words (2.67), they displayed a stronger preference for constructing sentences with new words (3.39), formulating definitions, and linking new words to their own experiences.

Qualitative data

The researcher interviewed students to gain insights into their attitudes toward vocabulary acquisition and the difficulties encountered in the vocabulary learning process.

In the interview, 73.33% of interviewees indicated that vocabulary learning is significantly important, while 20% expressed uncertainty about vocabulary learning in relation to grammar knowledge. In general, the majority of the students (60%) learned fewer than ten new words per week.

Table 3: Students' views and attitudes on vocabulary learning

Students' views and attitudes	Subjects (n=15)	Percentage
The importance of vocabulary		
Important	11	73.3%
Not sure	5	26.7%
The number of words learned per week		
More than 10 words	6	40%
Fewer than 10 words	9	60%

A number of interviewees indicated that they rarely practiced vocabulary outside of class, primarily due to the heavy workloads they faced in their other courses. There was a broad awareness among them that vocabulary acquisition was crucial to their academic success. The students, however, felt constrained by their commitments to their major subjects, leaving them little time to learn new words. Having to balance their primary coursework with vocabulary practice posed a challenge that limited their ability to improve their language skills outside the classroom.

Anh: *I am too overwhelmed with assignments and presentations in other classes*

Thien: *It is too hard to maintain the habit of practicing vocabulary regularly.*

Additionally, some students had difficulties with memory techniques (6) and choosing appropriate words according to different contexts (12). They admitted to frequently forgetting words, even shortly after learning them. In other words, students are concerned about the need to acquire new words more efficiently, especially those not frequently encountered.

Toan: *Though I am capable of communicating well in basic situations, I am unable to convey my ideas on more complex topics*

An: *I get confused when choosing words to express my ideas.*

Hieu: *Despite keeping a vocabulary list, I find it difficult to remember the words for an extended period.*

Some respondents referred to dictionaries, particularly bilingual dictionaries, but they were only used to look up meanings.

Nghia: *I prefer to consult an English-Vietnamese dictionary to determine the meaning of the words.*

Thong: *The English definition is sometimes difficult for me to understand*

A few students even complained about their poor English background and proficiency level, which demotivated them to some extent. Another pair of students even found English challenging and uninteresting, resulting in a lack of motivation to learn new words.

Discussions

How do students view vocabulary learning?

The findings show that students are aware of the importance of vocabulary in order to become proficient in a foreign language, which causes them to engage in a variety of strategies to acquire new vocabulary (Schmitt, 1997). This dynamic process involves both input and output, which refers to the words that are learned and how they are used. In the learning process, students take responsibility for their learning, engage in rote memorization, and acquire meaningful information.

There is, however, a lack of commitment to vocabulary learning among engineering students at HCMUT, in spite of the many opportunities they have to engage with English. They may have limited knowledge of the vocabulary they should acquire due to their insufficient dedication to the learning process. This may be due to the fact that the participants in this study possess an intermediate level of English proficiency. Therefore, they do not experience many difficulties when communicating in English. They find it relatively easy to comprehend English materials, even those with complex terminology because they have a sufficient command of vocabulary and grammar to participate in discussions with lecturers or international exchange students. This also contributes to the fact that more than 30 percent of the students interviewed are uncertain about the importance of vocabulary acquisition to their learning process. In addition, this could be because the frequency and importance of some vocabulary items may not be significant enough for them to pay attention to (Ellis, 2002). Since some students tend to review the vocabulary only when examinations are approaching, it is understandable why they do not retain information from hastily reviewed word lists.

Increasing proficiency for high-stakes exams or writing research reports or articles is not straightforward. Nasir et al. (2017) state that proficient learners have a greater vocabulary repertoire and that their performance on vocabulary tests may serve as an indicator of their overall proficiency level. In essence, there is a significant connection between vocabulary knowledge and improvement in proficiency.

Which vocabulary learning strategies are most and least commonly used by students?

The study's findings provide a comprehensive analysis of students' strategies, highlighting those that are most frequently used as well as those that are less commonly adopted. In addition to providing insight into students' preferences and behaviors regarding their learning methods, this data may indicate which methods are likely to be more effective or enjoyable in terms of their academic experience.

When students are first exposed to new words, using a bilingual dictionary seems to be the most frequently used strategy, which is in line with findings from many studies (Ahmed, 1989; Gu & Johnson, 1996). Interestingly, inferring meanings from the context and analyzing parts of speech are among the most popular strategies. According to Nation (2001), the effective use of contextual clues requires a reader to be familiar with approximately 95% of the surrounding words. This preference may be influenced by the fact that the participants had an intermediate level of English proficiency. As a result, enhancing vocabulary knowledge and adopting this strategy seem to be intertwined. Furthermore, their proficiency allows for greater independence in the language learning process as they are less reliant on explanations from teachers or peers.

Additionally, this study indicates that the findings concerning Consolidation Strategies are inconsistent with those of some previous studies since the use of higher-level Cognitive Strategies entails deeper cognitive processes, such as grouping, semantic mapping, and the creation of sentences from words (O'Malley et al., 1985). Based on the study of Cengizhana (2011), it appears that Cognitive Strategies are not the preferred method for learners to utilize. Aside from this, the study also shows that students in this study prefer to maintain a vocabulary journal. At the same time, Hashemi and Hadavi (2015) find that note-taking is generally the least frequently used of the strategies for learning vocabulary.

Further, students expressed an understanding of the importance of active vocabulary learning and utilized a range of Cognitive Strategies as part of their vocabulary acquisition process. The research by Mutalib et al. (2014) focusing on Malaysian second language learners' use of VLS, however, reveals that most students relied on Discovery Strategies, with only a few being familiar with Cognitive Strategies. Likewise, Celik and Toptas (2010) discuss the VLS

employed by Turkish EFL students and find that Determination Strategies were used frequently, whereas most learners did not favor Cognitive Strategies.

What are some of the problems students face when learning vocabulary?

According to the findings, there are two main problems associated with students' use of VLS. Students are likely to face challenges in utilizing the numerous opportunities for practicing vocabulary outside of English classes and in arranging their schedules appropriately to maximize their learning performance. As explained by Asgari and Ghazali (2011), inefficient time management can result in poor language proficiency. A study conducted by Kojic-Sabo and Lightbrown (1999) also demonstrates that learners' independence and study time were closely related to their ability to learn and use vocabulary proficiently.

The second problem students encounter has to do with their confusion about learning strategies. While some students can integrate various VLS into their vocabulary acquisition effectively, others seem to rely more on a trial-and-error approach than a systematic one, even after trying different strategies. As a result, they are not able to keep track of words effectively. Additionally, students are not really aware of how to make effective use of dictionaries. Word-to-word translation becomes problematic as a result of the overuse of bilingual dictionaries, especially online translation applications. As a result, students find it challenging to avoid errors related to word form or usage.

Pedagogical implications

The results of this study can be interpreted in several important pedagogical ways.

An orientation to the importance of ongoing vocabulary development

As a first step, it is essential to teach students how to manage their time efficiently and prioritize their work. This skill will help them allocate specific time for vocabulary improvement. Through this process, students will enhance their vocabulary and be prepared for further learning.

Teachers may emphasize the importance of learning new words for students with high proficiency in English to ensure that their students can communicate more effectively and accurately in complex situations. By introducing and reinforcing positive attitudes and effective VLS, teachers can provide learners with valuable tools to maximize their language learning potential.

Strategy development

In addition, students' metacognition should be developed in order to boost their own autonomy. Metacognition, as defined by Anderson (2002), includes actions such as (1) setting learning goals and defining how to achieve them; (2) making conscious decisions regarding the strategies to be used and how they will be utilized; (3) knowing how to use various strategies concurrently; and (4) evaluating strategy use and learning. The use of metacognitive strategies is, therefore, critical for the control of learning processes and the management of tasks as learners plan, monitor, and evaluate both language use and language learning (Harris, 2003). In this regard, these strategies are of particular importance in the context of vocabulary acquisition.

Teachers could guide students to select sets of meaningful words as well as to use appropriate VLS to learn them. Teachers need to identify the frequency of VLS use and its contribution at the beginning of a class in order to provide their students with the best possible learning experience (Oxford, 2001). When teachers guide students in the exploration of new strategies and in reflecting on what works effectively for their learning rather than just instructing them on what to do and how to do it, students are more likely to become independent learners, which undoubtedly benefits their learning processes. Additionally, teachers need to assist their students in identifying the most appropriate VLS to enhance their vocabulary acquisition. Kayi-Aydar (2018) also concludes that ESL learners can successfully develop their vocabulary knowledge if they are provided with appropriate scaffolding, guidance, and support during their learning process. In other words, students can benefit from teacher-directed instruction, which allows them to manage their study time more efficiently and maximize their learning both inside and outside the classroom (Rogers, 2018).

Furthermore, it is essential to understand that metacognition can be applied in a wide variety of academic fields, allowing students to become more self-aware, independent, and self-directed outside the language classroom as well. As students are trained to set their own goals for learning, monitor their task performance, and evaluate their results at both the content and language levels, they will likely be able to become more capable of learning and recalling information in any subject area when they have set their own learning goals. The development of such skills leads to a deeper understanding of the content of a course as well as the development of a more resilient and adaptable approach to learning in any subject area.

Conclusion

Foreign language learning is a dynamic and complex process that requires learners to take proactive measures to facilitate their learning. Vocabulary plays a key role in that acquisition process. Developing an effective vocabulary learning strategy is critical to L2 learners and instructors since it empowers students to become independent from their teachers.

The present study aims to give an insight into how engineering students at a public university in Vietnam utilize a variety of learning strategies to develop their vocabulary knowledge. Additionally, the findings can serve as an aid to teachers when it comes to selecting and designing appropriate materials and activities that will enhance students' ability to learn. Fostering self-awareness among learners requires an understanding of different strategies students use and how effective they are in fostering their own learning progress. As a result of this self-regulation, students can develop more strategic study habits, which ultimately improve their academic performance, equipping them with the capabilities necessary for success in both their academic as well as professional careers.

However, this study has some limitations, especially in terms of sample size, which may limit the generalizability of its findings. For future research, it would be beneficial to explore this issue with a larger and more diverse sample of students to enable a more comprehensive and detailed analysis.

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Exploring the Growth Mindset of Pre-Service Teacher Students in a Thai Context: An Exploratory Study

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ABSTRACT

The research project aimed to analyze the components of final-year pre-service teacher students' Growth Mindset and to study the characteristics of Growth Mindset. The population in this research study consisted of 349 final-year pre-service teacher students in Bangkok, Thailand. 48.453% of the variance was explained by components (a) Commitment Leading to Success, followed by (b) Challenge as Learning (7.176%), and (c) Self-Awareness (4.217%). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.955, indicating the appropriateness of the data for factor analysis. Bartlett's test of sphericity ($\chi^2 = 5259.906$, $p < .05$) confirmed the data's suitability for factor analysis. The Eigenvalues for the components ranged from 1.012 to 11.629. These findings suggest that pre-service teacher students with Growth Mindset are characterized by a strong commitment to achieving success, a propensity to view challenges as learning opportunities, and a heightened level of self-awareness. The results underscore the importance of incorporating Growth Mindset development into teacher education programs to foster resilience and adaptability among future educators.

Keywords: Pre-service teacher students, Growth Mindset, Fixed Mindset, Exploratory factor analysis, Confirmatory factor analysis.

Introduction

In today's rapidly evolving global context, the notion of developing human potential has become a focal point, particularly within the realm of education. Among the most influential concepts in this area is the Growth Mindset, introduced by Dweck (2006). This framework asserts that intelligence and abilities are not fixed traits but dynamic qualities that can be cultivated through dedication, effort, and learning from failure. Rather than viewing innate talent as the sole determinant of success, the Growth Mindset emphasizes that natural ability is merely a starting point. This perspective encourages resilience in overcoming obstacles and a proactive attitude toward challenges, promoting continuous self-improvement (Dweck, 2006). In contrast, the Fixed Mindset entails the belief that intelligence and skills are static and immutable. Individuals with this mindset often shy away from challenges, quickly surrender to difficulties, and demonstrate limited motivation for personal development (Dweck, 2006).

In the educational context, fostering a Growth Mindset is of paramount importance, particularly for educators who bear the responsibility of nurturing students' potential. Teachers with a Growth Mindset are better equipped to address the multifaceted challenges of the disruption era, characterized by rapid technological advancements and shifting educational paradigms. Such educators are more likely to embrace innovative technologies, adapt their teaching methodologies to meet diverse learner needs and create environments that support holistic student development. Additionally, these teachers serve as exemplary role models, demonstrating flexibility and resilience, which in turn inspires students to adopt similar attitudes toward challenges and lifelong learning (Heyder et al., 2023). By modeling a Growth Mindset, teachers cultivate a culture of persistence and adaptability, helping students to view challenges as opportunities for growth rather than as threats to be avoided.

However, the absence of a Growth Mindset or its misapplication can have detrimental effects on the learning process. Educators who hold a Fixed Mindset or misinterpret the principles of the Growth Mindset may inadvertently impose limitations on students' potential. For example, such teachers may fail to encourage students to take on challenging tasks, viewing difficulties as barriers rather than as opportunities for skill development. Furthermore, they might overlook the latent potential within students who do not initially excel, reinforcing negative

stereotypes about ability. Miscommunication of a fixed perspective can also create misconceptions among students, fostering the belief that success or failure is predetermined and immutable (Hu & Zhang, 2024). This not only stifles students' motivation to improve but also diminishes their ability to develop resilience and adaptive skills—key attributes in an unpredictable and complex world.

Given these dynamics, it is crucial to investigate the role of the Growth Mindset in teaching and learning, emphasizing its significance in fostering both educators' and students' development. When implemented effectively, this mindset can enhance the quality of education, equipping learners with the tools to navigate and thrive in an era of constant change. Moreover, cultivating a Growth Mindset within educational systems has the potential to generate long-term benefits for society by creating individuals who are resilient, adaptable, and committed to lifelong learning.

Thailand's education system is currently undergoing significant reforms aimed at transitioning from traditional, teacher-centered approaches to more student-centered and competency-based models (Hallinger & Lee, 2011). This shift places considerable pressure on teacher education programs to prepare future educators with the skills, adaptability, and mindset required to address the evolving demands of modern classrooms. Pre-service teachers play a pivotal role in this reform process; however, existing research indicates that many Thai educators continue to hold entrenched beliefs regarding intelligence and pedagogical practices, which may impede their ability to foster environments conducive to a growth-oriented learning culture (Saengboon, 2017). As such, the investigation of the mindset of pre-service teacher students in Thailand is both timely and essential for addressing this critical educational gap.

This study aims to address a critical gap in the existing literature by investigating the Growth Mindset of pre-service teacher students within the Thai educational context. Although prior research has consistently shown the positive effects of Growth Mindset interventions on student performance and motivation (Claro et al., 2016), there remains a paucity of research examining the development of Growth Mindset beliefs among pre-service teachers and the potential impact of these beliefs on their future pedagogical practices. A comprehensive understanding of the Growth Mindset in pre-service teachers is crucial to ensuring that they

are equipped to cultivate adaptive, resilient learners capable of thriving in an increasingly complex and dynamic educational environment.

In light of the ongoing educational reforms in Thailand, there is an urgent need to examine how pre-service teachers perceive their own capacity for growth and development. A lack of understanding in this area poses the risk that teacher education programs may fail to adequately prepare future educators to adopt and implement growth-oriented pedagogical approaches. This study, therefore, seeks to address this critical gap by investigating the Growth Mindset beliefs of pre-service teacher students in Thailand, offering essential insights that contribute both to local educational reform efforts and to the broader discourse on teacher development.

Literature Review

Growth Mindset

Mindset was proposed by Carol Dweck (Dweck, 2006), an American psychologist. It is stated that each person has two mindsets: a fixed mindset and a growth mindset. (Xiao et al., 2023) Though no one has only one theory of intelligence or simply mindsets, students can have two different hypotheses about their intellectual capacities. More fixed-minded people think that their intelligence is just a fixed attribute. They frequently approach learning with the intention of appearing intelligent, and they avoid problems because they think that having to put in much effort or making mistakes indicates that they are not very capable. On the other hand, those who have a growth mindset are more likely to regard effort as a motivating factor for learning and to view failures as chances to acquire new talents. They also think that skills can be developed.

A fixed mindset is characterized by the belief that abilities and intelligence are static traits that cannot be significantly developed. People with a fixed mindset tend to avoid challenges and give up easily when facing obstacles. On the contrary, people with a growth mindset believe that abilities and intelligence can be developed by their abilities. They view challenges and failures as opportunities for improvement. (Xiao, F. et al., 2023)

The concepts of student development using Growth Mindset (Visessuvanapoom & Tangpornpaiboon, 2023) are as follows:

(1) Growth Mindset relates to adaptability.

(2) Growth Mindset relates to learners' learning development.

(3) Growth Mindset relates to learners' good characteristics.

(4) Growth Mindset promotes learners' mental health.

Growth Mindset contains 3 elements (Wisessathorn, et al., 2022):

(1) Internal positive attitude

(2) Belief in development

(3) Appreciating the value of Growth Mindset

Growth Mindset of teacher students

Dweck (2006) defines a growth mindset as the belief that abilities and intelligence can be developed despite individual differences. This perspective encourages dedication, hard work, and learning to improve abilities. This is in accordance with Ricci (2013), who states that the meaning of a growth mindset involves understanding that intelligence and abilities can be developed through effort. This mindset emphasizes the importance of learning. Ricci highlights that cultivating a growth mindset involves encouraging a love for learning, valuing effort, and promoting resilience and adaptability in the face of setbacks, viewing them as opportunities for growth.

Phongprasertsin (2021) describes the growth mindset of student teachers as an individual mindset that expresses their perceptions. Abilities and intelligence are believed to be changeable and developable through dedication, hard work, challenges, maintaining effort and interest despite failures, and learning from criticism. These elements help in self-development and create learning processes and methods, particularly in the academic aspect. These are five key elements of a growth mindset, namely Belief in development, embracing challenges, persistence in the face of setbacks, emphasis on effort, and listening and learning from criticism. To begin, regarding *belief in development*, it is believed that each person can learn and develop. Understanding that intelligence and natural abilities can be developed through learning new things and building and improving new skills. Secondly, *embracing*

challenges refers to daring and learning to do new things, viewing challenges as interesting opportunities to study and grow, and understanding difficult or unfamiliar tasks can be opportunities to improve. Thirdly, *persistence in the face of setbacks* is the ability to deal with problems and maintain effort despite failures and obstacles. Acknowledging reality and adapting ways of thinking can solve problems and achieve goals. Fourthly, *emphasis on effort* is when recognizing that continuous effort, persistence, practice, and learning are crucial for improvement and success. Additionally, acquiring academic knowledge and employing effective learning processes and methods can help achieve desired outcomes. Fifthly, regarding *listening and learning from criticism,* it is important to consider the warnings, criticisms, and suggestions provided by others. Also, sharing knowledge, receiving others' opinions, and learning from others are ways to reflect thoughts, adjust, and refine deviations to improve in better ways.

To ensure effective teaching methods and cultivate a belief in students' potential, pre-service teachers must adopt a growth mindset. Future teachers' attitudes and views can be significantly shaped during the teacher education phase. Unresolved misconceptions from this period can limit teachers' influence on their students and obstruct their professional development. A unique strategy for creating a growth mindset in a short, effective, and economical intervention has been put forth to address this. In the first phase, pre-service teachers consider their own educational objectives. They can relate their goals to their job as future educators thanks to this reflective process. Writing a compelling letter to aspiring teacher education students emphasizing the good influence instructors can have on students' lives is the second step. Finally, this short intervention approach is a creative approach to help pre-service teachers develop a development attitude. Participants' perceptions of kids' learning potential are successfully changed, and their own preconceptions are addressed by fusing persuasive writing with reflective thinking. The method is effective, powerful, and scalable, and it is a viable way to train future teachers who are resilient, driven, and dedicated to empowering their students (Heyder et al., 2023).

Methodology

Population and sampling

The population in this research consisted of final-year teacher students who were expected to graduate in the second semester of the academic year 2023. The sample size was determined

using a criterion of 5 to 10 times the number of observable variables related to the Growth Mindset, which consists of 23 observable variables. Therefore, the sample size was set at 230 teacher-students. Data were collected from a total of 349 participants.

Research procedures:

This research is an exploratory study aimed at analyzing the components of the Growth Mindset framework. The procedure follows these steps:

Step 1: Review of Related Concepts and Theories on Growth Mindset.

Step 2: Development and Validation of Research Instruments.

The research instrument employed in this study was a questionnaire on Growth Mindset, adapted from the Growth Mindset Scale developed by Wisessathorn et al. (2022). This instrument was designed to cover the conceptual framework of the Growth Mindset comprehensively. The questionnaire was divided into two sections:

Section 1: General Information including gender, year of enrollment, and major/field of study.

Section 2: Growth Mindset Scale, consisting of 37 items across three dimensions: positive internal attitudes, confidence in self-development, and valuing cognitive growth. Each item was rated on a 7-point scale (0 = not at all reflective of your thoughts or character; 1 = slightly reflective; 2 = somewhat reflective or occasionally; 3 = moderately reflective; 4 = rather reflective; 5 = very reflective; and 6 = most reflective). The instrument's content validity index ranged from 0.66 to 1.00, and the overall reliability was 0.965.

Step 3: Data Collection. Data was collected from 349 final-year teacher students through an online survey using Google Forms during the graduation ceremony.

Step 4: Data Analysis. The researcher conducted quantitative data analysis using descriptive statistics, which were frequency, percentage, mean, and standard deviation. Exploratory Factor Analysis (EFA) was performed. Before conducting EFA, the researcher checked the preliminary assumptions, including the interrelationships

among variables, using the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) and Bartlett's test of sphericity.

Results

This study involved 349 participants, predominantly female (79.08%), with males making up 19.48% of the samples and 1.43% unspecified. Participants represented diverse academic fields, with the majority from the Thai Language (26.07%), Early Childhood Education (21.2%), followed by Social Studies (17.77%), and Primary Education (9.74%). Smaller proportions came from English, Mathematics, Science, Chinese, Physical Education, Arts, and Continuing Vocational Education majors. Some participants (5.16%) did not specify their field of study. The findings highlighted a notable gender imbalance and an uneven distribution across academic fields, with strong representation in certain areas influencing the study's context and potential outcomes.

Results of Growth Mindset Component Analysis

The Growth Mindset framework of final-year students consisted of four components: value effort and persistence, learn from criticism, embrace challenges, and inspire and be inspired by others' success. These components together explain 57.12% of the variance in the Growth Mindset variables, as detailed in Table 1.

Table 1: The number of variables, eigenvalues, percentage of variance (% of variance), and cumulative percentage of variance (% cumulative) for each component of the Growth Mindset framework (n = 349)

	Components	The number of variables	Eigenvalues	% of variance	% cumulative
1	Value Effort and Persistence (VP)	15	16.62	44.91	44.91
2	Learn from Criticism (LC)	6	1.96	5.29	50.20
3	Embrace Challenges (EC)	4	1.32	3.57	53.77
4	Inspire and Be Inspired by Others' Success (IB)	2	1.24	3.36	57.12
	Total	25			
Note: KMO = 0.959, Bartlett's test of sphericity = 7917.988, *df* = 666, p-value = 0.00					

From Table 1, it was found that the exploratory factor analysis of 349 final-year students extracted four components with eigenvalues ranging from 1.24 to 16.62. The KMO value was .959, which was close to 1.00, indicating that the data has a high level of correlation and is suitable for factor analysis. Additionally, Bartlett's test of sphericity yielded a value of 7917.988 ($p < .05$), indicating that the correlation matrix of the variables is significantly correlated.

Table 2: Results of the Exploratory Factor Analysis of Growth Mindset (GM) (n = 349)

	Component			
	1	2	3	4
Value Effort and Persistence				
32. Growth mindset helps in recognizing the real problem	.748			
28. Success is a matter of learning and practice.	.739			
29. Personal abilities can be changed through action (learning by doing)	.738			
33. Growth mindset enables individuals to find new solutions to problems	.735			
35. A growth mindset allows one to accept various changes	.707			
34. A growth mindset fosters creative thinking processes	.696			
27. Effort is the path to success.	.692			
24. Learning from previous mistakes for self-improvement	.685			
22. People can improve themselves.	.660			
23. Self-improvement is more important than overcoming others.	.631			
30. Many things can be done in the future to grow and learn in difficult situations.	.578			
37. Effort helps to advance an organization or unit	.578			
36. Effort changes everything that can be changed.	.566			
25. Open to new things	.541			
31. Enthusiasm always keeps one ready to learn	.514			
Learn from Criticism				
8. Having a good way to deal with mistakes		.664		
12. Having a method to motivate oneself		.625		
7. Having a method to motivate oneself		.614		
6. Knowing one's strengths and weaknesses		.593		
10. Accepting mistakes, whether intentional or unintentional		.552		
21. Learning from and accepting others' criticism, even if it is negative		.551		
Embrace Challenges				
15. Enjoying doing things that challenge one's abilities			.758	
16. Viewing challenges as opportunities to learn			.641	

	Component			
	1	2	3	4
3. Daring to express oneself creatively			.632	
19. Enjoying seeking constructive criticism			.597	
Inspire and Be Inspired by Others' Success				
11. Failure is the result of insufficient effort.				.729
14. Finding inspiration from others' success				.673

From Table 2**,** it was found that the components of the Growth Mindset framework consisted of 1) Value Effort and Persistence, 2) Learning from Criticism, 3) Embrace Challenges, and 4) Inspire and Be Inspired by Others' Success. Each component comprises the following indicators:

1) Value Effort and Persistence (VP) consisted of 15 indicators:
1.1) Growth Mindset helps in recognizing the true problem (C32)
1.2) Success is a matter of learning and practice (B28)
1.3) Personal abilities can be changed through action (learning by doing) (B29)
1.4) Growth Mindset enables individuals to find new solutions to problems (C33)
1.5) Growth Mindset allows one to accept various changes (C35)
1.6) Growth Mindset fosters creative thinking processes (C34)
1.7) Effort is the path to success (B27)
1.8) Learning from past mistakes for self-improvement (B24)
1.9) People can improve themselves (B22)
1.10) Self-improvement is more important than overcoming other people (B23)
1.11) Many things can be done in the future to grow and learn in difficult situations (B30)
1.12) Effort helps to advance an organization or unit (C37)
1.13) Effort changes everything that can be changed (C36)
1.14) Open to new things (B25)
1.15) Enthusiasm always keeps one ready to learn (B31)

2) Learn from Criticism (LC) consisted of 6 indicators:
2.1) Have a good way to deal with mistakes (A8)
2.2) Have a method to motivate oneself (A12)
2.3) Not worry about shortcomings as an obstacle to self-improvement (A7)
2.4) Know one's strengths and weaknesses (A6)

2.5) Accept mistakes, whether intentional or unintentional (A10)

2.6) Learn from and accept others' criticism, even if it is negative (A21)

3) Embrace Challenges (EC) consisted of 4 indicators:

3.1) Enjoy doing things that challenge one's abilities (A15)

3.2) View challenges as opportunities to learn (A16)

3.3) Dare to express oneself creatively (A3)

3.4) Enjoy seeking constructive criticism (A19)

4) Inspire and Be Inspired by Others' Success (IB) consisted of 2 indicators:

4.1) Failure is the result of insufficient effort (A11)

4.2) Find inspiration from others' success (A14)

Results of construct validity testing of the Growth Mindset model

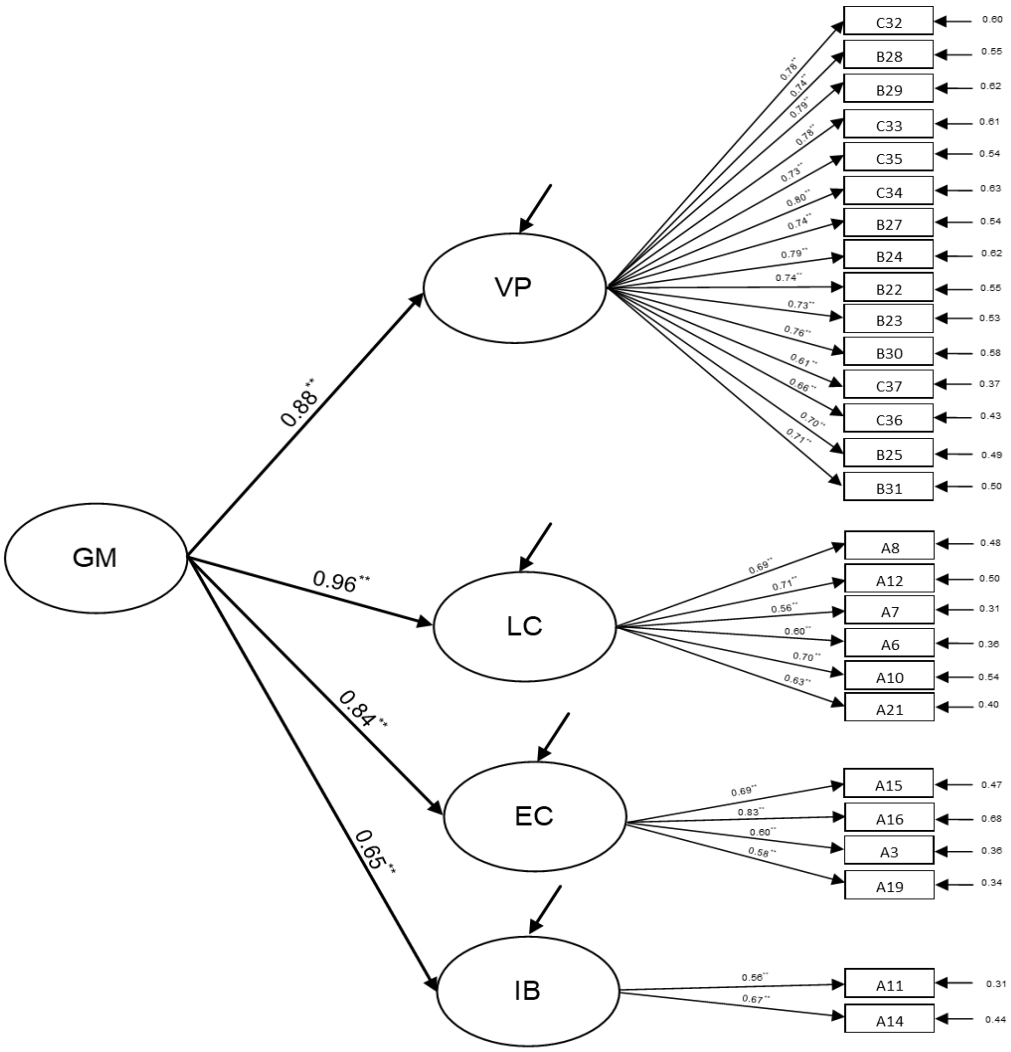

Figure 1: The Growth Mindset Model Components of Pre-service Teachers

The construct validity was tested using Secondary Order Confirmatory Factor Analysis (CFA) to examine the alignment between the model's structure and the indicators of Growth Mindset. The findings revealed that the measurement model demonstrated good construct validity showing a strong fit with the empirical data. The model fit indices were as follows: Chi-square = 527.193, df = 295, p-value = .000, CMIN/DF = 1.787, GFI = .897, NFI = .909, TLI = .949, CFI = .957, RMSEA = .048, and RMR = .051. These indices indicate that the measurement model was well-aligned, as detailed in Figure 1.

Conclusion

Growth Mindset is the belief that personal attributes, particularly abilities, motivation variables, and intelligence, can be developed and changed through effort, dedication, persistence, and inspiration, leading to success (Barroso et al., 2023; Rammstedt et al., 2024; Hu & Zhang, 2024). From the Exploratory Factor Analysis conducted on final-year teacher students, four components were extracted: Value Effort and Persistence, Learn from Criticism, Embrace Challenges, and Inspire and Be inspired by Others' Success. The eigenvalues for these components ranged from 1.24 to 16.62. The analysis yielded a KMO value of .959, and Bartlett's test of sphericity was 7917.988 ($p < .05$). Further Confirmatory Factor Analysis revealed that the measurement model demonstrated good construct validity, showing a strong fit with the empirical data. The fit indices were as follows: Chi-square = 527.193, df = 295, p-value = .000, CMIN/DF = 1.787, GFI = .897, NFI = .909, TLI = .949, CFI = .957, RMSEA = .048, and RMR = .051. Each component is discussed as follows:

Component 1: Value Effort and Persistence

This component reflects the belief that diligent action, learning, and practice will lead to success. Individuals with this mindset perceive mistakes and challenges as opportunities to gain deeper insight into problems and use these experiences for self-improvement. This aligns with the findings of Wisessathorn et al. (2022), who identified self-confidence as the second component of a growth mindset, emphasizing that people can develop themselves through learning, practice, effort, and action.

Component 2: Learn from Criticism

This component is defined by the belief that self-improvement can be achieved through both self-criticism and feedback from others. It encompasses the perspective of viewing criticism

as an opportunity for personal growth. For instance, criticism is regarded as a tool for development, while mistakes are seen as valuable lessons that can inform future prevention and correction. This mindset applies to both negative criticism and praise, which are perceived as sources of motivation. Individuals with this outlook understand the significance of mistakes, using them as a guide for improvement rather than interpreting them as punitive measures. This is consistent with Srirat and Siribanpitak (2019), who found that the development of a teacher's mindset involves listening to and accepting criticism from others as a tool for self-improvement. It also aligns with Wisessathorn et al. (2022), where the first component, a positive internal attitude, includes recognizing one's strengths and weaknesses, accepting mistakes, and embracing negative criticism. Additionally, it resonates with Pongprasertsin et al. (2022), who found that pre-service teachers should be open to criticism and willing to accept feedback from others.

Component 3: Embrace Challenges

This component reflects the belief that a growth mindset arises from having enough effort and persistence and viewing various situations as challenges to overcome. These individuals use constructive criticism to improve their work and do not easily give up. This is in line with Srirat and Siribanpitak (2019), who emphasized the need for teachers to develop a growth mindset that includes a love for challenges.

Component 4: Inspire and Be Inspired by Others' Success

This component is characterized by the belief that inspiration and motivation drawn from others' success are essential for personal development. This aligns with Srirat and Siribanpitak (2019), who stated that finding inspiration in the success of others is crucial, as it helps individuals see that they have goals and that they, too, can achieve them.

Discussion

The findings of this study provide significant insights into the Growth Mindset of pre-service teacher students in Thailand, identifying four key dimensions: valuing effort and perseverance, learning from constructive criticism, embracing challenges, and drawing inspiration from the success of others. These dimensions underscore the critical role of a Growth Mindset in cultivating resilience, adaptability, and reflective teaching practices. Pre-service teachers who possess a Growth Mindset are more inclined to view effort and perseverance as fundamental to achieving success, regard constructive feedback as an

essential tool for continuous self-improvement, confront challenges with determination, and find motivation in the achievements of others.

These findings highlight the imperative of integrating Growth Mindset principles into teacher education programs to prepare future educators better to meet the evolving demands of modern classrooms. By fostering the development of a Growth Mindset, pre-service teachers are more likely to create learning environments that emphasize student-centered pedagogies and encourage the cultivation of similar growth-oriented mindsets among their students. This study contributes to the broader discourse on educational reform in Thailand, emphasizing the need for further research to explore the systematic integration of Growth Mindset principles into teacher education curricula.

Regarding the dimensions with the strongest associations, it is evident that a Growth Mindset equips individuals with the capacity to discern the underlying causes of problems, formulate effective strategies to address errors, embrace challenges that test their abilities, and interpret failure as a result of insufficient effort rather than inherent inability. Individuals with a Growth Mindset exhibit a strong aptitude for solving daily life problems, maintaining a constructive outlook in the face of adversity, and believing that every challenge has a solution. They address problems progressively, demonstrating persistence, patience, and adaptability throughout the process.

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A Study on The Motivations, Advantages, and Barriers of Adult Learners of English: A Case of Female Students in Vietnam

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ABSTRACT

In the realm of educational discourse, the investigation into adult learning within an English as a Foreign Language (EFL) context has drawn considerable scholarly attention. With the increasing emphasis on language acquisition, there has been a corresponding surge in the enrollment of adult learners. This study seeks to explore the lived experiences of a specific cohort: five adult women, ranging from 26 to 41 years old, who are currently enrolled at the University of Foreign Language Studies (UFLs) in Danang, Vietnam. The university provides EFL programs tailored for adult learners, scheduled in the evening to accommodate their professional commitments. The study focuses on the motivations, advantages, and barriers encountered by these learners in their EFL learning journey. To comprehensively capture their perspectives, semi-structured interviews were conducted in Vietnamese and translated into English. The results were then presented in themes. The findings reveal an interplay of intrinsic and extrinsic motivations among female adult learners. Amidst the demands of work and study, familial responsibilities emerge as both an advantage and barrier to EFL female adult learners. Overcoming these barriers requires concerted support from educational institutions and family networks. Thus, there exists a compelling need for increased institutional and familial involvement in fostering an environment conducive to the success of female adult learners in their pursuit of EFL proficiency.

Keywords: Female adult learners, EFL, Motivations, Advantages, Barriers

Introduction

The pursuit of English language proficiency has become increasingly vital in today's interconnected world, where effective communication transcends geographical and cultural boundaries. In Vietnam, the growing emphasis on English as a key skill for personal and professional advancement has led to a notable rise in adult learners seeking to enhance their language capabilities. This language is widely recognized as essential for meeting occupational demands and fulfilling the learning outcome requirements of various training programs.

One of the crucial elements of this linguistic journey is the VSTEP (Vietnamese Standardized Test of English Proficiency), which is essential in proving one's English proficiency—a requirement for undergraduate graduation and an entry criterion for postgraduate programs (Nguyen, 2019). Those who are unable to obtain this certificate may enroll in evening English classes through second-degree programs at universities and colleges specializing in language studies, allowing them to earn a degree upon completing the 30-month course. While both are valid for postgraduate programs and professional promotion, the VSTEP certificate is valid for two years. In contrast, the second degree has no expiration - an advantage that attracts a significant number of learners to these institutions.

Among these learners, women frequently face unique challenges (Chartrand, 1990) yet also carry specific motivations that profoundly influence their educational journeys (Bye et al., 2007). Understanding the dynamics of adult female learners in the context of English as a Foreign Language (EFL) is essential for developing tailored educational strategies that address their specific needs.

This study focuses on a cohort of female adult learners enrolled at the University of Foreign Language Studies in Danang, Vietnam, exploring the factors that drive their engagement with English language education. By examining their motivations—ranging from personal aspirations to professional requirements—this research aims to uncover the complexities of their learning journeys. Moreover, the study delves into the barriers these women encounter, including familial obligations, time constraints, and institutional limitations, which can significantly impact their ability to succeed in their studies (Ariwijaya & Ningsih, 2020).

Using qualitative research methods, this investigation provides a nuanced understanding of these learners' lived experiences, highlighting their resilience and determination in the face of adversity. Ultimately, the findings aim to inform educational practices and policies, fostering an environment that supports the growth and success of female adult learners in their quest for English language proficiency.

Literature review

Female adult learners

Adults are typically characterized as independent, self-directed learners who bring a wealth of life experiences and knowledge to their educational pursuits. They tend to be goal-oriented, value practical relevance, and expect respect in learning environments (Lieb, 1991). This group is highly diverse, with varying educational backgrounds and learning needs, marked by maturity and a deep understanding of their learning objectives (Svetina & Perme, 2004). Adult learners, driven by the desire to enhance both their personal and professional lives, actively seek opportunities to acquire new skills and knowledge (Hudson, 2002; Tight, 1996). However, their quest for further education often coincides with the need to manage multiple responsibilities. Mali (2017) emphasizes that female adults frequently juggle non-academic obligations such as caring for family members, attending family-related events, and managing financial duties. Like other learner groups, female adult learners face unique motivations, advantages, and challenges in their pursuit of education.

Motivations

Described as a highly diverse group, adult female learners possess a wide range of preferences, needs, backgrounds, and skills. Their approach to learning is often life-centered, driven by various factors that sustain their active engagement in the learning process (Knowles, 1989). The concept of adult learning motivation is multifaceted and can be categorized in various ways. One of the most widely recognized theories is that of Pintrich and Schunk (1996), who distinguishes between two primary types of motivation: intrinsic motivation, which refers to engaging in an activity for the inherent satisfaction it provides, and extrinsic motivation, which involves participating in an activity to achieve an external outcome or reward.

Research by Kitiashvili and Tasker (2016) highlights gender differences in learning motivation. While older male learners are often motivated by economic reasons, female learners tend to have more complex motivations. Women returning to college frequently seek both professional development and personal fulfillment, aiming for self-actualization (Hardin, 2008). Furthermore, Bye, Pushkar, and Conway (2007) found that intrinsic motivation is particularly prevalent among non-traditional female students, suggesting that their drive to learn is deeply rooted in personal satisfaction and a love for learning. In research by UNITE (2006), the primary motivating factors for adult learners pursuing a university education are having a specific career goal (61.5%) and gaining higher qualifications (53.8%). Additionally, over half of re-entry among learners is driven by a desire to serve as role models for their children (Edwards, 1993). Notably, female learners are twice as likely as male students to cite these motivations for re-entry, with 63% of women compared to 33% of men expressing these reasons.

Advantages

Compared to younger learners, older adults have several advantages, such as better concentration, a stronger sense of responsibility, and broader knowledge and life experience (Nguyen & Nguyen, 2023). Additionally, female learners experience temporary advantages in certain areas. For mothers, the increasing involvement of grandparents in childcare—a growing global trend—provides additional support (Buchanan & Rotkirch, 2018). Meanwhile, single women can channel their energy into achieving their goals, including advancing their studies and careers (Menelao & Christoforos, 2022).

Institutional support plays a crucial role in the success of adult learners. Many educational institutions now offer tacit recognition of prior learning by reducing or eliminating entry requirements for mature students (Potter & Ferguson, 2003). Additionally, a variety of solutions, including "technical fixes," have been implemented to support these learners, such as enhancing induction programs, providing mentoring and support schemes, and ensuring that staff are flexible and accommodating. This flexibility allows students to better balance their family responsibilities with their academic workloads (Emma & Elodie, 2010).

Barriers

The challenges are even more pronounced for female learners, who must balance their studies with roles at work, home, and school (Chartrand, 1990). Due to their busy lifestyles, they often find it difficult to allocate sufficient time to academic tasks. Moreover, the increase in roles, demands, and time conflicts contributes to heightened stress and anxiety, particularly among female learners (Backels & Measheу, 1997). These factors create significant obstacles to academic achievement for women in educational settings. While research on the barriers faced by adult learners of English is extensive, comparatively little attention has been given to the challenges specific to female learners. Cross (1981) categorized learning barriers into three main types: institutional, situational, and dispositional. Accordingly, institutional barriers include policies and procedures established within the university, while situational barriers include factors such as family responsibilities, financial constraints, health issues, and transportation difficulties (Gotto & Martin, 2009). Dispositional barriers, on the other hand, are personal factors that are tied to learners' perceptions of their ability to succeed, fear of failure, and attitudes toward academic activities (Ekstrom, 1972). However, as noted by Toni and Lale (2020), although situational barriers can be demotivating, they often become a source of motivation for female learners to persist in their studies.

However, it is notable that there is a significant lack of research conducted in Vietnam that focuses on identifying the motivations, advantages, and barriers adult female learners encounter when learning a language, particularly English. Such studies are essential to improving both teaching methods and learning outcomes in this area.

Research Questions

The study sought to address the following research questions:

1. What drives female adult learners to study English as a Foreign Language (EFL)?
2. What advantages do female adult learners have in EFL education?
3. What barriers do female adult learners experience in EFL education?

Method

This study delves into the motivations, advantages, and barriers experienced by participants through a qualitative case study, focusing on five female adult learners from Vietnam's third-

largest public university. By analyzing these barriers, the research applies Ekstrom's theory of triangulated barriers (Ekstrom, 1972), offering a comprehensive framework to understand the multifaceted challenges these women encounter in their educational journeys. The study aims to shed light on the lived experiences of these learners, selected from a modest population, to provide meaningful insights into their academic and personal struggles and triumphs.

Data collection took place over one academic year (2023/2024), employing semi-structured, in-depth interviews as the primary methodology. These interviews were conducted individually, ensuring a safe and open environment for participants to share their narratives. Each session was digitally recorded, transcribed verbatim, and rigorously reviewed for clarity to ensure the reliability and validity of the findings. Participants were recruited during their second semester of the 2023 academic year, ensuring they had sufficient experience to reflect on their learning journey.

The research was conducted at Danang University of Foreign Language Studies, a renowned institution offering specialized programs tailored for adult learners under its Second-Degree program. This setting was strategically chosen as it provided access to a diverse group of working female learners representing a blend of personal, professional, and academic backgrounds. The unique context of these learners allowed the study to capture a rich tapestry of experiences, focusing on how these women navigate their dual roles as students and professionals. Their stories form the core of the larger study from which this data is derived, highlighting not just their challenges but also their resilience, aspirations, and strategies for overcoming barriers. Table 1 below shows the participants' bibliographical information.

Table 1: Participants' bibliographical information

Name	Age	Biographical notes	Interviewed (academic year)
Participant 1	26	Married; having 1 child; student of EFL, working full-time as a teacher at an international school.	2023-2024
Participant 2	29	Single student of EFL, working full-time as a government official.	2023-2024
Participant 3	35	Married; student of EFL, having 2 children, working as a full-time doctor at a public hospital.	2023-2024
Participant 4	41	Divorced; student of EFL, having 1 child, having a private educational center.	2023-2024
Participant 5	33	Married; student of EFL, having no children, working full-time for a tourist company.	2023-2024

Findings and Discussions

Motivations

The study revealed that the primary motivations driving female adult learners to study English encompass both intrinsic and extrinsic factors. Intrinsically, these learners express a genuine interest in the subject, finding joy and intellectual stimulation in mastering a new language. This reflects a deeper quest for self-actualization, as they aim to unlock their potential and achieve a sense of personal growth and accomplishment. Extrinsically, their motivations are closely tied to practical and professional aspirations. Many are motivated by the desire to enhance their qualifications, recognizing English proficiency as an asset in achieving career advancement and competitiveness in the job market. Additionally, they wish to become proficient and independent English speakers, seeking to gain confidence and autonomy in working in various professional and social contexts.

Participant 1 shared that she began learning English upon realizing it was a necessity. *"Firstly, it is because of my interests. I have long liked learning another language, such as English. My major is literature education, which has nothing to do with English, and I do not use it in my job either. However, my plans require a lot of English, so I decided to enroll in an English language course to partly improve my language skills and partly meet my knowledge needs so that I can continue to pursue my personal passion*."

Alternatively, driven by a stronger motivation to improve themselves or expand their job opportunities like Participant 2. *"There are many reasons. First, I see that everyone needs English. Second, my current job does not require much English, but I want to step out of my comfort zone, know more, and expand my thinking. Third, if there is a chance, I had a childhood dream of living and working abroad. I think that studying may not guarantee I will go, but if I do not study, I definitely will not go. So, I enrolled to study."*

Additionally, some learners are extrinsically motivated by job requirements, the potential for promotion, or other professional purposes. Participant 3 admitted that "*I want to have an English certificate so that I can pursue higher education in my field of expertise," and Participant 4 revealed that "I opened a cultural education center, and in the near future, I plan to invite teachers to teach English, so I need to know English…Moreover, my children are of school age, and I want to accompany them in this subject, so that is also a reason for*

me to learn English". Some aim to polish their CV. Participant 5 said, "*To add to my CV. My future plan is to teach English as well.*"

Interestingly, while Alshebou (2019) suggested that extrinsic motivations, such as improving financial situations, were significant, the current research, aligning with Al-Yaseen (2018) and Alshebou and Taqi (2019), shows that external pressures or obligations do not primarily drive most female adult EFL learners. Instead, their motivations stem from a genuine passion for the English language and the pursuit of their personal goals, reflecting a stronger intrinsic motivation among the five participants.

Extrinsic factors like job demands are deemed more critical than financial incentives. For example, Participant 2 noted that salary increases are not her main concern; rather, it is the demands of her job that necessitate a high level of English proficiency. "*Getting a raise is unlikely, but in my official work, there is a task of translating documents. If I want to do it, I need an English language certificate."*

Furthermore, the study highlights that female adult EFL learners may have distinct motivations, often influenced by societal or economic factors. For instance, Participant 4 is motivated by the desire to stay current with global trends, particularly the use of technology in the workplace. *"...Secondly, technology is developing, and communication channels are expanding, so I need English to access them more easily."*

In general, these motivations highlight a dynamic interplay between personal fulfillment and external goals, demonstrating how these learners align their academic pursuits with broader aspirations for self-efficacy, empowerment, and life enrichment. Their determination underscores the role of language learning not only as a tool for communication but also as a pathway to personal and professional transformation.

Advantages

The first advantage for the participants is their strong passion for learning English as their primary purpose for registering for the course. Their intrinsic motivation drives them to dedicate time and effort to their studies, fueled by a desire to fulfill personal aspirations, such as pursuing higher education opportunities and enhancing their job performance. This passion not only sustains their commitment but also motivates them to overcome the challenges of balancing work, family, and school responsibilities. It acts as a source of resilience, enabling them to stay focused on their goals despite the obstacles they face.

The second advantage is the substantial support they receive from their teachers, which plays a vital role in their learning journey. EFL teachers act as mentors and facilitators, tailoring their teaching methods to meet the unique needs of adult learners. These teachers recognize the challenges that come with returning to education as an adult, including time constraints, varied proficiency levels, and the pressure of managing multiple roles. By providing personalized guidance, clear explanations, and practical strategies, they help bridge gaps in understanding and build the learners' confidence. Moreover, the emotional support offered by teachers cannot be understated. They create an encouraging and inclusive learning environment where adult learners feel comfortable expressing their difficulties and seeking help. Teachers often go beyond their formal roles, offering flexibility and understanding to accommodate the students' busy schedules and personal challenges. This combination of academic and emotional support fosters a sense of belonging and motivation, enabling learners to stay engaged and progress steadily toward their goals.

Together, the learners' passion and the supportive role of their teachers form a powerful foundation for success, highlighting the importance of both internal motivation and external encouragement in adult language learning.

> Participant 1 shared that "*The teachers are also teaching in a very supportive and encouraging manner, slowing down because they know we are adult learners… Before attending the classes, I heard that adult learners learn for the sake of it. However, I genuinely want to learn, so I was also worried that the teachers might teach just for the sake of it, but they truly teach with dedication and offer much encouragement… Teachers are also the ones we can define in.*"
>
> Participant 2 said, *"Through the teaching process of the instructors, I have supplemented my knowledge and, combined with my own efforts and the learning methods guided by the teachers, I have seen a significant improvement in myself. The praise from the teachers motivates me to keep striving harder."*

The result also reveals an interesting role of family in the learning journeys of female adult learners, serving both as a barrier and an advantage. For some participants, particularly married women and single mothers, family responsibilities can be a significant obstacle. Juggling child-rearing, household duties, and academic commitments creates a heavy burden, often leaving them with limited time and energy to dedicate to their studies. This balancing

act can lead to feelings of stress and frustration, potentially affecting their academic performance and motivation.

On the other hand, the study highlights the positive impact of family support, which can greatly tackle these challenges. In the Vietnamese cultural context, the role of extended family members, especially grandparents, emerges as a crucial factor. Grandparents often step in to care for grandchildren and manage household tasks, allowing adult learners to focus on their professional and educational pursuits. This cultural practice provides support that helps women overcome the barriers associated with their dual roles. In fact, Vietnamese family responsibilities are deeply ingrained, with grandparents often assuming responsibility for childcare, like practices in other cultures around the world (Hayslip et al., 2017).

For example, Participant 3 and Participant 5 benefited greatly from their own family. With the active involvement of their parents or in-laws in childcare and household management, they were able to dedicate more time and energy to their studies without neglecting their familial responsibilities. This supportive environment not only eased their practical burdens but also gave them the emotional encouragement needed to persist in their educational goals.

> Participant 3 said, "I do not have much time to take care of my children, but with the support of my parents and husband at home, my children are doing fine." Participant 5 happily shared, *"Luckily, I have my parents to help with childcare…"*

The advantages mentioned above are particularly significant for adult female learners, as they play a crucial role in sustaining their commitment to their learning journey.

Barriers

Understanding these barriers is crucial for educational institutions to develop strategies that help female adult learners overcome challenges and enhance their educational experiences. By addressing these barriers, institutions can improve the retention and success of female learners in English language programs (Ariwijaya & Ningsih, 2020).

Female adult learners encounter several barriers to learning, which can be categorized into three main types: situational, institutional, and dispositional barriers.

Situational Barriers

Situational barriers are particularly pronounced for female students, who often take on multiple responsibilities and face constraints that make their educational journey more challenging. One common barrier is family responsibilities. Many female learners, especially those with children, face significant challenges in balancing the demands of child-rearing, household responsibilities, and academic commitments. Furthermore, some female learners often find themselves sacrificing their social lives to focus on their studies.

In fact, in Vietnamese culture, the responsibility for child-rearing is predominantly assigned to women, leading to feelings of guilt when mothers are separated from their children or unable to fulfill their obligations (Mestechkina et al., 2014). In this context, Participant 1 expressed her feelings as follows: *"Another difficulty that I think mothers with young children will face is that when they spend time on work and study, they will miss their child's first moments. For example, the first time the child speaks or sings a song, I cannot witness it. Alternatively, when I come home from work and hear from my husband that today, our child learned something new, I cannot see those moments firsthand. This is also a disadvantage, and because of the great distance, I cannot meet my child frequently, which somewhat causes emotional distance."*

> Participant 4 shared, *"For working people like me, there are many difficulties. First, there is the job itself. We have to arrange things so that the job is balanced. Secondly, at our age, with children, besides work, we also have family and other relationships, which affects our ability to attend classes."*

Otherwise, Participant 2 expressed concern about the possibility of marriage, given her lack of time for personal relationships. *"I am quite old, already 29 years old, and starting to study from scratch now is a bit late... Studying requires dedicating time to it. Since I am working, I need to have time for my own health and my family, including my extended family. Now that I am studying, I do not have time to explore relationships that could lead to marriage. It is not that all my time is gone, but it does take up much time."* Participant 1 has had to sacrifice time for social and kinship relationships, which are highly valued in Vietnamese society, to focus on her studies. *"Another difficulty, which I think is hard to accept, is that when studying, I have to give up social gatherings, celebrations, and parties with family, friends, and colleagues."*

Health issues and the lack of emotional support can also pose significant obstacles. Adult learners, especially working mothers, often face fatigue or health problems due to the demands of maintaining a work-life-study balance. As a divorced mother, Participant 4 faced significant challenges in balancing her responsibilities—caring for her children, working to earn income, and studying in the evenings. With no one to assist her, she sometimes brought her children to class. "*I occasionally had to leave class early because my kids were too noisy and disturbed the others. I felt so embarrassed… I could only study late at night after they went to bed*." Serving as both mother and father, she often felt overwhelmed and broke down in tears under the immense pressure she faced as she had to do everything on her own, which partly led her to unexpected health issues. These health challenges can hinder their ability to focus on their studies and participate in learning activities consistently. Participant 4 shared, "*I often caught a cold due to the overloading work and study, so sadly, I sometimes had to skip classes…*"

Financial constraints are another prevalent challenge. Education-related expenses, such as tuition fees, learning materials, and transportation costs, can be a heavy burden for adult learners, many of whom are also the breadwinners of their families. This financial strain can lead to stress and, in some cases, limit their ability to engage in academic activities fully. In this case, it appears that tuition fees do not largely impact their ability to afford education since they in Vietnam are lower compared to other countries (Vietnam Briefing, n.d.). Participant 5 shared, "Tuition *fee is not a big deal…".* However, additional expenses, such as the cost of learning materials and transportation, present significant concerns for those who are divorced kids. Participant 4 said, "We have to pay for copyright books and gasoline; they *cost quite a bit since we drive quite far from work to school*…"

Besides, conflicts with work schedules can prevent learners from attending classes or studying effectively. Participant 2 said, "*Additionally, at work, there are many days with sudden meetings or tasks that go beyond working hours, so when I am working, I do not have time to complete tasks outside of working hours. If there is an important task, I have to skip classes."* As a doctor, Participant 3 struggles to find time for studying. *"My job is really stressful, and I often have to study professional skills, so my time for learning English is quite limited."*

Also, transportation difficulties further cause these barriers. For example, Participant 1 resides in a different city from her educational institution, requiring her to commute long distances. This not only consumes valuable time and energy but also adds logistical and financial pressures. Such transportation challenges can reduce learners' accessibility to classes and

educational resources, impacting their academic progress. "*Firstly, my family lives in Hoi An while I am studying and working in Da Nang, so the distance between me and my family is quite far. After finishing my studies, it is also late, so I have to stay in Da Nang. Secondly, I have a 20-month-old child, so when I go to school, I have little time to take care of my child, my husband, and my family. There are situations such as when the child is sick or when my husband is busy at work or must meet deadlines, and there is no one to take care of the child*."

These situational barriers underscore the complex realities female adult learners face in pursuing their education.

Institutional Barriers

Although the participants agreed that they have received adequate academic support from the university and that the enrollment procedures and policies are generally designed to accommodate their needs, they continue to face challenges related to the rigidity of class schedules. Many of the learners expressed a strong desire for more flexible learning options, such as online classes, which would better align with their busy personal and professional lives. The current schedule, predominantly fixed, does not accommodate those who juggle family responsibilities, work obligations, or long commutes.

Participant 1 shared, *"With 8 hours a day for work and an additional 3 hours for studying, even though I really want to improve the knowledge I have learned, it is difficult for me and others to find time to do homework or to watch an extra video or to practice any skills. We cannot find time for self-study and skill enhancement, so each day we go to school, we are faced with the situation where we have not mastered the old material, and the new material already comes in."*

It is obvious that these institutional barriers partially hinder the learning progress of adult female learners.

Dispositional Barriers

All four participants have encountered significant difficulties due to the lack of opportunities to practice English outside the classroom. This has hindered their progress in developing the four core language skills—listening, speaking, reading, and writing. While classroom instruction provides foundational knowledge, the absence of real-world practice limits their ability to reinforce and apply what they learn. For these learners, opportunities to engage in

English outside of class, such as through conversation partners, language exchange programs, or immersive environments, are crucial for building fluency and confidence.

Participant 3 expressed, "Another problem is our environment because, *in our field, there are few opportunities to use English, which limits our ability to practice this foreign language."*

Furthermore, the fear of failure and anxiety about academic performance are significant concerns for them due to their age. Participant 4 said, "*Additionally, there is the issue of age, as we are over 40 years old, making it harder to remember vocabulary… if I had a wish, I would wish to be a few years younger to start learning English earlier, with more enthusiasm and higher concentration*."

Additionally, negative attitudes towards educational activities and self-doubt regarding their capabilities further contribute to their challenges. A lack of self-determination and reliance on personal motivation to overcome these obstacles also play a significant role. In fact, Participant 1 sometimes loses confidence, doubts the process, and has negative thoughts about her studies. *"Sometimes I think about giving up; I feel like I cannot go on. It is too much for me…"*

The dispositional barriers presented above pose a significant concern for female adult learners, greatly impacting their ability to succeed in their educational pursuits.

In summary, these barriers can significantly impact the educational experiences and outcomes of female adult learners. Divorced women with kids face greater challenges than married women with kids when pursuing further learning. They often struggle with low self-confidence, negative past experiences, and emotional distress, which hinder their focus and motivation.

Financial difficulties are more pronounced for divorced women, who may lack the financial support and shared childcare responsibilities that married women often benefit from. This lack of support can lead to increased stress and difficulty managing both childcare and educational responsibilities.

In contrast, married women often have emotional stability, financial support, and shared responsibilities, allowing for better time management and a more supportive learning environment. Overall, divorced women with kids encounter more complex barriers, making it

significantly harder for them to pursue further education compared to their married counterparts.

On the other hand, single women or married women without kids typically only face fewer barriers, primarily related to learning itself. They are typically better able to balance their time between study and work.

Conclusion

In summary, this study underscores the complex interplay of motivations and barriers faced by female adult learners in their pursuit of English language proficiency. While intrinsic motivations, such as personal passion and the desire for self-improvement, significantly drive these learners, extrinsic factors like job requirements and the need for professional advancement also influence their educational journeys.

The findings reveal that despite facing various situational, institutional, and dispositional barriers—such as family responsibilities, time constraints, and limited opportunities for practice—these learners exhibit remarkable resilience and determination. The support from family and teachers emerges as a crucial element in facilitating their learning experiences.

Implications

After exploring the motivations, advantages, and challenges faced by female adult learners of English in Vietnam, our research highlights several key implications for educational institutions and policies.

First, to reduce institutional barriers, academic entities should implement strategies around curriculum and accessible information. In terms of curriculum, it is essential to develop relevant programs with practical coursework aligned with learners' needs. Furthermore, institutions should create user-friendly websites where learners can access information about course schedules, academic procedures, exam results, and more. Supportive staff should also always be available to assist learners with questions and inquiries.

In addition, to help learners manage situational constraints, education organizations should emphasize flexibility and convenience, which are critical for female adult students. Offering project-based, online, evening, or weekend classes can minimize time commitment while maximizing efficiency. This approach allows female students to better balance their time between work, family, and study. Providing on-campus English classes for children could be

an excellent option, allowing mothers to bring their children along while they attend their own classes.

Finally, to overcome dispositional challenges, women students should be able to receive constant personalized support from staff and mentors. Tutorials, workshops on English learning skills and speaking clubs are essential for these learners to build their confidence and foster a sense of community.

Overall, the study advocates for a comprehensive approach to adult education that creates an environment that supports female learners' success in mastering English.

Limitations and Recommendations

This study has several limitations, including a small and homogeneous sample size, which may not fully capture the diverse experiences of female adult learners across different contexts. The focus on Vietnam limits the generalizability of the findings, and the qualitative nature of the research may introduce bias, making it challenging to apply the insights broadly. Future research should include a larger and more diverse sample, conduct longitudinal studies to track changes over time and explore the experiences of learners in different cultural contexts. By addressing these limitations and implementing these recommendations, future studies can enhance the understanding of female adult learners and inform the development of more effective educational programs and policies.

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APPENDIX

Questions for Interview

1. How old are you?

2. What kind of work do you do?

3. What is your marital status?

4. What motivates you to learn English as a second language?

5. What advantages or strengths do you have while learning English as a second language?

6. What challenges do you face while learning English?

7. If you could change anything about your current situation to make learning English easier, what changes would you make?

8. What are your plans after completing your English studies?