



OFFICIAL CONFERENCE PROCEEDINGS

The 12th Asian Conference on Education & International Development
(ACEID2026)

March 22-27, 2026 | Tokyo, Japan, and Online

ISSN: 2189-101X

Organised by the International Academic Forum (IAFOR) in partnership with the IAFOR Research Centre at the Osaka School of International Public Policy (OSIPP) at The University of Osaka, Japan, and IAFOR's Global Partners.

iafor

“To Open Minds, To Educate Intelligence, To Inform Decisions”

The International Academic Forum provides new perspectives to the thought-leaders and decision-makers of today and tomorrow by offering constructive environments for dialogue and interchange at the intersections of nation, culture, and discipline. Headquartered in Nagoya, Japan, and registered as a Non-Profit Organization (一般社団法人), IAFOR is an independent think tank committed to the deeper understanding of contemporary geo-political transformation, particularly in the Asia Pacific Region.

INTERNATIONAL

INTERCULTURAL

INTERDISCIPLINARY

iafor

International Academic Board

Professor Anne Boddington, IAFOR, Japan (IAB Chair)
Dr Joseph Haldane, IAFOR and The University of Osaka, Japan & University College London, United Kingdom
Professor Jun Arima, IAFOR & The University of Tokyo, Japan
Professor Virgil Hawkins, IAFOR Research Centre & The University of Osaka, Japan
Mr Lowell Sheppard, IAFOR & Never Too Late Academy, Japan

Professor Umberto Ansaldi, VinUniversity, Vietnam
Dr Susana Barreto, University of Porto, Portugal
Professor Grant Black, Chuo University, Japan
Dr Evangelia Chrysikou, Bartlett School of Sustainable Construction, University College London, United Kingdom
Professor Donald E. Hall, Binghamton University, United States
Professor Brendan Howe, Ewha Womans University, South Korea & The Asian Political and International Studies Association (APISA)
Dr James W. McNally, University of Michigan, United States & NACDA Program on Aging

ACEID2026 Conference Programme Committee

Dr Rena Alasgarova, Baku Oxford School, Azerbaijan
Professor Shingo Ashizawa, Kanda University of International Studies, Japan
Dr Brian Aycock, International Christian University, Japan
Dr Lara Carminati, University of Twente, Netherlands
Dr Joseph Haldane, IAFOR and The University of Osaka, Japan & University College London, United Kingdom
Professor Brendan Howe, Ewha Womans University & The Asian Political and International Studies Association (APISA), South Korea
Dr Taro Mochizuki, The University of Osaka, Japan
Professor Farish Noor, University of Malaya, Malaysia

ACP2026 Conference Programme Committee

Professor Dexter Da Silva, Keisen University, Japan
Dr Joseph Haldane, IAFOR and The University of Osaka, Japan & University College London, United Kingdom
Dr Miriam Sang-Ah Park, Nottingham Trent University, United Kingdom
Professor Roberto Ravera, ASL1 of Imperia, University of Turin & University of Genoa, Italy
Dr Roswiyani Roswiyani, Tarumanagara University, Indonesia
Professor Monty P. Satiadarma, Tarumanagara University, Indonesia
Professor Chi-Shing Tse, Chinese University of Hong Kong, Hong Kong
Dr Brian Victoria, Oxford Centre for Buddhist Studies, United Kingdom
Dr Mete Yasuji, Rikkyo University, Japan

AGen2026 Conference Programme Committee

Dr Joseph Haldane, IAFOR and The University of Osaka, Japan & University College London, United Kingdom
Dr James W. McNally, University of Michigan, United States & NACDA Program on Aging
Professor Sela V. Panapasa, University of Michigan, United States
Dr Miriam Sang-Ah Park, Nottingham Trent University, United Kingdom
Lowell Sheppard, IAFOR & Never Too Late Academy, Japan

The Asian Conference on Education & International Development 2026

Official Conference Proceedings

ISSN: 2189-101X

Executive Editor:
Joseph Haldane, PhD

IAFOR Publications Manager:
Nick Potts

IAFOR Publications Coordinator:
Mark Kenneth S. Camiling

Editorial Assistants:
Sachiko Sakamoto
Suzue Abe
Yuika Sakaguchi
Arisa Egami

Date Published: June 10, 2026

Published by The International Academic Forum on the IAFOR Research Archive
URL: <https://papers.iafor.org/>

© The International Academic Forum 2026
The International Academic Forum (IAFOR)
Sakae 1-16-26 2F
Naka Ward, Nagoya, Aichi
Japan 460-0008
iafor.org

Table of Contents

Bridging the Gap Between Academia and Industry: Oman National Work Placement Implementation Approach Using Action Research Cycle Hamed Saif Al Hadhrami	pp. 1 - 20
The Role of Morphological Awareness in Second Language Acquisition: Affixation as a Vocabulary Learning Strategy Ivana Zivkovic	pp. 21 - 31
The Important Role of Leadership in Creating Diversity, Equity, and Inclusion Plans in U.S. Higher Education Beatriz DeSantiago-Fjelstad Leslie Darmofal Kelly Meier Henry Morris Luis Posas	pp. 33 - 41
Enhancing Thai Students' Coding and Creativity Through <i>Minecraft</i>-Based Game Learning: A Thematic Analysis of Student Reflections Thanapat Sripan Komgrit Manyam	pp. 43 - 55
Navigating Experiential Learning: A Case Study of Adult Learners in the APEL Q Assessment Process Jennifer Tan	pp. 57 - 61
The Young Botanists Club: A Model for Blending Science, Life Skills, and Joyful Learning Komgrit Manyam Kanitta Pinngoen	pp. 63 - 75
Preparedness, Leadership, and Resilience: Crisis Management Principles in Educational Institutions Elena Khanzadyan	pp. 77 - 86
Career Planning Strategies of Graduating Law Students in the Philippines: Implications for Legal Education and Workforce Development Maureen Antonette B. Ledesma Kenrich Anthony D. Bereber	pp. 87 - 96
Game-Based Learning in Piped Services Engineering Education: Enhancing Student Engagement and Learning Experiences Sherry S. W. Yiu Roger T. H. Ng Joseph H. K. Lai	pp. 97 - 103

Global Citizenship Education in Japan: High School Teachers' Perspectives on MEXT vs. UNESCO Guidelines and the Challenges They Face

Miyuki Takeda

Tomoko Takahashi

pp. 105 - 121

Investigating Pre-service Teachers' Utilization of Written Feedback in Mathematics: A Basis for Designing Student-Centered Classrooms in Local Colleges and Universities

Richard Reine S. David

pp. 123 - 138

Enhancing Grade 6 Students' Learning Achievement in Circle Graphs Through Experiential Learning

Panitta Wongphanich

Suwicha Wansudon

Phatcharida Inthama

Aungsiya Krataytong

pp. 139 - 147

Learning Innovation Through Educational Games to Promote Desirable Characteristics of Bachelor of Education Students

Suwicha Wansudon

Phatcharida Inthama

Panitta Wongphanich

Aungsiya Krataytong

pp. 149 - 161

Translanguaging and Its Impact on Malaysian Preschool Children's Vocabulary and Cultural Identities: A Case Study From Johor Bahru

Liang Chuan Lau

pp. 163 - 167

Transforming Echolalia Into Functional Communication: A Case Study of Autistic Children in Inclusive Classrooms

Pe-Sun Ho

pp. 169 - 186

Developing a Game-Based Learning Management Activities for Basic Passenger Assessment Training

Chayanit Pichitronnchai

Tanapon Tomrongkunan

pp. 187 - 195

Why Otitis Media is Good for the Language Acquisition: Some Examples of Statistical Pitfalls in Language Assessment Programs

Eugen Zaretsky

pp. 197 - 209

What Does Variance in the Language Test Data Tell Us About Influencing Factors on Children's Linguistic Development?

Eugen Zaretsky

Benjamin P. Lange

Christiane Hey

pp. 211 - 229

Evaluating a Practice-Based Program With Foreign Intern Trainees: Impact on Japanese High School Students' Intercultural Understanding and English Learning Motivation Tomoshige Yamaguchi Rika Iwami	pp. 231 - 242
The Impact of the “Career Fun” Project on the Vocational Attitudes of Middle School Students in Ratchaburi’s Opportunity Expansion Schools Tanapon Tomrongkunanant Chayanit Pichitronnachai Tanes Tanitteerapan	pp. 243 - 251
Advancing English Proficiency Through AI-Enhanced and Cross-Cultural Learning: A Longitudinal Study of Integrated Pedagogical Frameworks Hiroyuki Obari	pp. 253 - 261
Self-Professional Development of Faculty Members Between Conventionality and Globalization Faiza Adil Gonaim	pp. 263 - 275
Empowering College Students With Generative AI Literacy in Higher Education Kay Coates Lili Li	pp. 277 - 290
Enhancing Pre-service Teachers’ Learning of Water Quality and Microalgae Through the <i>Water Ranger</i> Educational Board Game Phatcharida Inthama Suwicha Wansudon Panitta Wongphanich Aungsiya Krataytong Sugrid Sungthong	pp. 291 - 299
Exploring Student Engagement and Learning Outcomes in an Intensive Interdisciplinary Course on Biomedical Device Innovation: A Pilot Study in Taiwan Wei-Hung Huang	pp. 301 - 314
Private Preschool Teachers’ Preparedness in Implementing the Kurikulum Prasekolah 2026 (KP2026) in Malaysia Menn Sze Chua	pp. 315 - 323
Designing HyFlex Learning for the “RU for All” Learning Center Chuthaphon Masantiah Manika Wisessathorn Kritchaya Poompin Wanatphong Benjaphong	pp. 325 - 336

Gaps in Bear Research: A Qualitative Study of Plus-Size and GMPD Inclusion in University Education (Theory of Change Analysis) Lothar Filip Rudorfer	pp. 337 - 350
From Transactional Evaluation to Reflective Learning Practices: Postgraduate Student Feedback as a Catalyst for Sustainable Business Education Binganidzo Muchara Sanele W. Nhlabatsi	pp. 351 - 366
Development of Ayutthaya Metaverse Cultural Learning Resources Suchart Saenpich Phisit Nadprasert	pp. 367 - 373
SEPP 2.0—Advanced IoT Hacking Scenarios for Hands-On Security Education Dominic Hauser Julian Graf Sebastian Fischer	pp. 375 - 386
From Classroom to Career: Voices on Employability Challenges and Curriculum Relevance Hong-Van Nghiem Thi-Hong-Thuy Dang Hoang-Nam Tran	pp. 387 - 398
Evaluating the Effectiveness of the Flipped Classroom Model in English Language Teaching: Evidence From Secondary Education in Sri Lanka Yasangi Epitawala Dinithi Pallewatta	pp. 399 - 411
Environmental Education Practice in Independent Curriculum: Science Teacher Perspective in Indonesia Junior High School Hana Syarifah	pp. 413 - 425
Improving Teachers and School Leadership in Indonesia – Impact Evaluation of Guru Penggerak Program at the Primary Level Indah Shafira Zata Dini Jacobus Cilliers Noviandri Khairina Noah Yarrow	pp. 427 - 443
Empowering Futures: Uniting Education, Sustainability, and Social Justice for Global Progress Harishankar Singh Shipra Pathak “Water Woman”	pp. 445 - 460
Impact-Oriented Research Communication in Biomedical Education Kyoko Hombo	pp. 461 - 472

Rethinking Language Assessment in the AI Era Yulia Tregubova	pp. 473 - 486
How Do Magic Tricks Help Explain Social Science Concepts in University Teaching? Larry Lai	pp. 487 - 497
Understanding the Role and Place of Smartphones in EFL Education Lidija Elliott	pp. 499 - 507
Keeping a Language Alive: EFL Learners' Practices in Maintaining English Proficiency Shih-Chieh Chien	pp. 509 - 521
Effectiveness of an Interschool Global Education Workshop in Reducing Instructional Anxiety Among Elementary School Teachers Rika Iwami Makoto Fujiwara	pp. 523 - 530
Strategic Leadership and Its Impact on the Marketing of Educational Services in Private Schools in the State of Kuwait Ayshah Al-Rabiah Meznah Al-azmi	pp. 531 - 538
Enhancing Online Exam Integrity: A Case Study of the University of Wisdom Land in Myanmar Ohnmar Nyunt Sokout Hamidullah	pp. 539 - 552
Role of School Libraries in Conserving Sensitive Environments: A Case Study on the Bolgoda Ecosystem in Sri Lanka Thushari Seneviratne Asanka Gunawardana Chulantha Jayawardena Upali Chandrasekara	pp. 553 - 569
Study Smarter, Not Harder: Development and Preliminary Validation of a Diagnostic Tool to Support Academic Success Izel Marie B. Guatno	pp. 571 - 578
Weekly Titles as Micro-Advance Organisers: Small Design Choices for Pedagogical Memory Ian Frank	pp. 579 - 589
Generative Artificial Intelligence in Mathematics Education: A Systematic Literature Review Using the PRISMA Framework Jennifer Dela Torre Jero Sayco	pp. 591 - 606

Physics Curricular Complexity and Enrollment Barriers Analysis Ahl G. Balitaon	pp. 607 - 614
Why Children Stay Home? Uncovering Demand-Side Barriers to Early Childhood Education in Manokwari, West Papua Simon Sili Sabon Yendri Wirda Nur Listiawati	pp. 615 - 628
Specifics in Expert Assessments of Educational Profiles Based on Personality Strengths Among European Countries Maya Fyodorova-Radicheva Dora Levterova-Gadjalova Galin Tzokov	pp. 629 - 640
Spanish and English Proficiency at Kindergarten as Predictors of Later Academic Achievement Brian A. Collins Claudio O. Toppelberg	pp. 641 - 656
KI4ING: Integrating Generative AI Into Engineering Education – A Prototype LMS for Intelligent Tutoring in Technical Mechanics Christopher Klupak Elmar Dammann Simon Vock Jula Brüggmann Julius Groß	pp. 657 - 670
A Model for Educational Profiles of Students Based on Their Strengths and Competencies Dora Levterova-Gadjalova Ivan Trichkov Maya Fyodorova-Radicheva Lilyana Chobanova Andreyana Katusheva	pp. 671 - 680
AI as Pedagogy in Design Education: Can GenAI-Integrated Teaching Achieve Course Learning Goals in the Short Term? Jinmei Huang Henry Chi Fai Ma	pp. 681 - 692
From Theory to Classroom: Expert Evaluation and Practitioner Insights on Active Learning Models in K–12 Education Vania Sivakova Ilitsa Daskalova Mariyana Bizova-Georgieva Galin Tsokov Plamen Miltenoff	pp. 693 - 708

Headlines in the Classroom: Media Narratives and the Selective Shifts in Teachers' AI Judgments

Jess L. Gregory

pp. 709 - 724

Stakeholder Needs for the Development of the Sports Science and Recreation for Health Program at Phuket Rajabhat University

Parichat Pragobmas

Thawatchai Thoomthong

Kampanat Paditsaeree

Komkrit Krainara

Somthad Satjit

pp. 725 - 732

Effects of a Growth Mindset Inquiry Learning Model on Kindergarten Children's English Self-Development in Thai-English Bilingual Context

Aungsiya Krataytong

Panitta Wongphanich

Suwicha Wansudon

Phatcharida Inthama

pp. 733 - 742

School Dropouts in Brazilian High Schools: The Impact of the Pandemic

Rafael Altoé Frossard

pp. 743 - 754

Learning Without Walls: A Capability Approach to VR Schooling and Educational Equity in Japan

Seri Yoon

pp. 755 - 768

Reviewing Access in Internationalized Higher Education: A Scalar Investigation of the Chinese and Turkish Higher Education System

Victor Tan Chee Shien

pp. 769 - 788

Empowering Critical Thinking and Research Skills Through Mini Research: An Outcome-Based Education Approach in the Master of Elementary Education Program at Universitas Terbuka

Sri Dewi Nirmala

pp. 789 - 803

Integrating Technology to Promote Learning and Teaching Management Through Coaching Process for Teachers in Bangkok Metropolitan Administration

Chutiwat Suwatthipong

Pimprapa Phanphai

pp. 805 - 821

Bridging the Gap Between Academia and Industry: Oman National Work Placement Implementation Approach Using Action Research Cycle

Hamed Saif Al Hadhrami, Petroleum Development Oman, Oman

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This paper examines the design, implementation and challenges of Oman's national work placement initiative as a strategic response to graduate employability challenges and labour market misalignments. Framed within Oman Vision 2040, which emphasises human capital development as a pillar of economic diversification, the programme seeks to bridge the persistent gap between academia and industry by embedding structured, long-term work placements across higher education institutions and industry partners. Grounded in Kurt Lewin's (1946) Action Research (AR) cycle, the study employs an iterative, participatory methodology involving problem diagnosis, planning, implementation and reflection. Mixed methods, including surveys, observations and performance metrics, were used to capture the perspectives of students, academia and employers. Findings demonstrate that while traditional short-term internships offer limited exposure (Al-Lamki, 2002; Jackson, 2015; Reddy & Moores, 2012), structured placements provide more meaningful opportunities for skills development, academic improvement and professional readiness. At the same time, the initiative encountered significant challenges, including time-intensive cycles, complex stakeholder coordination, scalability across diverse institutions, limited organisational development frameworks and data collection constraints. These challenges highlight the realities of scaling participatory reform in contexts requiring sustained collaboration between universities, industry and government. The National work placement Program represents a regionally pioneering model of work-integrated learning, distinguished as the only long-term national framework that unites all higher education institutions in Oman under a single, coordinated structure to deliver standardised, large-scale work placement opportunities across multiple sectors. The paper concludes that the Action Research approach offers a robust and adaptive framework for institutionalising work-integrated learning in Oman.

Keywords: Oman, action research, learning, collaboration

iafor

The International Academic Forum
www.iafor.org

Introduction

This paper outlines the approach used to implement Oman's national work placement initiative and examines the challenges encountered during its development and expansion. Conceived as a structured, long-term work placement programme, the work placement represents a pioneering attempt to institutionalise work-integrated learning (WIL) across Oman's higher education sector. The initiative was designed to address a persistent gap between academic outputs and labour market needs, a challenge that has long affected graduate employability and national workforce readiness (Al-Abri et al., 2024; Al Harrasi & Al Subhi, 2024; Al Weshahi, S., 2022).

Oman Vision 2040 emphasises the strategic importance of human capital development, positioning education and skills as central to economic diversification and global competitiveness (Oman Vision 2040). Despite steady growth in higher education enrolment and graduation rates, many young Omanis face structural barriers to employment, including limited exposure to industry environments, weak academia-industry linkages and misalignments between academic curricula and labour market requirements (Kroen, T. (2024). Traditional short-term internships, while offering limited exposure, have proven insufficient in equipping graduates with the competencies needed for sustainable careers in a rapidly changing economy (Al-Lamki, 2002; Jackson, 2015; Reddy & Moores, 2012).

Against this backdrop, the work placement was launched in partnership with Petroleum Development Oman (PDO), the Ministry of Education (MoE), higher education institutions and a wide range of industry stakeholders. Unlike ad hoc internship schemes, the work placement is built on an Action Research (AR) framework that allows for iterative planning, implementation, observation and reflection. This methodology supports continuous learning, stakeholder engagement and evidence-based improvements, making it particularly well suited to national-level reforms in education and workforce development (Lewin, 1946; McNiff & Whitehead, 2010).

The implementation of the work placement has been both ambitious and complex. On the one hand, the programme has successfully demonstrated how structured placements can enhance graduate employability, strengthen academia-industry collaboration and contribute directly to Oman's economic diversification agenda. On the other hand, it has also revealed significant challenges related to time-intensive cycles, stakeholder coordination, scalability, organisational readiness and data collection. These challenges highlight the realities of translating theory into practice at scale and highlight the importance of adaptive, participatory methodologies in sustaining long-term impact.

Accordingly, this paper pursues two main objectives:

1. To present the methodological approach used to design and implement the initiative as a national work placement programme.
2. To critically examine the key challenges faced during the programme's development and expansion, with a view to informing both policy and practice in Oman and beyond.

By documenting the work placement journey, this paper contributes to both local and international debates on the role of work-integrated learning in enhancing graduate employability and supporting economic transformation. It offers practical insights into how Action Research can be applied to higher education reform in contexts where academia, industry and government must work together to achieve sustainable change.

Complementing this practical implementation, a Doctor of Business Administration (DBA) research project was undertaken to critically examine the underlying issues and contribute to evidence-based improvements in policy and practice. The research aims to provide a structured, professional and scholarly analysis of the program's design, execution and impact, thereby supporting the development of sustainable solutions that are empirically grounded and aligned with Oman's broader national development objectives.

Literature Review

Workplace Learning Through Action Research and Action Learning

In the context of Oman's higher education system, the application of action research to workplace learning for pre-final year undergraduates is highly relevant. Action research, as originally conceptualised by Lewin (1946), emphasises a cyclical process of planning, acting, observing and reflecting, making it an ideal methodology for investigating and improving the design and implementation of work placement programs. This methodology allows educators and industry stakeholders to collaborate closely, iterating on solutions that address the specific needs of students and employers.

Best practices in action research emphasise stakeholder engagement, iterative improvement and real-world problem-solving as foundational principles for designing and implementing workplace learning interventions. Recent studies highlight the effectiveness of participatory and cyclical processes in enhancing reflective learning and sustainable outcomes. For instance, Afzal and Tumpa (2025) demonstrated that iterative, action-research-based project learning enhanced teamwork, adaptability and decision-making skills among postgraduate project management students. Similarly, Gilbertson et al. (2024) found that collaborative action research between universities and schools improved capacity-building, professional learning and systemic improvement in teacher induction programs. In agricultural education, Guo et al. (2025) highlighted the importance of sustained stakeholder engagement and feedback cycles in improving research relevance and practical application.

In their work, Vannasy and Sengsouliya (2023) highlighted the importance of understanding workplace learning as influenced by both external and internal processes. One of the best models in action research is the integration of Illeris's learning model (2004), which links external social and cultural interactions with internal psychological processes, provides a robust foundation for designing effective workplace learning environments. The model emphasises that learning is both an individual and social process, making it particularly relevant to work placements where students engage with professionals and navigate real-world challenges. Contemporary research supports the applicability of Illeris's framework within workplace learning contexts. Knud Illeris (2004) conceptualises learning as an interaction between cognitive, emotional, and social dimensions, which has been widely applied to understand learning in professional environments. Similarly, Zhao and Ko (2018) highlight the value of such integrative frameworks in explaining professional identity development within vocational education. In addition, Jackson (2015) emphasises the critical role of supportive workplace environments, mentorship, and organisational culture in shaping students' learning outcomes and employability during work-integrated learning experiences.

Moreover, Kolb's Experiential Learning Theory (ELT) (1984) plays a significant role in shaping workplace learning strategies. ELT posits that learning occurs through a cycle of concrete experience, reflective observation, abstract conceptualisation and active

experimentation. For pre-final year undergraduates in Oman, workplace placements offer the opportunity to progress through these stages, from engaging in hands-on tasks to reflecting on their experiences and applying theoretical knowledge in practical contexts. By structuring work placements to align with Kolb's experiential learning cycle, educators can enhance students' ability to internalise and apply the skills required for the future labour market.

Scholars have highlighted the value of combining Experiential Learning Theory (ELT) with the Social Cognitive Career Theory (SCCT) to better understand and enhance workplace learning experiences. ELT emphasises the cyclical process of learning through concrete experience, reflection, conceptualisation and experimentation (Kolb, 1984), while SCCT explains how individuals' career interests and choices are shaped by self-efficacy beliefs, outcome expectations and personal goals (Lent et al., (1994). SCCT has also been widely applied to explore career decision self-efficacy and employability skills development among students (Lent & Brown, 2013). For Omani students, integrating these two frameworks offers a useful lens for educators and employers to assess how work placements influence students' confidence in their career choices and their readiness for the job market.

Key Best Practices in Action Research for Workplace Learning

1. **Collaborative Design:** Action research involves close collaboration between academic institutions and industry partners. To ensure that work placements are effective, it is essential to involve employers in the program design phase. This collaboration ensures that students gain exposure to the skills and competencies that are most relevant to the local job market, thus enhancing the alignment between academic preparation and industry needs (Reason & Bradbury, 2008).
2. **Iterative Feedback:** A critical element of action research is its cyclical nature, allowing for continuous refinement of the work placement program. Regular feedback from students, faculty and industry supervisors should be collected and analysed after each cycle to inform subsequent iterations of the program. This process promotes continuous improvement and ensures that the program remains responsive to both student needs and industry developments (Kemmis et al., 2014).
Empirical evidence indicates that structured feedback cycles substantially enhance learning effectiveness in applied and professional education contexts. Von Pressentin et al., (2016) demonstrated that participatory action research, which integrates regular reflection and collaborative inquiry, significantly improves the quality and relevance of workplace learning for medical students. Similarly, Lefroy et al., (2021) found that iterative feedback discussions combined with reflective writing fostered deeper learner engagement and professional growth. In higher education, van der Stappen and Baartman (2018) confirmed that embedding feedback loops within digital learning environments enhances adaptability and self-regulated learning, while Singh et al. (2024) reported that iterative student feedback mechanisms improve both academic performance and well-being in flexible learning contexts.
3. **Work placements should be structured in alignment with Kolb's Experiential Learning Cycle,** ensuring that students engage in a continuous process of concrete experience, reflective observation, abstract conceptualisation and active experimentation (Kolb, 1984). Students should be encouraged to engage in reflective practice during and after their placements, ensuring that they critically assess their experiences and understand how their theoretical knowledge applies in practical settings. Structured reflection sessions, such as debriefs or reflective journals, can facilitate this process (Moon, 2013).

4. **Development of Employability Skills:** As highlighted by Tynjälä, P. (2022), work placements should focus not only on technical skills but also on career decision self-efficacy and employability skills such as teamwork, communication and leadership. These soft skills are critical for success in the modern workforce and should be embedded into the work placement experience.
5. **Cultural and Social Adaptation:** Illeris's (2004) model emphasises the importance of the socio-cultural environment in learning. Work placements should be designed to expose students to the cultural norms and expectations of the workplace. In the context of Oman, this could involve sensitising students to local business practices and the broader socio-economic goals of Omanisation, thus helping students navigate the transition from academia to industry while contributing to national objectives.
6. **Evaluation and Continuous Improvement:** Following the completion of each placement cycle, a thorough evaluation should be conducted. This includes assessing the impact of the program on students' learning outcomes, career decision-making and employability. Action research encourages reflection not only on the part of students but also on the program itself, facilitating continuous improvements based on data-driven insights.

Key Theoretical Foundations for Work Placement Research

The design and implementation of structured work placement programs draw heavily on established theories of learning, career development and organisational change. These frameworks provide the conceptual foundation for understanding how students acquire knowledge, develop employability skills and transition into the labour market. Seminal contributions from scholars in action research, experiential learning, workplace learning and career theory offer critical insights into how internships and placements can be optimised for maximum impact. The following key scholars have been especially influential in shaping the theoretical underpinnings of work placement initiatives:

- Kolb, D. A. (1984): Kolb's Experiential Learning Theory is central to understanding how students learn through workplace placements. His model advocates for learning as a continuous process that is grounded in experience, making it highly relevant to the design of work placement programs.
- Illeris, K. (2004): Illeris's learning model highlights the importance of both internal cognitive processes and external social interactions in workplace learning. His work emphasises the need for an integrative approach to learning in practical environments, which aligns with the goals of action research in higher education.
- Lent et al., (1994): Social Cognitive Career Theory (SCCT) provides a framework for understanding how students' beliefs about their career paths are shaped during work placements, influencing their future career decisions and employability.

By integrating these best practices and theoretical frameworks, the application of action research to Oman's work placement program has led to significant improvements in student learning, employability and alignment with the needs of the local job market.

Examples of Global Studies and Best Practices

International experience demonstrates that well-structured work placement plays a critical role in enhancing graduate employability and aligning higher education with labour market needs. Countries such as Germany, the United Kingdom, Malaysia and Singapore provide evidence-based models that integrate academic learning with professional practice through curriculum

integration, extended placements, dual supervision, quality assurance and strong university-industry collaboration.

Germany's Dual Education System is widely regarded as a benchmark for vocational and professional training, combining theoretical instruction with structured industry apprenticeships. Its success is attributed to coordinated governance involving public authorities, industry associations and employers, ensuring curriculum relevance, skills recognition and consistent quality assurance (Deissinger & Hellwig, 2005; Gessler, 2017).

In the United Kingdom, "sandwich courses" integrate year-long, credit-bearing work placements within degree programs. Empirical evidence shows that these placements significantly enhance employability, workplace confidence and transferable skills such as communication, teamwork and problem-solving (Brooks & Youngson, 2016; Helyer, 2011). The UK model demonstrates the value of embedding experiential learning formally within academic curricula.

Malaysia has institutionalised work-based learning (WBL) and long-term internships as part of a national strategy to improve graduate outcomes. Guided by the Malaysia Education Blueprint 2015-2025 (Ganapathy, M., 2016), universities have embedded structured industrial training and extended internship programmes within their curricula, often under joint academic-industry supervision. Empirical evidence indicates that these initiatives help bridge the theory-practice gap and enhance graduates' technical competence, soft skills, motivation, and employability (Jackson, 2015; Omar et al., 2012; Rasul et al., 2013). Malaysia's experience reflects a deliberate national approach to embedding employability and experiential learning within higher education (Mustapha, 2017).

Singapore offers a well-established example of effective work-integrated learning (WIL) through its polytechnic system and national skills development initiatives. Policy frameworks such as SkillsFuture emphasise structured internships, strong industry collaboration and alignment between education and workforce needs (Ministry of Education Singapore, 2018). Research indicates that well-designed WIL programmes, characterised by clearly defined learning outcomes, extended placement duration, and active employer engagement, significantly enhance students' workplace readiness, professional identity, and overall employability (Ferns & Lilly, 2015; Jackson, 2015). Furthermore, Singapore's emphasis on coordinated governance and sustained partnerships between educational institutions and industry stakeholders has been identified as a key factor supporting the scalability and long-term sustainability of its model (Tan et al., 2017).

Across these contexts, several common success factors emerge, including robust governance and stakeholder collaboration, effective curriculum integration and credit recognition, extended placement durations (typically six to twelve months), dual academic-industry supervision, and competency-based assessment linked to employability outcomes (Ferns & Lilly, 2015; Helyer, 2011; Jackson, 2015; Reddy & Moores, 2012). Collectively, the evidence confirms that structured, long-term internships are effective mechanisms for bridging the gap between education and employment. Oman's National Work Placement Programme reflects these international best practices and aligns with national priorities such as Oman Vision 2040 by supporting workforce readiness, economic diversification, and the development of a competitive knowledge-based economy.

Methodology

Research Design

This study adopted a qualitative research design to explore the design and implementation of the work placement Programme and to understand how it aligns with both the academic context in Oman and the evolving needs of the national job market.

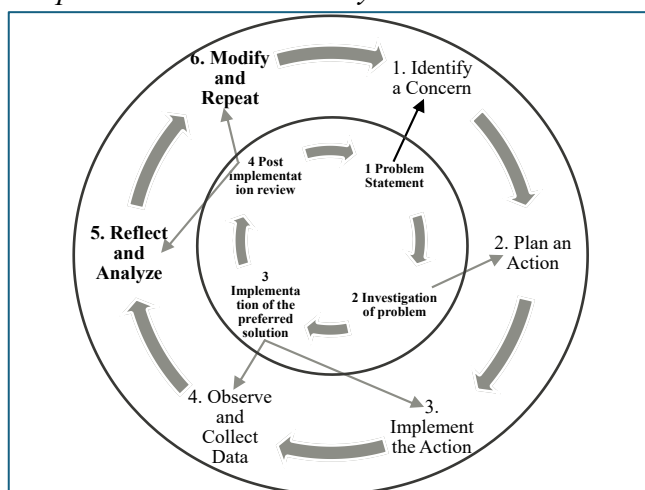
Research Approach

The implementation of the national work placement programme was guided by a four-stage adaptation of Lewin's (1946) Action Research (AR) cycle. Each phase was designed to address Oman's specific challenges of graduate employability and academia-industry alignment, while ensuring that outcomes were continuously reviewed and adapted to evolving needs. The AR approach provided both a methodological and philosophical foundation for iterative problem-solving, stakeholder engagement and evidence-based refinement.

Lewin's (1946) four-stage model was enhanced as shown in the figure 1 below by adding additional stages: observation and data collection as part of the implementation phase and reflect, analyse and modify, repeat as part of the post-implementation phase.

This enhancement was introduced to strengthen the model's applicability to contemporary programme implementation and evaluation. The inclusion of observation and data collection ensures that decisions during implementation are informed by real-time evidence and stakeholder feedback, allowing for greater responsiveness and accuracy in assessing progress. Similarly, the (reflect, analyse) and (modify, repeat) stages were added as part of the post implementation stage to promotes continuous improvement by encouraging critical evaluation of outcomes, identification of lessons learnt and adjustment of strategies based on evidence.

Figure 1
Adopted Action Research Cycle



Stage 1: Problem Diagnosis

The first stage focused on diagnosing systemic issues in Oman's higher education and employment ecosystem. A diagnostic study identified several barriers affecting graduate

employability and academia-industry collaboration, consistent with local reports (Oman Vision 2040, 2019) and international scholarship on graduate skills mismatches (Jackson, 2015).

Key concerns included:

- Weak linkages between universities and industry, with limited employer participation.
- A mismatch between academic output and labour market requirements.
- Graduates lacking essential professional and industry-relevant skills, particularly communication, adaptability and problem-solving (Al-Lamki, 2002).
- Reliance on short-term internships that offered limited skill development (Reddy & Moores, 2012).
- The need for structured initiatives that directly support Oman's economic diversification under Vision 2040 (Kroen, T. [IMF, 2024]).

The primary goal of this stage was to clearly articulate the problem, ensuring it was significant enough to warrant national-level intervention.

Stage 2: Planning the Intervention

The second stage consisted of participatory planning, in which academia, industry and government stakeholders co-developed actionable strategies. Consistent with AR principles of collaboration (Kemmis et al., 2014), the planning process emphasised inclusivity and adaptability.

Objectives defined at this stage included:

1. Supply and Demand Alignment: Matching interns majors with future job roles.
2. Capability Building: Enhancing both technical and soft skills through structured development framework.
3. Employability Index: Enhances Oman's employability index because of the integration of a one-year academic work placement, providing students with practical experience that strengthens their skills, increases job readiness and improves overall graduate employability at the national level.
4. Global Recognition: Aligns with Oman Vision 2040, which aspires to develop a highly skilled national workforce capable of competing locally, regionally and globally.

Key action plans involved:

- Developing a national work placement strategy and framework.
- Defining participation criteria, quality assurance measures and placement guidelines.
- Engaging stakeholders through workshops and consultation sessions.
- Establishing a multi-stakeholder working team with representation from academia, industry and PDO.
- Securing financial support, policy endorsement and ministerial approval.
- Preparing an execution plan based on a phased approach, starting with pilot institutions and disciplines.

This stage laid the foundation for structured action, ensuring that interventions were evidence-based, feasible and aligned with stakeholder expectations.

Stage 3: Implementation

The third stage represented the action phase, in which the planned work placement programme was piloted. Implementation initially targeted five academic institutions and five host organisations, with a focus on the Engineering discipline as a starting point.

Key features of the pilot included:

- **Phased Rollout:** Limiting the initial scope allowed for controlled testing and refinement before scaling nationally.
- **Development Framework:** A competency-based framework was created to guide industry supervisors and ensure structured learning outcomes.
- **Digital E-Portal:** A customised platform was built to support student allocation, tracking, feedback collection and real-time monitoring.
- **Feedback Loops:** Surveys captured perspectives from students, academia and employers during the pilot.
- **Gradual Expansion:** Following the pilot, the programme was scaled incrementally, integrating lessons learned and refining processes.

Implementation emphasised not only operational delivery but also the creation of systems that could be sustained nationally.

Stage 4: Observation and Data Collection

Observation and data collection formed a critical element of the AR cycle. Consistent with mixed methods approaches in WIL evaluation (Gomez et al., 2004), data were collected through multiple channels:

- **Surveys:** Quantitative and qualitative feedback from students, employers and academia.
- **Workplace Observations:** Monitoring interns' integration into host organisations and their engagement with professional tasks.
- **Performance Metrics:** Analysis of academic performance post-placement, employer evaluations and student self-assessments of skills.

This stage ensured that evidence, rather than assumptions, informed decisions regarding programme effectiveness and areas for refinement.

Stage 5: Reflection and Review

The fifth stage consisted of systematic analysis of the collected data. Findings indicated strong satisfaction among students and industry partners, alongside measurable improvements in academic performance, employability skills and professional readiness. Key reflections included:

- Positive impact on students' confidence, teamwork and problem-solving.
- Academic staff reporting improved classroom performance among returning students.
- Industry feedback confirming stronger job readiness and long-term employability potential.
- Identification of weaknesses in entry assessments, internship allocation and mentoring consistency across organisations.

These reflections highlighted both achievements and areas requiring further development.

Stage 6: Modification and Continuous Improvement

The final stage emphasised adaptive refinement, consistent with AR's iterative philosophy (Lewin, 1946; McNiff & Whitehead, 2010).

Key modifications included:

- Designing and developing a standalone E-Portal with expanded functionalities, including a job–major mapping module.
- Proposing adjustments to entry assessments to better reflect employability skills.
- Expanding placements to all higher education institutions in Oman, beyond the pilot.
- Introducing an Essential Skills Competency Framework to ensure consistency of soft skills development.
- Exploring the unification of credit hours to standardise academic recognition of placements.
- Increasing automation of processes to reduce administrative burden and enhance efficiency.

Through these modifications, the initiative evolved into a national framework for structured work placements, capable of scaling sustainably while retaining adaptability.

The application of AR to the work placement programme illustrates how iterative cycles of diagnosis, planning, implementation, observation, reflection and modification can enable continuous learning and improvement. Each stage was designed to be self-contained yet interconnected, ensuring that outputs from one cycle directly informed the next. This recursive process allowed the initiative to remain responsive to stakeholder needs while aligning with national policy goals.

Application of Learning Theories to Oman Work Placement

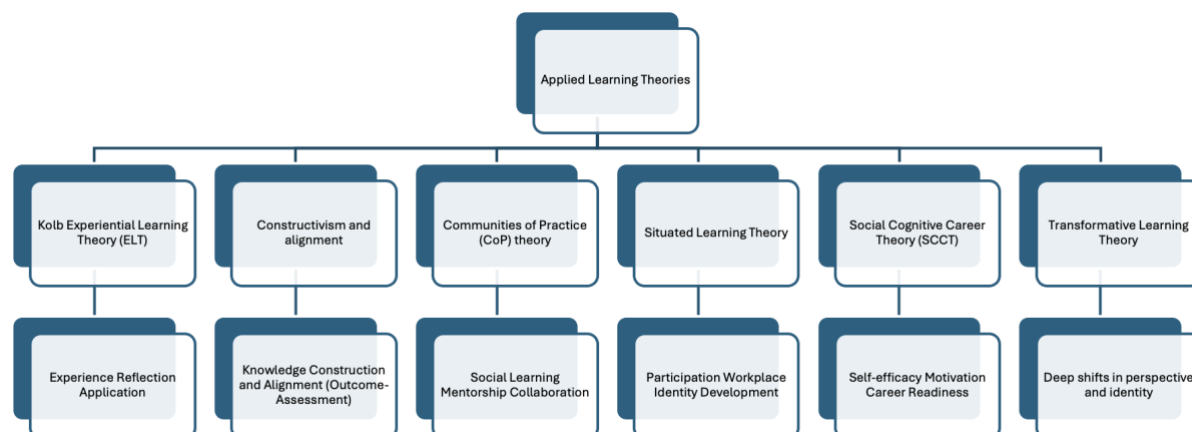
This section develops an integrated theoretical framework (Figure 2) to examine the learning processes underpinning the Oman National Work Placement Programme. While individual learning theories provide valuable insights, relying on a single perspective risks oversimplifying the complexity of work-integrated learning (WIL) environments (Billett & Henderson, 2011; Jackson, 2015). Therefore, this study adopts a multi-theoretical approach, combining experiential, transformative, social and constructivist perspectives to offer a more comprehensive understanding of workplace learning.

The framework moves beyond a narrow focus on skill acquisition to explore the interaction between experience, reflection, social participation and identity development. It recognises workplace learning as a dynamic, context-dependent process shaped by cognitive, social and organisational factors (Illeris, 2004; Lave & Wenger, 1991). In doing so, it positions learning as both an individual and collective process, while highlighting the role of structured programme design in influencing learning outcomes (Biggs, 2012).

Through this lens, the framework enables a deeper analysis of how the work placement supports not only competency development but also professional identity formation, adaptability and long-term employability. It thus provides a strong conceptual foundation for evaluating work placement initiatives in complex real-world contexts, where experiential and reflective learning are central to meaningful outcomes (Mezirow, 2000; Ryan & Ryan, 2013).

Figure 2

Integrated Theoretical Framework Illustrating How Learning Theories Collectively Inform the Design and Outcomes of the Oman National Work Placement Programme



Experiential Learning Theory (ELT) (Kolb, 1984) provides a foundational framework for understanding learning in work placements, conceptualising it as a cycle of experience, reflection, conceptualisation and experimentation. This approach emphasises the integration of practice and reflection, enabling students to apply theoretical knowledge in professional contexts. Evidence suggests that such approaches enhance adaptability and support the development of professional identity (Billett & Henderson, 2011; Jackson, 2015; Kolb, 1984; Moon, 2013). In the work placement, these principles are embedded through mentorship, competency frameworks and reflective evaluations.

Complementing this, Social Cognitive Career Theory (SCCT) (Lent et al., 1994) explains how self-efficacy and outcome expectations shape career development. Work placements strengthen students' confidence and employability, with research linking WIL to improved career readiness (Okolie et al., 2020). This is particularly relevant in Oman, where employability is a national priority.

Situated Learning Theory (Lave & Wenger, 1991) emphasises learning through participation in authentic work environments, where students progress from peripheral to active contributors. This process enhances collaboration, a sense of belonging and professional identity formation. In work placements, students are embedded within professional teams, where they learn through participation in real tasks and interactions within workplace communities (Billett & Henderson, 2011; Jackson, 2015; Lave & Wenger, 1991).

Similarly, Communities of Practice (Wenger, 1999) highlight the role of social learning through mentorship, collaboration and shared practice. Engagement in such communities supports the development of professional norms and facilitates students' transition into the workplace (Eames & Cates, 2011; Smith, 2012).

Constructivist theory (Vygotsky, 1978) further emphasises active, contextualised learning, while Biggs' (2012) concept of constructive alignment ensures coherence between learning outcomes, activities and assessment. Evidence suggests that aligned WIL programmes produce stronger learning outcomes (Shibani & Buck, 2022).

Finally, Transformative Learning Theory (Mezirow, 2000) explains how work placements can reshape students' perspectives through critical reflection. Exposure to unfamiliar professional

environments challenges assumptions, leading to increased self-awareness, adaptability and identity development (Jackson, 2015). In work placement, this is supported through structured reflection, mentoring and feedback, enabling students to transition towards professional readiness.

Key Challenges Faced in Implementing Oman's National Work Placements Using Action Research

While action research provides a flexible and participatory framework for developing national work placement initiative, its implementation presents several structural, logistical and procedural challenges. Based on the iterative cycles of this study, the key challenges are summarised below.

Time-Intensive Cyclical Process

A major limitation of action research is its time-intensive nature. The cyclical process of planning, implementation, observation and reflection requires sustained coordination and delays measurable outcomes. Studies highlight that such iterative approaches demand extended timelines due to continuous stakeholder engagement and adaptation (Black, 2020; Hudson et al., 2015; Schonenberg et al., 2018; Von Pressentin et al., 2016).

In the work placement, this challenge is amplified by phased implementation, where each expansion stage requires evaluation and refinement. The gradual onboarding of institutions, students and industry partners, while necessary for sustainability, significantly extends timelines and resource demands.

Complex Stakeholder Coordination

Coordinating multiple stakeholders across academia, industry and government is inherently complex. Effective work-integrated learning requires clear roles, shared goals and sustained collaboration, which are often difficult to achieve (Ali & Haapasalo, 2023; Oonk et al., 2022; Wait & Govender, 2016).

In the implementation, initial resistance emerged due to the introduction of long-term placements, a novel concept in Oman. Institutions expressed concerns regarding curriculum alignment and administrative readiness. Continuous engagement, trust-building and the establishment of a dedicated cross-sector working group were essential in overcoming these barriers and ensuring alignment.

Scalability of Participatory Approaches

Scaling action research-based initiatives presents challenges in maintaining consistency and quality across diverse institutions. Participatory approaches, while effective locally, are resource-intensive and difficult to standardise (Murphy et al., 2019; Pratt et al., 2024; Sommer et al., 2025; Von Pressentin et al., 2016).

As the work placement expanded, variations in institutional capacity and credit systems created inconsistencies. Additionally, onboarding new industry partners, many lacking structured training frameworks, required intensive support. A phased pilot-to-scale approach helped manage this complexity, enabling gradual national expansion while maintaining quality.

Absence of Organisational Development Frameworks

A critical challenge was the lack of structured learning and development frameworks within many host organisations. The absence of onboarding processes, mentoring systems and competency-based training limited the quality and consistency of student experiences.

This issue is widely documented, with studies showing that weak organisational structures undermine internship effectiveness (Ferns & Lilly, 2015; Ko & Tsai, 2025; Rianto et al., 2022; Virolainen et al., 2011). In response, we introduced guidelines, training support and national frameworks to promote structured workplace learning, though ongoing cultural and organisational change remains necessary.

Limited Placement Capacity and Sponsorship

Securing sufficient placement opportunities remains a significant constraint. Employer participation is often limited by resource constraints, lack of incentives and supervisory demands (Jackson et al., 2017; Naqvi, 2025; Thi Ngoc Ha et al., 2022).

In work placement, formal agreements with companies and increased awareness of programme benefits have helped expand participation. However, ensuring equitable and sustainable placement availability across sectors continues to be a challenge.

Data Collection and Feedback Limitations

Action research depends on timely and reliable feedback, yet data collection from students, supervisors and employers is often delayed or incomplete. This limits real-time evaluation and continuous improvement (Jellicoe & Forsythe, 2019; Winstone et al., 2022).

To address this, digital tools, mobile communication was utilised and follow-ups to improve response rates. However, maintaining consistent stakeholder engagement in feedback processes remains an ongoing issue.

Cultural Expectations and Student Participation

Cultural perceptions linking higher education directly to employment discourage participation in long-term internships. In Oman, internships may be viewed as delaying graduation, leading to resistance from students and families (Baker-Kelly & Al Hadhrami, 2025).

Similar challenges are observed globally, where socio-cultural and economic factors influence engagement in experiential learning (Chang & Utsumi, 2024; European Commission, 2022; Hora et al., 2019). To address this, the initiative was promoted through awareness campaigns and highlights the employability benefits of work placements to shift perceptions.

Conclusion

The national work placement programme represents a significant national effort to align higher education with labour market needs and support Omanisation by enhancing graduate employability. A key achievement is the establishment of a unified national framework and strong collaboration between academic institutions and industry.

The study demonstrates that structured, long-term work placements improve students' readiness for employment. Using Lewin's (1946) action research cycle, the programme provides a practical model for continuous improvement and stakeholder collaboration.

However, scaling such initiatives requires more than iterative development. Long-term sustainability depends on embedding supportive policies, standardised frameworks and institutional capacity across both academia and industry.

Overall, the national work placement serves as a scalable model for integrating work-based learning into higher education systems. Its national scope and collaborative approach position it as a benchmark for countries seeking to strengthen human capital development and bridge the gap between education and employment.

Acknowledgements

I would like to express my sincere gratitude to Petroleum Development Oman for providing me with the opportunity to lead this project from its initial concept through to its development at a national level. I am also deeply grateful of their financial support and sponsorship, which enabled the presentation of this work at the Asian Conference on Education and International Development 2026. Special thanks are extended to my supervisors, Dr David Acquaye and Dr Paul Cowley, for their invaluable guidance and continuous support throughout the development of this research.

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

The author declares that Grammarly Consensus software was used in proofreading and refining the language used in the manuscript. The usage was limited to correcting grammatical and spelling errors and rephrasing statements for accuracy and clarity. The author further declares that, apart from Grammarly, no other AI or AI-assisted technologies have been used to generate content in writing the manuscript. The ideas, design, procedures, findings, analyses, and discussion are originally written and derived from careful and systematic conduct of the research.

References

- Afzal, F., & Tumpa, R. J. (2025). Project-based group work for enhancing students' learning in project management education: An action research. *International Journal of Managing Projects in Business*, 18(1), 189–208.
- Al-Abri, M., Denman, C., Al Alawi, M., & Al Ajmi, M. (2024). Enhancing employability through university–industry linkages: Omani engineering students' perspectives of the Eidaad internship programme. *Humanities and Social Sciences Communications*, 11(1), 565.
- Al Harrasi, N., & Al Subhi, N. (2024). Determinants of effective university–industry collaboration: An empirical study of Oman's higher education institutions. *Cogent Education*, 11(1), 2387951.
- Ali, F., & Haapasalo, H. (2023). Development levels of stakeholder relationships in collaborative projects: Challenges and preconditions. *International Journal of Managing Projects in Business*, 16(8), 58–76.
- Al-Lamki, S. M. (2002). Higher education in the Sultanate of Oman: The challenge of access, equity and privatization. *Journal of Higher Education Policy and Management*, 24(1), 75–86.
- Al Weshahi, S. J. S. (2022). The impact of university–industry collaboration and its relevance to technical higher education in Oman. *Global Journal of Human Resource Management*, 10(6), 15–22.
- Baker-Kelly, B., & Al Hadhrami, H. S. (2025). Sustainable development of academia and industry: The role of internships and the Eidaad program. In B. Awwad (Ed.), *AI and IoT: Driving business success and sustainability in the digital age* (Vol. 590). Springer.
- Biggs, J. (2012). What the student does: Teaching for enhanced learning. *Higher Education Research & Development*, 31(1), 39–55.
- Billett, S., & Henderson, A. J. (Eds.). (2011). *Developing learning professionals: Integrating experiences in university and practice settings* (Vol. 7). Springer Science & Business Media.
- Black, G. L. (2020). Implementing action research in a teacher preparation program: Opportunities and limitations. *The Canadian Journal of Action Research*, 21(2), 47–71.
- Brooks, R., & Youngson, P. L. (2016). Undergraduate work placements: An analysis of the effects on career progression. *Studies in Higher Education*, 41(9), 1563–1578.
- Chang, C.-H., & Utsumi, Y. (2024). The impact of international internships on Japanese undergraduates' learning outcomes. *Education + Training*, 66(7), 890–906.

- Deissinger, T., & Hellwig, S. (2005). Apprenticeships in Germany: Modernising the dual system. *Education + Training*, 47(4–5), 312–324.
- Eames, C., & Cates, C. (2011). Theories of learning in cooperative and work-integrated education. In R. K. Coll & K. E. Zegwaard (Eds.), *International handbook for cooperative and work-integrated education: International perspectives of theory, research and practice* (2nd ed., pp. 41–52).
- European Commission. (2022). *Council recommendation on transnational cooperation and higher education mobility*. European Parliament.
- Ferns, S., & Lilly, L. (2015). Driving institutional engagement in WIL: Enhancing graduate employability. *Journal of Teaching and Learning for Graduate Employability*, 6(1), 126–143.
- Ganapathy, M. (2016). Transformation of Malaysia's higher education system: Malaysia Education Blueprint (2015–2025). *Bulletin of Higher Education Research*, 5(1), 10–11.
- Gessler, M. (2017). The lack of collaboration between companies and schools in the German dual apprenticeship system: Historical background and recent data. *International Journal for Research in Vocational Education and Training*, 4(2), 164–195.
- Gilbertson, E., Murphy, A., Janis, S., Thompson, K., & Harris, M. (2024). Sustaining induction teachers through partnerships: Action research as a catalyst for change within complex contexts. *School-University Partnerships*, 17(4), 365–385.
- Gomez, S., Lush, D., & Clements, M. (2004). Work placements enhance academic performance. *Journal of Vocational Education & Training*, 56(3), 373–385.
- Guo, T., Marquart-Pyatt, S., Ulbrich, T., Doll, J. E., Wilke, B., & Robertson, G. P. (2025). Assessing the impacts of stakeholder involvement in long-term agricultural experiments via a case study in the upper US Midwest. *Agronomy Journal*, 54(5), 1202–1213.
- Helyer, R. (2011). Aligning higher education with the world of work. *Higher Education, Skills and Work-Based Learning*, 1(2), 95–105.
- Hora, M. T., Wolfgram, M., & Chen, Z. (2019). *Closing the doors of opportunity*. Wisconsin Center for Education Research.
- Hudson, J. N., Farmer, E. A., Weston, K. M., & Bushnell, J. A. (2015). Implementing innovation in medical education. *BMC Medical Education*, 15(1), 2.
- Illeris, K. (2004). A model for learning in working life. *Journal of Workplace Learning*, 16(8), 431–441.
- Jackson, D. (2015). Employability skill development in work-integrated learning: Barriers and best practice. *Studies in Higher Education*, 40(2), 350–367.

- Jackson, D., Rowbottom, D., Ferns, S., & McLaren, D. (2017). Employer understanding of WIL. *Studies in Continuing Education*, 39(1), 35–51.
- Jellicoe, M., & Forsythe, A. (2019). Feedback in learning scale. In *Frontiers in Education* (Vol. 4).
- Kemmis, S., McTaggart, R., & Nixon, R. (2014). *The action research planner*. Springer.
- Ko, C. F., & Tsai, C. F. (2025). Tourism and hospitality internships in higher education: A conceptual framework to implementation. *Pakistan Journal of Life & Social Sciences*, 23(1).
- Kolb, D. A. (1984). *Experiential learning*. Prentice Hall.
- Kroen, T. (2024). *Monetary policy transmission in Oman*. International Monetary Fund.
- Lave, J., & Wenger, E. (1991). *Situated learning*. Cambridge University Press.
- Lefroy, J., Walters, B., Molyneux, A., & Smithson, S. (2021). Can learning from workplace feedback be enhanced by reflective writing? A realist evaluation in UK undergraduate medical education. *Education for Primary Care*, 32(6), 326–335.
- Lent, R. W., & Brown, S. D. (2013). Career self-management model. *Journal of Counseling Psychology*, 60(4), 557–568.
- Lent, R. W., Brown, S. D., & Hackett, G. (1994). Social cognitive career theory. *Journal of Vocational Behavior*, 45(1), 79–122.
- Lewin, K. (1946). Action research and minority problems. *Journal of Social Issues*, 2(4), 34–46.
- McNiff, J., & Whitehead, J. (2010). *You and your action research project* (3rd ed.). Routledge.
- Mezirow, J. (2000). *Learning as transformation*. Jossey-Bass.
- Ministry of Education Singapore. (2018). *Enhanced internship framework (EIF)*. Government of Singapore.
- Moon, J. A. (2013). *Reflection in learning and professional development: Theory and practice*. Routledge.
- Murphy, K., Parnell, T., Pope, R., Hughes, C., Biles, J., Bramble, M., O'Connor, S., Curtin, M., Speedie, L., & Plowman, E. (2019). Improving evidence-based practice education in healthcare courses: A participatory action research multiple-case study. In *Proceedings of the Fifth International Conference on Higher Education Advances* (pp. 605–614). Universitat Politècnica de Valencia.
- Mustapha, R. B. (2017). Skills training and vocational education in Malaysia. In *Education in Malaysia: Developments and challenges* (pp. 137–153). Springer.

- Naqvi, J. (2025). Post-COVID internships. *Industry and Higher Education*, 39(5), 492–503.
- Okolie, U. C., Igwe, P. A., Nwosu, H. E., Eneje, B. C., & Mlanga, S. (2020). Enhancing graduate employability: Why do higher education institutions have problems with teaching generic skills? *Policy Futures in Education*, 18(2), 294–313.
- Oman Vision 2040. (2019). *Vision 2040 document*. Government of Oman.
- Omar, N. H., Manaf, A. A., Mohd, R. H., Kassim, A. C., & Abd Aziz, K. (2012). Graduates' employability skills based on current job demand through electronic advertisement. *Asian Social Science*, 8(9), 103.
- Oonk, C., Gulikers, J., den Brok, P., & Mulder, M. (2022). Boundary crossing learning. *International Journal of Sustainability in Higher Education*, 23(8), 21–40.
- Pratt, S., Heggart, K., Christensen, P. H., & Sankaran, S. (2024). Participatory action research in HDR. *Systemic Practice and Action Research*, 37(5), 565–584.
- Rasul, M. S., Abd Rauf, R. A., Mansor, A. N., Yasin, R. M., & Mahamod, Z. (2013). Graduate employability for manufacturing industry. *Procedia - Social and Behavioral Sciences*, 102, 242–250.
- Reason, P., & Bradbury, H. (Eds.). (2008). *The SAGE handbook of action research* (2nd ed.). SAGE Publications.
- Reddy, P., & Moores, E. (2012). Placement year benefits revisited. *Teaching in Higher Education*, 17(2), 153–165.
- Rianto, J., Kamil, M., Putry, W. A., & Bahri, S. (2022). The relevance of the higher education curriculum in the development of the world of work and the industrial sector: The case of Universitas Islam Syekh-Yusuf. *Society*, 10(1), 110–125.
- Ryan, M., & Ryan, M. (2013). Reflective learning model. *Higher Education Research & Development*, 32(2), 244–257.
- Schonenberg, H., Fullaondo Zabala, A., de Bruin, S., Lette, M., Billings, J., Baan, C., van der Marck, M., & Nieuwboer, M. (2018). Participatory approaches to improve integrated care programs: Methods, experiences, and early results applying methods from implementation research. *International Journal of Integrated Care*, 18(s2), 110.
- Shibani, A., & Buck, A. (2022). *Designing effective work-integrated learning for data science students: Considerations and lessons learned*. ASCILITE Publications.
- Singh, A. A., Shapter, F. M., Bernard, A., Whitworth, D. J., Holt, M. G., Waller, P. S., & Bond, S. L. (2024). Applying iterative student feedback across flipped classroom and flexible teaching approaches: Impact on veterinary students' learning experience. *Animals*, 14(16), 2335.

- Smith, C. (2012). Evaluating the quality of work-integrated learning curricula: A comprehensive framework. *Higher Education Research & Development*, 31(2), 247–262.
- Sommer, R., Till, M., Boyer, L., Weber, P., Sauter, A., Ferschl, S., Herrmann-Johns, A., Abu-Omar, K., Pfeifer, K., & Gelius, P. (2025). The challenge of participatory projects for physical activity promotion: What to scale and how to scale? *PLOS ONE*, 20(6), e0326737.
- Tan, O. S., Liu, W. C., & Low, E. L. (2017). Teacher education futures: Innovating policy, curriculum and practices. In *Teacher education in the 21st century: Singapore's evolution and innovation* (pp. 1–9). Springer.
- Thi Ngoc Ha, N., Dakich, E., & Grieshaber, S. (2022). Factors influencing the participation of industry professionals in work-integrated learning in Vietnamese universities: A qualitative approach. *Higher Education, Skills and Work-Based Learning*, 12(3), 574–587.
- Tynjälä, P. (2022). Workplace learning perspectives. In *Research approaches on workplace learning* (pp. 429–450). Springer.
- van der Stappen, E., & Baartman, L. (2018). Automated feedback for workplace learning in higher education. In *International Conference on Technology Enhanced Assessment* (pp. 73–90). Springer.
- Vannasy, V., & Sengsouliya, S. (2023). Workplace learning predictors. *Andragoška Spoznanja*, 29(1), 81–97.
- Virolainen, M., Stenström, M., & Kantola, M. (2011). Employers' views on internships. *Journal of Vocational Education & Training*, 63, 465–484.
- Von Pressentin, K. B., Waggie, F., & Conradie, H. (2016). Towards tailored teaching: Using participatory action research to enhance the learning experience of longitudinal integrated clerkship students in a South African rural district hospital. *BMC Medical Education*, 16(1), 82.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes* (Vol. 86). Harvard University Press.
- Wait, M., & Govender, C. M. (2016). Multi-stakeholder WIL model. *South African Journal of Higher Education*, 30(2), 279–293.
- Wenger, E. (1999). *Communities of practice: Learning, meaning, and identity*. Cambridge University Press.
- Winstone, N., Boud, D., Dawson, P., & Heron, M. (2022). From feedback-as-information to feedback-as-process: A linguistic analysis of the feedback literature. *Assessment & Evaluation in Higher Education*, 47(2), 213–230.

Zhao, Y., & Ko, J. (2018). Workplace learning in the professional development of vocational education teachers. *Studia Paedagogica*, 23(2), 43–58.

The Role of Morphological Awareness in Second Language Acquisition: Affixation as a Vocabulary Learning Strategy

Ivana Zivkovic, University of Belgrade, Serbia

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This research investigates the role of morphological awareness in second language acquisition. The study focuses on affixation as a vocabulary learning strategy and examines whether instruction on affixation helps in vocabulary retention in learners of English as a foreign language (EFL). A total of 25 high school students in Serbia (aged 17–18), distributed across proficiency levels A1, A2, and B1 (based on a general English proficiency test), participated in a pre-/post-test intervention. The pre-test consisted of 60 words grouped by shared derivational affixes (e.g., un-, dis-, -less), while the post-test contained the same words randomly arranged, without affix cues. Instruction was delivered in the learners' mother tongue (Serbian) as a scaffolding strategy to support comprehension; multilingualism or cross-linguistic transfer was not explicitly analyzed. The instruction consisted of three sessions, each introducing approximately 20 new words through contextualized examples, morphological analysis, and guided word-formation tasks. The results of the study indicate that brief, targeted lessons on prefixes and suffixes can improve vocabulary acquisition, especially for lower-proficiency learners. The use of the learners' mother tongue as a support, combined with tasks requiring active word formation, can effectively enhance morphological awareness and provide practical guidance for planning an EFL curriculum.

Keywords: morphological awareness, affixation, vocabulary acquisition, EFL learners, second language acquisition

iafor

The International Academic Forum
www.iafor.org

Introduction

Morphological awareness represents a fundamental component of metalinguistic knowledge, enabling learners to identify and analyze the morphemic structure of words and to manipulate it appropriately. This ability is particularly valuable in second language acquisition, as recognizing systematic patterns of affixation (prefixes and suffixes) can greatly facilitate vocabulary learning, the primary goal in acquiring a second language. More efficient vocabulary expansion constitutes a crucial aspect of language learning; thus, the ability to generalize morphological rules across related lexemes enables the internalization of new lexical items. Reducing lexical opacity and mitigating the difficulty of unknown vocabulary become possible by decomposing complex words into smaller, semantically meaningful units. Although morphological strategies are not universally applicable to all lexical items (especially irregular or idiomatic forms), they nonetheless provide a framework that supports the language learning process. Morphological awareness helps learners analyze the morphemic structure of words and manipulate word parts in ways that support vocabulary learning (Carlisle, 1995).

Literature Review

Early research in psychology has shown that organizing information into categories facilitates faster memorization, while repetition aids in transferring information to long-term memory. In this context, categorizing words according to their prefixes and suffixes may support more efficient vocabulary acquisition in foreign language learners. This approach departs from traditional methods, such as extracting and explaining words individually from a text, offering a more systematic and cognitively supportive strategy for vocabulary learning. As Kim (2013) argues, affixation-based instruction can help learners expand their knowledge of meaning and grammatical categories and may also support longer-term vocabulary retention.

Additional research has also examined the broader relationship between morphological awareness and vocabulary knowledge in ESL contexts. For example, Zheng (2023) found that Chinese tertiary ESL learners demonstrated a good level of morphological awareness and strong academic vocabulary knowledge, although no statistically significant correlation was found between morphological awareness and vocabulary level. This suggests that the relationship between morphological awareness and vocabulary development may vary depending on learner profile, instructional background, and the specific aspects of vocabulary being measured.

As previous research has shown, morphological awareness is not acquired instantaneously but develops gradually over time through exposure to linguistic structures and increasing language proficiency (Anglin, 1993; Ku & Anderson, 2003), evolving through continuous exposure to word-formation patterns and explicit attention to morphemic structures. Furthermore, affix knowledge plays an important role in the processing of morphologically complex words, as exposure to words contributes to the development of high-quality lexical representations that support accurate and efficient word recognition (Carlisle & Katz, 2006). In line with this, explicit affix instruction in a regular English language classroom in an EFL context was shown to be a useful learning tool: “explicit instruction of English affixes facilitated the acquisition of vocabulary knowledge (e.g., meaning and linguistics)” (Sukying & Matwangsang, 2023, p. 60).

Morphological awareness and vocabulary growth develop in tandem, forming a reciprocal relationship. As learners encounter and acquire more lexical items, their sensitivity to

morphological structures (particularly high-frequency prefixes and suffixes) becomes more refined. This bidirectional development highlights the importance of morphological instruction at all stages of language acquisition. Considering multiple proficiency levels (e.g., A1, A2, B1) also provides valuable insights into how affixation supports vocabulary growth across learners of different linguistic competence. For novice learners with limited vocabulary, morphological strategies serve as foundational tools for decoding and memorizing new words. For advanced learners, they consolidate existing lexical knowledge and facilitate the acquisition of more complex or academic vocabulary. Consequently, affixation plays a crucial role not only in the initial stages of lexical development but also in its continued expansion and refinement.

Previous research has also shown that morphological awareness contributes to broader aspects of L2 literacy. In a study of young Chinese EFL learners, Zhang and Koda (2013) found that derivational and compound awareness independently predicted English reading comprehension, even after vocabulary and grammatical knowledge were taken into account. Their findings also showed that derivational awareness was less developed than inflectional and compound awareness, suggesting that this aspect of morphological knowledge may require more explicit support and greater exposure in foreign language learning contexts. This is relevant for the present study, which focuses on derivational affixation as a strategy for vocabulary learning, since it suggests that derivational morphology may be both developmentally demanding and instructionally important.

Empirical evidence confirms these theoretical insights. In a quasi-experimental study with 221 Thai EFL learners, Sukying and Matwangsaeng (2023) found that explicit morphological awareness instruction significantly enhanced both receptive and productive vocabulary knowledge. Similarly, in a ten-week study with 54 Korean students, Kim (2013) compared two groups (one trained in affixation strategies and one without such exposure) and reported that the affix-trained group acquired vocabulary more quickly and efficiently. These results demonstrate that understanding the structure and function of prefixes and suffixes can substantially enhance word learning and overall vocabulary acquisition.

Bound Morphemes, Inflectional and Derivational Affixes

In linguistic morphology, bound morphemes are defined as units that cannot occur independently but require attachment to a lexical base in order to convey meaning. Within this category, a fundamental distinction is drawn between inflectional and derivational affixes, which differ both in function and in their relevance for language learning.

Inflectional affixes primarily serve grammatical purposes: they encode features such as number, tense, or degree without altering the core semantic content or the syntactic category of the base word. As such, they are generally predictable and form part of a closed system of grammatical markers.

Derivational affixes, by contrast, play a central role in lexical development. They either modify the meaning of a base or change its grammatical category, thereby enabling the formation of new lexical items. This process is particularly relevant in the context of second language acquisition, as it provides learners with a systematic mechanism for expanding vocabulary beyond memorization of isolated forms.

Given this distinction, the present study focuses specifically on derivational affixation as a strategy for vocabulary learning, as it directly contributes to learners' ability to recognize, interpret, and produce morphologically complex words.

Methodology

This study investigated the effectiveness of affixation as a vocabulary learning strategy among learners of English as a foreign language (EFL) at different proficiency levels. Specifically, it examined whether explicit instruction in affixation facilitated vocabulary retention and productive word formation.

Participants were divided into three proficiency groups (A1, A2, and B1) based on their placement test results. All participants were high school students in a formal educational setting and had received at least two years of prior English instruction. Proficiency groups were determined based on a general placement test, administered prior to the intervention. Participation was voluntary, and all learners completed both phases of the study.

The research employed a pre-test/post-test design. Both tests consisted of 60 items assessing morphological awareness through the recognition and production of morphologically complex words. The pre-test presented items grouped according to shared derivational affixes, while the post-test included the same items presented in a randomized order, without affix grouping.

Following the pre-test, participants received explicit instruction in English affixation. Instruction was delivered in the learners' first language (Serbian) as a scaffolding strategy and consisted of three instructional sessions. Each session introduced approximately 20 new words through contextualized examples, explicit morphological analysis, and guided word-formation tasks.

Participants' progress was assessed by comparing pre-test and post-test performance, focusing on their ability to recognize, recall, and accurately use affixed words. Because the same participants completed both testing phases, within-group comparisons were conducted using paired-samples *t*-tests. Differences in improvement across proficiency levels were examined using a one-way (ANOVA) on gain scores. The results may contribute to the broader field of applied linguistics by offering insights into the cognitive mechanisms underlying vocabulary acquisition in L2 learners.

Results

Participants were divided into three proficiency groups based on a placement test: A1 (beginner, $n = 6$), A2 (elementary, $n = 5$), and B1 (intermediate, $n = 14$). All participants completed both the pre-test and the post-test, each consisting of 60 items assessing recognition and production of morphologically derived words.

Descriptive statistics for pre- and post-test scores are presented in Table 1. At the pre-test stage, the A1 group demonstrated minimal morphological awareness ($M = 1.00$, $SD = 1.55$), corresponding to approximately 1.7% correct responses. The A2 group achieved a slightly higher mean score ($M = 4.80$, $SD = 5.72$; 8.0% correct), while the B1 group performed substantially better ($M = 45.07$, $SD = 13.89$; 75.1% correct).

Following the instructional intervention, all three groups showed improved performance. The A1 group increased to a mean of 14.83 (SD = 3.06; 24.7% correct), the A2 group to 20.80 (SD = 8.87; 34.7% correct), and the B1 group to 50.86 (SD = 10.93; 84.8% correct). Absolute gains were largest for the lower-proficiency groups (A1 and A2), while the B1 group showed a more moderate increase, consistent with a ceiling effect.

Table 1

Descriptive Statistics for Pre- and Post-test Scores by Proficiency Level

Group	n	Pre-test M (SD)	Post-test M (SD)
A1	6	1.00 (1.55)	14.83 (3.06)
A2	5	4.80 (5.72)	20.80 (8.87)
B1	14	45.07 (13.89)	50.86 (10.93)

Because the same participants completed both testing phases, within-group comparisons were conducted using paired-samples *t*-tests. All three groups demonstrated statistically significant improvement from pre-test to post-test (Table 2). The A1 group showed the largest effect, $t(5) = 10.23, p < .001$, Cohen's $d = 4.18$, indicating a very large instructional impact. The extremely large effect size for the A1 group should be interpreted with caution, as it is partly inflated by very low baseline scores. The A2 group also showed a significant increase, $t(4) = 3.75, p = .02$, $d = 1.68$. The B1 group exhibited a statistically significant, though comparatively smaller, improvement, $t(13) = 5.38, p < .001, d = 1.44$.

Table 2

*Paired-Samples *t*-test Results for Pre- and Post-test Comparisons*

Group	t(df)	p	Cohen's d
A1	10.23 (5)	< .001	4.18
A2	3.75 (4)	= .020	1.68
B1	5.38 (13)	< .001	1.44

Normality of gain scores was not seriously violated within groups; however, Levene's test indicated unequal variances across proficiency levels. Therefore, ANOVA results should be interpreted with caution.

To examine differences in improvement across proficiency levels, gain scores (post-test minus pre-test) were analyzed using one-way ANOVA. The analysis revealed a significant main effect of proficiency level on improvement, $F(2, 22) = 9.01, p = .001$, with a large effect size ($\eta^2 = .45$), indicating that proficiency level explained a substantial proportion of variance in learning gains. Because Levene's test suggested unequal variances, these results were interpreted with caution; a Welch ANOVA confirmed the robustness of the group effect, Welch's $F(2, 8.25) = 11.27, p = .004$.

Discussion

Pre-test Performance by Proficiency Level

In the pre-test, there were clear differences in morphological task performance across proficiency levels. Beginner learners (A1) scored extremely low, with an average accuracy of only 1.7% (near-zero performance) on the morphological items. Elementary learners (A2) performed slightly better but still had a very low mean accuracy of 8.0%, indicating that they answered only a few items correctly on average. In contrast, the intermediate group (B1) demonstrated a much higher initial accuracy of ~75.1%, correctly answering the majority of the items. This suggests that, within the present sample, morphological awareness was minimal at the A1/A2 levels but fairly well-developed by the B1 level. Lower-level learners struggled with nearly all morphological transformations, whereas B1 learners already knew many affixed words, reflecting their greater vocabulary and language experience.

The pre-test results highlight a substantial proficiency gap in morphological knowledge. For example, A1 participants collectively answered almost none of the 60 items correctly, showing that beginners could not produce the required prefixed/suffixed forms for the given base words (e.g. failing to form *unhappy* from “happy” meaning *nesrećan*). A2 learners showed slightly higher success on a few very common items (notably those with the prefix *un-*), but still zeroed out on most items. Meanwhile, B1 learners knew most of the common derivatives – for instance, every B1 student correctly formed *unlucky*, *unusual*, and *unkind* (100% accuracy on those items in pre-test), and nearly all knew *unhappy* (93% got it right). Only the more complex or less familiar formations posed problems for B1 in the pre-test (e.g. *misunderstand* was answered correctly by just 7% of B1s, and *impossible* by 21%). This pattern indicates that without prior instruction, beginners lack morphological awareness for constructing new words, while intermediate learners appear to possess partial or previously acquired knowledge of many common affixed forms but may still miss more advanced or irregular ones.

Post-test Performance and Improvement

After the instructional period focused on prefixes and suffixes, all groups improved their performance in the post-test, although the extent of improvement varied by level. A1 learners’ accuracy jumped from ~1.7% to 24.7%, indicating they went from virtually no correct answers to about one quarter of the items correct on average. A2 learners improved from 8.0% to 34.7% accuracy, also a marked increase. B1 learners rose from 75.1% to 84.8% correct on average, a more modest increase in percentage points (since they were already high) but still a notable improvement.

To ensure these improvements are statistically meaningful, we compared each group’s pre- vs post-test scores using paired analyses. The gains for all three groups were statistically significant. In particular, A1’s improvement was highly significant (paired *t*-test, $p < 0.001$), reflecting the dramatic learning effect for beginners (with a very large effect size $d \approx 4.18$). A2’s improvement was also significant ($p \approx 0.02$), indicating a meaningful gain (large effect size $d \approx 1.68$). B1 learners’ improvement, though smaller in absolute terms, was statistically significant as well ($p < 0.001$, $d \approx 1.44$), suggesting even advanced students benefited from the focused instruction. All improvements reached statistical significance.

Overall, the results indicate that morphological instruction led to measurable improvements across all proficiency levels, with the most pronounced gains observed among lower-

proficiency learners. While A1 and A2 learners showed substantial increases in their ability to produce derived forms, B1 learners primarily exhibited consolidation and refinement of existing knowledge.

Interpretation of Results

The present study examined the effect of explicit instruction in affixation on morphological awareness and vocabulary development among EFL learners across different proficiency levels. The findings indicate statistically significant improvement in all groups, with particularly pronounced gains among lower-proficiency learners.

The largest improvement was observed in the A1 and A2 groups. Beginner learners demonstrated near-zero performance at pre-test, followed by substantial gains in the post-test, resulting in very large effect sizes. These results should be interpreted with caution, as low baseline scores tend to inflate relative gains. Nevertheless, the findings suggest that even brief, targeted instruction can effectively enhance morphological awareness when learners lack prior systematic knowledge of word formation.

A2 learners showed a similarly strong response to instruction, indicating that early-stage learners are especially receptive to explicit teaching of prefixes and suffixes. This supports previous research emphasizing the gradual development of morphological awareness and the importance of explicit instruction (Anglin, 1993; Bowers et al., 2010; Sukying, 2020).

Although the B1 group exhibited smaller gains, their improvement remained statistically and pedagogically meaningful. Given their relatively high pre-test performance, further progress was constrained by a ceiling effect. Nonetheless, the results indicate that morphological instruction continues to support vocabulary consolidation and refinement at intermediate levels (Amirjalili & Jabbari, 2018).

Between-group analysis further confirmed that proficiency level plays a significant role in moderating instructional effects. The large proportion of variance explained ($\eta^2 = .45$) suggests that initial linguistic competence strongly influences learning outcomes. This finding aligns with prior research showing that morphological instruction is particularly beneficial for learners with limited lexical resources (Bowers et al., 2010).

Item-level analyses (see Appendix A) revealed that learners most successfully acquired high-frequency and semantically transparent affixes, particularly the negative prefix *un-*. In contrast, lower-frequency or more abstract derivations (e.g., *-ity*, *mis-*) remained challenging, especially for lower-proficiency learners. This suggests that morphological transparency and lexical familiarity play a crucial role in mediating instructional effectiveness.

Pedagogical Implications

The results advocate for integrating explicit morphological instruction into standard EFL curricula. Teaching prefixes, suffixes, and base word analysis equips learners with strategies to decode and construct new vocabulary autonomously. Moreover, such instruction enhances reading comprehension and lexical retention, as learners begin to recognize systematic relationships between word parts and meanings. These results confirm previous evidence that morphological awareness is not merely a byproduct of vocabulary learning but an essential

cognitive skill that supports ongoing lexical development (Amirjalili & Jabbari, 2018; Badawi, 2019).

Given the pronounced benefits observed among lower proficiency groups, educators are encouraged to introduce morphological awareness training early in the learning process. Activities such as word-family mapping, affix identification, and derivational transformation tasks can foster analytical thinking about word structure and promote vocabulary depth.

Limitations and Future Research

Several limitations should be acknowledged. The sample size was relatively small, and group sizes were uneven, which may limit the generalizability of the findings. Additionally, the intervention was short-term and did not include a control group, making it difficult to assess long-term retention or isolate instructional effects from general exposure. Future studies should employ larger samples, longitudinal designs, and controlled comparisons to further examine the durability and scope of morphological instruction effects.

Conclusion

This study suggests that morphological awareness significantly enhances vocabulary acquisition in EFL contexts. Learners who received explicit morphological training exhibited substantial improvements in recognizing and understanding morphologically complex words. The magnitude of these improvements, especially among beginner and intermediate learners, underscores the pedagogical importance of integrating morphology-focused instruction into language learning programs.

Ultimately, developing morphological awareness empowers learners to approach new vocabulary analytically rather than through rote memorization, fostering deeper lexical knowledge and more autonomous language learning. The results thus contribute to both theoretical understanding and practical application in the field of second language acquisition, highlighting morphology as a cornerstone of vocabulary growth and linguistic competence.

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

The author declares that Grammarly, an AI-assisted writing software, was used in proofreading and refining the language used in the manuscript. The usage was limited to correcting grammatical and spelling errors and rephrasing statements for accuracy and clarity. The author further declares that, apart from Grammarly, no other AI or AI-assisted technologies have been used to generate content in writing the manuscript. The ideas, design, procedures, findings, analyses, and discussion are originally written and derived from careful and systematic conduct of the research.

References

- Amirjalili, F., & Jabbari, A. (2018). The effect of morphological instruction on EFL learners' derivational morphology and reading comprehension. *Cogent Education*, 5(1), 1483045. <https://doi.org/10.1080/2331186X.2018.1483045>
- Anglin, J. M. (1993). *Vocabulary development: A morphological analysis* (with commentary by G. A. Miller & P. C. Wakefield, and a reply by the author). Erlbaum.
- Badawi, M. F. (2019). The effect of explicit morphological awareness instruction on EFL secondary school students' reading comprehension. *TESOL International Journal*, 14(1), 42–58.
- Bowers, P. N., Kirby, J. R., & Deacon, S. H. (2010). The effects of morphological instruction on literacy skills: A systematic review of the literature. *Review of Educational Research*, 80(2), 144–179. <https://doi.org/10.3102/0034654310366686>
- Carlisle, J. F. (1995). Morphological awareness and early reading achievement. In L.B. Feldman (Ed.), *Morphological aspects of language processing* (pp. 189–209). Lawrence Erlbaum.
- Carlisle, J. F., & Katz, L. A. (2006). Effects of word and morpheme familiarity on reading of derived words. *Reading and Writing*, 19(7), 669–693. <https://doi.org/10.1007/s11145-005-5766-2>
- Kim, C. (2013). Vocabulary acquisition with affixation: Learning English words based on prefixes and suffixes. *Second Language Studies*, 31(2), 43–80.
- Ku, Y. M., & Anderson, R. C. (2003). Development of morphological awareness in Chinese and English. *Reading and Writing*, 16(5), 399–422. <https://doi.org/10.1023/A:1024227231216>
- Sukying, A., & Matwangsang, S. (2023). The Effects of Morphological Awareness on L2 Vocabulary Knowledge of Thai EFL Young Learners. *World Journal of English Language*, 13(2), 51–63. <https://doi.org/10.5430/wjel.v13n2p51>
- Zhang, D., & Koda, K. (2013). Morphological awareness and reading comprehension in a foreign language: A study of young Chinese EFL learners. *System*, 41(4), 901–913.
- Zheng, H. (2023). Morphological Awareness and Vocabulary Size among Chinese Tertiary ESL Learners in English-speaking Countries. In *Proceedings of the International Conference on Interdisciplinary Humanities and Communication Studies*. <https://doi.org/10.54254/2753-7064/3/20221028>

Appendices

Appendix A

Item-Level Accuracy per Word

This appendix presents item-level accuracy percentages for pre- and post-test performance across all proficiency groups.

Table A1

Item-Level Percentage Accuracy

Word	A1 Pre- Test (%)	A1 Post- Test (%)	A1 Gain (%)	A2 Pre- Test (%)	A2 Post- Test (%)	A2 Gain (%)	B1 Pre- Test (%)	B1 Post- Test (%)	B1 Gain (%)
unhappy	16.7	100	83.3	60	100	40	92.9	100	7.1
unlucky	0	100	100	40	100	60	100	100	0
unusual	0	83.3	83.3	60	100	40	100	92.9	-7.1
unkind	0	83.3	83.3	60	100	40	100	100	0
untidy	0	83.3	83.3	40	100	60	92.9	100	7.1
impatient	0	16.7	16.7	0	40	40	28.6	71.4	42.9
impossible	0	16.7	16.7	0	40	40	21.4	71.4	50
careful	16.7	83.3	66.7	20	100	80	85.7	100	14.3
hopeful	0	83.3	83.3	0	100	100	78.6	100	21.4
useful	0	66.7	66.7	0	80	80	85.7	100	14.3
...	...	...	...	...	...	...	...	...	...

Note. A shortened version is presented here; a complete version of the dataset is available from the author upon request.

Appendix B

Lexical Error Classification by Proficiency Level

This appendix summarizes the most common and most accurately used lexical items across the three proficiency levels (A1, A2, B1). The analysis highlights specific morphological structures that posed the greatest challenges before instruction and those that were most successfully mastered after instruction.

Table B1

Summary of Lexical Errors and Accurate Items

Level	Most Frequent Lexical Errors	Most Accurately Used Lexical Items
A1	<i>powerless, disagree, disappear, misunderstand, happiness</i>	<i>unhappy, unlucky, unusual, unkind, untidy</i>
A2	<i>misunderstand, possibility, improvement, achievement, announcement</i>	<i>unhappy, unlucky, unusual, unkind, untidy</i>
B1	<i>possibility, invisible, misunderstand, disobey, inactive</i>	<i>unhappy, unlucky, unkind, untidy, careful</i>

Note. Items classified as “Most Frequent Lexical Errors” were those with less than 20% accuracy on the pre-test, while “Most Accurately Used Lexical Items” exceeded 80% accuracy on the post-test. These patterns suggest that learners initially struggled with less frequent or morphologically opaque forms such as *dis-* and *mis-* prefixed words, while words containing the more transparent prefix *un-* were mastered more effectively after instruction.

The Important Role of Leadership in Creating Diversity, Equity, and Inclusion Plans in U.S. Higher Education

Beatriz DeSantiago-Fjelstad, Minnesota State University, United States

Leslie Darmofal, Minnesota State University, United States

Kelly Meier, Diversity, Minnesota State University, United States

Henry Morris, Minnesota State University, United States

Luis Posas, Minnesota State University, United States

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This brief discusses the challenges and strategies involved in creating Diversity, Equity, and Inclusion (DEI) plans in U.S. higher education institutions. It highlights the importance and critical role of leadership in this process, particularly the need for courageous leadership to overcome the barriers posed by the pushback, political resistance, and structural narratives to DEI plans. This brief illustrates the complexities of creating DEI plans and offers strategies to foster inclusive environments. The discussion emphasizes the need for a long-term commitment and actionable DEI plans beyond performative or symbolic steps, instilling confidence in the potential for significant and enduring institutional evolution.

Keywords: DEI, leadership, DEI plans, courageous leadership, pushback, equity-minded

iafor

The International Academic Forum

www.iafor.org

Introduction

Higher education has evolved in recent years, with diversity, equity, and inclusion (DEI) becoming pivotal across the United States as universities need to mirror the general populations of communities in the student body. However, amidst this push for inclusivity, there is often pushback against DEI plans. Many campuses recognize the value of a diverse student body, faculty, and staff, acknowledging that multiple perspectives enrich the academic experience. This trend reflects a commitment to social justice and a strategic response to prepare students for a globally interconnected world (Smith, 2018).

Despite the progress, universities face multiple challenges in developing and implementing DEI plans. One issue is that people of color are underrepresented, especially in faculty and leadership roles. Bridging these challenges requires a significant effort to eliminate barriers and create pathways for people from communities that have been marginalized to leadership roles (Williams, 2021).

DEI efforts are both external and internal. External challenges include legislative opposition and legal hurdles, as highlighted by Peralta (2024). Internal barriers within institutions, such as resistance to change, low levels of leadership commitment, and inadequate resources, impede the implementation of a successful DEI program. For instance, some faculty members may resist DEI plans due to concerns about changes in curriculum or teaching methods. In contrast, others may feel that their opportunities for advancement are threatened. As noted by Nwoga (2023), these internal barriers are often rooted in a lack of understanding or empathy for the experiences of marginalized groups.

Many university systems in the United States have demonstrated the need for other voices and accountability in pursuing DEI, as evidenced by their development and implementation of DEI plans. This requires a systematic focus over multiple years and the broader goal of a more equitable university community. Although work has been ongoing for decades, barriers must be addressed to move beyond conversation to action.

Embarking upon the development of an institutional DEI plan is critical. Engaging the campus community in data digging, assessment, and solution-oriented thinking encourages engagement in equity-minded work. A DEI plan is more than just a few goals that serve as performative practice. A DEI plan is a charted path to creating opportunities to close racial gaps and build an inclusive living, learning, and working environment. There are numerous benefits to a successful DEI plan. It can lead to a more diverse and vibrant academic community, enhance the learning experience for all students, and prepare them for a globalized workforce. In addition to cultivating buy-in for institutional community members, the planning process solidifies accountability and impels a culture shift. Long-term success hinges upon the understanding that a DEI plan is ongoing and leads everyone to a new way of approaching their work. For example, an academic department that sets enrollment and completion goals begins to understand that it will find new success if it uses an equity lens. As results are realized, so are new ways to approach equity-minded work.

Developing a DEI Plan

We explored the emergent themes from the literature review and our practices to illustrate standard approaches, focusing on leadership engagement, resistance to DEI initiatives, and the importance of courageous leadership.

Institutions discuss the desire for a demographically diverse employee and student group. However, the experiences of students and staff in historically underrepresented groups still show discrepancies in institutional positions of power and the inability to be included and heard in the planning and implementation of DEI change (Ovink & Murrell, 2022). Leadership that does not acknowledge the oppressive power of systems to maintain the status quo in higher education affects the ability of the institution to move beyond the surface rhetoric of DEI talk (Southern, 2024; Yi et al., 2022).

Leadership must intentionally set the tone of the university culture and induce change. Leaders must “walk the talk” by modeling inclusive behaviors, engaging in difficult conversations on equity and justice, and acknowledging their growth in DEI learning. This accountability sets an example, signaling that DEI is not only a professional commitment but a personal one for those in leadership positions. Leaders must understand how to reach equity goals to mobilize an institution (Ballard et al., 2020; Jacobs, 2023). Decision-making in moving DEI initiatives in the university system needs to be done more quickly. Leaders who are slow to make decisions may appear to impede progress and reverse the apparent avoidance or lack of commitment (MacKenzie et al., 2023).

Actionable outcomes for changing the institution's landscape require leadership to address and quantify results (Hinton & Lambert, 2022; Zheng, 2022). Committing to DEI means leadership must acknowledge the institution's need for improvement. Leaders who over-rely on metrics to track DEI discount how the institution's physical, social, and process environment, such as biases in hiring practices or procedures, influence the extent of change. An example is establishing measurable DEI goals that align with the university's mission and strategic plan. Include equity goals in student admissions and graduation rates, leadership representation, faculty and staff recruitment, campus climate improvement, and the enhancement of support services.

Leadership must robustly commit to DEI as essential to the institution and its mission to push actualized change (MacKenzie et al., 2023). Although the current financial landscape in many institutions is cost-reduction, DEI must be categorized as a non-negotiable requirement rather than a financial expenditure. Leadership must see DEI as part of the strategic vision for future students and employees to remain relevant in a global educational system (Hoffman & Mitchell, 2016).

The Pushback

Opposition to DEI has occurred at different levels and has come from various constituencies. The best-known and much-publicized anti-DEI stance occurred at the national level with the rejection of Affirmative Action, a decision associated with a political and ideological undertone (Peralta, 2024). These efforts emerged in opposition to the systemic corrective measures embedded in Affirmative Action legislation to ensure minority population access to opportunities in various institutional settings, including higher education. This anti-DEI stance advanced charges of unfairness and even reverse discrimination, particularly in the recruitment for employment and educational opportunities opened for participants from minority backgrounds.

As firmly documented, the establishment of DEI programming has the characteristic of being transformative and requires the actions of effective leadership (Gayle-Brissett, 2019; Martinez-Acosta & Favero, 2018). A practical institutional structural approach is required (MacKenzie

et al., 2023), and cultural symbolism is needed to support it (Yi et al., 2022). This means that DEI programming alone may not sufficiently assure the desired results for minority participation. Nwoga (2023) indicated that internal factors may work to create barriers in program implementation, and these involve the proposition of solutions before understanding the needs, detectable vulnerabilities in DEI planning, and flexibility in the organization's culture to absorb the changes. Similarly, MacKenzie et al. (2023) documented four forms of structural resistance to DEI programming: a) tactics to slow down planning implementation, b) pushback or questioning of planning methods, c) shutdown or halting of projects, and d) blowback tactics to stop the work.

Pushback to DEI initiatives should be expected to occur. Higher education institutions must run toward the challenge of embedding DEI work into the institution, regardless of pushback from internal and external constituents. When pushback occurs, the response must be data-driven and help those in opposition understand why an equity mindset is central to student success. Courageous leadership is the key to managing pushback to DEI initiatives. Leaders who are afraid of negative feedback will not successfully implement DEI strategies or any new change that transforms the institution's culture.

Courageous Leadership

Courageous leaders are authentic in their thinking and vulnerability. There is strength in being a humble leader and supporting the contribution of others whose lived experience or expertise can better address the more institutionally significant diversity needs. Leaders are vital in shifting institutional environments and prioritizing DEI in conducting all aspects of higher education (Martinez-Acosta & Favero, 2018). DEI strategies must include the surrounding community and the stakeholders of the environment and the culture to show the connection of initiatives that go beyond the institution's borders. For example, faculty can develop learning strategies that connect university curricula with local DEI challenges. Developing learning strategies that connect university curricula with local DEI challenges is imperative. For example, a public health course could collaborate with local health organizations to tackle health disparities in the community.

Leaders must be bold and courageous to move an entire institution with DEI-intentionality toward goals to change the institutional culture. Courage is required to address biases and enact change in small steps, one person at a time. Leadership requires demonstrating commitment to DEI and removing the power that stalls DEI change. Courageous leaders make their employees feel safe through active listening and showing their vulnerability. These leaders know who they are, and their presence motivates toward a shared purpose. Educational institutions must make employees and students feel safe and assured that the institution cares about them and their role in DEI.

A healthy higher educational institutional culture promotes DEI—leaders who recognize the value of differences as an asset foster inclusivity. Measurable goals must be flexible, and the leader must recognize that every division or department has its own DEI priorities. The DEI leader's flexibility is strengthened by being open to many paths to creating an inclusive environment.

Points of resistance will always be present. A courageous leader must address the points that resist moving DEI forward. It may be engaging with resisters and those who do not recognize they are resisting time, engagement, and listening to move forward collectively. It is the

humbleness and vision of the courageous leader to be able to take this on as a positive mechanism for the growth of DEI.

Actionable Recommendations for DEI Plans

To advance DEI planning on college campuses, we recommend: shift the culture, create an equity-minded ethos, engage leadership, abate resistance, and encourage courageous leadership.

Culture Shift

Moving toward equity actualization is a process that requires a culture shift. Exemplary institutions have been working toward this realization for many years. In 1998, The Chronicle of Higher Education featured a statement supported by more than 50 colleges and universities entitled “On the Importance of Diversity in Education.” A vital piece of this statement addresses why all require a conscious effort to implement diversity as a pillar of an equity-minded institution fully.

The diversity we seek and the nation's future do require that colleges and universities continue to be able to reach out and make a conscious effort to build healthy and diverse learning environments appropriate for their missions. The success of higher education and the strength of our democracy depends on it. (p. A48)

As the United States of America continues to diversify, it has become more critical for our higher education institutions to lead the way in diversity, equity, and inclusion. It is not just a moral imperative but a fiscal reality for the continued existence of institutions of higher learning. Political pressure from various constituent groups creates a delicate tug-of-war for college presidents. Highly evolved institutions will run toward discomfort. Senior administrators must be fearless and realize that healthy discord is essential to an engaged campus (Davis, 2002).

Courageous leadership is essential to the success of a successful diversity plan. In 2008, Adrianna Kezar wrote about the political landmines that presidents encounter as they work to implement diversity, equity, and inclusion. A president may feel the push from diverse affinity groups and, most often, from predominately White groups. Change connected to advancing diversity, equity, and inclusion requires tenacity to push ahead and a willingness to embrace challenging discussions. Kezar emphasized that presidents must spearhead advancing diversity, equity, and inclusion by creating allies, assessing the political tides, and expecting pushback. Resistance to change should not only be expected but embraced. The antidote requires data, a steadfast commitment to the cause, marketing, and developing transparent communication strategies.

Equity-Minded Ethos

A diversity plan requires a mission-centered focus on equity as the mindset for programs, policies, and practices. Diversity, Equity, and inclusion must be a part of the institution's fabric. Just as a rubric defines a course's learning objectives and assignments, leaders must use an equity rubric for all work that shapes institutional operations. Policy inventories allow leadership to use an equity lens to uncover hidden barriers that impede students' success from marginalized communities. Finally, data must be disseminated to academic departments to

allow faculty to understand opportunities to retool curriculum and practice that will lead to tremendous student success.

Historically, programs and practices related to diversity, equity, and inclusion have been the responsibility of a diversity office. To truly move the dial on creating a community of inclusion, DEI work must be embedded in all facets of the institution. Institutionalized diversity work should include the following:

1. Curriculum reform that incorporates a multicultural lens in all subject matters
2. Disaggregated data review of policies and practices to ensure that all students have equitable access
3. DEI training that is occupational-specific and meets the needs of every constituent
4. DEI audit that examines the campus's physical plant for accessibility obstacles
5. Climate studies should be scheduled regularly to showcase the positive movement in inclusive culture initiatives and uncover potential areas for improvement.

Leadership Commitment/Structure

The institution's leadership must be committed to creating and advancing the diversity plan. This begins with presidential leadership and the cabinet team, and it must be role-modeled by all decision-makers at the institution. A diversity plan should embody an equity-minded approach to all programs, policies, and practices. For example, a university president leads diversity plans throughout the institution by promoting equity dialogues, allocating resources for equity actions, and establishing equity frameworks. This commitment inspires other institution leaders and establishes diversity central to the university's mission and vision. Also, these leaders ensure that the diversity plan is a guiding force in every aspect of institutional practice.

A DEI plan must have institutional buy-in, which requires leadership and an infrastructure to steer the work. In addition to including the DEI in the cabinet, a DEI advisory group should be in place to provide guidance and recommendations to the president. Each academic college and division should have a DEI leader responsible for leading and supporting the work at the divisional level. This divisional leader should also sit on the Institutional DEI advisory group.

Structure.

A well-structured diversity plan should have overarching institutional and stretch goals. These goals are guideposts for developing diversity plans created at the divisional and departmental levels. The plan must foster an inclusive environment that aligns with an institution's broader mission, challenges the status quo, and pushes the boundaries to advance equity. Additionally, the plan must create a framework allowing each division to develop specific actions responding to the needs of each division.

Accountability and Shared Engagement

To effectively inform DEI planning, it is imperative to begin with a comprehensive climate study that includes all members of the institutional community. Additionally, it is essential to conduct focus groups to ascertain practical examples of areas of improvement and success. Other foundational assessment forms may include leadership meeting audits, mission reviews, policy inventories, and data disbursement to departments. Leadership meeting audits provide an opportunity to gauge how often DEI is discussed. To illustrate, a well-established and highly

supported DEI plan and its implementation requires a participatory, transparent process representative of the general institutional sentiment.

University Priorities

All institutionalized DEI planning must be data-informed. Each division and individual department should collect and use disaggregated data to inform all planning and practices. Data-informed equity work is student success work that will positively impact all students.

Institutions that do not have a bias reporting system should make this a high priority in DEI planning. Quantitative and qualitative data from bias reporting are critical to developing an inclusive living, learning, and working environment for all.

Challenge and Celebration

A successful diversity plan must include an ongoing assessment that invites challenge and celebration. The plan must keep pace with the community's evolution. Celebrating success is imperative and must be widely shared.

Successful implementation of an equity mindset requires both incentives and consequences. Employees must understand that they will be evaluated based on how they apply an equity lens to their work. Similarly, providing incentives for new equity-based initiatives or excelling in diversity, equity, and inclusion work will encourage the institution's transformation.

Conclusion

By exploring diversity, equity, and inclusion in U.S. universities, we seek transformative trends that signal progress and persistent issues that demand attention. As higher education stands at the intersection of societal change, creating genuinely inclusive environments is not merely an aspiration but a commitment to shaping the future of learning and fostering leaders equipped to navigate a diverse and interconnected world.

Despite political pressure to continue the norm of a White-centric approach, institutions of higher learning must serve as role models for promoting belonging and inclusion. We will evolve as a society of actualized minds and people by fostering an equity mindset.

References

- Ballard, D., Allen, B., Ashcraft, K., Ganesh, S., McLeod, P., & Zoller, H. (2020). When words do not matter: Identifying actions to effect diversity, equity, and inclusion in the academy. *Management Communication Quarterly*, 34(4), 590–616.
- Bauer-Wolf, J. (2024, January 8). *7 higher education trends to watch in 2024*. Education Dive. <https://www.highereddive.com/news/7-higher-education-trends-to-watch-in-2024/703769/>
- Davis, L. R. (2002). Racial diversity in higher education: Ingredients for success and failure. *The Journal of Applied Behavioral Science*, 38(2), 137–155.
- Gayle-Brissett, L. (2019). *Steering against the tide? Presidential leadership and diversity at Amherst College* [Doctoral dissertation, Amherst College]. <https://doi.org/10.7275/14167615>
- Hinton, A., & Lambert, W. M. (2022). Moving diversity, equity, and inclusion from opinion to evidence. *Cell Reports Medicine*, 3(4).
- Hoffman, G. D., & Mitchell, T. D. (2016). Making diversity “everyone's business”: A discourse analysis of institutional responses to student activism for equity and inclusion. *Journal of Diversity in Higher Education*, 9(3), 277.
- Jacobs, D. T. (2023). Why diversity, inclusion and equity initiatives in higher education really “DIE.” *Critical Education*, 14(3), 28–36.
- Kezar, A., Eckel, P., Conteras-McGavin, M., & Quaye, S. J. (2008). Creating a web of support: An important leadership strategy for advancing campus diversity. *Higher Education*, 55, 69–92. <https://doi.org/10.1007/s10734-007-9068-2>
- MacKenzie, M., Sensoy, Ö., Johnson, G. F., Sinclair, N., & Weldon, L. (2023). How universities gaslight EDI&I initiatives: Mapping institutional resistance to structural change. *International Journal of Education Policy and Leadership*, 19(1), 1–18.
- Martinez-Acosta, V. G., & Favero, C. B. (2018). A discussion of diversity and inclusivity at the institutional level: The need for a strategic plan. *Journal of Undergraduate Neuroscience Education*, 16(3), A252. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6153014/>
- Nwoga, A. (2023). Breaking the invisible wall: Barriers to DEI program implementation. *Open Journal of Business and Management*, 11(4), 1787–1815.
- On the importance of diversity in higher education*. (1998, February 13). *The Chronicle of Higher Education*, p. A48.
- Ovink, S. M., & Murrell, O. G. (2022). University diversity projects and the inclusivity challenge. *Socius*, 8, 23780231221136471.

- Peralta, P. (2024, March 7). *A people leader explains how to push past the 'antiDEI' narrative*. Employee Benefit News. <https://www.benefitnews.com/news/people-leader-from-fenton-shares-how-to-push-forward-with-dei-efforts>
- Smith, J. (2018). *The role of diversity in higher education: Promoting inclusion and equity across cultures*. Palgrave Macmillan.
- Southern, D. E. (2024, January 22). Whiteness and racialized emotions in leaders' planning and implementing equity in graduate education organizations. *Journal of Diversity in Higher Education*. Advance Online Publication. <https://dx.doi.org/10.1037/dhe0000547>
- Williams, R. (2021). *Leadership and diversity in higher education: Perspectives and approaches*. Routledge.
- Yi, V., LePeau, L., Chang, T. H., Museus, S. D., Mathew, S., Saelua, N., & Haywood, J. (2022). Symbols contested: An analysis of how symbols advance and hinder diversity, equity, and inclusion. *Journal of Diversity in Higher Education*, 17(4), 504–517. <https://doi.org/10.1037/dhe0000435>
- Zheng, L. (2022, December 1). *The failure of the DEI-industrial complex*. Harvard Business Review. <https://hbr.org/2022/12/the-failure-of-the-dei-industrial-complex>

Enhancing Thai Students' Coding and Creativity Through *Minecraft*-Based Game Learning: A Thematic Analysis of Student Reflections

Thanapat Sripan, Kasetsart University, Thailand
Komgrit Manyam, Kasetsart University, Thailand

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This study investigates how game-based learning (GBL) through *Minecraft: Education Edition* (*M:EE*) enhances coding and creative thinking among Thai primary school students. While prior research has often focused on quantitative outcomes or curriculum integration, this study emphasizes student voice by exploring learners' reflections on their experiences within a GBL environment. Drawing on the qualitative component of a larger mixed-methods project, the research analyzes written reflections from 284 Grade 4 students at a public laboratory school in Bangkok, Thailand, after completing an 8-week *M:EE*-integrated curriculum. Using thematic analysis, the study identifies three overarching themes: (1) students experienced coding as both challenging and enjoyable, particularly when visual feedback and in-game interactivity helped demystify abstract programming concepts; (2) students expressed a high degree of creative freedom through open-ended design tasks, taking ownership of their learning by building personalized digital artifacts; and (3) collaborative learning within the game environment contributed to increased digital confidence, teamwork skills, and peer-to-peer support. The findings highlight the potential of sandbox-based GBL platforms like *M:EE* to create learner-centered environments that support both technical and imaginative competencies. They also underscore the importance of reflective practices in understanding how students perceive and internalize coding and creative thinking processes. Implications are discussed for instructional design, teacher professional development, and the localization of educational technologies in non-English-speaking contexts. This research contributes to the growing literature on educational games by offering qualitative insight into the lived experiences of young learners navigating coding, creativity, and collaboration in digital spaces.

Keywords: *Minecraft: Education Edition*, game-based learning, student reflections, coding skills, creative thinking, thematic analysis

iafor

The International Academic Forum
www.iafor.org

Introduction

In today's rapidly evolving digital landscape, coding and creative thinking have emerged as foundational skills that are essential for success in both academic and professional contexts. In response, many educational systems—including Thailand's—have incorporated computational thinking into national curricula to better equip students for future challenges (IPST, 2018; Ministry of Education [MOE], 2023). However, traditional classroom instruction often struggles to engage students with abstract programming concepts, particularly among younger learners (Kafai & Burke, 2014).

Game-based learning (GBL) has gained attention as an effective pedagogical approach to foster student engagement and facilitate deeper learning. By integrating educational content with game mechanics, GBL promotes intrinsic motivation, critical thinking, collaboration, and problem-solving skills (Plass et al., 2015; Qian & Clark, 2016). Among GBL platforms, *Minecraft: Education Edition (M:EE)* stands out due to its open-ended, immersive environment that supports both technical and creative skill development (Alawajee & Delafield-Butt, 2021; Klimová et al., 2021).

M:EE has been adopted in various educational contexts to support subjects such as science, mathematics, and computer science. It is particularly effective in teaching coding and fostering creative thinking through sandbox-style gameplay that allows students to design, build, and collaborate in a virtual space (Bile, 2022; Sripan & Manyam, 2025). However, implementing *M:EE* in non-English-speaking contexts, such as Thailand, presents additional challenges—including language barriers and digital fluency—that can affect students' learning experiences and outcomes (Sripan & Manyam, 2025; Warschauer, 2003). Previous studies on *M:EE* have predominantly focused on measuring quantitative improvements in students' computational thinking or coding test scores. Yet fewer have explored how students reflect on their own learning processes in these environments—particularly in relation to their personal growth in creativity, collaboration, and digital confidence.

Research Gap

Although numerous studies confirm the effectiveness of *M:EE* in enhancing coding and creative skills, there remains a lack of in-depth, qualitative research exploring how students reflect on their learning experiences in game-based environments. In the Thai educational context, where *M:EE* is still relatively new, understanding students' subjective experiences is crucial for adapting pedagogical strategies and addressing contextual challenges. This study contributes to that gap by analyzing student reflections through a thematic lens to better understand how GBL via *M:EE* supports holistic skill development among primary school learners.

Objective

This study aims to address that gap by conducting a thematic analysis of student reflections from a large-scale implementation of *M:EE* in a Thai primary school. Through this qualitative lens, the research investigates how game-based learning impacts students' perceptions of coding, creativity, and collaborative learning.

Literature Review

Game-Based Learning and 21st Century Skills

Game-Based Learning (GBL) has become a widely adopted pedagogical approach aimed at increasing student motivation and engagement. Research shows that GBL can foster both cognitive and affective learning outcomes by embedding educational content in interactive, playful experiences (Plass et al., 2015). GBL has been shown to promote a range of essential 21st-century competencies, including critical thinking, problem-solving, collaboration, and digital literacy (Qian & Clark, 2016). The integration of game mechanics—such as rewards, progression, and instant feedback—encourages sustained engagement and enables learners to develop conceptual understanding through practice and iteration (Hamari et al., 2016).

Minecraft: Education Edition in Learning Contexts

Minecraft: Education Edition (M:EE), a classroom-adapted version of the popular sandbox game, has gained recognition as a powerful GBL tool. It offers open-ended gameplay and structured lesson templates designed to support subject-specific learning across disciplines such as science, history, mathematics, and computer science (Nebel et al., 2016). A growing body of research demonstrates *M:EE*'s effectiveness in enhancing student motivation and learning outcomes, particularly in STEM-related fields (Dezuanni, 2018; Klimová et al., 2021).

The unique features of *M:EE*—such as its Code Builder interface, collaborative multiplayer mode, and visual feedback system—allow students to engage with programming in intuitive and meaningful ways (Kafai & Burke, 2014). Several studies highlight *M:EE*'s role in developing computational thinking, as it allows students to explore coding concepts through design challenges and creative construction tasks (Bile, 2022; Kutay & Oner, 2022). Students benefit from experimenting within a low-stakes environment that emphasizes problem-solving, iteration, and self-expression.

Creative Thinking Through Sandbox Environments

Creative thinking, defined as the ability to generate novel and useful ideas, is increasingly seen as a core educational outcome (Sawyer, 2007). Digital sandbox games like *Minecraft* offer a fertile ground for developing this skill. By providing open-ended tasks, limited constraints, and opportunities for self-directed learning, *M:EE* encourages students to explore possibilities, take intellectual risks, and design innovative solutions (Clark & Ernst, 2020). Prior research has found that students engaged in *M:EE*-based activities often demonstrate increased originality, aesthetic awareness, and elaboration in their work (Alawajee & Delafield-Butt, 2021).

In collaborative settings, the platform also fosters social creativity by allowing students to co-create digital artifacts, share perspectives, and refine their designs through dialogue and negotiation. These activities reflect key elements of Vygotsky's (1978) social constructivist theory, which emphasizes the role of social interaction in cognitive development.

Student Reflections in Digital Learning Research

While many GBL studies focus on learning outcomes through test scores, less attention has been given to student reflections as a lens for evaluating learning experiences. Reflections provide valuable qualitative insight into learners' perceptions of their growth, challenges, and

preferences (Ryan, 2013). In GBL environments, reflections help capture affective dimensions of learning—such as enjoyment, confidence, and engagement—as well as metacognitive development. Sripan and Manyam (2025) conducted a large-scale implementation of *M:EE* in a Thai primary school and analyzed both performance data and students' written reflections. They found that students reported increased enjoyment in learning programming, enhanced creativity in designing virtual structures, and stronger collaboration skills. The authors emphasized the importance of examining student voice to improve instructional design and platform integration—particularly in non-English-speaking contexts, where language barriers and digital fluency may impact learner experiences.

Methodology

Research Design

This study employed a qualitative research design using thematic analysis to explore how game-based learning (GBL) through *Minecraft: Education Edition (M:EE)* influences students' perceptions of coding and creative thinking. The research focused on analyzing students' written reflections after participating in an 8-week learning program that integrated *M:EE* into the computer science curriculum. Thematic analysis was chosen for its ability to identify, analyze, and report recurring patterns of meaning within qualitative data (Braun & Clarke, 2006).

Research Context and Participants

The study was conducted at Kasetsart University Laboratory School Center for Educational Research and Development, a public demonstration school in Bangkok, Thailand. A total of 284 fourth-grade students (aged 9–10) participated in the research during the second semester of the 2023 academic year. All students had previously been introduced to basic coding concepts through Scratch but had no prior experience with *Minecraft: Education Edition*.

Students participated in an 8-week *M:EE*-integrated curriculum designed to enhance coding and creative thinking skills. Throughout the course, students engaged in activities such as block-based programming, problem-solving tasks, and creative digital design projects. Written reflections were collected at the end of the program to gain insight into students' learning experiences.

Data Collection

The primary data source for this study consisted of students' written responses to an open-ended reflection questionnaire administered at the end of the 8-week program. The reflection prompt asked students to describe what they had learned, what challenges they faced, and what aspects they enjoyed or found meaningful. In total, 654 individual reflections were collected from the 284 participating students.

The reflection activity was conducted in a classroom setting, with students given 20–30 minutes to respond. Responses were written in Thai and later translated into English for analysis. To preserve the authenticity of student voice, translations were carefully verified by bilingual researchers with expertise in educational technology.

Data Analysis

The data were analyzed using the six-phase framework for thematic analysis proposed by Braun and Clarke (2006):

1. Familiarization with the data: Researchers read and re-read the translated reflections to gain an initial understanding of the content.
2. Generating initial codes: Significant features of the data were systematically coded using QDA Miner Lite, a qualitative data analysis software.
3. Searching for themes: Codes were grouped into potential themes that captured patterns across the dataset.
4. Reviewing themes: Emerging themes were refined to ensure coherence and consistency with the coded extracts and the overall data.
5. Defining and naming themes: Each theme was clearly defined to capture its essence and relevance to the research questions.
6. Producing the report: The final themes were supported with illustrative student quotes and interpreted in relation to the literature.

Throughout the process, multiple rounds of coding and discussion were conducted among the research team to ensure analytical rigor, reduce bias, and enhance trustworthiness. Reflexivity was maintained through journaling and memoing, and discrepancies in interpretation were resolved through collaborative deliberation.

Trustworthiness and Ethical Considerations

To ensure the trustworthiness of the study, the following strategies were employed:

- Credibility: Data triangulation was achieved by comparing findings across multiple classrooms. Member checking was conducted by consulting participating teachers regarding the interpretation of themes.
- Transferability: Thick descriptions of the research context and participant demographics were provided to allow readers to assess the applicability of findings in other contexts.
- Dependability and Confirmability: An audit trail of the coding process, theme development, and analytic memos was maintained.

This research was approved by the Research Ethics Committee of Kasetsart University (Protocol ID: COE66/100). Informed consent was obtained from students and their legal guardians. All student data were anonymized and stored securely in accordance with ethical research standards.

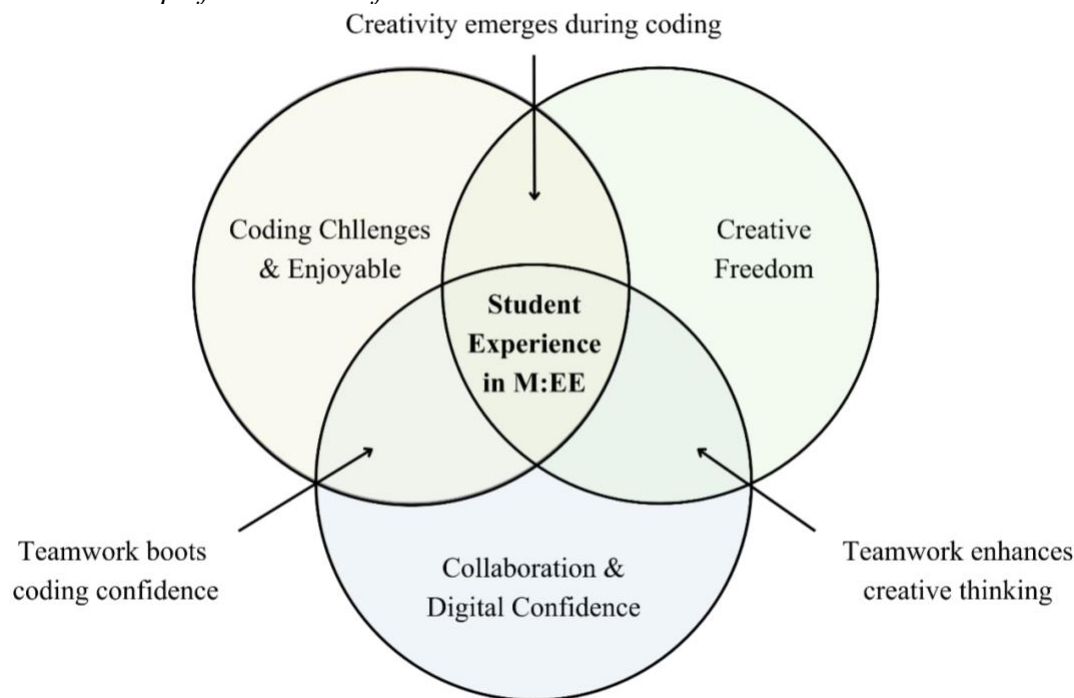
Findings

Thematic analysis of 654 student reflections revealed three major themes that captured the essence of students' experiences while learning through *Minecraft: Education Edition (M:EE)*: (1) Coding is Challenging but Enjoyable, (2) Creative Freedom in a Virtual World, and (3) Collaboration and Digital Confidence. Each theme highlights how game-based learning shaped students' perceptions of coding, creativity, and teamwork. Table 1 summarizes the thematic structure and Figure 1 presents a conceptual map of the findings.

Table 1*Summary of Identified Themes and Descriptions*

Theme No.	Theme Title	Description
1	Coding is Challenging but Enjoyable	Students found coding difficult at times but enjoyed the game-like environment and feedback.
2	Creative Freedom in a Virtual World	<i>M:EE</i> allowed students to freely design imaginative creations, fostering creative expression.
3	Collaboration and Digital Confidence	Students gained teamwork skills and became more confident using digital tools.

Table 1 summarizes the three key themes identified from students' reflections. Each theme represents a distinct dimension of their learning experience with *Minecraft: Education Edition* (*M:EE*), including perceptions of coding, creativity, and collaboration. The descriptions highlight how learners navigated challenges, expressed creativity, and developed confidence through teamwork and digital interaction.

Figure 1*Thematic Map of Students' Reflections*

This Venn diagram illustrates the three overarching themes identified from students' reflections—Coding Challenges & Enjoyable, Creative Freedom, and Collaboration & Digital Confidence. The intersections reveal how these themes interact to shape student experience in *M:EE*. For example, creativity often emerges during coding, while teamwork contributes to both digital confidence and creative thinking. The central overlap highlights the holistic nature of learning in a game-based environment, where technical, imaginative, and social skills are developed simultaneously.

Theme 1: Coding is Challenging but Enjoyable

Students widely reported that coding was both difficult and enjoyable. Many had never used coding commands in English, and found syntax confusing. However, the game-based format of *M:EE* helped reduce frustration by offering immediate feedback and visual cues.

“Sometimes I didn’t know what the code meant, but when I saw the Agent move, I felt excited and wanted to try again.” (*Student A*)

Despite struggling, students valued the problem-solving process and enjoyed seeing their code translated into real-time actions in the game world.

“At first I didn’t understand, but I clicked around and suddenly the Agent did what I wanted—then I felt like a coder!” (*Student B*)

Theme 2: Creative Freedom in a Virtual World

M:EE’s sandbox environment encouraged students to express their imagination freely. Students described designing houses, landscapes, and environments that reflected personal ideas—some even modeled structures after dream homes or fantasy settings.

“I made a three-story house with a sky garden and a secret lava trap inside. It was something I could never build in real life!” (*Student C*)

The open-ended tasks allowed students to experiment without fear of failure, which is a core component of creative development. Students also mentioned feeling proud of their unique creations, often elaborating on small details such as lighting, color patterns, and logic-based doors.

Table 2

Student-Created Objects in Creative Projects (Selected Examples)

Object Designed	Student’s Description	Creativity Indicators
Floating pink castle	“Made from glass blocks with rainbow roof and garden”	Novelty, color use, imagination
Underwater aquarium house	“Fish can swim through the living room”	Integration of biology and art
Roller coaster with traps	“Used redstone to make a loop-de-loop trap!”	Technical innovation, logic

This table presents selected examples of student-designed digital objects created during the final project phase. Each creation reflects how learners applied imagination, design logic, and interdisciplinary thinking through the sandbox environment of *Minecraft: Education Edition* (*M:EE*). The student descriptions illustrate their sense of ownership and engagement with the platform. These examples also reveal diverse creative strategies—ranging from aesthetic design to technical problem-solving—emerging through play-based learning.

Figure 2*Examples of Students' Work*

Examples of Students' Work: These screenshots display student-designed virtual structures created during the final project phase of the *M:EE*-integrated curriculum. The designs reflect individual creativity, spatial reasoning, and collaborative problem-solving. Projects ranged from modern architecture to recreational zones, showcasing diverse interpretations of design goals.

Theme 3: Collaboration and Digital Confidence

A majority of students reflected on how they learned from their peers during group projects. The collaborative mode in *M:EE* facilitated teamwork, communication, and task delegation. Students reported sharing knowledge—especially in areas like using commands, building structures, and fixing bugs.

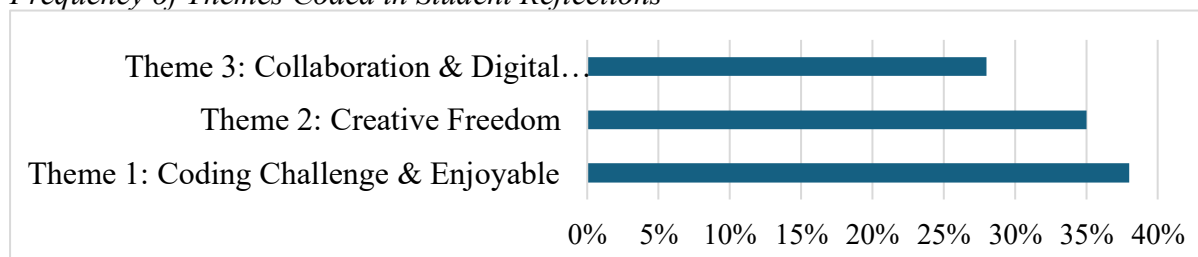
“My friend helped me with the code when I got stuck, and I helped him design the garden. It felt good to build something together.” (*Student D*)

Furthermore, many students mentioned how they felt more confident using a mouse, keyboard, and game interfaces after the project.

“I didn’t know how to play *Minecraft* before, but now I can use the keyboard easily and even help my little brother at home.” (*Student E*)

Summary of Findings

Figure 3 illustrates a breakdown of student reflection frequencies by theme. Coding-related experiences were most frequently mentioned, followed by creativity and collaboration, highlighting students’ engagement with both technical and social aspects of learning in *M:EE*.

Figure 3*Frequency of Themes Coded in Student Reflections*

Interpretation

Together, these themes reveal that *M:EE* supports a learner-centered digital environment where challenges are mitigated by motivation, creative self-expression is empowered, and collaborative digital skills are strengthened. The reflections suggest that when coding is embedded in an engaging, flexible, and socially interactive platform, students are more likely to persist, experiment, and thrive.

Discussion

The findings of this study demonstrate that *Minecraft: Education Edition (M:EE)*, as a game-based learning (GBL) platform, effectively supports Thai primary students in developing both technical and creative skills. Through thematic analysis of 654 student reflections, three key areas emerged: the dual nature of coding as challenging yet enjoyable, the empowering effect of creative freedom in sandbox environments, and the growth of collaboration and digital confidence. These themes align closely with prior research on GBL and reinforce theoretical perspectives in constructivist and experiential learning.

Coding Engagement Through Playful Challenge

Students consistently described coding as both “difficult” and “fun,” suggesting that *M:EE* successfully transformed an abstract, often intimidating subject into an accessible and motivating experience. This supports earlier findings by Kafai and Burke (2014), who emphasized that playful programming environments reduce cognitive load and increase persistence in problem-solving.

M:EE’s immediate visual feedback and intuitive interface allowed students to explore trial-and-error approaches, aligning with Kolb’s (1984) experiential learning model, where learners actively construct knowledge through reflection on action. Although some students struggled with debugging tasks or English-based commands—a challenge also noted by Sripan and Manyam (2025)—the overall tone of reflections suggests that these struggles were framed as learning opportunities rather than barriers.

Creativity as Empowered Expression

The second theme underscores the transformative role of sandbox-based game environments in cultivating creativity. Students designed elaborate digital artifacts—such as sky gardens, underwater homes, and fantasy castles—that reflected not only imagination but also strategic thinking and self-expression. These findings echo studies by Clark and Ernst (2020) and Alawajee and Delafield-Butt (2021), which highlight how open-ended design tasks foster creative exploration and intrinsic motivation.

By removing rigid constraints often found in traditional classrooms, *M:EE* allowed students to take intellectual risks and iterate on ideas without fear of failure. This aligns with Amabile’s (1983) theory of intrinsic motivation in creativity and validates the use of GBL environments to promote divergent thinking, aesthetic expression, and playful experimentation in young learners.

Collaboration and Digital Fluency

The third theme points to important gains in soft skills. Students reported learning from their peers, sharing strategies, and negotiating roles in group projects. These experiences reflect Vygotsky's (1978) concept of the Zone of Proximal Development (ZPD), in which learners develop new capabilities through social interaction and guided participation.

The cooperative nature of *M:EE* supports Sawyer's (2007) idea of "group genius," where creativity emerges through collaboration. Additionally, the repeated mentions of increased digital confidence—such as improved mouse/keyboard skills or navigating interfaces—highlight the role of GBL in bridging the digital skills gap among young learners. This is particularly relevant in Thailand, where concerns about equitable access and digital literacy remain (Warschauer, 2003).

Addressing Limitations

While the positive impacts of *M:EE* are clear, challenges remain. Some students noted issues with platform bugs, login errors, or difficulty understanding English-based coding syntax. These findings align with previous studies (e.g., Sripan & Manyam, 2025) and suggest the need for more localized versions of *M:EE* or culturally adapted lesson materials.

Moreover, students showed varied preferences for task difficulty—some requested simpler tasks, while others desired more complexity. This supports the need for differentiated instruction and adaptive task design in GBL environments, as suggested by Plass et al. (2015).

Contribution to Literature

This study contributes to the growing body of research on GBL by emphasizing student voice. While much of the literature on *M:EE* focuses on learning outcomes measured through tests or observations, this research foregrounds how students feel and reflect on their learning. It provides qualitative evidence that GBL environments like *M:EE* can simultaneously develop technical, creative, and interpersonal skills—particularly when designed with intentional scaffolding and space for reflection.

Conclusion and Implications

This study explored how game-based learning (GBL) through *Minecraft: Education Edition* (*M:EE*) enhances coding and creative thinking among Thai fourth-grade students. By conducting a thematic analysis of 654 student reflections gathered after an 8-week *M:EE*-integrated curriculum, the research uncovered rich qualitative insights into how students experienced learning through play, collaboration, and digital design.

Three key themes emerged: students perceived coding as challenging but rewarding, valued the creative freedom offered by *M:EE*, and gained confidence in their digital and collaborative skills. These findings support existing literature on the benefits of GBL in promoting motivation, creativity, and problem-solving (Clark & Ernst, 2020; Plass et al., 2015). More importantly, the study emphasizes the power of student voice in shaping educational innovation—particularly in contexts where language, access, and digital fluency remain barriers.

Practical Implications for Educators

The results suggest that educators should consider integrating sandbox-based GBL tools like *M:EE* into the elementary computing curriculum, particularly to:

1. Enhance engagement in coding: Embedding coding tasks in meaningful, gamified contexts increases students' willingness to persist through difficulty.
2. Promote creativity: Open-ended building tasks foster divergent thinking and allow students to apply coding for imaginative purposes.
3. Build soft skills: Digital confidence, collaboration, and communication emerged naturally through team-based activities in *M:EE*.

Teachers can leverage reflection activities—not only as assessment tools but also as instruments for encouraging metacognitive awareness. Additionally, scaffolding in areas such as basic computer skills and vocabulary can help students navigate technical challenges more effectively.

Policy Recommendations

At a policy level, this study supports the growing call for technology-enhanced learning environments in Thai education. The following recommendations are proposed:

1. Curriculum designers should integrate GBL platforms like *M:EE* in computational thinking frameworks, aligned with the Ministry of Education's digital literacy goals (MOE, 2023).
2. Educational authorities should invest in teacher training to ensure educators are equipped to design, implement, and assess GBL effectively.
3. Platform developers should prioritize localization features, including multilingual support and culturally relevant content, to broaden access and reduce learning barriers.

Future Research Directions

While this study sheds light on how students perceive learning through *M:EE*, further research is needed to deepen understanding and expand applicability:

1. Longitudinal studies could examine the sustained impact of GBL on students' coding proficiency and creative development over time.
2. Comparative studies might evaluate *M:EE* against other GBL tools or traditional instruction to assess relative effectiveness.
3. Teacher perspectives could be explored to understand how educators adapt their pedagogy in response to student feedback and engagement in GBL settings.
4. Equity-focused research is also needed to assess how GBL impacts learners from different socioeconomic and language backgrounds.

In conclusion, *Minecraft: Education Edition* offers more than just a playful approach to coding—it provides a meaningful, learner-centered space where students can take ownership of their learning journeys. By listening closely to student reflections, educators and policymakers can better understand how to design digital learning environments that are not only technically effective, but also personally transformative.

References

- Alawajee, O., & Delafield-Butt, J. (2021). Minecraft in education benefits learning and social engagement. *International Journal of Game-Based Learning*, 11(4), 19–56. <https://doi.org/10.4018/IJGBL.2021100102>
- Amabile, T. M. (1983). *The social psychology of creativity*. Springer-Verlag.
- Bile, A. (2022). Development of intellectual and scientific abilities through game-programming in Minecraft. *Education and Information Technologies*, 27, 7241–7256. <https://doi.org/10.1007/s10639-022-10894-z>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Clark, A. C., & Ernst, J. V. (2020). The impact of Minecraft on creativity: A systematic review. *Educational Technology Research and Development*, 68(3), 935–962. <https://doi.org/10.1007/s11423-020-09758-z>
- Dezuanni, M. (2018). Minecraft and children’s digital making: Implications for media literacy education. *Learning, Media and Technology*, 43(3), 236–249. <https://doi.org/10.108/17439884.2018.1472607>
- Hamari, J., Shernoff, D. J., Rowe, E., Coller, B., Asbell-Clarke, J., & Edwards, T. (2016). Challenging games help students learn: An empirical study on engagement, flow, and immersion in game-based learning. *Computers in Human Behavior*, 54, 170–179. <https://doi.org/10.1016/j.chb.2015.07.045>
- Institute for the Promotion of Teaching Science and Technology. (2018). *Wittayakan kamnuan* [Computing science teacher’s guide]. Institute for the Promotion of Teaching Science and Technology.
- Kafai, Y. B., & Burke, Q. (2014). *Connected code: Why children need to learn programming*. MIT Press. <https://doi.org/10.7551/mitpress/9992.001.0001>
- Klimová, N., Šajben, J., & Lovászová, G. (2021). Online game-based learning through Minecraft: Education Edition programming contest. In *2021 IEEE Global Engineering Education Conference (EDUCON)* (pp. 1660–1668). IEEE. <https://doi.org/10.1109/EDUCON46332.2021.9453953>
- Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice-Hall.
- Kutay, E., & Oner, D. (2022). Coding with Minecraft: The development of middle school students’ computational thinking. *ACM Transactions on Computing Education*, 22(2), Article 21. <https://doi.org/10.1145/3471573>
- Ministry of Education. (2023). *Phalang haeng coding* [The power of coding]. Office of the Basic Education Commission.

- Nebel, S., Schneider, S., & Rey, G. D. (2016). Mining learning and crafting scientific experiments: A literature review on the use of Minecraft in education and research. *Educational Technology & Society*, 19(2), 355–366.
<http://www.jstor.org/stable/jeductechsoci.19.2.355>
- Plass, J. L., Homer, B. D., & Kinzer, C. K. (2015). Foundations of game-based learning. *Educational Psychologist*, 50(4), 258–283.
<https://doi.org/10.1080/00461520.2015.1122533>
- Qian, M., & Clark, K. R. (2016). Game-based learning and 21st century skills: A review of recent research. *Computers in Human Behavior*, 63, 50–58.
<https://doi.org/10.1016/j.chb.2016.05.023>
- Ryan, M. (2013). The pedagogical balancing act: Teaching reflection in higher education. *Teaching in Higher Education*, 18(2), 144–155.
<https://doi.org/10.1080/13562517.2012.694104>
- Sawyer, R. K. (2007). *Group genius: The creative power of collaboration*. Basic Books.
- Sripan, T., & Manyam, K. (2025). Gamified learning: Teaching coding and creative thinking with Minecraft: Education Edition (M:EE) for Thai students. *Journal of Education and Learning*, 14(4), 270–283. <https://doi.org/10.5539/jel.v14n4p270>
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.
- Warschauer, M. (2003). *Technology and social inclusion: Rethinking the digital divide*. MIT Press. <https://doi.org/10.7551/mitpress/6699.001.0001>

Contact email: thanapat.srip@ku.th

Navigating Experiential Learning: A Case Study of Adult Learners in the APEL Q Assessment Process

Jennifer Tan, HELP University, Malaysia

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

There are many pathways for working adults to return to school to continue to pursue formal academic degrees; one such program is the Accreditation of Prior Experiential Learning for Qualifications (APEL Q) which assesses adult learners based on their experiential knowledge rather than traditional coursework. Some distinct characteristics of this program, unlike other conventional ones, include no classes to take, no lecturers to refer to and no peers to share the learning journey with. This program thus opens a different pathway to academia and provides opportunities to those who can work independently. For APEL Q, assessments comprise 4 assessment instruments – a portfolio, workplace visits, a challenge test comprising five essays, and a capstone research paper to meet program learning outcomes. Grounded in Kolb's Experiential Learning Theory and Mezirow's Transformative Learning Theory, this qualitative case study investigates 3 adult learners' strategies, challenges, and adaptations in navigating the program as they work towards completing the 4 main assessment instruments. Data collection includes in-depth interviews and document analysis of communication. Thematic analysis is employed to identify key patterns in learning experiences. Findings show that adult learners leverage on their prior knowledge and lived experiences when they engage with competency-based assessments. Additionally, they face personal and work-related challenges while demonstrating their learning.

Keywords: APEL Q, adult learning, experiential learning, transformative learning

iafor

The International Academic Forum
www.iafor.org

Introduction

The recognition of experiential learning has recently become increasingly popular in higher education, particularly for adult learners with extensive professional experience and seek academic credentials but may not be able to enrol due to lack in specific criteria for enrolment. In Malaysia, the Accreditation of Prior Experiential Learning for Qualification (APEL Q), introduced by the Malaysian Qualifications Agency, provides an alternative pathway for individuals to obtain academic qualifications based on prior learning and this has opened doors for many adult learners to continue pursuit further education.

The Master of Education (Teaching and Learning) programme at a Malaysian private higher education institution offers adult learners two pathways to degree completion: a conventional route and the APEL Q pathway. While the former route follows a weekend, on-campus modular format, requiring students to attend classes and complete 11 modules, the APEL Q pathway is tailored for experienced adult learners with a minimum of 20 years of relevant professional experience. Instead of attending formal classes, learners complete four assessment instruments: a portfolio, a field validation visit, a challenge test, and a capstone project. Each learner is supported by an academic advisor who provides ongoing guidance, while the assessment process is overseen by two assessors (internal and external) and a moderator to ensure validity and reliability. This pathway eliminates the need for the conventional coursework and physical attendance and instead emphasises assessment-driven learning supported by an academic team of four.

This study explores how adult learners navigate this pathway. It addresses three research questions:

1. What strategies do learners use when attempting the assessment instruments?
2. What challenges do they face during the process?
3. How do they adapt their learning approaches to meet the programme requirements?

Theoretical Framework

Data derived from this study will be analysed through two theories; Kolb's Experiential Learning Theory (2014) which conceptualises learning as a cyclical process involving four stages: concrete experience, reflective observation, abstract conceptualisation, and active experimentation and Mezirow's Transformative Learning Theory (2000) which emphasises critical reflection and the transformation of meaning perspectives. Through reflective processes, learners reassess their assumptions, leading to shifts in their understanding and professional practice. Together, these two theories provide a structured framework to examine how adult learners adapt experiential knowledge into their academic learning and in that duration of study, undergo personal transformation in areas of their lives.

Methodology

This study adopts a qualitative narrative inquiry approach, focusing on participants lived experiences and personal meaning-making processes. Narrative inquiry is preferred for this study because it focusses on understanding individuals lived experiences through storytelling. This approach was particularly suited to capturing the transformative learning journeys of adult learners, as it allowed the researcher to explore the personal narratives of the participants in depth. Data were collected through lengthy interview sessions lasting over 2 hours per session. Pre interview questions were sent in advance to pre-empt the participants on the discussion

topics. Besides the interviews, emails and other forms of written communication were included for trustworthiness of findings.

Participants

Three female adult learners in their mid-50s participated in the study. All were experienced educators; Kris is the owner of a childcare centre, Teng is a Mathematics teacher who has been teaching for more than 30 years and Amy wears many hats; teacher, principal and school administrator. Each participant has substantial professional experience prior to enrolment in the programme.

Findings

Strategies Used by Learners

Participants employed several strategies in completing the assessment instruments. The first strategy was to methodically chart their prior experiences to the programme learning outcomes. This involved analysing and understanding the required competencies and aligning them with professional practice and experiences which demonstrate structured organisation of experiential knowledge. Second, participants engaged in extensive evidence gathering. They searched for previous documentation such as reports, certificates, and teaching materials to substantiate their claims, some of these documents dated more than 20 years ago. Third, they integrated theory with practice, particularly in the challenge tests. Participants actively sought theoretical frameworks to support their experiential knowledge. Finally, participants applied newly acquired knowledge in their professional contexts, for example, new strategies to try out in class, indicating the relevance of learning to practice.

Challenges Encountered

Participants faced several challenges throughout the process of completing the 4 instruments. The main challenge according to all was the lack of documentary evidence because of the long lapse of time. Despite extensive experience, participants struggled to locate sufficient proof of their prior learning. Time constraints were another significant challenge, as participants balanced professional and personal responsibilities with academic demands. Academic challenges also emerged, particularly in relation to unfamiliar skills such as academic writing, theoretical engagement and content knowledge. Finally, but not surprisingly, participants reported emotional and physical strain, highlighting the intensity of the assessment process and their own work and personal commitments.

Adaptations in Learning

Participants adapted their learning approaches in several ways. Reflective learning became central, particularly in portfolio development. Participants revisited their professional experiences, leading to deeper understanding and appreciation of their work. They also demonstrated strong self-directed learning, independently sourcing materials, exploring theories, and developing strategies to complete tasks. An additional “bonus” was how the participants developed new digital and research skills, reflecting the demands of the programme and their growing academic competence, as one aptly puts it “*I didn’t even know how to use PowerPoints before.*”

Discussion

The findings align closely with Kolb's experiential learning cycle. Participants began with concrete experiences derived from their professional backgrounds, along their academic journeys, through reflective observation, they were able to analyse these experiences, particularly during portfolio preparation where they discovered they had *“done so much and accomplished a lot”* and *“I never knew my travelling and interest in art and music could contribute to my portfolio even.”* This led to abstract conceptualisation, where they connected experience with theory as they had to complete their essays and relate pedagogy with educational theories. Finally, through active experimentation, they applied new knowledge in their professional contexts.

From Mezirow's Transformative Learning, participants experienced changes in their perspectives, particularly towards themselves and their own capabilities; in the beginning, all three experienced uncertainty and were very overwhelmed, however, they gradually developed confidence and academic capability. As they reflected on their journeys, they re-evaluated their assumptions and reinterpreted their experiences as valid academic knowledge and that they *“actually know more than I thought I did in the beginning of this program.”*

Conclusion

This study demonstrates that adult learners in the APEL Q pathway engage in a dynamic process of learning that integrates experience, reflection, and transformation. Through strategic approaches, reflective practices, and self-directed learning, participants successfully navigated the assessment process.

The findings underscore the transformative potential of higher education for adult learners, not only in terms of academic achievement but also in reshaping professional identity and confidence. As a result, several implications for practice are to be taken into account; firstly, adult education programmes should provide flexible learning pathways that recognise experiential knowledge, secondly, some form of structured academic support is essential, particularly in writing and research skills and finally, emotional and professional support systems should be taken into account and made available.

Acknowledgements

I would like to acknowledge the support of HELP University, Malaysia, in funding this study through the HELP University Internal Research Grant Scheme [IRGS 25-09-008].

References

Kolb, D. A. (2014). *Experiential learning: Experience as the source of learning and development* (2nd ed.). Pearson.

Mezirow, J. (2000). *Learning as transformation: Critical perspectives on a theory in progress*. Wiley.

Contact email: jennifer.tan@help.edu.my

The Young Botanists Club: A Model for Blending Science, Life Skills, and Joyful Learning

Komgrit Manyam, Kasetsart University, Thailand
Kanitta Pinngoen, Kasetsart University, Thailand

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This study explores the design and implementation of weekly extracurricular activities conducted by the Young Botanists Club in a laboratory school setting. Conducted twice a week after school, the program integrates botanical knowledge with interdisciplinary learning experiences, including cooking, digital technology, home economics, creative arts, and entrepreneurship. Activities were thematically diverse and tailored to students' interests, school priorities, and relevant and contemporary issues. The research employed student and parent questionnaires alongside in-depth interviews to investigate participants' perceptions and experiences. Results revealed that elementary school students particularly valued cooking-related activities, citing enjoyment, experimentation, and the tangible outcome of their efforts. These experiences not only enhanced practical skills but also offered potential vocational relevance. Moreover, students consistently reported that the varied nature of each session fostered continuous engagement, personal development, and new social connections. The presence of expert guest speakers further enriched the learning process. Overall, the Young Botanists Club effectively bridged scientific concepts with everyday life, offering an exemplary model for holistic, interest-driven education that cultivates both knowledge and essential life skills

Keywords: extracurricular learning, interdisciplinary education, primary school students, experiential learning, student engagement

iafor

The International Academic Forum
www.iafor.org

Introduction

In recent years, education has increasingly emphasized the development of learners who possess not only academic knowledge but also essential life skills, adaptability, and lifelong learning abilities. Traditional classroom instruction alone is often insufficient to address these complex demands, particularly at the primary level where holistic development is crucial. Therefore, educational approaches that integrate cognitive, social, and emotional dimensions have become increasingly important. Research suggests that meaningful learning experiences should connect knowledge with real-life contexts and support the overall development of learners (Darling-Hammond et al., 2020). As a result, schools are encouraged to design learning environments that extend beyond conventional classroom settings.

Contemporary education also highlights the importance of active and student-centered learning approaches that encourage participation and real-world application. Such approaches enable students to engage more deeply with content and develop transferable skills necessary for the 21st century. Global educational perspectives emphasize competency-based learning, where knowledge, skills, and values are integrated to prepare students for future challenges (OECD, 2020). Learning environments that promote hands-on activities and real-life connections are therefore essential in fostering meaningful and effective learning experiences.

Student engagement is widely recognized as a critical factor influencing learning outcomes. Engaged students are more likely to participate actively, demonstrate persistence, and achieve better academic performance. Engagement is shaped by the relevance and diversity of learning activities, as well as the extent to which students find the learning process meaningful. Recent studies indicate that engagement is a multidimensional construct that includes behavioral, emotional, and cognitive components (Fredricks et al., 2011). Furthermore, the development of students' interest plays a significant role in sustaining long-term engagement and motivation in learning. According to the four-phase model of interest development, learners gradually develop interest through structured and meaningful experiences. These findings emphasize the importance of designing student-centered learning experiences that align with learners' interests and needs.

In response to these perspectives, the Young Botanists Club was developed as an extracurricular program that integrates botanical knowledge with student-centered and real-world learning experiences in a laboratory school context. The program provides primary school students with opportunities to engage in a variety of hands-on activities, such as cooking, digital technology, creative arts, and entrepreneurship, all of which are connected to real-life applications. By linking scientific concepts with everyday experiences, the program aims to promote both academic understanding and essential life skills. Therefore, this study aims to explore the design and implementation of the program and to examine students' and parents' perceptions of its outcomes. The findings are expected to contribute to the development of effective models for holistic, interest-driven education.

Research Objectives

This study aims to examine the design and implementation of extracurricular activities conducted by the Young Botanists Club to ensure they are engaging, enjoyable, and beneficial for primary school students. It focuses on integrating interdisciplinary and experiential learning within a laboratory school context, connecting students' interests with real-life applications. The study also proposes a model for organizing activities that promote engagement and holistic

development. It seeks to answer how activities should be designed to be engaging and beneficial, and what outcomes they produce for students.

Literature Review

Botanical Learning and the School Botanical Garden Concept (Rewritten)

Botanical learning plays a significant role in enhancing students' understanding of plant science, environmental awareness, and sustainable living. In primary education, learning about plants extends beyond theoretical knowledge to include hands-on experiences that enable students to connect scientific concepts with real-life contexts. School botanical gardens are widely recognized as effective learning environments that support inquiry-based and student-centered learning. These spaces provide opportunities for students to observe plant growth, explore biodiversity, and develop responsibility through direct interaction with nature. Previous studies have shown that garden-based learning can improve students' scientific understanding, environmental awareness, and practical skills (Ohly et al., 2016; Soga et al., 2017). In addition, such environments promote interdisciplinary integration by linking science with other subjects, including art, health, and social studies. Therefore, botanical learning combined with the school botanical garden concept offers a meaningful approach to fostering holistic and sustainable education.

Extracurricular Activities and Holistic Student Development

Extracurricular activities play a crucial role in promoting holistic student development beyond academic achievement. These activities provide opportunities for students to develop social, emotional, and practical skills through active participation in diverse learning experiences. Research indicates that participation in extracurricular programs is associated with improved academic performance, enhanced self-confidence, and stronger interpersonal skills (Eccles & Barber, 1999; Fredricks & Eccles, 2019). Moreover, such activities encourage collaboration, responsibility, and leadership, which are essential competencies for lifelong learning. Holistic development is further supported when extracurricular programs are aligned with students' interests and real-life contexts, fostering both intrinsic motivation and sustained engagement. Recent studies also emphasize that well-structured extracurricular activities contribute to students' well-being and overall development by integrating cognitive, emotional, and social dimensions (Darling-Hammond et al., 2020). Therefore, extracurricular learning environments serve as an important platform for nurturing well-rounded individuals who are prepared for future challenges.

Interdisciplinary Learning and Life Skills Development (Final Clean Version)

Interdisciplinary learning plays a significant role in developing essential life skills among students in the 21st century. By integrating knowledge across multiple subject areas, learners are able to construct deeper understanding and apply concepts to real-world situations. This approach promotes critical thinking, creativity, and problem-solving, which are key competencies for lifelong learning. Interdisciplinary learning environments encourage students to connect ideas across domains, fostering meaningful learning experiences and deeper engagement. In addition, such approaches promote collaboration, communication, and adaptability, as students participate in activities that require teamwork and active involvement. These experiences contribute to the development of life skills necessary for personal and social growth. Furthermore, educational approaches that integrate cognitive, social, and emotional

dimensions can enhance students' overall development and learning outcomes (Darling-Hammond et al., 2020). Recent research also highlights the importance of teaching transferable skills through integrated and applied learning experiences (van Laar et al., 2020). Therefore, interdisciplinary learning provides an effective framework for fostering both academic achievement and holistic life skills development.

Interest-Driven and Joyful Learning (Updated Version)

Interest-driven and joyful learning plays a crucial role in enhancing students' motivation, engagement, and overall learning outcomes. When learning activities align with students' interests, they are more likely to participate actively and sustain attention over time. Such learning environments encourage curiosity, exploration, and intrinsic motivation, which are essential for meaningful learning. Research suggests that positive emotions in learning, such as enjoyment and interest, significantly influence students' cognitive processes and academic performance (Pekrun et al., 2017). In addition, self-determination theory highlights the importance of intrinsic motivation in fostering sustained engagement and effective learning (Ryan & Deci, 2020). Joyful learning experiences also help reduce anxiety and create a supportive environment where students feel comfortable expressing their ideas and taking risks. Furthermore, interest-driven learning promotes deeper understanding, as students are more willing to invest effort in activities that they find meaningful. It also contributes to long-term motivation and the development of lifelong learning habits. Therefore, designing learning activities that are both engaging and enjoyable is essential for supporting students' holistic development.

Learning With Experts and Community Participation

Learning with experts and community participation plays a vital role in enriching students' learning experiences and connecting classroom knowledge with real-world applications. Interaction with experts allows students to gain authentic insights, practical knowledge, and exposure to real-life problem-solving processes. These experiences help bridge the gap between theoretical understanding and practical application, making learning more meaningful and relevant. In addition, community participation promotes collaborative learning and encourages students to develop a sense of social responsibility. Engaging with external partners also enhances students' communication, critical thinking, and adaptability skills, as they interact with individuals from diverse backgrounds. Research indicates that learning environments involving real-world collaboration and community engagement can significantly improve student motivation and learning outcomes (Darling-Hammond et al., 2020). Such experiences support both personal and social development through active participation and contextualized learning. Therefore, integrating experts and community resources into educational activities provides an effective approach to fostering holistic and meaningful learning.

Conceptual Framework

By addressing these research questions, this study contributes to the growing body of knowledge on extracurricular learning and its potential to enhance the development of primary school students. The findings provide practical insights for designing activities that are engaging, enjoyable, and beneficial for learners. Furthermore, it is important to explore how the Young Botanists Club can be effectively implemented in a laboratory school context to support meaningful learning experiences and meet the diverse needs of students. The

conceptual framework developed by the researchers presents the independent variable (IV), namely the Young Botanists Club activities, and the dependent variables (DV), including the design of activities that are engaging, enjoyable, and beneficial, as well as the outcomes of these activities for students, as illustrated in Figure 1.

Figure 1

Conceptual Framework of the Study

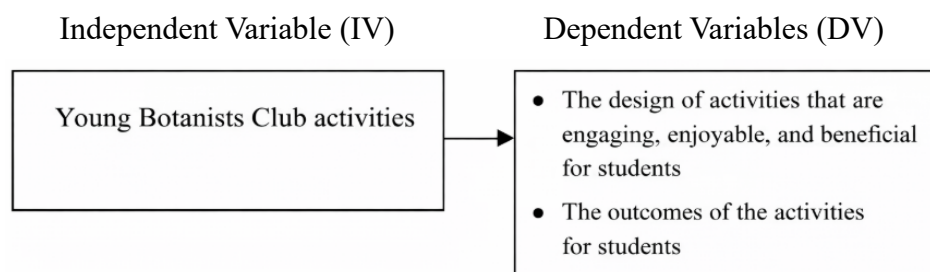


Figure 1 illustrates the conceptual framework of this study, which examines the implementation of the Young Botanists Club and its impact on student development. The framework consists of independent and dependent variables, where the Young Botanists Club activities serve as the independent variable, while the design of activities that are engaging, enjoyable, and beneficial, as well as the outcomes of these activities for students, represent the dependent variables. The framework emphasizes how well-designed extracurricular activities can enhance students' learning experiences and contribute to their overall development. It highlights the relationship between activity design and student outcomes, demonstrating how meaningful and interest-driven activities can foster engagement, skill development, and positive learning experiences among primary school students.

Method

Research Design

This study employed a descriptive research design to examine the design and implementation of extracurricular activities conducted by the Young Botanists Club in a laboratory school setting. The activities were organized once or twice a week after school, integrating botanical knowledge with interdisciplinary learning experiences, including cooking, digital technology, creative arts, and entrepreneurship. Data were collected through student and parent questionnaires, as well as in-depth interviews, to explore participants' perceptions and experiences. The descriptive approach enabled the researchers to analyze both the characteristics of the activities and their outcomes in relation to student engagement and development.

Participants

The participants in this study consisted of two groups. First, five experts in activity design and botany were involved in developing and validating the extracurricular activities of the Young Botanists Club to ensure their quality, relevance, and appropriateness. In addition, a total of 100 participants were included, consisting of 50 student members of the Young Botanists Club and 50 parents of the club members. They provided data on their perceptions, experiences, and opinions through questionnaires. All participants were selected using purposive sampling to ensure that they had direct experience with the program.

Instruments

This study employed a mixed-methods approach, utilizing both qualitative and quantitative instruments to collect data. In-depth interviews were conducted with experts in activity organization and botany to support the design and validation of the Young Botanists Club activities. In addition, questionnaires were used to gather the opinions and experiences of student members of the club and their parents regarding the activities. The instruments were designed to ensure a comprehensive understanding of both the activity design and its outcomes.

In-Depth Interview

In-depth interviews are a qualitative research instrument used to collect detailed information regarding participants' opinions and experiences. In this study, they were conducted with experts in activity organization and botany to support the design and development of the Young Botanists Club activities. The interviews were semi-structured, allowing participants to freely elaborate on their responses. The questions covered aspects such as the appropriateness, relevance, and suggestions for improving the activities. The data obtained were analyzed using content analysis to enhance the effectiveness of the activity design.

Activity Plans

The activity plans were used as a research instrument to organize extracurricular activities of the Young Botanists Club. They were developed in alignment with interdisciplinary learning and experiential learning approaches. The activities were designed to be diverse, including cooking, digital technology, creative arts, and entrepreneurship, with a focus on being engaging, enjoyable, and beneficial for students. A total of 16 activity plans were implemented in this study.

Questionnaire

The questionnaire was used as a quantitative research instrument to collect data from student members of the Young Botanists Club and their parents. It was designed to assess participants' perceptions, experiences, and opinions regarding the activities. The questionnaire consisted of structured items using a Likert scale to measure key aspects such as engagement, enjoyment, and the benefits of the activities. In addition, open-ended questions were included to allow respondents to provide further comments and suggestions. It also covered the evaluation of the outcomes of the activities for students.

Validity and Reliability Assessment

To ensure the validity and reliability of the research instruments, three educational experts reviewed all instruments, including the in-depth interview, activity plans, and questionnaires. The evaluation focused on content appropriateness, alignment with research objectives, and clarity of the items. Content validity was assessed using the Index of Item-Objective Congruence (IOC), and all items were found to meet the acceptable criterion (≥ 0.50). Based on expert recommendations, the instruments were revised to improve clarity and appropriateness, resulting in reliable tools for effective data collection.

Data Collection

Data were collected using multiple methods during the implementation of the Young Botanists Club extracurricular activities. First, in-depth interviews were conducted with experts in activity organization and botany to inform the design and improvement of the activity plans. The activities were then implemented with student participants. After the completion of the activities, questionnaires were administered to student members of the club and their parents to gather their opinions and experiences. The data collection process was carried out systematically to ensure the accuracy and completeness of the information.

Data Analysis

Data analysis in this study was conducted based on the type of research instruments. Data from in-depth interviews were analyzed using content analysis to identify key themes, ideas, and suggestions from experts, which were used to design and improve the activity plans. Meanwhile, data from questionnaires were analyzed using descriptive statistics, specifically percentages, to summarize students' and parents' perceptions, experiences, and opinions. In addition, responses from open-ended questions were analyzed using content analysis to identify key issues and additional suggestions.

Ethical Considerations

This study adhered to ethical principles in conducting research involving human participants. Informed consent was obtained from all participants and parents prior to data collection. Participants were informed about the purpose of the study, and their participation was voluntary. Confidentiality and anonymity were ensured by coding the data and securely storing all information. The research activities were designed to minimize any potential risks and to ensure the well-being of student participants throughout the study.

Limitations

The limitations of this study include its implementation in a single-school context and a specific sample of Young Botanists Club members, which may limit generalizability. Additionally, data collected through questionnaires may be subject to perception and response bias. The duration and frequency of the activities may also have influenced the outcomes.

Results

Design and Implementation of the Young Botanists Club Activities

The findings revealed that the extracurricular activities of the Young Botanists Club were systematically designed and effectively implemented under the concept of Blending Science, Life Skills, and Joyful Learning, in alignment with interdisciplinary and experiential learning approaches. A total of 16 activity plans were developed, and the activities were conducted once or twice a week after school.

The activities were held from 4:00 p.m. to 6:00 p.m. and were divided into two main categories: botanical learning activities (approximately 25%) and activities integrating botanical knowledge with other subject areas (approximately 75%).

All activities were organized into seven main groups: 1) Botanical learning activities, including making dried plant specimens (herbarium), listening to lectures on plant structures and plant fossils, and learning about medicinal plants in daily life; 2) Integrating botany with art, including printing plant images using the cyanotype technique and making greeting cards with dried flowers; 3) Integrating botany with computer studies, including creating botany games using Wordwall and designing greeting cards using Canva; 4) Integrating botany with cooking, including stir-fried vegetables with eggs and fruit mocktails; 5) Integrating botany with handicrafts, including painting plant pots and tray garden arrangement; 6) Herbal products, including herbal dishwashing liquid and herbal scented sachets; and 7) Learning botany through festivals, including making krathongs from natural materials during the Loy Krathong festival and creating Christmas tree-shaped vegetable salad.

The activities integrated multiple disciplines, including botanical knowledge, cooking, digital technology, creative arts, and entrepreneurship. The design emphasized variety, real-life relevance, and joyful learning experiences, allowing students to actively engage in hands-on learning.

Data from expert interviews indicated that the activity plans were appropriate, relevant, and suitable for primary school students. Experts also confirmed that the activities were well-structured and aligned with the research objectives. Their suggestions were used to refine the activities to better match students' interests and developmental levels.

In terms of implementation, the activities were carried out as planned, with flexibility to adapt to students' responses and contextual factors. The inclusion of guest speakers and hands-on experiences further enhanced the effectiveness of the program.

Overall, the design and implementation of the Young Botanists Club activities were found to be appropriate, diverse, and consistent with the concept of Blending Science, Life Skills, and Joyful Learning, promoting meaningful and holistic learning experiences for students.

Outcomes of the Activities

The findings revealed that the activities of the Young Botanists Club produced positive outcomes in terms of students' engagement, preferences, and perceived benefits. Data were collected from 100 respondents, consisting of 50 students and 50 parents.

Table 1
Students' Preferences for Activity Types (n = 100)

Activity Type	Percentage (%)
Integrating Botany with Cooking	30
Integrating Botany with Handicrafts	21
Integrating Botany with Art	17
Herbal Products	13
Integrating Botany with Computer Studies	8
Botanical Learning Activities	7
Learning Botany through Festivals	4

The results presented in Table 1 indicate that students showed a strong preference for hands-on and practical activities, particularly those integrating botany with cooking, which received

the highest percentage. This was followed by activities related to handicrafts and art, respectively.

Further findings revealed that students particularly valued cooking-related activities, citing enjoyment, opportunities for experimentation, and the tangible outcomes of their efforts. These experiences not only enhanced practical skills but also offered potential vocational relevance.

Moreover, students consistently reported that the varied nature of the sessions fostered continuous engagement, personal development, and new social connections. The presence of expert guest speakers further enriched the learning process.

Overall, the Young Botanists Club effectively bridged scientific concepts with everyday life, offering an exemplary model for holistic, interest-driven education that cultivates both knowledge and essential life skills.

Examples of Open-Ended Reflections

Examples of Students' Reflections

Student A: *I was able to use my after-school time productively. I learned about different types of plants and practiced cooking. Some of the plants were unfamiliar to me, and I had never tried them before.*

Student B: *I enjoyed cooking and learned about the benefits of various herbs.*

Student C: *The activities helped me learn more about plants, understand how they can be used, and see how they could become a career in the future.*

Examples of Parents' Reflections

Parent A: *The activities helped my child relax after a full day of studying.*

Parent B: *My child gained a variety of experiences and learned about new plants, both edible and non-edible.*

Parent C: *The activities helped my child develop life skills through hands-on practice and the integration of different subjects.*

Discussion

The findings of this study highlight the effectiveness of the Young Botanists Club in designing and implementing extracurricular activities that promote meaningful learning among primary school students. The results indicate that activities developed under the concept of Blending Science, Life Skills, and Joyful Learning can significantly enhance student engagement, learning experiences, and overall development.

In terms of activity design, the integration of botanical knowledge with interdisciplinary areas—such as cooking, art, digital technology, and entrepreneurship—created authentic and meaningful learning experiences. This finding aligns with the principles of experiential learning, which emphasize learning through direct experience and active participation (Kolb, 2015). By connecting academic content with real-life applications, students were able to construct knowledge more effectively and meaningfully. Supporting evidence from large-scale educational research also confirms that interdisciplinary and applied learning approaches enhance deeper understanding and long-term retention (Darling-Hammond et al., 2020; National Academies of Sciences, Engineering, and Medicine, 2018).

Regarding student outcomes, the results revealed that students showed a strong preference for hands-on activities, particularly those related to cooking. This can be explained by the tangible nature of such activities, which provide immediate feedback and a sense of accomplishment. These findings are consistent with research on active learning, which demonstrates that student-centered, activity-based approaches significantly improve engagement and academic performance (Freeman et al., 2014; Theobald et al., 2020).

Furthermore, the diversity of activities played a crucial role in sustaining students' engagement throughout the program. Students reported increased enjoyment, personal development, and social interaction, indicating that extracurricular activities can support not only cognitive development but also emotional and social growth. This is supported by recent research highlighting student engagement as a key factor influencing learning outcomes and overall student development (Cents-Boonstra et al., 2021; Li et al., 2023).

In addition, both students and parents perceived that the activities contributed to the development of essential life skills, including practical skills, creativity, and collaboration. These findings are consistent with global education frameworks that emphasize the importance of 21st-century skills in preparing learners for future challenges (OECD, 2019; World Economic Forum, 2020).

Overall, the findings suggest that the Young Botanists Club provides an effective model for organizing extracurricular activities that promote holistic development. By integrating scientific knowledge with practical applications and enjoyable learning experiences, the program supports students' cognitive, social, and emotional growth in a balanced and meaningful way.

Conclusion

This study concludes that the Young Botanists Club serves as an effective model for designing and implementing extracurricular activities that promote meaningful learning among primary school students. The integration of botanical knowledge with interdisciplinary and hands-on activities under the concept of Blending Science, Life Skills, and Joyful Learning successfully enhanced student engagement, learning experiences, and overall development.

The findings indicate that extracurricular activities that integrate botany with interdisciplinary learning aligned with students' interests enhance motivation and continuous engagement in learning. In particular, hands-on activities, such as cooking, help develop life skills, thinking, and problem-solving abilities, while effectively connecting knowledge to real-life contexts.

In addition, the diversity of activities and the involvement of expert speakers contribute to the quality of learning and support students' holistic development. These elements also promote personal growth, social interaction, and sustained interest among students.

Overall, the Young Botanists Club demonstrates the potential of extracurricular programs in fostering holistic education by connecting scientific knowledge with real-life experiences. The study highlights the importance of designing student-centered, interdisciplinary activities to support both academic and life skill development in primary education.

Recommendations

Based on the findings of this study, several recommendations are proposed for the development and implementation of extracurricular activities in primary education.

First, integrated extracurricular activities aligned with students' interests should be organized to enhance learning motivation and sustain engagement. Designing activities that reflect learners' preferences can encourage active participation and meaningful learning experiences.

Second, greater emphasis should be placed on hands-on activities connected to real-life contexts. Such activities not only support the development of life skills but also enhance students' thinking and problem-solving abilities through experiential learning.

Finally, collaboration with experts and the community should be promoted to improve the quality of learning. The involvement of external specialists can provide authentic knowledge, broaden students' perspectives, and enrich the overall learning experience.

Recommendations for Future Research. Future studies should explore the long-term impact of extracurricular programs on students' academic achievement, life skills, and career awareness. In addition, research could be conducted in different educational contexts or with larger sample sizes to enhance generalizability. Further studies may also investigate the integration of digital technologies or emerging tools in extracurricular activities to support innovative and adaptive learning environments.

Final Thoughts

This study highlights that designing out-of-class learning experiences that are connected to real-life contexts, aligned with students' interests, and focused on hands-on activities can make learning more meaningful and effectively support both academic knowledge and life skills. Extracurricular activities should therefore be considered an essential component of holistic education, as they foster curiosity, engagement, and lifelong learning among students.

Acknowledgments

The authors would like to express their sincere gratitude to Kasetsart University Laboratory School Center for Educational Research and Development for providing financial support and essential facilities for this research and the activities of the club. The authors also gratefully acknowledge the support for presenting this research at an international level.

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

In preparing this manuscript, generative AI was used solely for language refinement and grammar checking. It was not employed for data generation, analysis, or findings. All research content and conclusions were developed by the authors, who take full responsibility for the manuscript's accuracy.

References

- Cents-Boonstra, M., Lichtwarck-Aschoff, A., Denissen, J. J. A., Aelterman, N., & Haerens, L. (2021). Fostering student engagement with motivating teaching: An observation study of teacher and student behaviours. *Educational Studies*, 47(2), 145–162. <https://doi.org/10.1080/02671522.2020.1767184>
- Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2020). Implications for educational practice of the science of learning and development. *Applied Developmental Science*, 24(2), 97–140. <https://doi.org/10.1080/10888691.2018.1537791>
- Fredricks, J. A., Wang, M. T., Schall Linn, J., Hofkens, T. L., & Sung, H. (2019). Using qualitative methods to develop a survey measure of math and science engagement. *Learning and Instruction*, 43, 5–15. <https://doi.org/10.1016/j.learninstruc.2019.01.001>
- Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences*, 111(23), 8410–8415. <https://doi.org/10.1073/pnas.1319030111>
- Kolb, A. Y., & Kolb, D. A. (2017). Experiential learning theory as a guide for experiential educators in higher education. *Journal of Experiential Education*, 40(1), 7–44. <https://doi.org/10.1177/1053825916683272>
- Kolb, D. A. (2015). *Experiential learning: Experience as the source of learning and development* (2nd ed.). Pearson.
- Li, J., Xue, E., & Li, Y. (2023). Student engagement and its influencing factors: A meta-analysis. *Frontiers in Psychology*, 13, Article 9855184. <https://doi.org/10.3389/fpsyg.2022.985518>
- National Academies of Sciences, Engineering, and Medicine. (2018). *How people learn II: Learners, contexts, and cultures*. National Academies Press. <https://doi.org/10.17226/24783>
- OECD. (2019). *Future of education and skills 2030*. <https://www.oecd.org/education/2030-project/>
- OECD. (2020). *What students learn matters: Toward a 21st century curriculum*. OECD Publishing. <https://doi.org/10.1787/d86d4d9a-en>
- Ohly, H., Gentry, S., Wigglesworth, R., Bethel, A., Lovell, R., & Garside, R. (2016). A systematic review of the health and well-being impacts of school gardening. *Journal of Public Health*, 38(2), 214–225. <https://doi.org/10.1093/pubmed/fdv020>
- Pekrun, R., Lichtenfeld, S., Marsh, H. W., Murayama, K., & Goetz, T. (2017). Achievement emotions and academic performance: Longitudinal models of reciprocal effects. *Child Development*, 88(5), 1653–1670. <https://doi.org/10.1111/cdev.12704>

- Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology*, 61, 101860.
<https://doi.org/10.1016/j.cedpsych.2020.101860>
- Soga, M., Gaston, K. J., & Yamaura, Y. (2017). Gardening is beneficial for health: A meta-analysis. *Preventive Medicine Reports*, 5, 92–99.
<https://doi.org/10.1016/j.pmedr.2016.11.007>
- Theobald, E. J., Hill, M. J., Tran, E., Agrawal, S., Arroyo, E. N., Behling, S., Chambwe, N., Cintron, D. L., Cooper, J. D., Dunster, G., Grummer, J. A., Hennessey, K., Hsiao, J., Iranon, N., Jones II, L., Jordt, H., Keller, M., Lacey, M. E., Littlefield...Freeman, S. (2020). Active learning narrows achievement gaps for underrepresented students in undergraduate science, technology, engineering, and math. *Proceedings of the National Academy of Sciences*, 117(12), 6476–6483.
<https://doi.org/10.1073/pnas.1916903117>
- van Laar, E., van Deursen, A. J. A. M., van Dijk, J. A. G. M., & de Haan, J. (2020). Determinants of 21st-century skills and 21st-century digital skills for workers: A systematic literature review. *Computers in Human Behavior*, 72, 577–588.
<https://doi.org/10.1016/j.chb.2017.03.010>
- World Economic Forum. (2020). *The future of jobs report 2020*.
<https://www.weforum.org/reports/the-future-of-jobs-report-2020>

Contact emails: fedukgm@gmail.com
kanitta.p@ku.th

Preparedness, Leadership, and Resilience: Crisis Management Principles in Educational Institutions

Elena Khanzadyan, Management Development Institute of Singapore in Tashkent,
Uzbekistan

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

We all have to admit that the operational context for educational institutions today has changed dramatically. The reality is that crises have become not just rare disruptions, but recurring realities that challenge stability and development. From the COVID-19 pandemic to rapid technological change and uncertainties, schools and universities must navigate environments marked by volatility, risk, and unexpected “black swan” events. This paper explores the principles of crisis management as a framework for strengthening leadership and governance in education. The conceptual part of the paper is built around three dimensions: (1) preparedness, including institutional readiness, planning mechanisms, and proactive strategies that anticipate disruptions; (2) leadership – adaptive, ethical, and transparent decision-making that sustains both organizational continuity and trust within learning communities; and (3) resilience – the ability of institutions to transform challenges into opportunities for educational innovation and sustainable growth. The paper views crisis management not as limited to emergency response, but as a strategic foundation for institutional development; it draws on international and regional literature and is positioning the study within an emerging doctoral research project in management and economics. By bridging insights from management science and psychology with the realities of higher education and related service organizations, the study offers a conceptual map to guide empirical analysis in Uzbekistan and comparable contexts. The contribution is twofold: conceptually, it reframes crisis management as an educational leadership tool for fostering stability and growth; practically, it highlights actionable, trust-based practices that can enhance resilience and preparedness in resource-constrained learning environments.

Keywords: crisis management, resilience, higher education

iafor

The International Academic Forum
www.iafor.org

Introduction

Today educational institutions are increasingly facing environments that feature instability, complexity, and rapid transformation. Back to the COVID-19 pandemic, numerous system vulnerabilities and imperfections were revealed across global education systems, thus forcing institutions to adapt quickly to online learning, reorganize processes, and operate under conditions of prolonged uncertainty (Gössling et al., 2020). However, it is not only health-related crises that mark the complex context educational institutions have to operate in. Technological advances, continuous change, geopolitical pressures, and policy reforms, all force educational organizations to reconsider their daily operational routines.

Despite this, crisis management in education often remains reactive and fragmented. Institutions mainly focus on immediate responses aimed at absorbing shocks and immediate threats. Little is done to implement long-term changes into strategic and methodology planning. Another concern here is that academic literature mainly views crisis management from one dimension: it is either managerial perspective, or psychological lens, thus disregarding its potentially fruitful structural-behavioral integration.

This paper is aiming at filling the existing gap by conceptualizing crisis management as a comprehensive strategic competency in education. The study attempts to build and empirically test a model based on three key dimensions (preparedness, leadership, and resilience) and examine the interactions between these dimensions in the context of higher education institutions. Combining quantitative and qualitative data from institutions in Uzbekistan, the study provides a more holistic understanding of crisis management in education.

Literature Review

The theoretical background for the given study is the traditional understanding of crisis management as a focus on reactive response to a broader approach that combines preparedness, adaptability, and organizational learning (Boin et al., 2017; Coombs, 2015). In complex systems, crises are commonly viewed as inevitable outcomes of interdependence and uncertainty rather than rare failures (Perrow, 2011). Authors believe that this approach is highly relevant for educational institutions, because they operate in a multi-layered environment that involves multiple stakeholders: students, staff, administrative structures, and external stakeholders.

To begin with the first dimension: preparedness is widely viewed as a fundamental element of crisis management. However, research shows that there is noticeable difference between what we call formal preparedness, and the actual one. According to Mitroff (2005), organizations often develop crisis action plans that are more symbolic than practical, and as such, cannot be integrated into daily work and decision-making processes. When it comes to educational institutions, this gap may be exacerbated by limited resources and competing institutional goals, as well as priority setting at different levels (nationwide, regional, university-based).

Another central factor in effective response to any crisis situation is leadership. In the context of uncertainty management, crisis leadership requires the combination of decisiveness and empathy, ensuring operational continuity and psychological stability (Dirani et al., 2020). However, leadership's role in educational institutions is particularly complex due to the

diversity of stakeholders and the importance of maintaining trust within all academic communities involved.

Third key concept this paper is built on is resilience. Quite recently, resilience has become a dimension that can build the bridge between preparedness and leadership. Duchek (2020) defines resilience as the ability of organizations to absorb shocks, adapt to changing conditions, and recover while maintaining core functions. Also, resilience should be seen not only as a structural competency, but also behavioral, manifested through communication, collaboration, and other practices.

Also, this paper considers psychological aspects of organizational change in the context of crises. For example, recent studies indicate the role of perception, uncertainty, and behavioral changes in the transitions to sustainable and green economic systems in shaping responses to systemic change (Duchek, 2020; Khanzadyan, 2025; Wenzel et al., 2020). These findings clearly indicate the need for psychology and management integration into understanding crisis management.

Methodology

This study used an exploratory cross-sectional design combining quantitative and qualitative methods.

Participants

84 respondents from higher education institutions in Uzbekistan were selected, including faculty staff (42), administrative staff (18), and senior students (24). This multi-level sample allowed for inclusion of diverse perspectives on crisis management in institutional settings. It is also worth mentioning that educational institutions that participated in the study also involved international respondents. This can enhance, as well as complicate the results interpretation.

Data Collection

Data were collected using a structured questionnaire that addressed three main dimensions:

- Preparedness: crisis planning, training, risk awareness
- Leadership: communication, transparency, flexibility, ethical clarity
- Resilience: adaptability, recovery, innovation

Responses were rated using a five-point Likert scale. Open-ended questions were included to obtain qualitative insights into participants' experiences and participants were encouraged to answer them fully, through guided instruction.

Data Analysis

Quantitative data were analyzed using descriptive statistics and means analysis. Qualitative responses were analyzed using thematic coding following Braun and Clarke (2006), which allowed for the identification of recurring patterns and contextual interpretation of quantitative results.

Results

The results of the survey will be used for further study extension to 500 respondents and are presented in this paper as a pilot study. That's why, the study limitations should be noted when interpreting the results.

The analysis reveals clear discrepancy across the three dimensions (Table 1). As can be seen, Preparedness is the weakest here, while leadership demonstrates the strongest presence. Resilience shows the average result, compared to the other two dimensions, but is much closer to Leadership.

Table 1
Mean Scores by Dimension

Dimension	Mean	Interpretation
Preparedness	2.9	Moderate-Low readiness
Leadership	3.8	Strong
Resilience	3.5	Moderate

Preparedness: Structural Weaknesses

Preparedness levels indicate a significant gap between existing structures and operational readiness (Table 2). Only 46% of respondents reported having clear crisis response plans.

This suggests that preparedness is often viewed as a formal requirement rather than a built-in capability. Most institutions may have documentation on how to act and behave in times of uncertainty, but they may lack working mechanisms to implement these practices, such as training, simulations, or clearly defined roles. As a result, preparedness remains largely reactive, consistent with broader research in crisis management (Mitroff, 2005).

Leadership: Central Stabilizing Mechanism

Leadership results demonstrate that it is the most influential dimension (Table 1). A strong majority of respondents reported high level of effective communication and transparency.

Table 2
Selected Survey Responses (later supported by qualitative findings as well)

Statement	% Agreement
We have a clear crisis plan	46%
Leadership communicates transparently	81%
Institution adapts quickly to change	68%

These results demonstrate that leadership compensates for structural weaknesses by providing direction, clarity, and psychological reassurance. Leaders who communicate consistently and act decisively contribute significantly to institutional stability.

Resilience: Adaptive but Uneven

The level of Resilience is moderate (Table 1), reflecting the capacity of institutions to adapt under pressure. However, this adaptability is often uneven and relies on individuals or teams rather than institutional systems.

It can be inferred that resilience exists but is not fully institutionalized. Instead, it manifests itself through informal practices, such as collaboration, flexibility, and problem solving.

Relationships Between the Three Dimensions

The close relationship between leadership and resilience suggests that leadership behavior plays a critical role in ensuring adaptive capacity (Table 3).

The study's findings demonstrate that crisis management in educational institutions is determined by the interaction of structural and behavioral factors. While preparedness provides a foundation, leadership activates and supports resilience.

Table 3

Relationships Between Dimensions

Relationship	Strength
Preparedness - Resilience	Moderate
Leadership - Resilience	Strong
Preparedness - Leadership	Moderate

Qualitative insights from open-ended responses further support the quantitative findings. Participants frequently emphasized the importance of clear communication, flexibility, and informal coordination during crisis situations. Several respondents among administrative staff noted that proper and transparent leader's communication helped reduce uncertainty, while others (both administrative and academic staff) highlighted the role of peer collaboration and problem solving. These themes make a strong point that resilience in educational institutions is not only structural but also behavioral and enacted through individuals rather than the organization itself.

Discussion

One of the main results revealed by the is a huge fundamental imbalance in crisis management in educational institutions. As we have seen, leadership plays a dominant role, while crisis preparedness remains poor and resilience is unevenly distributed.

This imbalance means a lot and might have huge implications in the long-term. While it would be true to say that strong leadership can compensate for weak preparedness in the short term,

long-term resilience obviously requires institutionalizing crisis management practices. Otherwise, institutions will remain highly vulnerable and dependent on individual leadership abilities, that paired with low structural preparedness, makes them fragile and unstable in times of uncertainty.

Also, a moderate level of resilience indicates that educational institutions have decent level of adaptive capacity, but this capacity is not systematic. Instead, resilience is often fragmented and is performed through informal and reactive processes. It is suggested that future studies might develop more detailed questionnaires regarding this part, so that to differentiate clearly between what respondents consider to be resilience, and what institutional resilience actually is.

These results suggest that a comprehensive approach to crisis management in educational institutions is needed. The three dimensions explored in this paper (Preparedness, leadership, and Resilience) should not be viewed separately, but should be addressed as interrelated capabilities that must be developed simultaneously. The results also support the use of the following conceptual model: preparedness provides the structural foundation, leadership activates adaptive processes, and resilience reflects the outcome of their interaction. This model that can be further analyzed and developed in future research.

Implications

The study points to a number of practical implications for educational institutions operating in uncertain environments:

Organizations should develop systems aimed at operational preparedness. This could include regular crisis simulations, scenario-based planning exercises, and clearly defined roles and responsibilities during disruptions, either as part of regular training for staff or as part of internal procedures for HE institutions.

They could also strengthen leadership competencies, especially in part where it comes to transparent vertical communication, rapid decision-making, and adaptive coordination plans under uncertainty.

Another aspect could be the institutionalization of certain resilience-enhancing practices, such as agile processes, cross-functional collaboration, and support for innovation.

The interdisciplinary aspect should also be considered. Since management practice is impossible without psychological competencies, it is essential to foster communication based on trust, in which employees (teachers and administrative staff) and students feel supported; in which the well-being of the organization as a whole and its individual participants will be monitored and supported; and in which structured interaction methods are used to overcome uncertainty.

Conclusion

Crisis management is a strategic competency in educational institutions. It should not be seen as a separate domain of management studies. By integrating preparedness, leadership, and resilience, educational institutions can move from reactive measures to stability and adaptation.

The results indicate that the role of leadership in crisis setting is immense, as it currently compensates for structural gaps. However, if an organization wants to ensure long-term effectiveness, it requires balanced development of all three dimensions. Future research should explore these dynamics in different contexts and over time.

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

The author declares that Grammarly, an AI-assisted writing software, was used in proofreading and refining the language used in the manuscript. The usage was limited to correcting grammatical and spelling errors and rephrasing statements for accuracy and clarity. The author further declares that, apart from Grammarly, no other AI or AI-assisted technologies have been used to generate content in writing the manuscript. The ideas, design, procedures, findings, analyses, and discussion are originally written and derived from careful and systematic conduct of the research.

References

- Alves, J. C., Lok, T. C., Luo, Y., & Hao, W. (2020). Crisis management for small business during the COVID-19 outbreak: Survival, resilience and renewal strategies of firms in Macau. *Research in Globalization*, 2, 100006. <https://doi.org/10.21203/rs.3.rs-3454/v1>
- Baum, T., & Hai, N. T. T. (2020). Hospitality, tourism, human rights and the impact of COVID-19. *International Journal of Contemporary Hospitality Management*, 32(7), 2397–2407. <https://doi.org/10.1108/IJCHM-03-2020-0242>
- Baum, T., Mooney, S., Robinson, R., & Solnet, D. (2020). COVID-19's impact on the hospitality workforce – New crisis or amplification of the norm? *International Journal of Contemporary Hospitality Management*, 32(9), 2813–2829. <https://doi.org/10.1108/IJCHM-04-2020-0314>
- Beliaeva, T., Ferasso, M., Kraus, S., & Damke, L. I. (2019). Dynamics of business model innovation: How firms respond to crisis. *International Journal of Entrepreneurial Behaviour & Research*, 110, 12–23. <https://doi.org/10.1108/IJEBr-06-2019-0397>
- Boin, A., 't Hart, P., Stern, E., & Sundelius, B. (2017). *The Politics of Crisis Management* (2nd ed.). Cambridge University Press.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
- Bundy, J., Pfarrer, M. D., Short, C. E., & Coombs, W. T. (2017). Crises and crisis management: Integration, interpretation, and research development. *Journal of Management*, 43(6), 1661–1692. <https://doi.org/10.1177/0149206316680030>
- Carnevale, J. B., & Hatak, I. (2020). Employee adjustment and well-being in the era of COVID-19: Implications for human resource management. *Journal of Business Research*, 116, 183–187. <https://doi.org/10.1016/j.jbusres.2020.05.037>
- Colmekcioglu, N., Dineva, D., & Lu, X. (2022). Building back better: The impact of the COVID-19 pandemic on the resilience of the hospitality and tourism industries. *International Journal of Contemporary Hospitality Management*. <https://doi.org/10.1108/IJCHM-12-2021-1509>
- Coombs, W. T. (2015). *Ongoing Crisis Communication: Planning, Managing, and Responding* (4th ed.). Sage.
- Dirani, K. M., Abadi, M., Alizadeh, A., Barhate, B., Garza, R. C., Gunasekara, N., Ibrahim, G., & Majzun, Z. (2020). Leadership competencies and the essential role of human resource development in times of crisis: A response to COVID-19 pandemic. *Human Resource Development International*, 23(9), 380–394. <https://doi.org/10.1080/13678868.2020.1780078>
- Duchek, S. (2020). Organizational resilience: A capability-based conceptualization. *Business Research*, 13, 215–246. <https://doi.org/10.1007/s40685-019-0085-7>

- Edmondson, A. C. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly*, 44(2), 350–383. <https://doi.org/10.2307/2666999>
- Gössling, S., Scott, D., & Hall, C. M. (2020). Pandemics, tourism and global change: A rapid assessment of COVID-19. *Journal of Sustainable Tourism*, 29(1), 1–20. <https://doi.org/10.1080/09669582.2020.1758708>
- Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? *Field Methods*, 18(1), 59–82.
- Kaparov, B. (2023). Crisis leadership strategies in Central Asian SMEs: Learning from COVID-19 disruptions. *Eurasian Business Review*, 13(1), 55–72.
- Khanzadyan, E. (2025). Psychological impacts of green economy implementation on individuals and society: A literature review. *The International Scientific Journal*, 2(3), 70–73. <https://doi.org/10.5281/zenodo.15267146>
- Kotter, J. P. (1996). *Leading Change*. Harvard Business School Press.
- Kraus, S., Clauss, T., Breier, M., Gast, J., Zardini, A., & Tiberius, V. (2020). The economics of COVID-19: Initial empirical evidence on how family firms in five European countries cope with the corona crisis. *International Journal of Entrepreneurial Behavior & Research*, 26(5), 1067–1092. <https://doi.org/10.1108/IJEBr-04-2020-0214>
- Kvale, S., & Brinkmann, S. (2009). *InterViews: Learning the Craft of Qualitative Research Interviewing* (2nd ed.). Sage.
- Lengnick-Hall, C. A., Beck, T. E., & Lengnick-Hall, M. L. (2011). Developing a capacity for organizational resilience through strategic human resource management. *Human Resource Management Review*, 21(3), 243–255. <https://doi.org/10.1016/j.hrmr.2010.07.001>
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic Inquiry*. Sage.
- Malterud, K., Siersma, V. D., & Guassora, A. D. (2016). Sample size in qualitative interview studies: Guided by information power. *Qualitative Health Research*, 26(13), 1753–1760.
- Drew P., & Heritage J. (1992). Analysing talk at work: An introduction. In P. Drew, & J. Heritage (Eds.), *Talk at work* (pp. 3–65). Cambridge University Press.
- Mitroff, I. I. (2005). *Why some companies emerge stronger and better from a crisis: 7 essential lessons for surviving disaster*. AMACOM.
- Nguyen, L. D., & Tran, B. Q. (2021). Navigating uncertainty: Crisis communication strategies during COVID-19 in Vietnam's hospitality sector. *Asian Journal of Business Research*, 11(2), 1–18.
- Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods*, 16, 1–13.

- Perrow, C. (2011). *Normal Accidents: Living with High-Risk Technologies* (Updated ed.). Princeton University Press.
- Tong, A., Sainsbury, P., & Craig, J. (2007). COREQ: A 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*, 19(6), 349–357.
- Wenzel, M., Stanske, S., & Lieberman, M. B. (2020). Strategic responses to crisis. *Strategic Management Journal*, 41(2), V7–V18. <https://doi.org/10.1002/smj.3161>
- Zhou, S., Yu, W., Tang, X., & Li, X. (2023). Government crisis communication innovation and its psychological intervention coupling. *Frontiers Psychology*, 13, 35. <https://doi.org/10.3389/fpsyg.2022.1008948>
- Xie, C., Zhang, J., Chen, Y., & Morrison, A. M. (2023). The effect of hotel employee resilience during COVID-19. *Tourism Management Perspectives*, 46, 101087. <https://doi.org/10.1016/j.tmp.2023.101087>

Contact email: lesa0889@yahoo.com

Career Planning Strategies of Graduating Law Students in the Philippines: Implications for Legal Education and Workforce Development

Maureen Antonette B. Ledesma, De La Salle University, Philippines
Kenrich Anthony D. Bereber, West Visayas State University, Philippines

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

Career planning plays a crucial role in helping university graduates transition from academic study to professional practice. In the Philippines, legal education has traditionally emphasized preparation for the bar examination, often leaving broader career planning underdeveloped. This qualitative descriptive study explored the career planning strategies of graduating law students in the Philippines through three focus group discussions involving fifteen final-year students from selected law schools. The discussions were audio-recorded, transcribed verbatim, and analyzed using thematic analysis. Findings show that bar examination preparation remains the dominant orientation of career planning; however, students also consider alternative pathways in government service, corporate legal roles, academia, and regulatory work. Participants reported using professional networking, prior work experience, disciplined study routines, mentorship, and experiential learning opportunities as preparation strategies. They also identified major barriers, including financial constraints, work-study balance challenges, psychological pressure, and limited institutional career guidance. The study underscores the need for Philippine law schools to strengthen career development initiatives through structured counseling, mentoring, and expanded experiential learning opportunities to support adaptable and resilient graduates.

Keywords: career planning, legal education, employability

iafor

The International Academic Forum
www.iafor.org

Introduction

Career planning is widely recognized as a critical component of higher education because it helps students connect academic preparation with long-term professional aspirations. Universities play a central role in developing students' career awareness, professional competencies, and decision-making skills needed to navigate increasingly complex labor markets (Brown & Lent, 2019). Effective career planning is especially important in professional degree programs where academic training is closely linked to licensure, regulated practice, and shifting workforce demands.

For law students, the transition from academic training to professional practice is particularly demanding. Legal education is marked by rigorous coursework, extensive reading requirements, and intense competition. In the Philippines, these challenges are amplified by the high-stakes nature of the bar examination, which continues to function as the primary gateway to legal practice.

Although bar passage remains a significant milestone, contemporary legal education also prepares graduates for a broad range of pathways beyond traditional litigation. Law graduates may pursue careers in government service, corporate compliance, regulatory work, public policy, legal research, and academe, among others (Dinovitzer & Garth, 2019). Despite these expanding opportunities, many graduating law students continue to rely on personal initiative, informal mentoring, and existing networks when making career decisions because structured career guidance in law schools remains limited.

This study examined how graduating law students in the Philippines plan for their professional futures. Specifically, it explored the strategies they use, the barriers they encounter, their views of bar and non-bar pathways, and the forms of institutional support that may strengthen career guidance within legal education. The study is significant for law students, law schools, and educational leaders because it contributes evidence that may inform more responsive career development initiatives in Philippine legal education.

Literature Review

Career Planning and Legal Education

Career planning has been described as a developmental process through which individuals assess their interests, competencies, and goals in order to make informed occupational decisions. Super's (1990) life-span perspective explains career development as an evolving process of exploration, establishment, and maintenance, while Savickas' (2013) Career Construction Theory emphasizes adaptability, meaning-making, and the active construction of career narratives. Within higher education, structured career services, experiential learning, and professional development initiatives help students align academic training with labor market opportunities (Brown & Lent, 2019; OECD, 2021).

In legal education, however, professional formation often remains closely tied to doctrinal mastery and preparation for licensure. Scholars have argued that law schools should develop not only intellectual and technical competence but also professional identity, ethical responsibility, and broader career readiness (Sullivan et al., 2007). Research has shown that law graduates increasingly enter diverse sectors beyond litigation, including government, compliance, policy work, corporate legal departments, and academe (Dinovitzer & Garth,

2019). Yet many students continue to view bar passage as the dominant marker of success, which can narrow career exploration and intensify stress during the final stages of legal training (Organ et al., 2016).

Career Development Theories

This study is anchored in Career Construction Theory and Social Cognitive Career Theory. Career Construction Theory suggests that individuals actively build careers through personal narratives shaped by experience, adaptability, and context (Savickas, 2013). Social Cognitive Career Theory highlights the role of self-efficacy, outcome expectations, and contextual supports or barriers in shaping career choices and persistence. Applied to graduating law students, these perspectives suggest that career planning is shaped by the interaction of personal motivations, institutional supports, and broader social and economic realities.

The conceptual framework of the study proposes that individual factors such as aspirations, self-efficacy, and work experience, together with institutional factors such as curriculum, externships, mentorship, and career guidance, and contextual factors such as finances, labor market opportunities, and bar preparation demands, influence the career planning strategies of graduating law students and the professional pathways they eventually pursue.

Bar Examination Challenges and Non-bar Career Pathways

The bar examination represents one of the most significant milestones in the legal profession. Passing the bar is typically required to practice law, making it a crucial determinant of professional opportunities for law graduates.

However, the bar examination is widely recognized as an extremely challenging licensure test. Research indicates that bar exam preparation can create significant emotional, financial, and psychological strain among law graduates (Mertz, 2016). Students often devote months or even years to preparing for the exam, sometimes leaving employment temporarily to focus on review.

Studies on bar exam preparation have also highlighted the financial burden associated with review programs, study materials, and delayed employment. These costs can disproportionately affect students from lower socioeconomic backgrounds (Organ et al., 2016). For graduates who do not pass the bar or who choose not to take it immediately, alternative career pathways are increasingly recognized. These include roles in government agencies, corporate compliance, legal research, policy development, human resources, and academia (Dinovitzer & Garth, 2019).

The emergence of these alternative pathways reflects broader changes in the legal labor market. As organizations face increasingly complex regulatory environments, professionals with legal training are increasingly sought after in non-traditional roles such as compliance officers, policy analysts, and corporate advisors (Boon & Whyte, 2019).

Nevertheless, research suggests that law students often lack awareness of these opportunities. Without structured guidance, many students assume that traditional legal practice is the only viable career option after graduation (Hamilton & Bilionis, 2022).

Career Guidance and Employability in Legal Education

Career guidance services are widely recognized as an essential component of student success in higher education. Effective career services help students develop professional competencies, identify career pathways, and connect with potential employers (Brown & Lent, 2019).

In legal education, career services may include career counseling, job placement assistance, internship programs, mentorship initiatives, and professional networking opportunities. These services can significantly influence graduates' employment outcomes and professional development (Hamilton & Bilonis, 2022).

However, studies have shown that many law schools still lack comprehensive career guidance systems. Instead, students often rely on informal networks, personal initiative, or online resources to explore career opportunities (Jackson, 2017).

Employability research highlights the importance of transferable skills such as communication, problem-solving, adaptability, and professional networking. These skills enable graduates to navigate evolving labor markets and pursue diverse career paths (Yorke, 2006).

Experiential learning programs have also been identified as key drivers of employability in legal education. Clinical legal education allows students to apply legal knowledge in real-world contexts while developing practical skills and professional confidence (McConnell, 2022).

Gaps in the Philippine Context

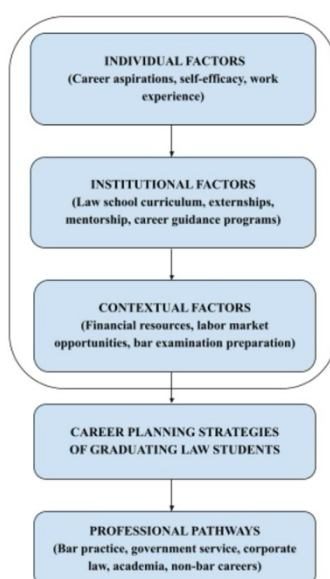
Although career development has become an important focus in higher education globally, structured career guidance programs remain limited in many Philippine law schools. Legal education in the Philippines continues to emphasize bar examination preparation as the central objective of law school training.

While bar passage remains an important milestone, the lack of formal career planning programs may leave students underprepared for diverse professional pathways. Many students rely on personal networks, internships, or workplace experiences to navigate career decisions.

This gap highlights the need for research that documents how law students plan their careers and what forms of institutional support may enhance their professional development.

By exploring the experiences of graduating law students, this study contributes to a deeper understanding of career planning within Philippine legal education and offers insights that may inform improvements in career guidance services.

Figure 1
Conceptual Framework of the Study



Methodology

This study employed a qualitative descriptive research design to explore the career planning strategies of graduating law students in the Philippines. Qualitative description is appropriate when the goal is to provide a rich, straightforward account of participants' experiences while staying close to their own perspectives (Creswell & Poth, 2018; Sandelowski, 2000). Focus group discussions were used because career planning is shaped not only by individual experiences but also by shared academic environments, institutional cultures, and professional expectations within legal education.

The study involved fifteen graduating law students from selected Philippine law schools. Participants were recruited through purposive sampling based on the following criteria: they were final-year or graduating law students, were either planning to take the bar examination or considering alternative pathways, were willing to participate in a focus group discussion, and were able to provide informed consent. The participants were organized into three focus group discussions, a size consistent with recommendations for meaningful qualitative group interaction (Krueger & Casey, 2015).

The focus group discussions were conducted online through a video conferencing platform to accommodate participants from different locations. Each session lasted approximately 90 to 120 minutes. A semi-structured guide covered four areas: career planning approaches, strategies for career preparation, challenges and barriers, and support systems and recommendations. Sessions were audio-recorded with permission, transcribed verbatim, and analyzed through thematic analysis following Braun and Clarke's (2006) six-step process of familiarization, coding, theme development, review, definition, and report writing.

To strengthen research rigor, the researchers used peer debriefing during coding and analysis, compared patterns across the three focus groups, and presented findings with thick description supported by participant quotations. Ethical safeguards included informed consent,

confidentiality through pseudonyms and removal of identifying details, secure storage of recordings and transcripts, and the participants' right to withdraw from the study at any time.

Results and Discussion

The analysis generated four major themes: career planning approaches, strategies for career preparation, challenges and barriers, and the role of law schools in career preparation. Across the three focus group discussions, participants described career planning as dynamic, adaptive, and shaped by economic realities, prior work experience, institutional support, psychological readiness, and professional aspirations.

Table 1

Thematic Analysis of Career Planning Strategies of Graduating Law Students

Initial Codes	Categories	Emergent Themes
Preparing for the bar exam; prioritizing bar review; planning to take the bar immediately	Bar-focused career planning	Career Planning Approaches
Considering government work; interest in corporate legal roles; exploring teaching or compliance positions	Exploration of alternative career pathways	Career Planning Approaches
Building professional networks; seeking mentorship; maintaining study routines; leveraging prior work experience	Career preparation strategies	Strategies for Career Preparation
Joining externships; observing practicing lawyers; gaining real-world exposure	Experiential learning opportunities	Strategies for Career Preparation
Financial constraints; working while studying; family responsibilities	Financial and personal pressures	Challenges and Barriers
Stress from law school workload; uncertainty about the future; pressure to pass the bar examination	Psychological and academic pressures	Challenges and Barriers
Lack of structured career guidance; reliance on personal research; limited exposure to non-bar careers	Institutional gaps in career development support	Role of Law Schools in Career Preparation
Value of externship programs; mentorship from professors or practitioners	Institutional support mechanisms	Role of Law Schools in Career Preparation

Career Planning Approaches

The bar examination emerged as the central reference point of career planning. Most participants framed their immediate futures in relation to whether they would take the bar examination right after graduation, delay it, or prepare through alternative work arrangements. Even students considering non-bar roles still viewed the bar as a major professional milestone. This finding suggests that bar preparation continues to organize how graduating law students imagine success and readiness within Philippine legal education.

At the same time, participants did not plan rigidly. Many described flexible and contingent pathways shaped by timing, finances, family responsibilities, and labor market opportunities. Existing employment functioned as a strategic anchor for many working students, who viewed their current roles as sources of income, experience, and future opportunities. These findings support Career Construction Theory by showing that career development is shaped by adaptation to context rather than by a single linear pathway (Savickas, 2013).

Strategies for Career Preparation

Participants reported several practical strategies for career preparation, including disciplined study routines, time management, self-assessment, networking, and the strategic use of prior work experience. For working students, time management was described not merely as a productivity technique but as a condition for survival within the overlapping demands of work, study, commuting, and family responsibilities.

Professional networks and mentors also emerged as important informal resources. Participants relied on classmates, alumni, professors, former employers, and legal practitioners for information, recommendations, and access to opportunities. Externships and practical exposure expanded participants' understanding of legal work and helped them imagine more concrete pathways. These findings are consistent with Social Cognitive Career Theory, which emphasizes self-regulation, contextual support, and goal-directed action in career development (Brown & Lent, 2019).

Challenges and Barriers

Financial pressure was the most pervasive challenge across the focus groups. Many participants were working students, breadwinners, or parents, and financial realities directly influenced decisions about whether to resign from work, when to take the bar examination, and what pathways appeared sustainable. Time scarcity and role overload further complicated planning, as participants balanced classes, employment, family obligations, and bar preparation.

Participants also identified uncertainty, self-doubt, and the lack of structured career guidance in law school as major barriers. Many reported relying on personal research and informal conversations because formal career counseling specific to law students was largely absent. These findings suggest that career planning is not only an informational task but also a psychological process shaped by pressure, fatigue, and institutional gaps.

Role of Law Schools in Career Preparation

Participants valued supports such as clinical legal education, externships, exposure to legal offices, moot court activities, and institutional bar support. These experiences strengthened

confidence, practical understanding, and professional identity. Law school was also described as formative in teaching prioritization, discipline, and endurance.

Despite these strengths, participants repeatedly called for stronger and more structured career guidance. They wanted clearer information about bar and non-bar pathways, more relatable mentors, and support systems that recognized the realities of working students and financially constrained learners. The findings indicate that law schools may be strong in doctrinal and bar-oriented preparation but less consistent in supporting the wider career development needs of future graduates.

Conclusion

The findings show that career planning among graduating law students in the Philippines is highly adaptive, pragmatic, and context-sensitive. Although bar examination preparation remains the dominant orientation, students increasingly recognize alternative and law-adjacent pathways in government, compliance, corporate legal work, academe, and public service. Their preparation strategies include networking, disciplined study routines, prior work experience, mentorship, and experiential learning. At the same time, their choices are shaped by financial strain, time scarcity, psychological pressure, and limited institutional career guidance.

These findings suggest that legal education institutions would benefit from adopting a more holistic approach to career preparation. Structured career counseling, mentoring systems, pathway mapping, and expanded experiential learning opportunities may help students make informed decisions and transition more effectively into varied professional roles. In particular, law schools should consider how to support working students and financially constrained learners whose career planning is inseparable from material realities and competing responsibilities. Future research may extend this work by examining a broader range of law schools and by comparing pathways across different student backgrounds and post-graduation plans.

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

The authors declare that Grammarly, an AI-assisted writing tool, was used only for proofreading and language enhancement in the preparation of this manuscript. Its use was limited to the correction of grammatical and spelling errors and the refinement of wording for clarity and accuracy. No other AI or AI-assisted technologies were used to generate, analyze, or write the content of the manuscript. The ideas, research design, procedures, findings, analyses, and discussion are original to the author and are derived from the careful and systematic conduct of the research.

References

- Boon, A., & Whyte, A. (2019). The globalization of law and the changing legal profession. *The Law Teacher*, 53(4), 487–501.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
- Brown, S. D., & Lent, R. W. (2019). Social cognitive career theory at 25: Empirical status of the interest, choice, and performance models. *Journal of Career Assessment*, 27(4), 563–578.
- Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). SAGE.
- Dinovitzer, R., & Garth, B. G. (2019). Lawyer satisfaction in the process of structuring legal careers. *Law & Society Review*, 53(2), 419–450.
- Hamilton, N. W., & Bilonis, L. D. (2022). *Law student professional development and formation: Bridging law school, student, and employer goals*. Cambridge University Press.
- Jackson, D. (2017). Developing employability skills through career planning. *Higher Education Research & Development*, 36(2), 351–367.
- Krill, P. R., Johnson, R., & Albert, L. (2016). The prevalence of substance use and other mental health concerns among American attorneys. *Journal of Addiction Medicine*, 10(1), 46–52.
- Krueger, R. A., & Casey, M. A. (2015). *Focus groups: A practical guide for applied research* (5th ed.). SAGE.
- McConnell, S. (2022). Commercial awareness and clinical legal education. *International Journal of Clinical Legal Education*, 29(1), 66–91.
- Mertz, E. (2016). *The language of law school: Learning to “think like a lawyer”*. Oxford University Press.
- OECD. (2021). *Career guidance for adults in a changing world of work*. OECD Publishing. <https://doi.org/10.1787/9a94bfad-en>
- Organ, J. M., Jaffe, D. B., & Bender, K. M. (2016). Suffering in silence: The survey of law student well-being and the reluctance of law students to seek help for substance use and mental health concerns. *Journal of Legal Education*, 66(1), 116–156.
- Sandelowski, M. (2000). Whatever happened to qualitative description? *Research in Nursing & Health*, 23(4), 334–340. [https://doi.org/10.1002/1098-240X\(200008\)23:4<334::AID-NUR9>3.0.CO;2-G](https://doi.org/10.1002/1098-240X(200008)23:4<334::AID-NUR9>3.0.CO;2-G)

- Savickas, M. L. (2013). Career construction theory and practice. In S. D. Brown & R. W. Lent (Eds.), *Career development and counseling: Putting theory and research to work* (2nd ed., pp. 147–183). John Wiley & Sons.
- Sullivan, W. M., Colby, A., Wegner, J. W., Bond, L., & Shulman, L. S. (2007). *Educating lawyers: Preparation for the profession of law*. Jossey-Bass.
- Super, D. E. (1990). A life-span, life-space approach to career development. In D. Brown & L. Brooks (Eds.), *Career choice and development: Applying contemporary theories to practice* (2nd ed., pp. 197–261). Jossey-Bass.
- Yorke, M. (2006). *Employability in higher education: What it is, what it is not*. Higher Education Academy.

Contact email: maureen.b.ledesma@dlsu.edu.ph

Game-Based Learning in Piped Services Engineering Education: Enhancing Student Engagement and Learning Experiences

Sherry S. W. Yiu, Technological and Higher Education Institute of Hong Kong, China

Roger T. H. Ng, Hong Kong Institute of Vocational Education, China

Joseph H. K. Lai, The Hong Kong Polytechnic University, China

The Asian Conference on Education & International Development 2026

Official Conference Proceedings

Abstract

This paper evaluates the integration of Game Based Learning (GBL) into the SBS5221 *Piped Services* module of the BEng (Hons) in Building Services Engineering programme at the Technological and Higher Education Institute of Hong Kong (THEi). Traditionally delivered through lectures, tutorials and laboratory sessions, the module has faced challenges in engaging Generation Z students, who prefer interactive and digitally enriched learning environments. To address this, a Unity-based online mini-game was developed to simulate a cold water supply system design for a domestic building. The study involved 42 Year-3 students. The effectiveness of GBL was assessed using pre- and post-game quizzes and a questionnaire survey. Quiz results showed an average improvement of 35.0%, with the highest gain (50.0%) observed in pipework design considerations. A paired-samples *t*-test confirmed that the improvement was statistically significant, demonstrating a strong positive impact on student learning outcomes. Survey results further supported these findings: 83.3% found the game easy to navigate, 80.9% rated it engaging, 76.2% reported improved understanding of technical concepts and 83.3% felt more confident in applying theoretical knowledge in practice. Overall, the GBL adopted in this case effectively bridged theory and practice. While students suggested refinements such as more advanced scenarios and improved navigation, the findings highlight the potential of GBL to modernise engineering education and enhance professional preparedness.

Keywords: engineering education, game-based learning, piped services, student engagement, teaching

iafor

The International Academic Forum

www.iafor.org

Introduction

Rapid technological advancement has transformed students' learning expectations. Generation Z, raised in digital environments shaped by video games and interactive platforms, increasingly prefers immersive and engaging learning experiences. Traditional teaching methods based on passive knowledge transmission often struggle to meet these expectations (Galloway, 2008), particularly in technical disciplines such as building services engineering.

SBS5221 *Piped Services* is a Year-3 core module in the BEng(Hons) in Building Services Engineering programme at THEi. It develops essential competencies in pipe sizing, material selection, system design and compliance with local waterworks regulations, which are skills critical for professional practice in dense urban contexts like Hong Kong. However, conventional pedagogies, such as lectures, tutorials and laboratory sessions, may not sufficiently engage students (Ohland et al., 2008; Seymour & Hewitt, 1997). While lectures deliver theoretical knowledge and laboratories provide practical exposure, these formats often lack the interactivity preferred by contemporary learners, potentially reducing motivation and learning effectiveness.

To address this gap, this study integrates game-based learning (GBL) into the module. A custom-designed online mini-game was developed to simulate real-world plumbing system challenges, enabling students to apply theory in practical contexts. The study evaluates the effectiveness of GBL through pre- and post-game quiz analysis and a questionnaire survey assessing usability, engagement and educational impact.

Game-Based Learning

GBL integrates gaming mechanics into educational, offering an interactive alternative to traditional, lecture-centred approaches (Price, 2009). By immersing students in realistic scenarios that require critical thinking, decision-making and problem-solving, GBL promotes active engagement rather than passive knowledge acquisition.

In the SBS5221 *Piped Services* module, GBL was implemented through a Unity-based online mini-game simulating cold water supply system design for residential buildings. Students designed and connected pipework while considering technical, economic and sustainability factors. Tasks included calculating water pressure and flow rates, selecting appropriate pipe sizes and materials, and ensuring compliance with local waterworks regulations. This simulated environment enabled students to apply theoretical knowledge in contexts resembling professional practice (Hwang et al., 2009).

Research highlights the benefits of GBL in enhancing motivation, engagement and knowledge retention (Apra & Ifenthaler, 2021). Immediate feedback and immersive gameplay support deeper understanding, particularly for digital native learners who favour interactive, hands-on experiences (Deshpande & Huang, 2011). However, in building services engineering, empirical evidence on GBL remains limited (Lam & Tse, 2022; Ting et al., 2019; Zou et al., 2018), especially regarding its impact on practical knowledge, confidence and student perceptions.

This study addresses these gaps by investigating four questions:

1. How effective is GBL in improving knowledge acquisition and practical application in SBS5221 *Piped Services*?

2. Does the GBL significantly enhance understanding of technical concepts such as pipe sizing and regulatory compliance?
3. How do students perceive the usability and engagement of the GBL tool?
4. What is its potential for application in other engineering modules?

The primary aim of this study is to evaluate the effectiveness of integrating GBL in enhancing engagement and learning outcomes. Pre- and post-game quiz results of the students were analysed to determine any statistical significance between the quiz scores. A structured questionnaire further assessed usability, engagement and perceived educational value.

By examining both learning performance and student perceptions, the study provides a comprehensive evaluation of GBL's applicability in technical education. It demonstrates how interactive simulation can bridge theory and practice, contributing empirical evidence to the use of digital game-based approaches in engineering education and informing future curriculum innovation.

Methods and Materials

The integration of GBL into the SBS5221 *Piped Services* module involved the development of an online mini-game with a total cost of HK\$50,000. The game was collaboratively designed by a professional game development company and the project team to align with the module's intended learning outcomes.

Game Design and Features

The mini-game simulated pipework design in a domestic building, providing an immersive learning environment. Students worked individually or in teams of up to four to address pipe sizing, material selection, water pressure, flow rate, and economic and sustainability considerations. Tasks the students included calculating water pressure, selecting appropriate materials and ensuring compliance with local standards, balancing technical performance with cost effectiveness and environmental sustainability.

Game Development Process

Development was collaborative and iterative, involving lecturers, student representatives and the game company. Initial meetings defined learning objectives and identified challenging topics to guide design. A prototype was created and pilot tested by five students, whose feedback led to improvements in interface design, task clarity and difficulty balance.

Subsequent refinements resolved technical issues and enhanced educational alignment while maintaining budget constraints. A Game Design Document (GDD) guided development, outlining game mechanics, objectives, player roles and the simulated domestic building environment. The final version presented realistic piping system challenges requiring students to apply technical, regulatory and sustainability considerations in system design (Figure 1).

Figure 1*Images of the Final Version of the Online Mini-Game*

Evaluation Tools

Two tools were used to evaluate the effectiveness of the GBL.

(i) Pre- and Post-Game Quizzes

10 multiple-choice questions were administered before and after gameplay. The same questions were used in both tests, with solutions released only after the post-game quiz. The quiz assessed fundamental knowledge of cold water supply systems in domestic buildings in Hong Kong across four areas:

1. Pipe materials and fittings
2. Hydraulic principles (e.g., diameter, pressure and flow rate)
3. System design considerations (e.g., pressure limits, pressure loss)
4. Regulatory and professional knowledge

The questions evaluated both theoretical understanding and practical application aligned with the module's learning outcomes. Example questions include:

- “How does pipe diameter affect the flow rate in a cold water supply system?” (hydraulic principles)
- “Which government authority regulates the water supply in buildings in Hong Kong?” (regulatory knowledge)

(ii) Questionnaire Survey

A structured survey assessed students' perceptions of usability, engagement and educational effectiveness, as well as comparison with traditional teaching methods. It comprised four sections:

1. General Information – enrolment confirmation and prior familiarity with GBL.
2. Game Usability and Engagement – ease of navigation, interaction, engagement and visual design.
3. Educational Effectiveness – understanding of system design, clarity of technical concepts, problem-solving skills, realism and confidence in application.
4. Comparison to Traditional Learning – perceived effectiveness relative to lectures and labs, and willingness to have GBL in other subjects (e.g., HVAC, electrical systems).

Overall, the survey captured both experiential and learning dimensions of the GBL intervention and its potential for broader curriculum integration.

Results and Analysis

A total of 42 Year-3 students enrolled in the SBS5221 *Piped Services* module participated in the mini-game (about 20 minutes), completed both quizzes and responded to the questionnaire survey. Participants received a CPD certificate in recognition of their involvement.

Quiz Results

The quizzes quantitatively measured learning gains and showed an average improvement of 35.0%. Notable increases include:

- Pipework design considerations: 42.9% to 92.9% (+50.0%)
- Effect of system pressure on flow rate: 47.6% to 88.1% (+41%)
- Effect of pipe diameter on flow rate: 50.0% to 88.1% (+38.1%)

Detailed results are presented in Table 1.

Table 1
Quiz Results

Question	Concept Assessed	Pre-Game (%) Correct	Post-Game (%) Correct	Improvement (%)
1	Primary material for cold water pipes	52.4	81.0	28.6
2	Pipework design considerations	42.9	92.9	50.0
3	Water pressure limit for pipework	47.6	83.3	35.7
4	Regulatory authority for water supply	69.0	95.2	26.2
5	Effect of pipe diameter on flow rate	50.0	88.1	38.1
6	Measurement of water pressure	61.9	90.5	28.6
7	Pipe fittings for directional changes	54.8	88.1	33.3
8	Common causes of pipe bursts	50.0	85.7	35.7
9	Effect of system pressure on flow rate	47.6	88.1	40.5
10	Fittings for connecting different diameters	59.5	92.9	33.4
Average		53.6	88.6	35.0

Statistical Verification Using Paired-Samples *t*-Test

A paired-samples *t*-test was conducted to examine whether the improvement in quiz scores was statistically significant. As the same 42 students completed both quizzes, this test was appropriate. The null hypothesis (H_0) test was conducted to examine whether there was a significant difference between pre- and post-game mean scores. The alternative hypothesis (H_1) proposed that the post-game mean score would be significantly higher.

The mean pre-game score was 53.6% (5.36 out of 10), increasing to 88.6% (8.86 out of 10) in the post-game quiz, showing an average improvement of 35.0 percentage points (3.50 points). The paired-samples *t*-test yielded $t(41) = 8.84$, $p < 0.001$. At the 0.05 significance level (two-tailed), the critical value is $t_{critical} = 2.02$, the null hypothesis was rejected ($p < 0.05$). These results provide statistical evidence that the integration of GBL significantly improved students' understanding of piped services concepts.

Questionnaire Survey Results

The survey assessed usability, engagement and perceived learning impact. Prior familiarity with GBL varied (33.3% familiar; 38.1% not familiar).

A substantial majority (83.3%) found the game easy or very easy to navigate, indicating a user-friendly interface. Engagement levels were high, with 80.9% rating the game as engaging or very engaging. Regarding learning outcomes, 76.2% agreed that the game enhanced their understanding of technical concepts, and 83.3% reported increased confidence in applying their knowledge practically. In terms of realism, 76.2% considered the scenarios realistic or very realistic, supporting the game's effectiveness in linking theory with practice. When compared with traditional teaching methods, 80.9% preferred the game, and 90.5% supported extending GBL to other building services topics such as HVAC and electrical systems, highlighting its broader applicability within the curriculum.

Conclusion

The integration of GBL into the SBS5221 *Piped Services* module appears to be an effective pedagogical strategy. Statistically significant improvements in quiz scores, supported by positive student feedback, demonstrate that GBL enhances engagement, understanding and confidence in applying technical knowledge. To further strengthen its impact, future development should incorporate more advanced scenarios, improved navigation and enhanced graphical features. Expanding GBL to other modules, such as HVAC and electrical systems, may yield similar benefits. Overall, this study suggests that GBL has the potential to bridge theory and practice and represents a positive direction for innovation in engineering education.

Acknowledgement

The work reported above is supported by *THEi's Fund for Trial Incorporation of Game-Based Learning into Academic Curriculum*.

References

- Apra, C., & Ifenthaler, D. (2021). Game-based Learning Across the Disciplines. *Advances in Game-Based Learning*. Springer. <https://doi.org/10.1007/978-3-030-75142-5>
- Deshpande, A. A., & Huang, S. H. (2011). Simulation Games in Engineering Education: A State-of-the-Art Review. *Computer Application in Engineering Education*, 19, 399–410. <https://doi.org/10.1002/cae.20323>
- Galloway, P. D. (2008). *The 21st Century Engineer: A Proposal for Engineering Education Reform*. American Society of Civil Engineers.
- Hwang, G. J., Yang, T. C., Tsai, C. C., & Yang, J. H. (2009). A Context-Aware Ubiquitous Learning Environment for Conducting Complex Science Experiments. *Computers & Education*, 53(2), 402–413. <https://doi.org/10.1016/j.compedu.2009.02.016>
- Lam, P., & Tse, A. (2022). Gamification in Everyday Classrooms: Observations From Schools in Hong Kong. *Frontiers in Education*, 6, 1–9. <https://doi.org/10.3389/educ.2021.630666>
- Ohland, M. W., Sheppard, S. D., Lichtenstein, G., Eris, O., Chachra, D., & Layton, R. A. (2008). Persistence, Engagement, and Migration in Engineering Programs. *Journal of Engineering Education*, 97(3), 259–278. <https://doi.org/10.1002/j.2168-9830.2008.tb00978.x>
- Price, C. (2009). Why Don't My Students Think I'm Groovy?: The New "R"s for Engaging Millennial Learners. *The Teaching Professor*, 23.
- Seymour, E., & Hewitt, N. M. (1997). *Talking about Leaving: Why Undergraduates Leave the Sciences*. Westview Press.
- Ting, F. S. T., Lam, W. H., & Shroff, R. H. (2019). Active Learning via Problem-Based Collaborative Games in a Large Mathematics University Course in Hong Kong. *Education Sciences*, 9(3), 172. <https://doi.org/10.3390/educsci9030172>
- Zou, D., Wang, F. L., Xie, H., & Kohnke, L. (2018). Game-Based Vocabulary Learning in China and Hong Kong: Students' Evaluation of Different Word Learning APPs. *Technology in Education: Innovative Solutions and Practices*, 2018, 44–55. Springer. https://doi.org/10.1007/978-981-13-0008-0_5

Contact emails: joseph.lai@polyu.edu.hk
 sherry.yiu@thei.edu.hk
 rogerng@vtc.edu.hk

Global Citizenship Education in Japan: High School Teachers’ Perspectives on MEXT vs. UNESCO Guidelines and the Challenges They Face

Miyuki Takeda, Soka University of America, United States
Tomoko Takahashi, Soka University of America, United States

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This study examined Japanese high school teachers’ understanding and opinions of global citizenship education (GCE) and how it is carried out according to the guidelines established by Japan’s Ministry of Education, Culture, Sports, Science, and Technology (MEXT) and the United Nations Educational, Scientific, and Cultural Organization (UNESCO). Using semi-structured interviews, the study explored: (1) teachers’ awareness of the differences in expectations, values, and goals between the two organizations; (2) the extent to which GCE is embraced; and (3) the successes and challenges in implementing GCE. The thematic analysis of interview data revealed three main themes: (1) varying awareness of MEXT and UNESCO guidelines; (2) specific challenges faced by different types of schools; and (3) successes and barriers in achieving GCE goals. The findings indicate that, regardless of school type, teachers tend to align more with UNESCO’s globally oriented perspective on GCE. These insights underscore the need to improve the use of UNESCO’s Associated Schools Project Network (ASPnet) and to address structural barriers to further develop GCE in Japan.

Keywords: global citizenship education (GCE), Japanese high schools, MEXT, *jinzai*, UNESCO

iafor

The International Academic Forum
www.iafor.org

Introduction

Japan is at a crucial point in improving global education, with its government increasingly focusing on globalization and on developing future generations capable of contributing to the global community. High school education plays an essential role in preparing students for life in such a society. Currently, Japan faces social and economic challenges, including an aging population and declining birth rates. The government aims to create a generation that can compete worldwide, especially economically, with a focus on global citizenship education (GCE). To achieve this, Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT) serves as the primary educational authority, seeking policy guidance from the United Nations Educational, Scientific and Cultural Organization (UNESCO).

At this early stage of implementing GCE in Japan, how do high school teachers perceive the new guidelines set by MEXT and UNESCO? To explore this question, the study first reviews the general concepts of GCE, UNESCO's vision, Japan's history of globalization, and MEXT's initiatives and challenges.

Literature Review

Global Citizenship Education (GCE)

Global citizenship is not a new concept; it dates back more than 2,000 years to ancient Greece. At that time, citizenship focused on developing responsible and loyal citizens. But as globalization expanded, simply being loyal to your country became inadequate. Socrates and Diogenes called themselves "the citizens of the world" to challenge the limited view of the Polis, which only asks for loyalty to one's city and excludes others (Schattle, 2008). They believed that global citizens are those who are aware of their homeland and the wider world (Mutluer, 2013).

Today, the concept of global citizenship has many different meanings, with various opinions and interpretations. Mannion et al. (2011) argue that GCE often reveals how people are unconsciously influenced by Eurocentric views, and it's crucial to learn from local perspectives, including colonial history and imperialism. They also highlight that some viewpoints go beyond national borders, emphasizing the need for GCE to challenge Eurocentrism. Furthermore, they point out that globalization has already taken place and that this ongoing process provides an opportunity to move past the anti-globalization movement, especially in Europe.

According to Richardson (1979), a global citizen "knows how the world works, is outraged by injustice, and is both willing and enabled to take action to meet this global challenge" (p. 1). Davies (2006) suggests that GCE needs to include a sense of anger to sustain high motivation to change current situations, rather than simply becoming empathetic individuals. In this way, she believes that GCE could guide the future direction of education, a view that differs from education that focuses solely on students' academic skills.

Schattle (2008) argues that the modern definition of global citizenship is not about legal status but reflects behaviors that naturally occur in daily life. Educational institutions aim to develop ethical individuals who are not only members of society but also demonstrate actions typical of global citizens (Schattle, 2008). He believes that GCE emphasizes individuals serving as role models, not just within a limited community but for all of humanity.

Dill (2013) argues that GCE has two primary goals: (1) developing young citizens who can compete on a global scale, and (2) teaching students global awareness and empathy while inspiring them to adopt a humanistic outlook. Dill also emphasizes that these two goals depend on each teacher's willingness, meaning teachers shape the direction of GCE.

Bosio (2023a) views GCE as a value-based educational theory that encourages students to focus on similarities rather than differences. It promotes its use through reflective, dialogic methods where students share their values with peers. This ongoing dialogue helps them understand the mechanisms of problems and potential actions. Ultimately, learners engaged in this dialogic approach to GCE will evolve from simply being "human resources" into "global citizens" (Bosio, 2023a, p. 178).

Although scholars' definitions of GCE vary, there are common understandings. They agree that GCE aims to prepare younger generations to advocate for a better world by transcending national boundaries and fostering individuals who understand global challenges and can lead humanitarian change. In other words, GCE concentrates on developing citizens capable of promoting a better world peacefully by bridging differences.

UNESCO's Vision for GCE

In November 1946, one year after World War II, UNESCO was founded to promote peace through dialogue and mutual understanding, acknowledging the remorse associated with WWII, antisemitism, and racism (MEXT, 2024a). Since then, UNESCO has made significant progress in GCE efforts. In 1953, it established the UNESCO Associated Schools Project Network (ASPnet) to implement its core educational policies. ASPnet schools foster global interactions among educators and students while developing innovative approaches to address worldwide challenges (MEXT, 2024a). Today, ASPnet includes over 12,000 schools across 182 countries (MEXT, 2024a). A key goal of ASPnet schools is supporting the Sustainable Development Goals (SDGs), especially Goal 4: "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" (MEXT, 2024a). To achieve this, UNESCO encourages ASPnet schools to prioritize GCE.

UNESCO states that "a global citizen understands how the world works, values differences in people, and works with others to find solutions to challenges too big for any one nation. Citizenship and global citizenship do not exclude each other. Instead, these two concepts are mutually reinforcing" (UNESCO, 2024, n.p.). Through GCE, individuals can belong not only to a country but also to the global community, addressing issues locally and globally (UNESCO, 2024). As the world changes rapidly, education must adapt. Therefore, UNESCO uses ASPnet to develop an innovative educational system for peace (UNESCO, 2024). With over 70 years of GCE experience, UNESCO demonstrates that those exposed to GCE early in life have the creativity to find peaceful solutions to conflict (UNESCO, 2024). Consequently, UNESCO plays a key role in promoting GCE worldwide.

Japan's History of Westernization, Internationalization, and Globalization

Although developed, Japan lagged in globalization. Its late start can be linked to the *sakoku* [national isolation] period (1639–1853), when the country cut ties with the outside world due to fears that Catholicism would influence the shogunate (Garside, 2023). Additionally, a century of instability during the *Sengoku* [warring states] period caused the Tokugawa shogunate to limit foreign trade to maintain stability. The *sakoku* policy also aimed to counter

perceptions of Japan as inferior to China (Garside, 2023). By closing most borders except Nagasaki, Japan remained isolated from Western influence for over 200 years, while the West experienced major advancements, especially during the first industrial revolution (1760–1840). Japan focused on stability and recovery, while Western nations shifted from relying on human labor to machine technology, notably advancing the steam engine (Mohajan, 2019). As a result, the technological gap between Japan and the West widened during this period.

After the Meiji Revolution ended *sakoku* and ushered in the new era (1868–1912), Japan worked to catch up with Western countries that had advanced during its period of isolation. They focused on educating future leaders in economic and technological fields to compete with other nations and avoid colonization (Vosse, 2019). However, after the Meiji Restoration, Japan gradually shifted toward conservatism. While the Japanese embraced Western ideas, they limited these influences to preserve their traditions and unique culture (Vosse, 2019). Although the Meiji era marked Japan’s reopening, the country never fully internationalized due to its conservative stance.

Japan’s internationalization increased significantly after WWII, reaching its peak in the 1980s during the “bubble economy.” The boom began with the 1985 Plaza Agreement, which aimed to boost U.S. exports and reduce the trade deficit by weakening the dollar. Yen appreciation shifted investment to Japan, raising asset prices and unrealized profits and increasing collateral and loans, which fueled the bubble (Nomura Wealth Management, n.d.). Excess capital led Prime Minister Yasuhiro Nakasone to promote internationalization and global trust through education (Aspinall, 2010). A key development was the Japan Exchange and Teaching (JET) Programme, inviting native English speakers to teach in schools to modernize Japan’s insular attitude and strengthen global ties (Borg, 2018). The JET program marks the beginning of Japan’s efforts to internationalize its education system.

Another turning point occurred in 2012, when MEXT introduced new globalized educational policies (see the next section below), and in 2014, when MEXT launched a nationwide system called Super Global High School and University. The 2014 project aims to foster global leaders who can contribute to the world through education that helps students build communication and problem-solving skills (Super Global High School, n.d.). Schools designated as Super Global High Schools (SGHs) can expand global education with government-provided funding (Super Global High School, n.d.). The introduction of global education guidelines and SGH marked a clear shift from internationalization to globalization in Japan.

MEXT’s Global Jinzai Guidelines and Japan’s Challenges

In Japan, MEXT plays a key role in shaping educational policies for all schools. In 2012, MEXT introduced new globalized educational policies aimed at fostering “global *jinzai*” [global human resources, global workers], outlining three guidelines for the qualities that global *jinzai* must possess.

Guideline 1: English ability and communication skills

Guideline 2: Initiative, proactivity, challenge spirits, cooperation, flexibility, sense of responsibility, and mission

Guideline 3: Cross-cultural understanding and Japanese identity

(MEXT, 2012a, p. 3)

One reason for emphasizing English proficiency is the reality of low English proficiency among the Japanese population, as evidenced by their low scores on the Test of English as a Foreign Language (TOEFL), with Japan ranking 33rd out of 35 Asian countries (TOEFL, 2023). The Japanese government believes that improving English proficiency is not only for educational purposes but also for developing *jinzai* who can contribute to and compete globally and help rebuild the Japanese economy (MEXT, 2012a).

MEXT's global *jinzai* education also emphasizes Education for Sustainable Development (ESD), UNESCO's response to urgent sustainable development challenges, including environmental destruction, economic issues, and social problems (UNESCO, n.d.). MEXT states that ESD aims to foster values and actions for problem-solving, supporting a sustainable society by addressing modern challenges as our own—reflecting the slogan “Think globally, act locally”—to ensure an abundant life for future generations (MEXT, n.d.). Therefore, ESD develops leaders who contribute to a sustainable society, and MEXT aligns with UNESCO's policies in launching global educational initiatives.

In 2016, MEXT concluded that GCE fosters a sense of global community by introducing a new concept that can influence schools pursuing ESD (MEXT, 2016). However, ASPnet Japan's guidelines do not include global citizenship or GCE, focusing solely on promoting ESD (MEXT, 2012c). Despite national efforts to encourage schools to join ASPnet, the Japanese government has never used the term “global citizenship” to develop global leaders, preferring instead “global *jinzai*.” This may be because UNESCO's goal is to nurture youth capable of addressing global issues beyond borders through GCE (UNESCO, 2024), while Japan aims to cultivate generations that support its prosperity. Consequently, UNESCO's GCE conflicts with Japan's objectives.

Japan has over 1,000 ASPnet schools (K–12), the highest number among 182 countries (MEXT, 2024b). MEXT considers ASPnet schools as hubs for promoting ESD (MEXT, 2021a) and supports curricula that foster research, action, and reporting, incorporating ESD into schools (MEXT, 2023a). Their perspective differs from that of other countries (MEXT, 2021a). While aiming to maximize the potential of ASPnet schools, MEXT questions further expansion because of a gap between schools that use assistance materials and those that do not (MEXT, 2021a). ASPnet schools only submit annual reports, leaving UNESCO and MEXT unclear about their current status (MEXT, 2021a).

According to Yoshida (2017), MEXT has aligned its educational policies with UNESCO for over 50 years. For example, MEXT promoted international education in 1988, following UNESCO's 1974 recognition of its importance (Yoshida, 2017). However, Japan lacks flexibility in implementing GCE within its curriculum, having integrated international education into existing subjects such as social studies and moral education (Yoshida, 2017).

Bosio (2021) argues that Japanese educational institutions are shifting from a traditional, rhetorical education model to incorporating GCE to produce globally aware graduates. However, their focus is on equipping students with skills to compete internationally rather than fostering respect or understanding of other cultures. Bosio criticizes Japan's emphasis on English and study abroad opportunities as means to secure careers in the Global North, noting that this focus on competitive global human resources has hindered the development of GCE skills like recognizing inequalities or societal issues. He insists that Japan's GCE mainly aims to help students succeed in the global market, lacking the broader global community awareness.

Although high school education is not compulsory in Japan, 99% of junior high school graduates attend high school today. MEXT expects high schools to recognize students' diversity and offer a unique and engaging education while supporting each student's independent approach to learning (MEXT, 2021b). MEXT also anticipates that the future will be difficult to predict due to rapid social changes, including economic globalization, declining birth rates, an aging society, advancements in information technology, and the mobility of the labor market and industrial and employment structures. From these perspectives, future high school education should equip all students with essential skills to navigate society and develop the qualities and abilities needed for their career paths. This should be based on a clear vision of the individual, considering the community's actual conditions as well as students' wishes and realities (MEXT, 2012b).

Present Study

The present study investigated how Japanese high schools can improve their efforts to promote GCE by comparing (1) MEXT and UNESCO's definitions and goals for GCE, and (2) how public and private schools implement GCE curricula as outlined by MEXT and UNESCO. Specifically, the study addressed the following research questions:

1. To what extent are Japanese school teachers familiar with the difference between the MEXT and UNESCO guidelines for GCE, such as expectations, values, and goals?
2. How do Japanese high schools incorporate GCE?
3. How are they implementing the goals outlined by MEXT and UNESCO? What challenges do they face?

Methodology

Participants

This study involved seven MEXT-licensed high school teachers, all of whom taught English. Six private school teachers were recruited from two previously designated SGHs and the current ASPnet schools. One public school teacher from an ASPnet school also participated. This participant had experience teaching in multiple schools and offered insights into the realities of public schools from various perspectives. Table 1 shows the participants and their backgrounds.

Table 1
Participants

	School (School Type)	Years Taught	Educational Background
Teacher A	School X (Private)	3	B.A. from the U.S. Teacher Training Course in Japan
Teacher B	School X (Private)	18	B.A. from the U.S. M.A. from the U.S.
Teacher C	School X (Private)	24	B.A. from Japan M.A. from the U.S.
Teacher D	School Y (Private)	6	B.A. from the U.S. B.A. from Japan
Teacher E	School Y (Private)	8	B.A. from Japan
Teacher F	School Y (Private)	10	B.A. from Japan
Teacher G	School Z (Public)	38	B.A. from Japan

Data Collection Procedure and Analysis

Data were collected through one-on-one semi-structured interviews, conducted either in person or via Zoom, focusing on participants' experiences and thoughts regarding MEXT's global jinzei guidelines and UNESCO's GCE. Each interview lasted between 40 and 60 minutes. The data analysis examined similarities and differences in the experiences and perspectives of public and private school teachers, their opinions on the MEXT and UNESCO guidelines, their acceptance of GCE, and the challenges they face.

Findings and Discussion

Teachers' Awareness of MEXT and UNESCO Guidelines

None of the private school teachers interviewed were familiar with MEXT's global jinzei guidelines, whereas the public school teacher was familiar with them and could explain them. Regarding UNESCO's GCE guidelines, although some teachers had heard of the concept, no one was thoroughly familiar with the actual guidelines. One possible reason is that private school teachers prioritize their schools' visions for GCE. Another reason could be the length of their teaching experience. MEXT released its global jinzei guidelines in 2012, which sparked a trend in Japan by introducing a new concept to the Japanese educational field. However, those who started teaching after 2012 did not have the chance to witness the transition before and after the definitions and guidelines were introduced.

MEXT's Global Jinzai Guidelines

After reviewing explanations about MEXT's global jinzaï and UNESCO's GCE guidelines, the interviewees expressed interest in MEXT Guidelines 1 and 3, which emphasize improving English skills and communication, cross-cultural understanding, and Japanese identity. After learning about these guidelines, they examined the details and identified both positive and negative impressions. Regarding Guideline 1, all interviewees, who are English teachers, agreed on the importance of English education. However, they questioned whether English should be the most important aspect of global jinzaï.

Sakamoto (2022) critiques the overemphasis on English education within the global jinzaï guidelines. He argues that while acknowledging the importance of English education is necessary, achieving English proficiency should not be the primary goal of global education. Furthermore, he states that Guideline 1 (global jinzaï) is crucial because MEXT emphasizes the significance of Guideline 3 (cross-cultural understanding), and merely improving English skills does not automatically improve global competence. Similarly, those interviewed for this study preferred students to develop as global citizens rather than just proficient English speakers.

The interviewees also discussed Guideline 3, especially regarding Japanese identity. Drawing from their personal experiences living abroad, all interviewees agreed that having an identity is important but questioned whether it should be specifically "Japanese." Kawano (2009) argues that students' understanding of "Japanese" is more flexible than many think, calling for a broader definition of "Japanese" in educational contexts. Since Japan began globalizing, Japanese identity has been seen as a key step in expanding GCE; however, creating a shared identity can sometimes exclude certain groups.

Kitayama (2018) raises concerns about xenophobia and racism in schools amid the rising far-right, comparing Japanese teachers with those from other backgrounds. Her research indicates that many Japanese teachers overlook this issue, while those from different backgrounds are more aware of it. She links this to justice in education. Although MEXT aims to promote a Japanese identity, some question whether people need to understand what it means. Without creative thinking about what being "Japanese" entails, as Kitayama emphasizes, xenophobia and extreme nationalism can arise. Understanding "who I am" is crucial in global interactions. Expanding perspectives on Japanese identity, especially in GCE, is important.

Overall, interviewees acknowledged that Japan's education has become more globalized due to the government-led global jinzaï guidelines. They also recognized MEXT's goal of developing younger generations who can contribute to the world as representatives of Japan. However, they clearly stated that teachers, except those in management positions, do not discuss MEXT's guidelines at work. While MEXT's guidelines influence school policy decisions at the management level, they do not have enough impact on teachers.

UNESCO vs. MEXT

While most teachers were unfamiliar with either MEXT's or UNESCO's GCE, they formed their views on GCE by taking advantage of the opportunities provided by MEXT and/or UNESCO. Additionally, the teachers' needs leaned toward an outward-facing GCE, which

provides education for Japan and its schools and helps students broaden their perspectives on the world.

All interviewees responded positively to UNESCO's GCE definition. Teacher D noted its relevance beyond English education, and Teacher G said it relates to the SDGs and is crucial for raising youth. Private school teachers linked their GCE to UNESCO's, seeing understanding of the global standard as broadening perspectives and connecting their mission. They also distinguished MEXT's and UNESCO's GCEs: MEXT emphasizes Japan's benefits from global *jinzai*, while UNESCO emphasizes contributing to the world as global citizens.

All interviewees indicated that their views of GCE align more closely with UNESCO's GCE than with MEXT's. At the same time, they did not disagree with either definition. Teacher G, for instance, stated, "MEXT's definition focuses on what is lacking in Japanese people, whereas UNESCO's goes beyond that." Teacher F said, "MEXT's definition indicates the need to become global citizens, while UNESCO's clarifies the purpose of global citizens."

Burgess (2015) criticizes MEXT's inward-focused global *jinzai* guidelines. He claims that although the Japanese government seeks to globalize the country through these *jinzai* guidelines, its view remains limited to Japan's internal internationalization. For example, MEXT encourages students to study abroad, and universities promote English exams like the TOEFL. However, as Japan has recently become more open to globalization, this inward-focused tradition has become more noticeable than ever (Burgess, 2015).

Public vs. Private

Although there are no major differences between public and private schools in implementing GCE, the presence or absence of clear school policies and personnel changes impacts how they engage with GCE. Private schools generally find it easier to implement GCE consistently because of cohesive school policies and stable instructional staffing, although each school's decision ultimately depends on its specific policies. Meanwhile, public schools face challenges in adopting GCE due to frequent teacher transfers.

Although both private schools left SGH, they continued activities from the SGH period because personnel remained unchanged. Teachers with prior experience integrated GCE into the curriculum, while new teachers learned from veterans. Private schools, using their flexibility, adopted the GCE curriculum before MEXT updated its guidelines. Many teachers, recognizing GCE's impact, supported and incorporated it early, thanks to their staffing stability, curriculum independence, and shared mission.

Teacher G mentioned that at least one of her five colleagues in public schools embraced GCE. A major change she noticed in her career occurred in 2012 when MEXT promoted global *jinzai* guidelines, making education more open. The focus shifted from just learning the guidelines to integrating them into teaching and grading. However, the guidelines had limited impact on activities. Teachers need to actively incorporate them, or they won't influence classrooms. G said, "MEXT's guidelines do not restrict but allow maintaining curriculum while adding global *jinzai* elements."

MEXT affirms that any school, public or private, can apply for ASPnet (MEXT, 2023a), but challenges differ by school type. Applicants must align activities with UNESCO policies. After applying, schools undergo a one-year "challenge period" to improve their national review

efforts (MEXT, 2025). Completing this period allows for biannual domestic reviews, and successful schools can become ASPnet candidates (MEXT, 2023bc) within 14 months to two years. UNESCO reviews candidates before designating them as ASPnet schools, which must maintain activities for at least two years (MEXT, 2023b, 2023c). The entire process from application to ASPnet designation typically takes at least four years. Passing the domestic review hinges on demonstrating an organized, continuous participation system (MEXT, 2025). Long-term engagement is challenging for public school teachers, whose contracts often last three to six years due to personnel changes and transfers (Tokyo Metropolitan Board of Education, n.d.).

Kimura and Mitarai (2021) highlight challenges in implementing global education in public schools. Introducing such education requires coordination with local governments and education boards to address issues like tax burdens, fairness, laws, hiring foreign teachers, training Japanese teachers, and informing parents. While there's hope that public high school teachers will influence others through personnel changes, this is often hindered by curriculum and class size constraints. However, public schools tend to be more aligned with government policies and must intentionally adopt GCE, as shown by three exemplary schools.

GCE Implementation and the Challenges

Different schools implement GCE in their own ways, but share features such as overseas activities and exploring local and global issues to understand society and consider solutions. In Japan, GCE is often seen as a higher education matter due to its autonomy (Bosio, 2023b), but Chapple (2016) argues that most universities lack commitment and that substantial changes are unlikely without foundational reforms in compulsory education. Despite challenges, high school interviewees show that schools can do more, offering hope for broader GCE implementation.

Leveraging ASPnet Membership

Although all interviewees had a positive impression of UNESCO's GCE, their schools still struggle to leverage their status as ASPnet schools to enhance their GCE activities. Teachers A, E, and G shared similar comments, such as "My school embraces GCE, but there are no activities that the school participates in as an ASPnet school." Teacher G also commented, "There are many in-school opportunities to develop students' abilities through GCE. But schools have never had the chance, for example, to participate in conferences using the school's affiliation with ASPnet."

Unlike government-funded SGH schools, ASPnet schools do not receive financial support; instead, ASPnet membership primarily serves as a branding name. Therefore, although these schools can continue their GCE activities, they find it challenging to fully appreciate the privilege of being part of the ASPnet community. Kobayashi (2016) notes the urgent need for an inter-school network to promote GCE. He argues that while it is evident that such a network is crucial for spreading GCE, the values guiding ASPnet schools and their structures still require clarification to be effectively embraced (Kobayashi, 2016). Given that teachers hold a favorable view of UNESCO's GCE, it is essential to strengthen ASPnet by providing more opportunities for schools and redefining its value.

There is a notable example of successfully leveraging ASPnet membership. To promote student interactions with peers from different countries, School X contacted an ASPnet school in the

U.S. Building trust with another school is often a major challenge. However, School X's ASPnet designation helped it establish this trust and form a partnership with the U.S. institution. This example showed that being an ASPnet school can expand educational opportunities. Still, since schools often don't see clear benefits just by being part of the ASPnet network, each school needs to put in ongoing effort and exploration to fully realize these advantages.

New Curriculum and Human Resources

School education takes different forms, and the implementation of GCE can vary. For example, it can happen during inquiry-based cross-disciplinary classes, club activities, after-school programs, selected-student activities, or long breaks. One interviewee mentioned that it is generally easier to conduct an activity if it is smaller in scope, such as a club or after-school activity. The downside of this approach is that not every student can access GCE through those activities, so integrating it into the curriculum ensures that all students can participate. However, adding GCE to the curriculum requires schools to navigate many processes, especially when starting a new curriculum. Teachers are already burdened with mandatory responsibilities, which makes it difficult to take on extra work. Therefore, human resources remain a major challenge.

Adopting a new curriculum is time-consuming and requires support and additional human resources. However, schools often lack the necessary human resources to implement a new curriculum. Teacher B mentioned, "If schools want specific teachers trained for the new curriculum, such as GCE, they must send them to a training course. While the teachers are away, someone must fill their position, meaning the school needs additional staff resources." Teacher A also noted, "We must learn about global issues to teach them effectively. However, our overwhelming responsibilities leave little time for study." Even if schools are willing to adopt the GCE curriculum, implementing it is challenging when human resources are unstable.

Grading and College Entrance Exams

High school students depend on their grades for university applications, making it crucial for teachers to set clear grading standards for the GCE curriculum. As Teacher C pointed out, "Unlike math or English, students find it hard to see their progress in GCE. So, those applying to college may overlook the importance of the GCE." Teacher G also commented: "Grading standards are essential. If students are passionate about GCE, should they automatically receive an A+? What about those who excel in GCE writing composition but don't take the course seriously? Grading significantly affects students." While they recognized the benefits of GCE, many expressed feeling overwhelmed by their duties. Curriculum, human resources, and grading are three vital pillars of schools, intricately connected. They emphasized that effectively addressing these components is key to implementing GCE successfully.

Most Japanese high school students attend university, so their education mainly prepares them for college entrance. According to MEXT (2025), college enrollment has risen yearly, increasing exam pressure. This competitive environment hinders GCE adoption. Teacher C said, "GCE's impact appears after college or work life because entrance exams drive students to focus on English or math over GCE." Teacher G mentioned, "Implementing GCE is tough as schools also aim for university admissions." Although college entrance exams are becoming more diverse, this environment still makes it difficult for high schools to adopt GCE.

Conclusion

This study explored how Japanese high school teachers perceive and adopt GCE, examining their views and challenges. Results showed that most teachers create their own initiatives rather than strictly following MEXT's and UNESCO's GCE guidelines, while some schools foster values through long-term efforts. There are differences in the level of autonomy they have; however, both public and private schools have the potential to implement GCE. The study also suggests increasing the use of UNESCO's ASPnet and removing structural barriers to further develop GCE in Japan.

The study's limitations include a small sample size of six private school teachers and only one public school teacher. Additionally, the schools examined were unique because of their teachers' active involvement in GCE; however, not all Japanese high schools or teachers participate in GCE, and many Japanese educators remain unaware of or unconvinced about its importance. Future research should involve a larger sample of teachers from various schools, including those not represented in this study.

GCE is often seen as the responsibility of English teachers, and this study focused on their opinions. However, future research should also include teachers from different subjects to provide a comprehensive view of GCE in high schools. It is important to raise awareness among all teachers about the importance of GCE, as every subject plays a role in shaping students' future social contributions. Insights from teachers of various subjects could deepen the understanding of GCE approaches in Japanese high schools.

Acknowledgments

The authors thank the study participants who volunteered and shared their insights into their practices and perspectives.

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

The authors acknowledge that Grammarly, an AI-assisted writing software, was used to proofread and refine the language of the manuscript. The usage was limited to correcting grammatical and spelling errors and rephrasing statements for accuracy and clarity. The authors further declare that, apart from Grammarly, no other AI or AI-assisted technologies have been used to generate content in writing the manuscript. The ideas, design, procedures, findings, analyses, and discussion are original and derived from the appropriate and systematic conduct of the research.

References

- Aspinall, R. W. (2010). Education reform in Japan in an era of internationalization and risk. *Center for Risk Research Discussion Series*, (A-3), 1–20. <https://www.econ.shiga-u.ac.jp/risk/10/2/3/res.9/DPA3Aspinall201012C2.pdf>
- ASPnet. (n.d.). *List of schools by level/s of education*. https://www.unesco-school.mext.go.jp/schools/en/schooltype_en/
- Borg, P. (2018). What is the JET programme really for? A discussion of official discourse and policy. *Gifu Keizai University Journal*, 53(2), 89–109. https://52.199.59.112/bitstream/11207/274/1/ronshu_52%282%29_089_borg.pdf
- Bosio, E. (2021). Global human resources or critical global citizens? An inquiry into the perspectives of Japanese university educators on global citizenship education. *Prospects*, 53, 425–442. <https://link.springer.com/article/10.1007/s11125-021-09566-6>
- Bosio, E. (2023a). Global citizenship education as a reflexive dialogic pedagogy. *Citizenship Teaching & Learning*, 18(2), 177–194. https://intellectdiscover.com/content/journals/10.1386/ctl_00119_1
- Bosio, E. (2023b). Leveraging Online Teaching and Learning to Foster Critical Global Citizenship Education: Higher Education Faculty's Perceptions and Practices from Japan. *Journal of Creative Communications*, 19(1), 1–15. <https://journals.sagepub.com/doi/10.1177/09732586231191027>
- Burgess, C. (2015). To globalise or not to globalise? “Inward-looking youth” as scapegoats for Japan’s failure to secure and cultivate “global human resources.” *Globalisation, Societies, and Education*, 13(4), 487–507. <https://www.tandfonline.com/doi/full/10.1080/14767724.2014.966805>
- Chapple, J. (2016). “Global *jinzai*,” Japanese higher education, and the path to multiculturalism: imperative, imposter, or immature? In Shimizu, K., & Bradley, W. S. (Eds.), *Multiculturalism and conflict reconciliation in the Asia-Pacific* (pp. 213–228). Palgrave Macmillan, London. https://link.springer.com/chapter/10.1007/978-1-137-40360-5_11
- Davies, L. (2006). Global citizenship: Abstraction or framework for action? *Educational Review*, 58(1), 5–25. <https://www.tandfonline.com/doi/epdf/10.1080/00131910500352523?needAccess=true>
- Dill, J. S. (2013). *The longings and limits of global citizenship education: The moral pedagogy of schooling in a cosmopolitan age*. Routledge.
- ETS. (n.d.). *TOEFL iBT® test and score data summary 2023*. <https://www.ets.org/pdfs/toefl/toefl-ibt-test-score-data-summary-2023.pdf>

- Garside, P. (2023). The *sakoku* period and the current state of English learning in Japan. *Globalisation, Societies and Education*, 1–9.
<https://www.tandfonline.com/doi/full/10.1080/14767724.2024.2361028>
- Hattori, K. (2021). Koukou kyouin no su-pa- guro-baru haisuku-ru heno taiou to kyouikuryoku, ishiki no henyuu nikansuru shitsuteki kenkyuu [A qualitative study of high school teachers' responses to Super Global High School and transformation of teaching skills and attitudes]. *Regional Cooperation Education and Research*, 6(8), 19–31. https://repository.kulib.kyoto-u.ac.jp/dspace/bitstream/2433/261786/1/jerra_6_19.pdf
- Jinnai, M., & Kimura, T. (2021). Daigaku nyuushi kyoutsuu tesuto no kokugo kijutsu mondai wo meguru juken taisaku no senryaku ge-mu ka [A “strategy game” of test-taking strategies over the “Japanese” writing-type questions of the common university entrance examination]. *Kyushu University Institutional Repository*, 21, 49–62.
https://catalog.lib.kyushu-u.ac.jp/opac_detail_md/?lang=1&amode=MD100000&bibid=4372203
- Kawano, M. S. (2009). The development of Japanese identity among middle school students in Japan: From the perspectives of the state and students. PhD Dissertation, University of California, Los Angeles.
<https://eric.ed.gov/?q=moral+AND+education&ff1=pubDissertations%2FTheses+-+Doctoral+Dissertations&pg=3&id=ED515868>
- Kimura, M., & Mitarai, S. (2021). Kouritsu koukou no kyouin wa kokusai bakarorea no kyouiku kouka wo dou ninshiki shiteiruka (nihongo DP dounyuukou heno fo-kasu, guru-pu intabyu- wo tooshite) [A study on public teachers' recognition in impact of international baccalaureate (through focus-group-interview of a school implementing Japanese DP)]. *Education and Research for Global Human Resource Development*, 9(2), 84–94. https://www.jstage.jst.go.jp/article/jagce/9/2/9_84/_pdf/-char/ja
- Kitayama, Y. (2018). The rise of the far right in Japan, and challenges posed for education. *London Review of Education*, 16(2), 250–267.
<https://journals.uclpress.co.uk/lre/article/id/2523/>
- Kobayashi, R. (2016). Yunesuko suku-ru no shourai tenbou to kadai — yunesuko no kachi kyouiku tonon kanrensei [Prospects and challenges for UNESCO Schools—relationship with UNESCO's value education]. *Tamagawa University Academic Repository*. 19–33. <https://tamagawa.repo.nii.ac.jp/records/243>
- Mannion, G., Biesta, G., & Priestley, M. (2011). The global dimension in education and education for global citizenship: Genealogy and critique. *Globalisation, Societies and Education*, 9(3), 443–456.
<https://www.tandfonline.com/doi/full/10.1080/14767724.2011.605327>
- MEXT. (n.d.). *ESD (Education for Sustainable Development)*.
<https://www.mext.go.jp/en/unesco/title04/detail04/sdetail04/1375695.htm>
- MEXT. (2008). Yunesuko suku-ru (ASPnet) ni tsuite [About UNESCO Schools (ASPnet)].
<https://www.mext.go.jp/unesco/004/005/002.pdf>

- MEXT. (2012a). *Guro-baru jinzai no ikusei nitsuite* [Nurturing global human resources]. https://www.mext.go.jp/b_menu/shingi/chukyo/chukyo3/047/siryo/_icsFiles/afieldfile/2012/02/14/1316067_01.pdf
- MEXT. (2012b). *Koutougakkou kyouiku ni kitai sarerumono* [Expectations for High School Education]. https://www.mext.go.jp/b_menu/shingi/chukyo/chukyo3/siryo/attach/1325911.htm
- MEXT. (2012c). *Yunesuko suku-ru gaidorain ni tsuite* [About the UNESCO Associated Schools guidelines]. <https://www.mext.go.jp/unesco/004/1339991.htm>
- MEXT. (2016). *Nihon yunesuko kokunai iinkai kaichou sute-tomento wo humaeta kongono torikumino arikata nitsuite* [Future initiatives in light of the statement by the president of the Japanese National Commission for UNESCO (sample discussion points)]. <https://www.mext.go.jp/unesco/002/006/001/shiryo/attach/1369790.htm>
- MEXT. (2017). *Daigaku nyuugaku kyoutsuu tesuto jisshi houshin sakutei niatatte no kangaekata* [Approaches to the formulation of the implementation policy for the common university entrance examination]. https://www.mext.go.jp/component/a_menu/education/micro_detail/_icsFiles/afieldfile/2017/10/24/1397731_002.pdf
- MEXT. (2020). *02_daigaku nyuugakusha senbatsu kankei shiryou* [02_Documents Related to University Entrance Selection]. 1–17. https://www.mext.go.jp/content/20201209-mxt_daigakuc02-100014554_2.pdf
- MEXT. (2021a). *Yunesuko suku-ru no aratana tenkai ni mukete* [Toward the new development of UNESCO Schools]. pp. 1–9. https://www.mext.go.jp/content/20210521-mxt_koktou01-100014721_05.pdf
- MEXT. (2021b). *Koutou gakkou seido no gaiyou* [About high school system]. pp. 1–4. https://www.mext.go.jp/content/20210715-mxt_kyokoku-000016741_02-1.pdf
- MEXT. (2023a). *Yunesuko suku-ru gaidobukku ESD no katsudou wo toushite tsukuru mirai* [UNESCO Associated Schools guidebook: Creating a future through ESD activities]. pp. 1–38. https://www.mext.go.jp/content/20230403-mxt_koktou01-000028952_1.pdf
- MEXT (2023b). *Yunesuko suku-ru kamei shinsei sukeju-ru (zenki)* [Application schedule for the UNESCO Associated Schools (February – July)]. <https://www.unesco-school.mext.go.jp/wp-content/uploads/2023/08/9e3d6b62bbfd4fde26918eff593de531.pdf>
- MEXT (2023c). *Yunesuko suku-ru kamei shinsei sukeju-ru (kouki)* [Application schedule for the UNESCO Associated Schools (August – January)]. <https://www.unesco-school.mext.go.jp/wp-content/uploads/2023/08/bbea60b057aad763af073ff3659c74f4.pdf>
- MEXT. (2023d). *Reiwa 4nendo daigaku nyuugakusha senbatsu jittai chousa nitsuite* [Survey on the actual conditions of university admission selection in academic year 2022]. 1–5. https://www.mext.go.jp/content/20231016-mxt_daigakuc02-000031719_27.pdf

- MEXT. (2024a). *UNESCO Associated Schools Network (ASPnet) in Japan*.
https://www.mext.go.jp/content/20231016-mxt_daigakuc02-000031719_27.pdf
- MEXT. (2024b). *Yunesuko suku-ru* [UNESCO Associated Schools].
<https://www.mext.go.jp/unesco/004/1339976.htm>
- MEXT. (2024c). *Reiwa 7nendo daigaku nyuugakusha senbatsu jisshi youkou nitsuite (tsuuchi)* [Implementation guidelines for the 2025 university entrance examination (notice)]. https://www.mext.go.jp/content/20240605-mxt_daigakuc02-000005144-1.pdf
- MEXT (2025). *Yunesuko suku-ru kamei shinsei no tebiki* [UNESCO Associated Schools membership application guide]. <https://www.unesco-school.mext.go.jp/wp-content/uploads/2023/09/c00bd73ec822c4730502e6e2bf8a905c-2.pdf>
- Mohajan, H.K. (2019). The first Industrial Revolution: Creation of a new global human era. *Journal of Social Sciences and Humanities*, 5(4), 377–387. <https://mpira.ub.uni-muenchen.de/96644/>
- Mutluer, C. (2013). The place of history lessons in global citizenship education: The views of the teacher. *ANKARA-TURKEY*, 8(2), 189–200.
https://arastirmax.com/tr/system/files/dergiler/79199/makaleler/8/2/arastirmx_79199_8_pp_189-200.pdf
- Nomura Wealth Management. (n.d.). *Baburu keiki* [Bubble Economy].
https://www.nomura.co.jp/terms/japan/ha/bubble_e.html
- Richardson, R. (Ed.). (1979). *Learning for change in world society: Reflections, activities and resources*. London, World Studies Project.
- Sakamoto, F. (2022). Global competence in Japan: What do students really need? *ScienceDirect*. 91. 216–228.
<https://www.sciencedirect.com/science/article/pii/S0147176722001262?via%3Dihub>
- Schattle, H. (2008). Education for global citizenship: Illustrations of ideological pluralism and adoption. *Journal of Political Ideologies*, 13(1), 73–94.
- Schattle, H. (2013). Global citizenship in theory and practice. In Lewin, R. (Ed.), *The handbook of practice and research in study abroad*. Routledge (pp. 3–20).
https://goglobal.fiu.edu/_assets/docs/schattle-2009-globalcitizenship-in-theory-and-practice.pdf
- Super Global High School. (n.d.). *Super Global High School*. <https://sgh.b-wwl.jp/>
- Tokyo Metropolitan Board of Education. (n.d.). *Dai4shou ninyou* [Chapter 4 Appointment]. pp.1–3. https://www.kyoiku.metro.tokyo.lg.jp/documents/d/kyoiku/02_03_04_3
- UNESCO. (n.d.). *Education for sustainable development*.
https://www.kyoiku.metro.tokyo.lg.jp/documents/d/kyoiku/02_03_04_3

- UNESCO. (2024). *What you need to know about global citizenship education*.
<https://www.unesco.org/en/global-citizenship-peace-education/need-know>
- Vosse, W. M. (2019). Reviving Japan through internationalization of higher education. In Coats, K., Hara, K., Holroyd, C, & Soderberg, M. (Eds.), *Japan's future and a new Meiji transformation* (pp. 154–167).
<https://www.taylorfrancis.com/books/edit/10.4324/9780429056697/japan-future-new-meiji-transformation-ken-coates-kimie-hara-carin-holroyd-marie-s%C3%B6derberg>
- Yoshida, M. (2017). Recognition of international education in Japanese teachers. *RedFame*, 5(2), 53–62. <https://redfame.com/journal/index.php/jets/article/view/2016/2196>

Investigating Pre-service Teachers' Utilization of Written Feedback in Mathematics: A Basis for Designing Student-Centered Classrooms in Local Colleges and Universities

Richard Reine S. David, Philippine Christian University, Philippines

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

Written feedback plays a very important role in the teaching and learning process of pre-service teachers, because it allows students to reflect on their learning and clearly see their areas of improvement. Given this established importance of feedback in education, limited research has examined how pre-service teachers utilize feedback and its association with mindset orientation and feedback perception, particularly in the context of mathematics education. This convergent parallel mixed-methods study examined associations among pre-service teachers' mindset beliefs, perceptions of written feedback, and feedback utilization in mathematics at a local college in the Philippines. Quantitative data were gathered from an adapted mindset survey and pre-service teachers' resubmission behaviors and were analyzed with the chi-square test of independence; qualitative results from semi-structured interviews underwent thematic analysis, and findings were integrated with the quantitative findings through triangulation. Results indicated that growth mindset was associated with student-centered feedback perception ($\chi^2 = 6.18$, $p = .013$) and with greater feedback utilization ($\chi^2 = 8.27$, $p = .004$), while feedback perception and feedback utilization were not significantly associated ($\chi^2 = 0.49$, $p = .483$). Qualitative themes showed how growth-oriented beliefs and student-centered feedback perception supported pre-service teachers' feedback utilization. The findings indicated that integrating feedback literacy training and growth-oriented written feedback practices, such as the Summarize, Explain, Redirect, Resubmit (SE2R) model, into teacher-education coursework may strengthen pre-service teachers' capacity to interpret feedback, act on it during revision, and apply student-centered feedback routines in mathematics classrooms.

Keywords: pre-service teachers, written feedback, mindset beliefs, student-centered learning, mathematics education, feedback utilization

iafor

The International Academic Forum
www.iafor.org

Introduction

Written feedback is an essential component of the teaching and learning process in mathematics education where students are expected to understand the concepts and solve problems. By highlighting their strengths and identifying their areas for improvement, effective written feedback fosters more profound engagement with math concepts (Brookhart, 2017). Additionally, the quality of feedback provided in higher education has a significant impact on the teaching practices of pre-service teachers during the early stages of their professional development. According to Kastberg et al. (2020), written feedback is not only structured very similarly to how students organize their work, but it also serves as a record that can be reviewed any time.

In mathematics education, pre-service teachers often experience difficulty in interpreting and engaging with written feedback provided by their mentors (Bishop, 1999). Evidence suggests that the culture, value systems, and conventions of different disciplines may influence both the nature of feedback and how students utilize it (Winstone et al., 2022). Empirical research remains limited on how pre-service mathematics teachers in the Philippines perceive written feedback and how they utilize it on their coursework. Even less is known whether pre-service teachers' mindset beliefs are associated with their perception and utilization of written feedback. This gap underscores the need for research that can guide the development of more effective, student-centered, and feedback-oriented mathematics classrooms in local colleges and universities.

Literature Review

Mindset Theory in Education

Mindset theory suggests that there are two different mindset orientations: a fixed mindset and a growth mindset. This was popularized by Dweck (2016) and suggests that mindset orientation significantly influences how a person interprets and engages with feedback received. In the context of teacher education, pre-service teachers who perceive feedback as learning opportunities or a guide to improve their instructions have growth mindset orientation (Cutumisu & Schwartz, 2018). On the contrary, those who perceive feedback as direct criticisms of their instructional abilities have fixed mindset orientation.

Having a growth mindset orientation alone does not guarantee an improvement in the instruction. Research also highlights that growth mindset becomes more effective when the environment is supportive of growth and improvement through providing clear and actionable feedback, strong support from the mentor, and institutional norms and culture that encourage continuous growth (Thurlings et al., 2015). According to Kroeper et al. (2022), for the professional growth among pre-service teachers to be sustainable, it is important to note that mindset development should be integrated with structured feedback and with supportive learning environments.

Written Feedback in Teacher Education

Written feedback plays an important role in pre-service teachers' journey in the teacher education program. Its effectiveness depends on its clarity, specificity, timeliness, and actionability. Written feedback can then guide pre-service teachers in learning their coursework, reflecting on their teaching practices, and using it to identify instructional gaps

and implement improvements on their pedagogy (Brookhart, 2017; Henderson et al., 2019; Shute, 2008).

Although written feedback is deemed important, there are several challenges to effectively engage with and utilize it, including feedback being unclear, too general or broad, or untimely, which limits its contribution to instructional improvement (Brookhart, 2017; Carless & Winstone, 2019; Shute, 2008). Mindset-related responses further influence feedback utilization. Fixed-mindset beliefs result in defensive reactions and may hinder utilization, while growth-mindset beliefs support reflection and instructional improvement (Claro et al., 2016; Kroeper et al., 2022).

Written feedback is particularly important in preparing pre-service teachers to implement student-centered teaching strategies. However, it is important to note that the feedback should focus on reflection, inquiry, and conceptual understanding to help in transitioning from traditional way of teaching to student-centered mathematics instruction (Gravemeijer & Cobb, 2006; Hiebert & Grouws, 2007). Moreover, its effectiveness will be strengthened when it is supplemented with on-going and continuous professional development, there is an institutional support, and it is aligned with an inquiry-based framework (Boaler et al., 2021; Sherin & van Es, 2009).

SE2R Feedback Model (Summarize, Explain, Redirect, Resubmit)

The SE2R feedback model (Summarize, Explain, Redirect, Resubmit) was made by Barnes in 2015. Barnes highlighted in his study that effective feedback should briefly explain what students already know and what their strengths and weaknesses are, direct them on how to improve their work, and encourage them to resubmit their work to improve learning and mastery of the learning standard. On the other hand, Shute (2008) noted that feedback specificity is very critical in reducing vagueness and promoting goal-directed student responses.

Carless and Boud (2018) highlighted that actionable feedback should be clear and are well-understood by the students. Moreover, Carless and Boud (2018) also noted that pre-service teachers can develop feedback literacy more effectively when they are exposed to well-structured feedback. This is supported by Cutumisu and Schwartz (2018) stating that structured feedback fosters professional growth and instructional reflection among educators.

Research shows that by using SE2R feedback model teachers can create and maintain a student-centered classroom where students are more motivated to learn and have a sense of ownership over their learning. This can be achieved by actively discussing the learning objectives with students and allowing them to monitor their own progress over time. This approach can significantly influence classroom diversity and foster student independence and self-reliance due to the well-crafted feedback structure.

Methodology

Research Design

This study utilized a mixed-methods research design, specifically the convergent parallel approach, to comprehensively investigate how pre-service teachers engaged with and utilized written feedback in mathematics and how it related to their mindset beliefs. This approach was

appropriate because it allowed the researcher to combine the strengths of both quantitative and qualitative methods. By integrating these approaches, the study achieved a deeper and more comprehensive understanding of the phenomenon, enhanced the interpretation of statistical findings, and provided a solid foundation for future research.

The quantitative aspect aimed to describe the following among pre-service teachers: demographic characteristics (age, gender, and year level), mindset beliefs (fixed or growth mindset), and perceptions on written feedback (teacher- or student-centered). A descriptive survey was administered using an adapted version of the Student Mindset Survey by Sun (2015), and teacher-created homework was assigned to examine how pre-service teachers responded to feedback and used it in improving their work. In addition to this, a statistical test of significance was conducted to determine whether a relationship existed among these variables. On the other hand, the qualitative aspect aimed to offer more profound insights into how pre-service teachers perceived the written feedback, including their experiences and challenges in engaging with written feedback, and how feedback motivates them to resubmit their work. Data were collected through semi-structured interviews via Google Meet.

This study also aimed to triangulate the results by examining both sets of data independently and then integrating them during interpretation. This enabled the researcher to have a better understanding of the statistical results and to come up with practical recommendations for how teacher education programs can implement student-centered math instruction by providing effective written feedback.

In the quantitative data analysis, the independent variable (IV) was the mindset belief of the students, categorized into two groups: growth mindset (coded as 1) and fixed mindset (coded as 0). The dependent variable (DV) was the utilization of written feedback, also categorized into two groups: utilized feedback for resubmission (coded as 1) and did not utilize feedback (coded as 0). The analysis aimed to determine whether a statistically significant relationship existed between pre-service teachers' mindset beliefs and their utilization of written feedback.

A descriptive survey was administered to identify the mindset beliefs of pre-service teachers, adapting the Student Mindset Survey by Sun (2015), and a teacher-created homework was assigned to analyze how pre-service teachers responded to feedback and used it to improve their work. A chi-square test of independence was conducted to examine the association between the mindset beliefs of pre-service teachers and their utilization of written feedback.

Participants and Sampling

The participants are 31 first- to third-year pre-service teachers from City College of San Fernando, Pampanga who satisfy the following inclusion criteria: (1) currently enrolled in a teacher education program at City College of San Fernando, Pampanga; (2) pursuing a Bachelor of Secondary Education major in Mathematics; and (3) enrolled in a mathematics class as part of their coursework. Fourth-year pre-service teachers were excluded due to their limited availability, for they are working on their practice teaching (student teaching).

Research Instruments

Three instruments were utilized: an adapted Student Mindset Survey (Sun, 2015), mathematics homework assignment in algebra, trigonometry, and calculus, and a semi-structured interview guide adapted from Carroll (2022). Written feedback on the homework assignments followed

the SE2R model, emphasizing formative feedback and voluntary resubmission prior to final grading.

Instrument Reliability and Validity

The instrument used in this study was adapted from existing validated questionnaires developed by previous researchers. While the original instrument demonstrated acceptable validity in prior studies, no additional validity testing was conducted in the present study. The adapted instrument was utilized based on the assumption that it retained its validity within the current research context. This limitation is acknowledged and is recommended to be addressed in future research.

The research instrument used in this study was adapted from existing validated tools. To ensure its internal consistency, Cronbach's alpha was computed using the responses gathered from the participants. Prior to the analysis, one negatively worded item was reverse-coded to align its scoring with the other items. The analysis yielded a Cronbach's alpha coefficient of 0.727 for the six items included in the instrument, indicating an acceptable level of internal consistency based on the criteria set by the researcher's institution (Cronbach's alpha > 0.70). This result suggests that the instrument was reliable for use in the present study.

Data Collection Procedure

Data collection followed institutional ethical guidelines and approval from the Research and Extension Services Office. After obtaining informed consent, the survey was administered, followed by the distribution of homework tasks with written feedback based on the SE2R model. Selected participants then engaged in one-on-one semi-structured interviews to further explore their engagement with written feedback.

Data Analysis

Quantitative data were analyzed using descriptive statistics and chi-square tests of independence at a significance level of $\alpha = .05$. Qualitative data were analyzed thematically following Braun and Clarke's (2006) framework. Findings from both data sets were triangulated during interpretation to provide an integrated understanding of how mindset beliefs and feedback perceptions relate to the utilization of written feedback in mathematics.

Results and Discussion

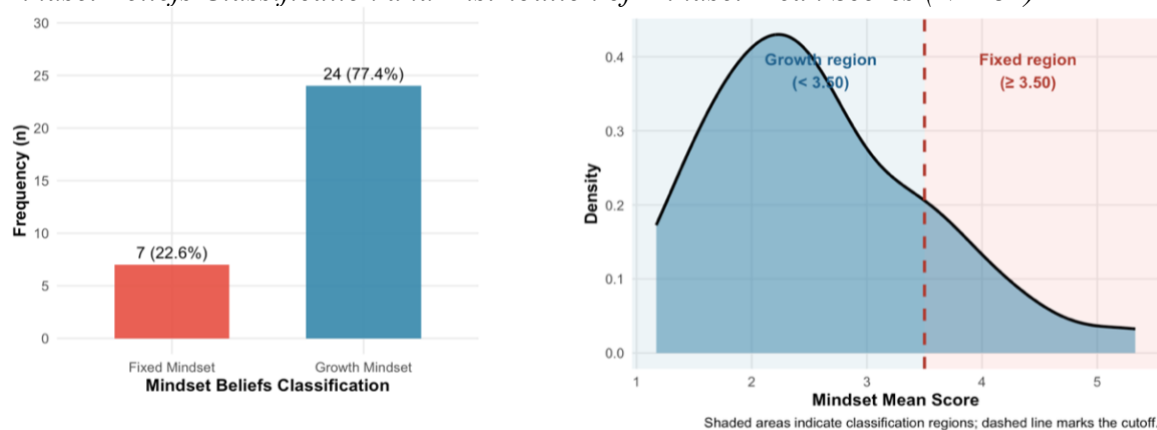
Quantitative data were analyzed using descriptive statistics such as frequency counts, percentages, and the Chi-Square Test of Independence. On the other hand, qualitative data from semi-structured interviews were thematically analyzed to recognize recurring patterns and themes.

Table 1
Demographic Profile of the Participants

Characteristics		Frequency (n)	Percentage (%)
Age (in years)	18	6	19.4
	19	6	19.4
	20	9	29.0
	21	3	9.7
	22	4	12.9
	23	2	6.5
	24	1	3.2
Gender	Female	19	61.3
	Male	12	38.7
Year Level	1st Year	19	61.3
	2nd Year	6	19.4
	3rd Year	6	19.4

Note. The table presents the age, gender, and year level distribution of the 31 pre-service teacher participants

Figure 1
Mindset Beliefs Classification and Distribution of Mindset Mean Scores (N = 31)



Note. Density Plot of Mindset Mean Scores
Cutoff for Growth Mindset is Mean Score < 3.5 (1–6 scale)

Figure 1 presented the corresponding mindset belief classifications of pre-service teachers based on the mean score of their responses to the Mindset Belief Survey. Participants were grouped into two categories: fixed mindset and growth mindset. These classifications were derived from their mean scores, where scores less than 3.5 indicated growth mindset beliefs and scores greater than 3.5 indicated fixed mindset beliefs.

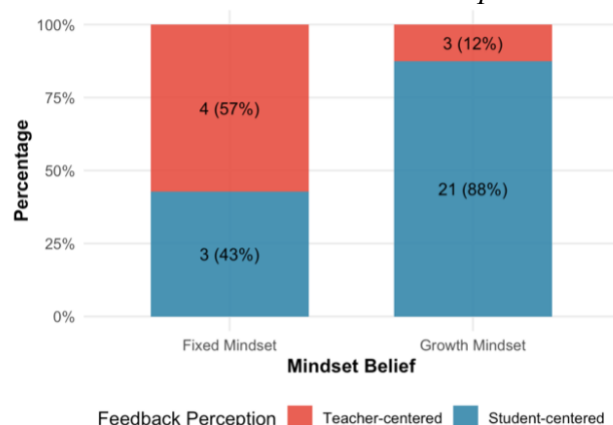
Figure 2*Pre-service Teachers' Feedback Perception Within Each Mindset Classification*

Figure 2 presented 31 pre-service teachers' feedback perception (student-centered or teacher-centered) based on their mindset beliefs (growth or fixed mindset). Most pre-service teachers with growth mindset beliefs had a student-centered written feedback perception. Conversely, those with fixed mindset beliefs were more likely to have a teacher-centered written feedback perception. Results suggested an association between mindset beliefs and written feedback perception. While this association is evident, a few cases still deviated, indicating that there might have been some other factors influencing how written feedback is perceived beyond mindset belief alone.

Table 2*Pre-service Teachers' Utilization of Written Feedback*

Utilization of Written Feedback	n	%
Did Not Utilize Written Feedback	6	19.4
Utilized Written Feedback	25	80.6
N = 31		100%

Note. This table shows the distribution of pre-service teachers based on their utilization of written feedback.

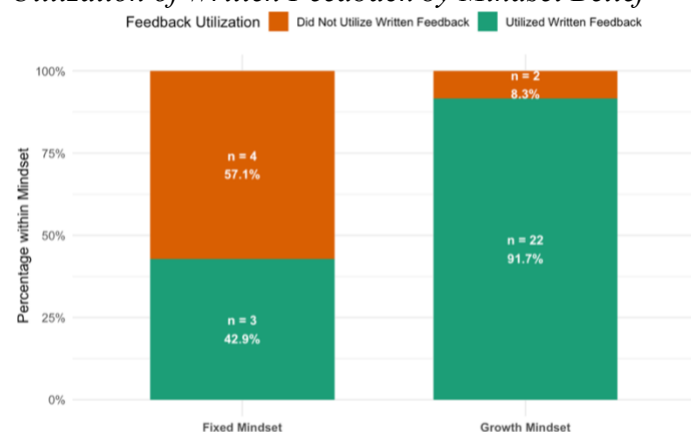
Figure 3*Utilization of Written Feedback by Mindset Belief*

Figure 3 revealed a significant contrast in feedback utilization between pre-service teachers with fixed and growth mindsets. Among 24 pre-service teachers with a growth mindset ($n = 24$), 91.7% utilized written feedback, while only 8.3% did not. On the other hand, 57.1% of

pre-service teachers with a fixed mindset ($n = 7$) did not utilize written feedback, while only 42.9% of them did. These results suggest that pre-service teachers with a growth mindset were significantly more likely to engage with and utilize written feedback than those with a fixed mindset.

Table 3

Chi-Square Test of Independence Between Mindset Beliefs and Feedback Utilization

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.272 ^a	1	.004		
Continuity Correction ^b	5.440	1	.020		
Likelihood Ratio	7.133	1	.008		
Fisher's Exact Test				.014	.014
N	31				

Note. a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.35.

b. Computed only for a 2x2 table

A Chi-Square Test of Independence was conducted to determine the association between pre-service teachers' mindset beliefs (fixed vs. growth mindset) and their utilization of written feedback. The test yielded a statistically significant result, $\chi^2(1, N = 31) = 8.272, p = .004$, indicating that feedback utilization was significantly associated with mindset orientation. Results conclude that the likelihood of engaging with and utilizing written feedback depended on the mindset beliefs of pre-service teachers (fixed or growth mindset).

Additionally, a Fisher's Exact Test was also performed to address the expected count assumption violation of the chi-square test—two cells had expected counts being less than 1.35. The results of the Fisher's Exact Test also revealed a statistically significant result, $p = .014$, therefore strengthening and supporting the initial chi-square results that mindset beliefs of pre-service teachers and their feedback utilization had significant association.

In conclusion, the results indicate a statistically significant association between pre-service teachers' mindset orientation and their written feedback utilization. Pre-service teachers with a growth mindset were more likely to engage with and utilize written feedback than those with a fixed mindset. This conclusion was supported by both the chi-square test of independence and Fisher's exact test, and this also underscored the importance of integrating mindset interventions in teacher education programs.

Figure 4

Pre-service Teachers' Mindset Beliefs and Their Feedback Perception

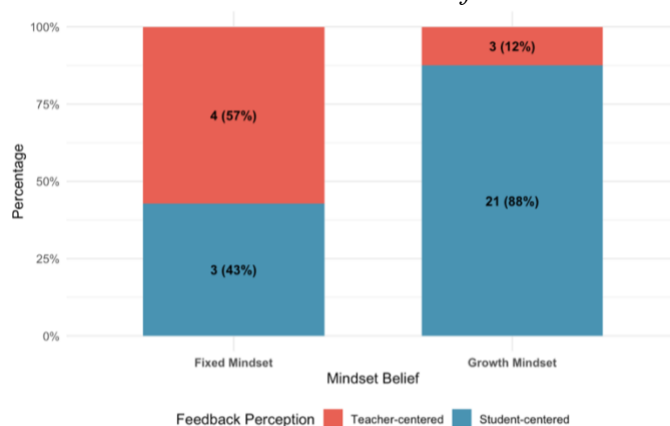


Table 4*Cross-Tabulation of Pre-service Teachers' Mindset Beliefs and Feedback Perception*

			Student-Centered	Teacher-Centered	Total
Interpretation	Fixed Mindset	Count	3	4	7
		% within Interpretation	42.9%	57.1%	100.0%
		% within Feedback Perception	12.5%	57.1%	22.6%
	Growth Mindset	Count	21	3	24
		% within Interpretation	87.5%	12.5%	100.0%
		% within Feedback Perception	87.5%	42.9%	77.4%
Total	Count		24	7	31
	% within Interpretation		77.4%	22.6%	100.0%
	% within Feedback Perception		100.0%	100.0%	100.0%

Note. The table presents the cross-tabulation between pre-service teachers' mindset beliefs and their feedback perception.

Table 4 presents the cross-tabulation of pre-service teachers' mindset beliefs and their written feedback perception. Among 24 pre-service teachers with a growth mindset, 87.5% perceived the feedback as student-centered, while only 12.5% perceived it as teacher-centered. On the other hand, among seven pre-service teachers with a fixed mindset, 57.1% perceived written feedback as teacher-centered, while 42.9% perceived it as student-centered. Results suggest that there was an association between mindset beliefs and feedback perception.

It is also important to note that while SE2R feedback model (Summarize, Explain, Redirect, Resubmit) was utilized in this study—a framework that focuses on student-centered learning—it still cannot guarantee that all pre-service teachers will perceive the feedback as student-centered. This is evident among seven pre-service teachers who perceived the given written feedback as teacher-centered. These results suggest that even well-structured, student-centered feedback can still be misinterpreted due to some moderating factors such as student's prior experience or class/institution norms and culture.

Table 5*Chi-Square Test of Independence Between Mindset Beliefs and Feedback Perception*

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.178 ^a	1	.013		
Continuity Correction ^b	3.888	1	.049		
Likelihood Ratio	5.472	1	.019		
Fisher's Exact Test				.029	.029
N	31				

Note. a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 1.58.

b. Computed only for a 2x2 table

A Chi-Square Test of Independence was conducted to determine the association between pre-service teachers' mindset beliefs (fixed vs. growth mindset) and their feedback perception (teacher-centered or student-centered). The test yielded a statistically significant result, $\chi^2(1, N$

$= 31) = 6.178, p = .013$, indicating that feedback perception was significantly associated with mindset belief. Results concluded that the interpretation of written feedback (teacher-centered or student-centered) depended on the mindset beliefs of pre-service teachers (fixed or growth mindset).

However, since 25% of the cells had expected counts less than 5, the Fisher's Exact Test was also performed. The result still showed statistically significant association ($p = .029$), thereby confirming and strengthening the initial conclusion from the chi-square test that pre-service teachers' perception of written feedback was significantly associated with their mindset belief. In conclusion, the results show a significant association between mindset belief and feedback perception, however, even well-structured feedback may still be misinterpreted by students. This highlights the importance of promoting a growth mindset culture within teacher education programs to maximize the effectiveness of written feedback and to be able to create a more conducive student-centered classroom. When teacher education programs have a growth-mindset culture, students will believe that their abilities are not fixed, and they will perceive feedback as a constructive guidance and not a judgment of their abilities.

Figure 5

Pre-service Teachers' Feedback Utilization and Their Feedback Perception

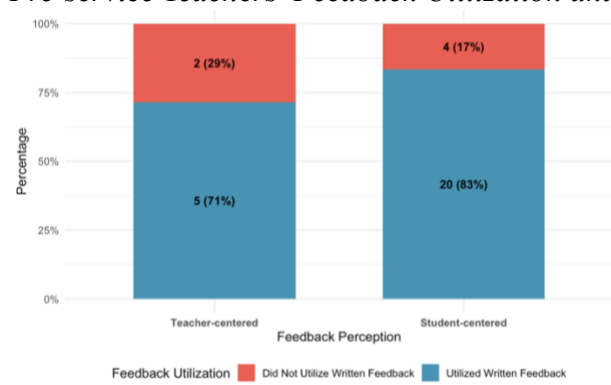


Table 6

Chi-Square Test of Independence Between Feedback Perception and Feedback Utilization

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.492 ^a	1	.483		
Continuity Correction ^b	.025	1	.875		
Likelihood Ratio	.460	1	.498		
Fisher's Exact Test				.596	.413
N	31				

Note. a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 1.35.

b. Computed only for a 2x2 table

A Chi-Square Test of Independence was conducted to determine the association between pre-service teachers' feedback perception (teacher-centered or student-centered) and their feedback utilization. The test yielded no statistically significant association, $\chi^2(1, N = 31) = .492, p = .483$, indicating that there is not enough statistical evidence to conclude the existence of a meaningful association between the two variables. Results suggested that pre-service teachers' feedback perception does not necessarily determine whether they will utilize the received written feedback.

This means that other factors, such as feedback clarity, students' intrinsic motivation, and the amount of time given or allowed to react to and engage with feedback, may have a stronger influence on students' feedback utilization. Perceiving written feedback as student-centered may not always guarantee feedback utilization especially if students lack feedback literacy. Moreover, some pre-service teachers with a teacher-centered perception also utilized the feedback, confirming that feedback perception is not a predictor of feedback utilization.

In conclusion, while student-centered feedback perception is often associated with better learning outcomes, the results indicate that it is not a sufficient predictor of feedback utilization. Academic institutions should integrate feedback literacy training with complementary strategies that develops students' ability to reflect on their own learning and self-regulation learning. This approach could strengthen their ability to interpret and engage with constructive written feedback.

Thematic Analysis

Thematic analysis was performed to analyze qualitative data because it is a systematic way to identify and report recurring patterns or themes (Braun & Clarke, 2006). The analysis followed Braun and Clarke's six-phase framework: (1) familiarization with the data, (2) generation of initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the report.

Table 7

Triangulation of Survey and Interview Data on Pre-service Teachers' Perceptions of Written Feedback

Participant	Mindset Orientation	Interview Theme	Triangulation Result	Remark
R002	Growth Mindset	Student-centered	Convergent	Strong match between survey and interview
R003	Fixed Mindset	Teacher-centered	Convergent	Strong match between survey and interview
R005	Fixed Mindset	Student-centered	Divergent	Interview suggests student-centered perception despite having a fixed mindset result in the survey.
R006	Growth Mindset	Teacher-centered	Divergent	Interview suggests teacher-centered perception despite having a growth mindset result in the survey.
R009	Fixed Mindset	Teacher-centered	Convergent	Strong match between survey and interview
R030	Growth Mindset	Student-centered	Convergent	Strong match between survey and interview

Note. This table presents the triangulated results between survey-based perceptions and interview-derived themes of six pre-service teachers regarding written feedback.

Table 7 presents the triangulation of survey responses and interview themes on pre-service teachers' perceptions of written feedback. The table highlights pre-service teachers' mindset

orientation, derived interview themes, triangulation result (convergent or divergent), and remarks. Only six of 31 pre-service teachers were selected for this triangulation procedure because they were identified as needing improvement on their classwork assignment, while the other 25 pre-service teachers did not need to improve their work.

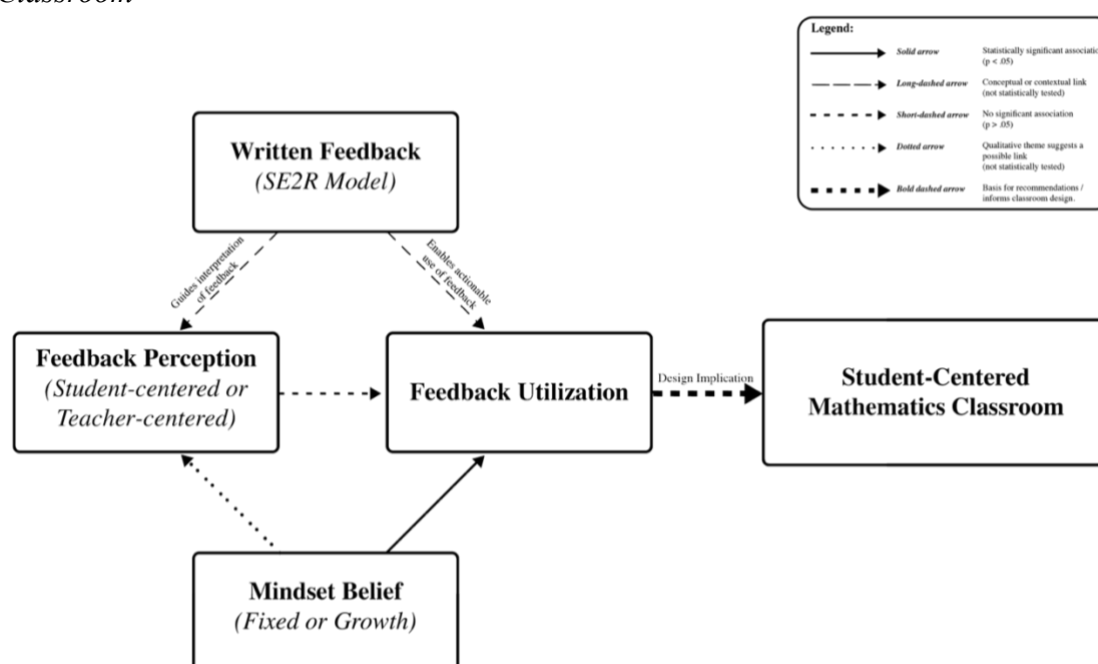
In summary, there were four convergent results and two divergent results. Convergent results indicate a strong match between pre-service teachers' survey-based mindset belief and derived interview themes, such that growth mindset corresponded with a student-centered feedback perception and a fixed mindset corresponded with a teacher-centered feedback perception. On the contrary, divergent results suggest otherwise, in which fixed mindset corresponded with a student-centered feedback perception and a growth mindset corresponded with a teacher-centered feedback perception.

In conclusion, the triangulation results revealed a more comprehensive understanding on how pre-service teachers made sense of the written feedback. Evidence showed that most cases translated as convergent, indicating that pre-service teachers' survey-based mindset orientation corresponded to their interview-derived theme. However, the emergence of few divergent results should not be overlooked. This suggests that survey-based mindset orientation does not always strongly match the interview-derived themes, and that other factors may influence how pre-service teachers interpret and engage with the received written feedback. Further and deeper qualitative analysis is recommended.

Final Conceptual Framework

Figure 6

Final Conceptual Framework Linking Written Feedback, Mindset Belief, Feedback Perception, Feedback Utilization, and the Design of a Student-Centered Mathematics Classroom



This conceptual framework shows written feedback, following the SE2R feedback model, as an instructional context that guides how pre-service teachers perceive and utilize written feedback. Moreover, mindset belief is modeled as a factor that is significantly associated with

feedback utilization ($p < .05$), which indicates that mindset is related to how pre-service teachers engage with and utilize written feedback. On the contrary, feedback perception and feedback utilization revealed no significant association ($p > .05$), which suggests that interpreting or perceiving feedback as student-centered does not translate into higher feedback utilization. However, it is recommended to further investigate other moderating factors that may have to non-significant association such as, but not limited to sample size limitations, self-efficacy of pre-service teachers, assessment culture and structure, and workload constraints. Qualitative theme further suggests a possible link between mindset belief and feedback perception. Overall, the framework reveals that feedback utilization functions as a pragmatic basis for designing and creating a student-centered mathematics classroom.

Conclusion

Empirical data and related literature reinforced the claims and conclusions about pre-service mathematics teachers' mindset beliefs, their perception and utilization of written feedback, and how these could inform the design of student-centered mathematics classrooms in local colleges and universities.

The study revealed that most pre-service teachers exhibited a growth mindset (77.4%), which is consistent with the claim of Claro et al. (2016). This implies that majority of the pre-service mathematics teachers were more likely to engage with feedback and perceive learning as a continuous process and that their math ability can improve overtime through consistent practice. However, a small percentage (22.6%) exhibited fixed mindset beliefs, which reveals perennial challenge for teacher education programs that aims to foster reflective thinking and adaptive future educators (Yeager & Dweck, 2020).

Although the study employed a structured student-centered feedback model (SE2R), not all pre-service mathematics teachers perceived it as student-centered. The feedback was mostly perceived as student-centered (77.4 %), which implies that pre-service teachers valued the feedback that gave them clearer steps for improvement and that was actionable. This reinforces the claim that employing a structured feedback model, such as the SE2R, can support more meaningful student learning outcomes.

The results of the study indicated a statistically significant association between pre-service mathematics teachers' mindset belief and their feedback utilization ($p < .05$). In mathematics context, this suggests that pre-service teachers with a growth mindset are more likely to compare the written feedback against their work or solution, reflect on the errors committed, and make the necessary revisions to improve the quality of their work. This is aligned with the findings of Cutumisu and Schwartz (2018) that students who exhibit growth mindset beliefs are more open to and are more likely to engage with and utilize feedback. In contrast, those with fixed mindsets may completely disregard the written feedback, take no further action such as clarifying misconceptions or revising the work, or interpret it as direct criticism of their mathematics ability. These findings strengthen the claim that even in a localized context, mindset beliefs significantly influenced how individuals engage with and utilize written feedback.

Additionally, the findings also revealed a statistically significant association between pre-service teachers' mindset beliefs and their perception of written feedback ($p < .05$). This means that those with growth mindset were more likely to perceive written feedback as actionable, constructive, timely, and specific, while those with fixed mindset were more likely to perceive

it as evaluative and corrective. Therefore, these observed significant associations reinforce the need to cultivate a growth mindset culture and an explicit feedback literacy in teacher preparation programs to strengthen student-centered feedback utilization and to inform the design of student-centered mathematics classroom.

Although pre-service teachers' mindset beliefs demonstrated significant associations between feedback perception and feedback utilization, further statistical analysis revealed that the association between feedback perception and feedback utilization is not significant. This implies that pre-service mathematics teachers' feedback perception—whether student-centered or teacher-centered— does not meaningfully influence whether they engage with and utilize written feedback they receive. Moreover, this also means that having a student-centered feedback perception alone does not always translate to feedback utilization. This highlights the need to address other moderating factors such as sample size limitations, self-efficacy of pre-service teachers, assessment culture and structure, and workload constraints.

Finally, the triangulation data revealed that most pre-service teachers' mindset beliefs (fixed or growth mindset) and their feedback perception (student-centered or teacher-centered) are convergent. However, some mismatches still occurred, which indicates that pre-service teachers' mindset belief alone does not determine how they perceive the given feedback. These inconsistencies must not be overlooked because they suggest that some other factors may have also influenced the change in perception. Some possible factors are student's prior experience or class/institution norms and culture, and feedback literacy. Therefore, integrating feedback literacy training, particularly using SE2R, with mindset development can help with the alignment of beliefs with practices, promote growth mindset culture and student-centered learning, and prepare future educators to interpret and engage with written feedback purposely and constructively.

In summary, the conclusions highlighted that there exist a significant association between pre-service teachers' mindset beliefs and feedback perception and utilization. The findings are aligned with existing literature and theoretical frameworks while also presenting context-specific recommendations that inform the development of student-centered mathematics classrooms in local colleges and universities.

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

The author declares that ChatGPT and QuillBot, AI-assisted writing software, were used in proofreading and refining the language used in the manuscript. The usage was limited to correcting grammatical and spelling errors and rephrasing statements for accuracy and clarity. The author further declares that, apart from ChatGPT and QuillBot, no other AI or AI-assisted technologies have been used to generate content in writing the manuscript. The ideas, design, procedures, findings, analyses, and discussion are originally written and derived from careful and systematic conduct of the research.

References

- Barnes, M. (2015). *Assessment 3.0: Throw out your grade book and inspire learning*. Corwin.
- Bishop, A. J. (1999). Mathematics teaching and values education: An intersection in need of research. *ZDM*, 31(1), 1–4.
- Boaler, J., Dieckmann, J. A., & LaMar, T. (2021). The transformative impact of a mathematical mindset experience taught at scale. *Frontiers in Education*, 6, 784393.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
- Brookhart, S. M. (2017). *How to give effective feedback to your students* (2nd ed.). ASCD.
- Carless, D., & Boud, D. (2018). The development of student feedback literacy: Enabling uptake of feedback. *Assessment & Evaluation in Higher Education*, 43(8), 1315–1325.
- Carless, D., & Winstone, N. E. (2019). *Designing effective feedback processes in higher education: A learning-focused approach*. Routledge.
- Carroll, E. L. (2022). *Understanding college students' use of written feedback in mathematics* [Master's thesis, Brigham Young University]. BYU ScholarsArchive.
- Claro, S., Paunesku, D., & Dweck, C. S. (2016). Growth mindset tempers the effects of poverty on academic achievement. *Proceedings of the National Academy of Sciences*, 113(31), 8664–8668.
- Cutumisu, M., & Schwartz, D. L. (2018). The impact of critical feedback choice on students' revision, performance, learning, and memory. *Computers in Human Behavior*, 78, 351–367.
- Dweck, C. S. (2016). *Mindset: The new psychology of success* (Updated ed.). Ballantine Books.
- Gravemeijer, K., & Cobb, P. (2006). Design research from a learning design perspective. In J. van den Akker, K. Gravemeijer, S. McKenney, & N. Nieveen (Eds.), *Educational design research* (pp. 17–51). Routledge.
- Henderson, M., Phillips, M., Ryan, T., Boud, D., Dawson, P., Molloy, E., & Mahoney, P. (2019). Conditions that enable effective feedback. *Higher Education Research & Development*, 38(7), 1401–1416.
- Hiebert, J., & Grouws, D. A. (2007). The effects of classroom mathematics teaching on students' learning. In F. K. Lester Jr. (Ed.), *Second handbook of research on mathematics teaching and learning: A project of the National Council of Teachers of Mathematics* (pp. 371–404). Information Age Publishing.

- Kastberg, S. E., Lischka, A. E., & Hillman, S. L. (2020). Characterizing mathematics teacher educators' written feedback to prospective teachers. *Journal of Mathematics Teacher Education*, 23(2), 131–152.
- Kroeper, K. M., Fried, A. C., & Murphy, M. C. (2022). Towards fostering growth mindset classrooms: Identifying teaching behaviors that signal instructors' fixed and growth mindset beliefs to students. *Social Psychology of Education*, 25(2–3), 371–398.
- Sherin, M. G., & van Es, E. A. (2009). Effects of video club participation on teachers' professional vision. *Journal of Teacher Education*, 60(1), 20–37.
- Shute, V. J. (2008). Focus on formative feedback. *Review of Educational Research*, 78(1), 153–189.
- Sun, K. (2015). *The role of mindset and attributions in college students' learning from negative feedback* [Doctoral dissertation, Stanford University]. Stanford Digital Repository.
- Thurlings, M., Evers, A. T., & Vermeulen, M. (2015). Toward a model of explaining teachers' innovative behavior: A literature review. *Review of Educational Research*, 85(3), 430–471.
- Winstone, N. E., Balloo, K., & Carless, D. (2022). Discipline-specific feedback literacies: A framework for curriculum design. *Higher Education*, 83(1), 57–77.
- Yeager, D. S., & Dweck, C. S. (2020). What can be learned from growth mindset controversies? *American Psychologist*, 75(9), 1269–1284.

Contact email: profreine@gmail.com

Enhancing Grade 6 Students' Learning Achievement in Circle Graphs Through Experiential Learning

Panitta Wongphanich, Srinakharinwirot University, Thailand
Suwicha Wansudon, Srinakharinwirot University, Thailand
Phatcharida Inthama, Srinakharinwirot University, Thailand
Aungsiya Krataytong, Srinakharinwirot University, Thailand

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This study examined the effects of experiential learning on Grade 6 students' mathematics achievement in circle graphs. Thirty Grade 6 students from Bangkok participated in a one-group pretest-posttest quasi-experimental design. The intervention was based on Kolb's experiential learning cycle, incorporating concrete experience, reflective observation, abstract conceptualization, and active experimentation. Research instruments included activity sheets on interpreting and constructing circle graphs, and a 20-item achievement test. Results showed students' post-test mean score was 15.73 (78.65%), with a standard deviation of 2.35. Furthermore, 73.33% of students achieved above the 60% criterion. Paired-sample t-test revealed significantly higher post-instruction scores compared to pre-instruction scores ($t = 8.47$, $p < .001$). Qualitative observations indicated high engagement, collaborative interaction, and improved problem-solving abilities. These findings confirm that experiential learning effectively enhances mathematical achievement in topics requiring visualization and data interpretation, fostering deeper understanding and active participation among primary school students.

Keywords: experiential learning, mathematics achievement, circle graphs, grade 6 students, instructional effectiveness

iafor

The International Academic Forum
www.iafor.org

Introduction

Education plays a crucial role in developing human capital in contemporary society. The National Education Act B.E. 2542 (1999) of Thailand emphasizes learner-centered approaches, positioning teachers as facilitators who guide students in constructing knowledge through active engagement. In 21st-century mathematics education, instructional approaches must promote higher-order thinking, problem-solving, and real-life application capabilities.

Circle graphs (pie charts) represent a critical topic at the primary level, requiring students to understand proportions, percentages, and data relationships. However, students frequently experience difficulties interpreting and constructing circle graphs due to their abstract nature (Friel et al., 2001). Traditional teaching methods focusing on procedural knowledge often prove insufficient for supporting deep conceptual understanding.

Experiential learning, based on David A. Kolb's (1984) theory, defines learning as “the process whereby knowledge is created through the transformation of experience.” The experiential learning cycle comprises four stages: (1) Concrete Experience, (2) Reflective Observation, (3) Abstract Conceptualization, and (4) Active Experimentation. This cyclical process enables learners to actively engage, reflect, conceptualize, and apply knowledge, facilitating deeper learning outcomes.

Research supports experiential learning's effectiveness in mathematics education. Garfield and Ben-Zvi (2008) emphasized that active, experience-based learning significantly improves understanding of statistical concepts and data representation. Tong (2020) demonstrated that students learning through experiential activities achieved significantly higher performance than those receiving conventional instruction. Similarly, Uyen et al. (2022) found experiential learning positively influenced mathematical achievement and motivation.

Despite growing research support, context-specific studies at the primary level remain limited, particularly in developing countries. In Thailand, many classrooms rely on traditional approaches, limiting opportunities for active engagement. Furthermore, research specifically focusing on experiential learning for Grade 6 circle graphs remains scarce. This gap highlights the need for instructional innovations supporting students' learning in this domain.

This study aims to enhance Grade 6 students' learning achievement in circle graphs through experiential learning, integrating Kolb's cycle into mathematics instruction to promote meaningful learning, improve conceptual understanding, and support real-life application.

Research Objectives

The study sought to: (1) compare Grade 6 students' mathematics achievement in circle graphs before and after implementing experiential learning; (2) examine the efficiency of mathematics lesson plans based on experiential learning according to the 60% criterion; and (3) investigate students' qualitative learning behaviors during experiential learning instruction.

Literature Review

Experiential Learning Theory

Experiential learning, grounded in Kolb's (1984) work, proposes a four-stage learning cycle: concrete experience, reflective observation, abstract conceptualization, and active experimentation. This cyclical process allows learners to construct knowledge actively and apply it to new situations, promoting deeper understanding and retention. In mathematics education, experiential learning aligns with constructivist principles emphasizing that learners construct knowledge through environmental interaction.

Challenges in Teaching Circle Graphs

Teaching circle graphs requires understanding complex relationships among proportions, percentages, and visual representations. Friel et al. (2001) found that students' graph comprehension difficulties stem from limited ability to interpret relationships within graphical representations.

Effectiveness of Experiential Learning

Experiential learning effectively addresses pedagogical challenges. By engaging students in hands-on activities and real-life problem-solving, it helps develop deeper conceptual understanding. Tong (2020) demonstrated that experiential learning students achieved significantly higher academic performance and showed more positive attitudes than those taught conventionally. Uyen et al. (2022) found experiential learning positively influenced achievement and motivation by encouraging active participation and meaningful engagement.

Garfield and Ben-Zvi (2008) emphasized that active learning approaches support deeper understanding of statistical concepts and improve data interpretation abilities. Research consistently indicates experiential learning fosters connecting mathematical knowledge with real-world contexts, improving both conceptual understanding and application skills.

Methodology

Research Design

This study employed a one-group pretest-posttest quasi-experimental design to examine experiential learning effects on Grade 6 students' learning achievement in circle graphs. The instructional intervention was designed based on Kolb's (1984) experiential learning theory.

Participants

Thirty Grade 6 students from a primary school in Bangkok participated, selected through simple random sampling. This sample size was appropriate for classroom-level quasi-experimental research, allowing in-depth examination of learning outcomes and behaviors.

Instructional Procedure

Instruction was systematically structured into four stages aligned with Kolb's experiential learning cycle. Stage 1 (Concrete Experience) introduced students to real-life data

representation situations, such as interpreting pie charts from everyday contexts. Stage 2 (Reflective Observation) engaged students in group discussions analyzing presented data, identifying patterns and relationships. Stage 3 (Abstract Conceptualization) guided students to develop mathematical concepts related to circle graphs, including proportions, percentages, and angles. Stage 4 (Active Experimentation) enabled students to apply knowledge by constructing their own circle graphs based on given datasets and real-life problems.

Research Instruments

Instructional instruments included mathematics lesson plans on circle graphs designed based on experiential learning principles. Data collection instruments included activity worksheets on interpreting and constructing circle graphs, and a mathematics achievement test consisting of 20 items validated by content experts.

Data Collection Procedures

Phase 1 involved students completing a pretest assessing prior knowledge before intervention. Phase 2 consisted of students participating in experiential learning activities based on Kolb's cycle over multiple instructional sessions. Phase 3 required students to complete an identical posttest measuring learning achievement after intervention. Qualitative data were collected through systematic classroom observations examining learning behaviors.

Data Analysis

Quantitative analysis employed descriptive statistics (mean, standard deviation) to summarize learning achievement and paired-sample t-test to compare pretest and posttest scores. Lesson plan efficiency was evaluated using the 60/60 criterion. Qualitative analysis used content analysis of classroom observations to identify patterns in learning behaviors. Triangulation of quantitative and qualitative data provided comprehensive understanding.

Results

Quantitative Results

Students' post-instruction achievement demonstrated substantial improvement, with a mean score of 15.73 out of 20 (78.65%), standard deviation 2.35. Twenty-two students (73.33%) achieved scores above the 60% threshold, indicating substantial majority met minimum performance standards. Eight students (26.67%) scored below this criterion. Paired-sample t-test revealed significantly higher post-instruction achievement compared to pre-instruction at the .05 significance level ($t = 8.47$, $p < .001$). The pretest mean of 10.24 (51.20%) increased to posttest mean of 15.73 (78.65%), representing substantial gains of 5.49 points or 27.45 percentage points.

Table 1

Comparison of Students' Learning Achievement Before and After Experiential Learning (n = 30)

Test	Full Score	Mean	S.D.	t	p
Pretest	20	10.24	2.73	8.47*	.001
Posttest	20	15.73	2.35		

Note. *Statistically significant at .05 level

Systematic classroom observations revealed important patterns. First, most students demonstrated high engagement throughout instruction, actively participating in hands-on activities involving construction and calculation of circle graphs. Second, students exhibited strong collaborative interaction during group work, including sharing ideas, discussing problem-solving strategies, and supporting one another. Third, students showed improved ability connecting experiential knowledge to mathematical problem-solving, successfully applying concepts from worksheets to new situations. Fourth, students not meeting achievement criterion experienced persistent difficulties calculating missing data and interpreting information, particularly during abstract conceptualization, indicating foundational skill gaps. Fifth, students demonstrated progressive development in communicating mathematical ideas, increasingly using appropriate vocabulary and explaining reasoning processes clearly.

Discussion

Alignment With Experiential Learning Theory

The significant improvement in learning achievement ($t = 8.47$, $p < .001$; mean gain 27.45%) can be explained through Kolb's (1984) experiential learning theory. The intervention systematically emphasized all four learning cycle stages, particularly Concrete Experience and Active Experimentation. By allowing students to collect real-life data and apply mathematical concepts to construct circle graphs, the intervention transformed abstract concepts into tangible experiences, enabling deeper conceptual understanding.

Development of Cognitive and Social Skills

Qualitative findings indicate that active participation and peer interaction effectively supported Reflective Observation within Kolb's cycle. Through discussion, verification, and presentation of circle graphs, students developed multiple competencies: analytical thinking, statistical communication, and collaborative skills. This multidimensional development aligns with Garfield and Ben-Zvi (2008), who emphasize that active experiential learning environments are essential for promoting statistical reasoning. The social constructivist dimension—wherein students co-construct knowledge through interaction—appears critical to intervention effectiveness.

Effectiveness and Limitations

The finding that 73.33% achieved above criterion indicates experiential learning effectiveness for most learners. However, the 26.67% not meeting criterion warrant consideration.

Observations revealed these students faced challenges primarily in basic mathematical skills, particularly percentage calculations and interpreting incomplete data. This suggests experiential learning may not be universally sufficient without adequate foundational knowledge support. Abstract Conceptualization requires prerequisite skills; when foundations are weak, students struggle transitioning from concrete experiences to abstract understanding. This aligns with Cobb et al. (2003), emphasizing effective mathematics learning requires both experiential engagement and systematic conceptual development.

Implications for Practice

For teachers, experiential learning can be effectively integrated into primary mathematics classrooms to enhance conceptual understanding. Careful attention to all four learning cycle stages is necessary, with differentiated support for students with weaker foundational skills. For curriculum designers, mathematics curricula should incorporate concrete experience and active experimentation opportunities. Assessment should evaluate both conceptual understanding and procedural skills. For educational policy, professional development should include experiential learning pedagogy training, with classroom resources supporting activity-based learning.

Conclusion

This study aimed to enhance Grade 6 students' circle graph learning achievement through experiential learning based on Kolb's learning cycle. Findings provide strong evidence that experiential learning effectively improves mathematical understanding, particularly in data representation topics. Quantitative results demonstrated significantly higher post-intervention achievement ($t = 8.47$, $p < .001$), with students' mean achievement increasing from 51.20% to 78.65%, representing substantial 27.45 percentage point gains. Furthermore, 73.33% met the 60% performance criterion.

Qualitative findings revealed increased engagement, active participation, and collaborative interaction during learning. Students connected experiential knowledge to mathematical concepts and applied understanding in new contexts. These outcomes reflect Kolb's (1984) key experiential learning principles, particularly integrating concrete experience, reflective observation, abstract conceptualization, and active experimentation.

For mathematics education, this highlights learner-centered instructional approach importance. Experiential learning effectively bridges gaps between abstract mathematical concepts and real-world applications, enhancing conceptual understanding and higher-order thinking skills. However, approximately 26.67% did not meet expected achievement levels, possibly attributed to insufficient foundational mathematical skills. This suggests experiential learning should be complemented with targeted support for students lacking prerequisite knowledge.

The study has limitations. The one-group pretest-posttest design without control group limits definitive causality attribution and generalizability. Relatively small sample size ($n = 30$) and single-school context further constrain generalizability. Despite these limitations, the study provides valuable evidence supporting experiential learning effectiveness for teaching circle graphs.

In conclusion, experiential learning has significant potential enhancing circle graph learning achievement by promoting active engagement and meaningful learning. Systematic integration of Kolb's four-stage learning cycle provides theoretically sound and practically effective frameworks for primary-level mathematics instruction. When implemented with fidelity and complemented with appropriate foundational support, experiential learning can transform students' understanding of challenging mathematical concepts and foster essential 21st-century competencies development.

Future Work

Based on findings and limitations, several future research directions are recommended. First, future studies should employ randomized controlled trials with experimental and control groups establishing definitive causal relationships. Longitudinal studies examining long-term effects are needed to assess knowledge retention over extended periods. Second, replication studies should be conducted across diverse educational settings and diverse learner characteristics, illuminating for whom experiential learning is most effective. Third, future studies should explore experiential learning application in other mathematics areas beyond circle graphs. Fourth, research should investigate experiential learning integration with innovative instructional technologies. Fifth, studies examining teacher professional development for experiential learning are needed. Sixth, future studies should employ methodologies illuminating cognitive and metacognitive processes involved. Seventh, research should investigate strategies for identifying students needing additional support and effective preparatory interventions. Finally, research should explore how experiential learning can be effectively integrated with other evidence-based approaches. These research directions would collectively advance both theoretical understanding and practical implementation of experiential learning in mathematics education.

Acknowledgements

The authors express sincere gratitude to all contributors to this study's successful completion. Heartfelt appreciation to the Grade 6 students whose enthusiasm, cooperation, and active engagement were essential. Deep gratitude to the school administration and teaching staff who facilitated this research. We acknowledge research support from Srinakharinwirot University, Thailand. Appreciation extends to the expert panel who validated research instruments. Thanks to colleagues who provided constructive feedback. We acknowledge foundational theoretical contributions of David A. Kolb and scholarly work of researchers such as Joan Garfield and Dani Ben-Zvi. While benefiting from many contributions, any remaining limitations or errors are solely the authors' responsibility.

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

The authors declare that no generative artificial intelligence tools or large language models were used in conceptualization, design, data collection, data analysis, or interpretation of findings for this research study. The manuscript was written entirely by authors without generative AI assistance. All text, arguments, interpretations, and conclusions represent the original intellectual work of named authors. Standard word processing software and reference management software were used for document preparation. All quantitative analyses were conducted using standard statistical software. Qualitative data analysis was performed by

researchers using systematic content analysis methods without AI assistance. The authors take full responsibility for accuracy, integrity, and originality of all manuscript content.

References

- Cobb, P., McClain, K., & Gravemeijer, K. (2003). Learning about statistical covariation. *Cognition and Instruction*, 21(1), 1–78. https://doi.org/10.1207/S1532690XCI2101_1
- Friel, S. N., Curcio, F. R., & Bright, G. W. (2001). Making sense of graphs: Critical factors influencing comprehension and instructional implications. *Journal for Research in Mathematics Education*, 32(2), 124–158. <https://doi.org/10.2307/749671>
- Garfield, J., & Ben-Zvi, D. (2008). *Developing students' statistical reasoning: Connecting research and teaching practice*. Springer. <https://doi.org/10.1007/978-1-4020-8383-9>
- Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice-Hall.
- Tong, D. H. (2020). Applying experiential learning to teaching the equation of a circle: A case study. *European Journal of Educational Research*, 9(3), 1135–1146. <https://doi.org/10.12973/eu-jer.9.3.1135>
- Uyen, B. P., Tong, D. H., & Lien, N. B. (2022). The effectiveness of experiential learning in teaching arithmetic and geometry in sixth grade. *Frontiers in Education*, 7, Article 858631. <https://doi.org/10.3389/feduc.2022.858631>

Learning Innovation Through Educational Games to Promote Desirable Characteristics of Bachelor of Education Students

Suwicha Wansudon, Srinakharinwirot University, Thailand
Phatcharida Inthama, Srinakharinwirot University, Thailand
Panitta Wongphanich, Srinakharinwirot University, Thailand
Aungsiya Krataytong, Srinakharinwirot University, Thailand

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This study aimed to develop a learning innovation through educational games to promote desirable characteristics among Bachelor of Education students, evaluate its quality, and examine its effectiveness. Employing a mixed-methods approach, a research and development (R&D) process was integrated with a quasi-experimental pretest-posttest control group design. The participants were 58 undergraduate education students, divided into an experimental group ($n = 30$) receiving the educational game intervention, and a control group ($n = 28$). The instruments included an educational game packages, an instructional manual, expert review forms, a desirable characteristics scale, behavioral observation rubrics, and reflective journals. Quantitative data were analyzed using descriptive statistics and analysis of covariance (ANCOVA), while qualitative data underwent thematic analysis. The results indicated that the developed educational game innovation achieved a very good quality level (Mean = 4.66, SD = 0.51). Furthermore, the experimental group demonstrated a statistically significant improvement in desirable characteristics after the intervention compared to their pretest scores ($p < .05$), effectively transforming passive perception into active practice. Students also reported the highest level of satisfaction with the learning innovation (Mean = 4.62, SD = 0.51). The qualitative findings highlighted that the game-based approach successfully fostered proactive problem-solving, collaboration, and ethical decision-making. Ultimately, this research provides empirical evidence that well-designed educational games can significantly enhance essential professional characteristics in higher education.

Keywords: educational games, learning innovation, desirable characteristics, Bachelor of Education students, active learning

iafor

The International Academic Forum
www.iafor.org

Introduction

The landscape of modern teacher education has shifted from a focus on content knowledge to the holistic development of professional competencies and desirable characteristics. In the 21st-century educational framework, pre-service teachers are expected to embody complex attributes, including ethical responsibility, discipline, professional integrity, and collaborative problem-solving skills, which are essential for navigating diverse classroom environments. International benchmarks, such as the OECD Learning Compass 2030 and UNESCO's sustainability goals, emphasize that teacher preparation must cultivate “transformative competencies” that allow educators to act as proactive agents of change (OECD, 2023; UNESCO, 2021). For Bachelor of Education students, who are in the foundational stage of their professional identity, these characteristics are not merely supplementary but are the core of their professional “Evidence of Practice” (Council for the Accreditation of Educator Preparation [CAEP], 2022).

However, traditional pedagogical approaches in higher education often struggle to foster these affective and behavioral domains effectively. Many professional education courses still rely on passive learning models and rote-memorization-based assessments, which fail to engage students deeply or provide authentic opportunities for decision-making (Barkley & Major, 2020). This gap is particularly evident when teaching subjects like “Virtue and Ethics for Teachers.” While students may understand ethical theories intellectually, they often lack the “safe space” required to practice ethical decision-making and witness the consequences of their actions in simulated yet realistic scenarios.

To bridge this gap, game-based learning (GBL) and gamification have emerged as powerful instructional innovations. The effectiveness of these methods is grounded in Self-Determination Theory (SDT), which posits that learning is optimized when the environment supports three basic psychological needs: autonomy, competence, and relatedness (Ryan & Deci, 2017). Well-designed educational games, such as the “Teacher Ethics Quest” developed in this study, provide autonomy through choice-driven narratives, build competence through immediate feedback and level progression, and foster relatedness through cooperative missions. Recent empirical evidence suggests that when gamification is “meaningful”—prioritizing learning objectives over superficial rewards—it significantly boosts intrinsic motivation and long-term behavioral change in higher education (Balalle, 2024; Klock et al., 2020; Sailer & Homner, 2020; Subhash & Cudney, 2018; Wijaya et al., 2022).

In the context of Thailand's professional teacher standards, there is an urgent need for innovations that transform students from passive recipients into proactive problem-solvers. This research aims to address this need by developing a learning innovation through educational games specifically tailored to five dimensions of desirable characteristics: (1) Professional Integrity and Ethics, (2) Ethical Decision-Making, (3) Responsibility and Discipline, (4) Respect, Equity, and Empathy, and (5) Professional Collaboration and Communication. By utilizing a mixed-methods approach and a quasi-experimental design involving 58 Bachelor of Education students, this study rigorously evaluates how these interactive experiences can catalyze the development of professional traits essential for the future of the teaching profession.

Research Objectives

This study was guided by the following specific objectives:

1. To develop a learning innovation through educational games designed to promote the desirable characteristics of Bachelor of Education students.
2. To evaluate the quality of the developed educational game innovation in terms of content validity, appropriateness, and practical feasibility.
3. To examine the effectiveness of the educational game innovation on students' desirable characteristics by comparing pre- and post-intervention scores, as well as comparing outcomes between the experimental and control groups.
4. To explore students' learning experiences and behavioral changes resulting from the implementation of the educational game innovation.

Literature Review

Game-Based Learning and Gamification in Higher Education

The integration of educational games and gamification in higher education has gained widespread attention due to its positive impact on increasing student motivation, engagement, and learning outcomes (Clark et al., 2016; Vlachopoulos & Makri, 2017). Contemporary meta-analyses support that gamification significantly enhances motivation, particularly when game elements are purposefully designed to align with specific learning processes and objectives (Sailer & Homner, 2020). However, caution is advised in the design process; the superficial use of points or badges can lead to a decrease in intrinsic motivation, causing students to focus on point accumulation rather than self-development (Koivisto & Hamari, 2019; Subhash & Cudney, 2018). Consequently, the success or failure of educational game innovations depends heavily on the quality of learner-centered design and assessments that are strictly aligned with target outcomes (Dichev & Dicheva, 2017).

Desirable Characteristics of Pre-service Teachers

Modern teacher education emphasizes the development of professional competencies and desirable characteristics—such as responsibility, ethics, teamwork, and critical thinking—rather than just academic achievement (OECD, 2019). International standards increasingly prioritize “evidence of practice” as a benchmark for teacher certification (Council for the Accreditation of Educator Preparation [CAEP], 2022). In this study, desirable characteristics are categorized into five dimensions: (1) Professional Integrity and Ethics, (2) Ethical Decision-Making, (3) Responsibility and Discipline, (4) Respect, Equity, and Empathy, and (5) Professional Collaboration and Communication. Regarding assessment, research suggests that relying solely on self-reporting is insufficient due to potential social desirability bias. Therefore, a multi-method approach involving behavioral observation rubrics and reflective journals is employed to enhance the reliability and construct validity of the findings (Dichev & Dicheva, 2017; Vlachopoulos & Makri, 2017).

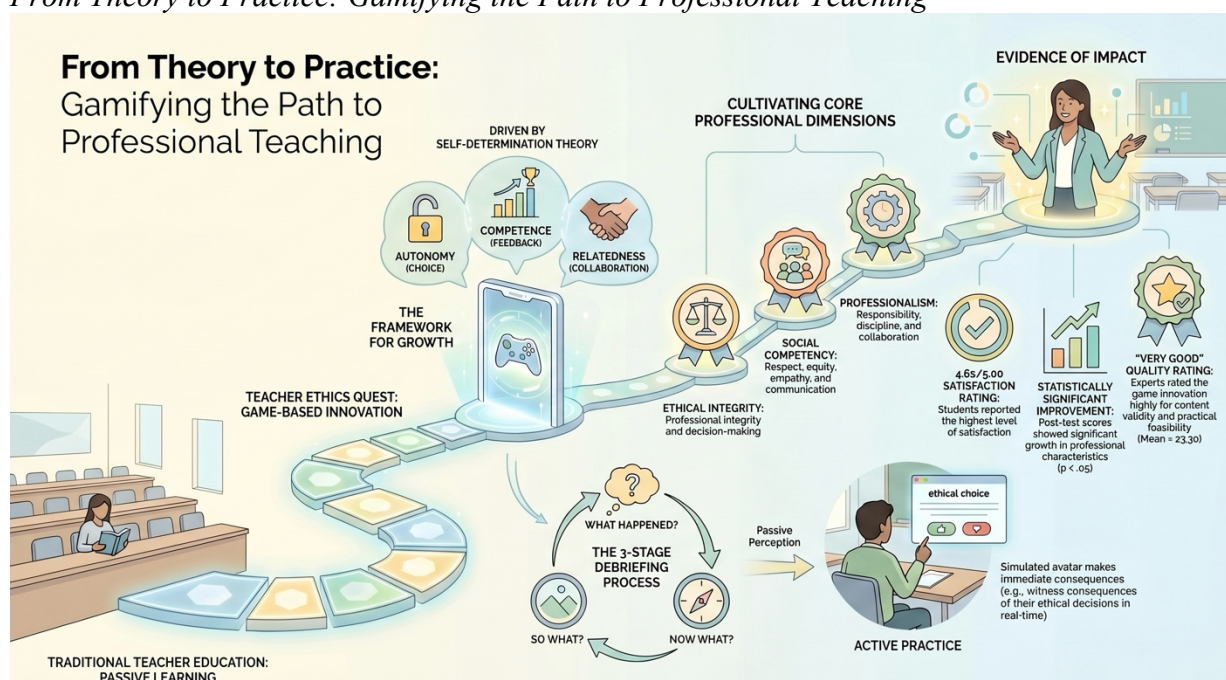
Self-Determination Theory in Educational Game Design

The development of educational games in this research is grounded in Self-Determination Theory (SDT), which posits that well-designed games foster intrinsic motivation by satisfying three basic psychological needs: autonomy, competence, and relatedness (Ryan & Deci, 2017). Designing games for the teaching profession requires alignment with target

competencies, specifically through scenario-based missions that allow students to practice decision-making and take responsibility for outcomes (Vlachopoulos & Makri, 2017). Furthermore, the concept of “tailored gamification” is crucial for mitigating negative side effects of competition by prioritizing social collaboration (Klock et al., 2020; Koivisto & Hamari, 2019). The most vital mechanism for transforming game experiences into principled knowledge is the provision of appropriate feedback and the implementation of systematic debriefing processes at every stage (Vlachopoulos & Makri, 2017).

Figure 1

From Theory to Practice: Gamifying the Path to Professional Teaching



Conceptual Framework

Theoretical Underpinnings

The conceptual framework of this study is built upon the integration of game-based learning (GBL) and Self-Determination Theory (SDT). According to SDT, learning environments that satisfy the three basic psychological needs—autonomy, competence, and relatedness—are more likely to foster intrinsic motivation and long-term behavioral change. In this study, the educational game “Teacher Ethics Quest” is designed to provide students with choice-driven narratives (autonomy), immediate feedback on ethical decisions (competence), and collaborative missions (relatedness). These interactive experiences serve as a catalyst for transforming passive theoretical knowledge into active professional practice.

Research Variables and Logical Flow

The framework outlines a systematic relationship between the following key components:

1. **Independent Variable (Input):** The learning innovation through educational games, comprising the game packages, structured lesson plans, and the three-stage debriefing process (What happened? So what? Now what?).

2. **Theoretical Mediator (Process):** The application of SDT and reflective thinking. Students engage in simulated ethical dilemmas where they must apply professional principles to resolve conflicts.
3. **Dependent Variables (Output):** The development of 15 behavioral indicators across 5 dimensions of desirable characteristics: (1) Professional Integrity and Ethics, (2) Ethical Decision-Making, (3) Responsibility and Discipline, (4) Respect, Equity, and Empathy, and (5) Professional Collaboration and Communication.

The logic of this framework posits that when pre-service teachers are immersed in a high-engagement, game-based environment, they gain the “safe space” needed to practice professional traits, which are then reinforced through systematic reflection and evidence-based assessment.

Theoretical Framework

The conceptual framework of this study is grounded in the logical progression from game-based interaction to behavioral development. The primary theoretical foundation is Self-Determination Theory (SDT), which posits that learning environments are most effective when they satisfy three basic psychological needs: autonomy, competence, and relatedness (Ryan & Deci, 2017). By designing game mechanics that provide meaningful choices (autonomy), clear progression and feedback (competence), and cooperative missions (relatedness), the innovation fosters high levels of intrinsic motivation among pre-service teachers. This heightened engagement allows students to actively practice complex ethical decision-making and professional behaviors in a safe, simulated environment. These experiences are subsequently internalized and transformed into professional characteristics through structured debriefing sessions that bridge gameplay with professional standards.

Research Variables

To rigorously evaluate the impact of the developed innovation, the following variables were established:

1. **Independent Variable:** The learning innovation through educational games, which includes the “Teacher Ethics Quest” game packages, comprehensive instructional plans, and the systematic debriefing process.
2. **Dependent Variable:** The desirable characteristics of Bachelor of Education students, specifically categorized into five key dimensions: (1) Professional Integrity and Ethics, (2) Ethical Decision-Making, (3) Responsibility and Discipline, (4) Respect, Equity, and Empathy, and (5) Professional Collaboration and Communication.
3. **Control Variables:** Factors maintained consistently throughout the study, including the total instructional time (5-week intervention), course content (Virtue and Ethics for Teachers), the instructor, the physical learning environment, and the group assignment process.

Figure 2
Conceptual Framework



Methodology

Research Design

This study employed a mixed-methods research design, integrating a Research and Development (R&D) framework with a quasi-experimental pretest-posttest control group design. The R&D phase focused on the systematic creation and validation of the educational game and its accompanying instructional manual by domain experts. Subsequently, the quasi-experimental phase was implemented to evaluate the effectiveness of the intervention on behavioral indicators. Furthermore, qualitative methods were integrated to explain the underlying mechanisms of behavioral change and capture the nuances of the learning experience.

Participants

The participants consisted of 58 undergraduate students enrolled in the Bachelor of Education program at Srinakharinwirot University. Using a purposive sampling approach adapted for practical classroom constraints, the students were assigned to either an experimental group ($n = 30$), which received the educational game intervention, or a control group ($n = 28$), which underwent traditional instructional activities.

Research Instruments

The study utilized five primary instruments to ensure data triangulation and validity:

- 1. Educational Game Package and Manual:** An original card-driven board game titled "Teacher Ethics Quest," featuring scenario-based dilemma cards and cooperative mechanics designed to foster ethical decision-making.

2. *Expert Review Forms*: Utilized by a panel of five experts to assess the content validity (Index of Item-Objective Congruence: IOC/CVI), appropriateness, and practical feasibility of the innovation.
3. *Desirable Characteristics Scale*: A self-assessment tool measuring five dimensions: Professional Integrity and Ethics, Ethical Decision-Making, Responsibility and Discipline, Respect, Equity and Empathy, and Professional Collaboration and Communication. The reliability of this scale was established using Cronbach's alpha.
4. *Behavioral Observation Rubrics*: Employed to evaluate 15 specific behavioral indicators during gameplay. Two independent observers utilized a 4-level rubric to ensure assessment consistency.
5. *Reflective Journals and Interviews*: Semi-structured qualitative tools designed to capture students' reflections on their behavioral shifts, learning obstacles, and overall satisfaction.

Data Collection

The intervention spanned a period of five weeks. In the first week, an orientation was conducted, and baseline data were collected via pretests. Over the subsequent weeks, the experimental group engaged in the educational game modules, during which behavioral observations and weekly reflections were systematically recorded. In the final week, posttests were administered, followed by focus group interviews to gather in-depth qualitative feedback.

Data Analysis

Quantitative data were analyzed using descriptive statistics, including mean and standard deviation. To test the research hypotheses, an Analysis of Covariance (ANCOVA) was employed to compare the posttest scores between the experimental and control groups while controlling for initial pretest differences. Effect sizes, specifically partial η^2 or Cohen's d , were calculated to determine the practical significance of the educational game. Qualitative data derived from interviews and reflective journals were transcribed and analyzed using thematic analysis, employing techniques such as member checking and inter-coder agreement to ensure trustworthiness and structural validity.

Quality of the Educational Game Innovation

The educational game innovation, "Teacher Ethics Quest," underwent a rigorous evaluation by a panel of five experts to assess its content validity, appropriateness, and practical feasibility. The results indicated that the overall quality of the developed innovation was at a "very good" level (Mean = 4.66, SD = 0.51). The experts highlighted that the game mechanics effectively aligned with the targeted learning outcomes and provided highly relevant situational feedback.

Table 1*Expert Evaluation of the Educational Game Innovation Appropriateness*

Evaluation Dimensions	Mean	SD	Quality Level
Alignment with Learning Outcomes	4.70	0.45	Very Good
Accuracy of Content	4.60	0.55	Very Good
Game Mechanics and Feedback	4.75	0.48	Very Good
Practical Feasibility	4.59	0.52	Very Good
Overall Average	4.66	0.51	Very Good

Note. N = 5 experts.

Effectiveness on Desirable Characteristics

Following the five-week intervention, the desirable characteristics of Bachelor of Education students were assessed. Within the experimental group, students demonstrated a statistically significant increase in their desirable characteristics scores after the intervention compared to their pre-intervention baseline ($p < .05$).

Table 2*Comparison of Pretest and Posttest Scores for the Experimental Group*

Dimensions of Desirable Characteristics	Pretest		Posttest		t	p	Cohen's d
	Mean	SD	Mean	SD			
Professional Integrity & Ethics	3.42	0.65	4.51	0.48	9.85	< .001	1.80
Ethical Decision-Making	3.35	0.58	4.45	0.52	10.21	< .001	1.86
Responsibility & Discipline	3.50	0.62	4.55	0.45	9.45	< .001	1.72
Respect, Equity, & Empathy	3.48	0.55	4.60	0.42	10.50	< .001	1.91
Collaboration & Communication	3.30	0.60	4.48	0.50	11.12	< .001	2.03
Total Characteristics Score	3.41	0.52	4.52	0.38	12.35	< .001	2.25

Note. n = 30.

To rigorously compare the effectiveness of the intervention between the experimental and control groups while accounting for initial differences and multiple variables, a Two-way Analysis of Covariance (Two-way ANCOVA) was conducted, using the pretest scores as the covariate. The analysis revealed a significant main effect of the instructional method on the posttest scores, indicating that students in the gamified experimental group outperformed those in the traditional control group across the measured dimensions. Furthermore, students reported the highest level of satisfaction with the learning innovation (Mean = 4.62, SD = 0.51).

Table 3*Two-Way ANCOVA Results for Desirable Characteristics Between Groups*

Source of Variance	Type III Sum of Squares	df	Mean Square	F	p	Partial η^2
Corrected Model	9.70	2	4.85	50.52	< .001	.647
Intercept	12.50	1	12.50	130.21	< .001	.703
Pretest (Covariate)	4.50	1	4.50	46.88	< .001	.459
Group (Instructional Method)	5.20	1	5.20	54.17	< .001	.495
Error	5.28	55	0.096			
Total (Total SS)	1215.40	58				
Corrected Total	14.98	57				

Note. N = 58 (Experimental n = 30, Control n = 28)

Qualitative Findings on Student Experience

To triangulate the quantitative data, thematic analysis was applied to the semi-structured interviews and reflective journals. The qualitative findings provided deep insights into the mechanisms driving the behavioral changes, revealing three primary themes:

1. **Increased Engagement and Intrinsic Motivation:** Students consistently reported that the game mechanics, such as role-playing and limited resources, transformed abstract ethical theories into engaging challenges. The autonomy provided within the game significantly boosted their motivation to actively participate.
2. **A Safe Environment for Trial and Error:** Participants expressed that the game served as a “safe space” where they could explore the consequences of various ethical decisions without facing real-world disciplinary repercussions. The structured debriefing sessions were frequently cited as the critical bridge connecting game outcomes to professional teaching standards.
3. **Enhanced Professional Collaboration and Communication:** The cooperative nature of the “Teacher Ethics Quest” required students to actively listen, negotiate, and establish consensus. Students noted that the necessity to manage conflicting viewpoints during the game directly improved their real-world group communication skills.

Discussion

The findings of this study demonstrate that the educational game innovation significantly enhanced the desirable characteristics of pre-service teachers. This success can be explained through a mechanism-based perspective grounded in Self-Determination Theory (SDT). The game mechanics—such as role-playing and scenario-based dilemmas—effectively satisfied the students' psychological needs for competence and relatedness, leading to increased intrinsic motivation and active engagement. Furthermore, the structured debriefing sessions served as a crucial catalyst, transforming raw interactive experiences into internalized professional principles and ethical understanding.

These results align with contemporary meta-analyses and systematic reviews which assert that meaningful game-based learning and gamification exert a positive impact on behavioral outcomes in higher education. Unlike superficial gamification approaches that rely solely on

points and badges—which can sometimes yield uncertain or diminished motivational results—the “Teacher Ethics Quest” focused on deep cognitive involvement and professional relevance.

In terms of implications for teacher education, this innovation successfully bridges the gap between theoretical knowledge and practical application. By transforming passive perception into active, scenario-based problem-solving, the study directly addresses the international demand for competency-based preparation and “evidence of practice” in teacher accreditation. Ultimately, it cultivates the exact future-oriented competencies—such as ethical responsibility, critical collaboration, and equity—that global educational frameworks currently emphasize.

Conclusion

Summary of Findings

This study successfully developed, validated, and implemented a high-quality educational game innovation designed to promote desirable characteristics among Bachelor of Education students. Both quantitative and qualitative findings confirmed that the gamified intervention significantly outperformed traditional instructional methods, effectively shifting students from passive learners to proactive, ethical problem-solvers.

Recommendations for Practice

For educators intending to implement similar innovations, it is highly recommended to prioritize collaborative game mechanics over purely competitive ones. This approach mitigates potential negative side effects, such as unhealthy rivalry or stress, ensuring a supportive learning environment. Additionally, the debriefing process must be strictly maintained as a mandatory component of the activity, and behavioral assessments should combine observational rubrics with self-reporting to ensure comprehensive evaluation.

Limitations and Future Research

Despite the positive outcomes, certain limitations must be acknowledged. The quasi-experimental design, while practical for real classroom settings, inherently limits complete participant randomization. Furthermore, the five-week intervention period may be relatively short for observing the permanent internalization of complex ethical traits, and the overall effectiveness remains partially dependent on the instructor's facilitation and debriefing skills.

Future research should aim to implement the innovation across different courses and universities to establish broader generalizability. Conducting longitudinal studies to track these students during their actual teaching practicums would provide valuable insights into the long-term retention of these characteristics. Finally, integrating digital learning analytics to capture real-time behavioral data during gameplay could offer robust, objective evidence of students' cognitive and ethical development.

Acknowledgements

The authors would like to express their sincere gratitude to the 58 undergraduate students from the Bachelor of Education program at Srinakharinwirot University for their active participation and valuable reflections throughout this study. We also extend our deep appreciation to the panel of five experts who rigorously evaluated and provided constructive feedback on the “Teacher Ethics Quest” educational game innovation. Finally, we thank Srinakharinwirot University for fostering an academic environment that supports educational research and innovation.

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

The author declares that no AI or AI-assisted technologies have been used to generate, refine, or correct the content in the manuscript. The ideas, design, procedures, findings, analyses, and discussion are originally written and derived from careful and systematic conduct of the research.

References

- Balalle, H. (2024). Exploring student engagement in technology-based education in relation to gamification, online/distance learning, and other factors: A systematic literature review. *Social Sciences and Humanities Open*, 9(1), 100870. <https://doi.org/10.1016/j.ssaho.2024.100870>
- Barkley, E. F., & Major, C. H. (2020). *Student engagement techniques: A handbook for college faculty* (2nd ed.). John Wiley & Sons.
- Clark, D. B., Tanner-Smith, E. E., & Killingsworth, S. S. (2016). Digital games, design, and learning: A systematic review and meta-analysis. *Review of Educational Research*, 86(1), 79–122. <https://doi.org/10.3102/0034654315582065>
- Council for the Accreditation of Educator Preparation. (2022). *CAEP standards*. <https://caepnet.org/standards>
- Dichev, C., & Dicheva, D. (2017). Gamifying education: What is known, what is believed and what remains uncertain: A critical review. *International Journal of Educational Technology in Higher Education*, 14(9), 1–36. <https://doi.org/10.1186/s41239-017-0042-5>
- Klock, A. C. T., Gasparini, I., Pimenta, M. S., & Hamari, J. (2020). Tailored gamification: A review of literature. *International Journal of Human–Computer Studies*, 144, 102495. <https://doi.org/10.1016/j.ijhcs.2020.102495>
- Koivisto, J., & Hamari, J. (2019). The rise of motivational information systems: A review of gamification research. *International Journal of Information Management*, 45, 191–210. <https://doi.org/10.1016/j.ijinfomgt.2018.10.013>
- OECD. (2019). *OECD future of education and skills 2030: OECD learning compass 2030*. <https://www.oecd.org/education/2030-project/>
- OECD. (2023). *The Future of Education and Skills 2030: Interactive Compass*. <https://www.oecd.org/education/2030-project/>
- Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Press.
- Sailer, M., & Homner, L. (2020). The gamification of learning: A meta-analysis. *Educational Psychology Review*, 32, 77–112. <https://doi.org/10.1007/s10648-019-09498-w>
- Subhash, S., & Cudney, E. A. (2018). Gamified learning in higher education: A systematic review of the literature. *Computers in Human Behavior*, 87, 192–206. <https://doi.org/10.1016/j.chb.2018.05.028>
- UNESCO. (2021). *Reimagining our futures together: A new social contract for education*. UNESCO Publishing.

- Vlachopoulos, D., & Makri, A. (2017). The effect of games and simulations on higher education: A systematic literature review. *International Journal of Educational Technology in Higher Education*, 14(22), 1–33. <https://doi.org/10.1186/s41239-017-0062-1>
- Wijaya, T. T., Wijaya, V. V., & Santoso, H. A. (2022). Gamification and game-based learning: A systematic review. *Journal of Educational Technology and Society*, 25(4), 11–25.

Contact email: suwichaw@g.swu.ac.th

Translanguaging and Its Impact on Malaysian Preschool Children's Vocabulary and Cultural Identities: A Case Study From Johor Bahru

Liang Chuan Lau, HELP University, Malaysia

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

Malaysia's multilingual and multicultural environment provides both unique prospect and challenges for pre-primary education. Young learners often navigate multiple languages in their daily activities, making translanguaging an increasingly relevant pedagogical practice. This paper presents preliminary findings on the impact of translanguaging in supporting vocabulary development, cultural identity and multicultural engagement among 5- and 6-year-old children in the early childhood classroom. In particular, it focuses on how vocabulary is learned as multiple languages are used between the teacher and the children as well as amongst the children themselves. The study employs the qualitative-method approach, combining classroom observation and interviews to capture both teacher- student and peer interactions. Thematic analysis is used to analyse the transcripts while observations notes provided additional contextual detail on children's linguistic and cultural practices. The findings reveal that translanguaging plays an important role in helping children learn new vocabulary, as they draw upon their diverse linguistic repertoires to construct meaning and learn new words from both teachers or their peers. Furthermore, translanguaging serves as a valuable resource for identity expression, allowing students to validate their cultural heritage while cultivating a sense of belonging in the classroom. It also fosters intercultural engagement by encouraging children to negotiate and exchange meanings across diverse languages and cultural norms.

Keywords: translanguaging, multilingual, multicultural, cultural identity

iafor

The International Academic Forum
www.iafor.org

Introduction

This study looks at an important gap in early childhood education. It explores how using all languages together—called translanguageing—helps young children learn new words and develop their cultural identity. While many studies have shown the benefits of translanguageing for older students in primary and secondary school, very little research has been done with young children. This is surprising because young children naturally use all the languages they know to understand the world around them. Unlike older learners, who may have learned to keep languages separate, young children mix languages freely without thinking of them as different systems. Translanguageing teaching supports this natural habit, helping teachers build new vocabulary on top of words children already know, while also respecting the culture and identity tied to their home languages. This respect is very important because banning a child's home language does not just limit their vocabulary—it can hurt their sense of self and their ability to think deeply. In Malaysia, a country with many languages including English, Bahasa Malaysia, Chinese, and Indian languages, young children in places like Johor Bahru already move easily between different language varieties. However, most research on Malaysian early childhood education has focused only on learning through play, ignoring how children's many language skills could be used for teaching that respects their culture. This study fills that gap by providing real evidence from Malaysia, adding to global discussions about translanguageing in early years education, and offering helpful ideas for teachers working with young children anywhere.

It addresses four research questions:

1. How do teachers employ translanguageing practices in English classrooms with young multilingual learners?
2. What is the impact of translanguageing on young learners' vocabulary acquisition in the English classroom?
3. In what ways does translanguageing support the development of cultural identity among young multilingual learners in English instruction?
4. What challenges do teachers encounter when implementing translanguageing, and what strategies do they employ to support language development and cultural identity in multilingual English classrooms?

Theoretical Framework

This research is grounded in a comprehensive theoretical framework that strategically unifies three complementary perspectives: Sociocultural Theory, Translanguageing Theory, and the Ecological Concept of Affordances. This theoretical triad collectively offers a comprehensive and synergistic analytical lens for examining translanguageing not merely as a linguistic strategy confined to language processing, but as a multifaceted social, cognitive, and identity-forming process embedded within the complex ecology of multilingual kindergarten environments. Each constituent theory contributes a unique analytical viewpoint, yet together they coalesce into a unified interpretive instrument capable of capturing the full complexity of the phenomenon under investigation.

Methodology

A comprehensive overview of the research methodologies developed to examine the complex function of translanguageing in multilingual kindergarten environments in Johor Bahru, providing a detailed foundations of the philosophical assumptions, research framework,

participant selection, data collection techniques, analytical strategies, and ethical considerations that govern this study. A qualitative case study methodology is employed, as outlined by Yin (2018), to enable an in-depth, contextual analysis of translanguaging as a dynamic phenomenon situated within the authentic complexities of early childhood classrooms. A comprehensive, multi-method data collection approach employed, integrating non-participant classroom observations to document naturalistic translanguaging practices, semi-structured interviews with educators to explore their beliefs, decision-making processes, and perceived limitations, document analysis of curricular materials and classroom artifacts, and play-based observations with conversational prompts.

Participants

Two distinct participant groups; each selected according to carefully considered criteria designed to maximize the depth and relevance of collected data:

1. Teachers: A selected group of three kindergarten teachers were recruited from the participating institution, with the precise number determined by the size of the kindergarten and the number of classes serving the target age group.
2. Students: A specific cohort of six to eight students was selected from the classrooms of the participating educators, with the final sample size determined by the number of consenting families and the diversity of linguistic backgrounds present in each classroom.

Findings

Teachers use translanguaging by mixing languages to help young children understand lessons, even though the school has a rule that each language should be taught separately by different teachers. Some teachers quietly break this rule because they know it helps children learn better. For vocabulary, translanguaging works in two ways: children learn new words by connecting them to words they already know in other languages (like linking *rambutan* to *hongmaotan*), and teachers also help them tell languages apart by teaching phonics step by step—English first, then Bahasa, then Mandarin. When it comes to cultural identity, children don't really think about being “Chinese” or “Malay”—they just enjoy learning with words and pictures from all three languages as a fun classroom experience. The main challenge teachers face is the school's strict rule about keeping languages separate, which doesn't work well in real teaching. To solve this, teachers use picture cards with three languages, give hints like “you are now in Bahasa class,” teach sounds in a clear order, and let children use all their languages naturally when talking to each other. These strategies help children learn better and feel comfortable with their multilingual background.

Discussion

The findings show that translanguaging with young learners is complicated and needs to be understood from multiple angles. From a sociocultural perspective, teachers used translanguaging as quick, on-the-spot support within the child's “zone of learning,” helping them understand just a little beyond what they could do alone, and teachers learned these strategies from each other through monthly meetings rather than formal training. From a translanguaging theory perspective, the school's rule of keeping languages apart represents the very old-fashioned thinking that the theory rejects—Teacher A used “weak” translanguaging, treating home languages only as a temporary crutch for English, while children naturally used “strong” translanguaging by mixing all their languages freely. However, the data also questions

pure translanguaging theory because teachers' concerns about confusion and their use of strategies to help children tell languages apart suggest that for young learners, clearly showing differences between languages may actually be helpful, meaning teachers need a balanced approach—allowing free mixing for understanding but also teaching each language's unique features. Finally, from an ecological perspective, the classroom environment offered many learning opportunities, but teacher attitudes and school rules acted as barriers; Teacher A's English-only approach limited learning, Teacher B's warm approach opened up more chances for interaction, and children during peer play simply ignored school rules and used all their languages anyway. In short, translanguaging is not just a teaching method but a result of what the environment offers, what teachers and children choose to use, and what rules get in the way—showing that early childhood education needs a flexible, practical approach rather than following any single theory too strictly.

Conclusion

This study shows that translanguaging in this Malaysian young learner is a complex and often messy issue. The school tries to keep all languages separate by having different teachers for English, Bahasa, and Mandarin, but this rule does not match reality. The children naturally mix all their languages together as one complete tool for talking, playing, and learning, while teachers show different approaches—some strictly follow the separation rule, some quietly resist it, and some rely on years of experience to be flexible. Translanguaging helps children learn new words by comparing languages side by side and creates a classroom where using many languages feels normal, not special or strange. The main finding is a big gap: the school's policy is based on the idea that languages should stay separate, but the children are already skilled at using them fluidly together. This questions whether strict language separation policies make sense in a multilingual country like Malaysia. Teachers and schools should stop fighting against children's natural way of using language and instead recognize, value, and strategically use the translanguaging skills that children already bring to the classroom, leading to better recommendations for teaching, school rules, and future research.

Acknowledgements

I would like to acknowledge the support of HELP University, Malaysia.

Reference

Yin, R. K. (2018). *Case study research and applications: Design and methods*. (6th ed.). Sage Publications.

Transforming Echolalia Into Functional Communication: A Case Study of Autistic Children in Inclusive Classrooms

Pe-Sun Ho, National Changhua University of Education, Taiwan

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This study examines echolalia in two autistic boys (ages 7–8) in inclusive primary school classrooms, focusing on its pragmatic functions and the conditions under which echolalic utterances transform into context-fitting, interpretable responses. Adopting a multiple-case design, interaction episodes were analyzed as the embedded unit (adult trigger→child echolalia→adult response→outcome). Episodes were coded across five dimensions: contextual stability, echolalia form, pragmatic function, adult response type, and interaction outcome. Quantitative findings indicate that transformation occurred more frequently in predictable contexts than in variable contexts for both cases (Case A: 73.2% vs. 41.7%; Case B: 55.0% vs. 22.5%). Qualitative analysis further shows that supportive, semantically contingent adult responses (e.g., recasts, prompts, guided choices) increase the likelihood of transformation, whereas controlling responses tend to sustain echolalia or lead to breakdown. The findings suggest that echolalia transformation is best understood as a context-sensitive and interactionally mediated process, rather than a fixed deficit or developmental stage. The study highlights how contextual conditions and adult mediation jointly shape transformation outcomes and offers an episode-based perspective for analyzing communication in inclusive classroom settings.

Keywords: autism spectrum disorder, echolalia, inclusive education

iafor

The International Academic Forum
www.iafor.org

Introduction

In recent years, the expansion of inclusive education and the advocacy of communication rights under the Convention on the Rights of Persons with Disabilities (CRPD; United Nations, 2006) have positioned equitable communication as a central concern for autistic students' participation. However, pragmatic and language difficulties remain significant challenges in inclusive classrooms (Ryan et al., 2024). In particular, echolalia has not been sufficiently examined through approaches grounded in natural classroom interaction or oriented toward pragmatic transformation (Blackburn et al., 2023; Ryan et al., 2024).

Echolalia has traditionally been viewed as a non-functional or pathological behavior requiring reduction (Prizant & Duchan, 1981). However, earlier work (Prizant, 1983; Prizant & Rydell, 1984) suggested that echolalia may serve communicative and regulatory functions. More recently, NLA/GLP perspectives have been influential in clinical discussion (Blanc, 2012), although their application remains debated (Hutchins et al., 2024). Functional and interactional studies, meanwhile, support the view that echolalia can serve meaningful communicative purposes (Cohn et al., 2022; Xie et al., 2023).

Interdisciplinary research further indicates that echolalia reflects more than rote repetition and may involve communicative, cognitive, and interactional organization (Cohn et al., 2022; Xie et al., 2023). Despite these advances, current research has not sufficiently explained how echolalia transforms into context-fitting communication within interaction.

This study addresses this gap by examining echolalia in naturalistic inclusive classroom settings. Using an episode-based approach, it explores how echolalic utterances function pragmatically and under what conditions they transform into interpretable responses. The study conceptualizes echolalia as a context-sensitive and interactionally mediated process, contributing to both theoretical understanding and inclusive educational practice.

The present study returns to naturally occurring classroom Q–A sequences and proposes an episode-based analytic framework for investigating echolalia as interaction, not merely as form. The study addresses three research questions:

- What pragmatic functions does echolalia serve in classroom interaction?
- How does echolalia transform into context-fitting responses within episodes?
- How do contextual stability and adult response strategies shape transformation outcomes?

Literature Review

Functional Role of Echolalia in Autistic Language Development

Autistic children possess the capacity for language acquisition (Tager-Flusberg, 2006), yet their language production is often misaligned with contextual and interactional demands. Such patterns have been associated with differences in social motivation, theory of mind, imitation, and pragmatic coordination (Baron-Cohen et al., 1985; Baron-Cohen et al., 2000; Paul et al., 2009; Williams et al., 2006). Within this framework, echolalia has historically been interpreted as a non-functional or residual behavior reflecting underlying deficits.

However, this deficit-oriented perspective has been challenged by research highlighting the functional and communicative roles of echolalia. Early work by Prizant and Rydell (1984)

demonstrated that echolalic utterances may serve communicative purposes such as requesting, responding, emotional regulation, and maintaining interaction. Subsequent studies further suggest that echolalia can function as a transitional and strategic linguistic resource, rather than a purely imitative phenomenon (Cohn et al., 2022; Sterponi & Shankey, 2014).

Evidence from naturalistic interaction supports this view, showing that autistic children may selectively use or adapt echolalic utterances according to contextual demands (Sterponi & Shankey, 2014). At the same time, constraints in speech motor planning and execution may limit the production of novel utterances (Shriberg et al., 2001), and neuroimaging findings suggest reduced activation in regions associated with imitation and social understanding (Dapretto et al., 2006). Taken together, these findings indicate that echolalia may function as a compensatory communicative strategy, allowing reliance on familiar utterances when generative language production is constrained.

However, the effectiveness of echolalia appears to vary across contexts. Some instances become pragmatically appropriate, whereas others remain repetitive or mismatched. This suggests that echolalia is not inherently functional, but conditionally functional, depending on interactional factors. In particular, adult mediation and response patterns may play a critical role in shaping whether echolalic speech remains repetitive or develops into contextually appropriate communication.

Theoretical Debate: Structural and Pragmatic Perspectives

Two complementary perspectives are commonly used to interpret echolalia in autism: a structural view of language and a pragmatic-interactional view. From a structural perspective, language development is understood in terms of formal linguistic systems, including vocabulary, syntax, and representational abilities. Research has shown that language profiles in autism are highly heterogeneous, with some individuals demonstrating relatively intact structural language alongside persistent pragmatic difficulties (Tager-Flusberg, 2006). Within this framework, echolalia is often interpreted as reflecting limitations in generative language, such as reliance on stored or formulaic expressions when flexible production is constrained (Paul et al., 2009).

In contrast, a pragmatic-interactional perspective emphasizes that the communicative value of an utterance must be interpreted in relation to context, communicative intent, and listener response, rather than linguistic form alone (Gee, 2004; Gumperz, 1982). From this view, echolalia functions as an interactional resource that supports participation, response alignment, and conversational continuity. Empirical studies have shown that echolalic utterances can serve meaningful communicative functions when interpreted contingently within interaction (Cohn et al., 2022; Sterponi & Shankey, 2014).

Recent research further suggests that echolalia is not a static or purely imitative phenomenon, but may involve flexible use of prior linguistic material to support meaning construction. For example, Xie et al. (2023) demonstrated that echolalic expressions can integrate previously heard utterances with current contextual demands, indicating their role as communicative strategies rather than mere repetition.

Within clinical discourse, Natural Language Acquisition (NLA) and gestalt language processing (GLP) frameworks propose that some autistic individuals acquire language through larger memorized chunks that are gradually reorganized into smaller units (Blanc,

2012). However, recent analyses caution that the empirical basis for these stage-based accounts remains limited, suggesting that NLA/GLP may be better understood as clinical interpretive frameworks rather than established developmental models (Hutchins et al., 2024).

Taken together, these perspectives highlight a key limitation of purely structural accounts: they cannot fully explain why echolalic utterances vary across contexts or change within interaction. At the same time, reliance on a single clinical framework without sufficient empirical support risks overgeneralization. Therefore, the present study adopts a pragmatic-interactional orientation, conceptualizing echolalia as a context-sensitive communicative phenomenon whose function and transformation depend on the interaction between contextual conditions and adult response.

Echolalia in Natural Contexts and Pragmatic Transformation

Recent research has increasingly emphasized that echolalia should be understood within naturalistic interaction, rather than as isolated linguistic output. Observational studies indicate that echolalia frequently occurs in structured activities, instructional exchanges, and routine-based contexts, where it may support participation, regulation, and response alignment (Cohn et al., 2022; Sterponi & Shankey, 2014). Within these contexts, the communicative value of echolalia depends on its interactional positioning. Echolalic utterances may function as meaningful responses when they align with the sequential structure of discourse, even if they retain formal features of repetition (Cohn et al., 2022). This highlights the importance of interpreting echolalia in relation to communicative intent and interactional organization, rather than linguistic form alone (Gumperz, 1982).

Emerging evidence further suggests that echolalia may exhibit varying degrees of pragmatic transformation. Rather than remaining fixed repetitions, some utterances show partial modification, semantic adaptation, or contextual alignment, indicating that previously heard language can be flexibly reorganized in response to situational demands (Xie et al., 2023). These findings support the view of echolalia as a transitional communicative resource under conditions of linguistic or cognitive constraint.

However, such transformation is not consistently observed. Variability has been linked to differences in contextual predictability and task demands. In more predictable, routine-based contexts, reduced cognitive and pragmatic load may facilitate participation, whereas unfamiliar or rapidly changing contexts may limit contextually appropriate responses (Andrés-Roqueta & Katsos, 2020; Ryan et al., 2024). In addition to contextual factors, adult responses play a critical role in shaping the trajectory of echolalic utterances. Semantically contingent responses—such as recasts, prompts, and guided choices—can support the reorganization of echolalic speech into contextually appropriate forms, whereas corrective or suppressive responses may disrupt interactional flow and reduce opportunities for development (Cohn et al., 2022; Stiegler, 2015).

Despite these insights, existing research has rarely examined how contextual conditions and adult responses jointly operate in real-time interaction. Most studies have focused either on functional classification or intervention outcomes, without systematically analyzing the interactional mechanisms underlying transformation. To address this gap, the present study adopts an episode-based analytic approach to examine how contextual stability and adult

response orientation jointly influence the likelihood of transformation into context-fitting communication.

Interactional Challenges in Inclusive Classrooms and Research Gap

Despite increased recognition of its functional potential, echolalia remains poorly understood in inclusive educational contexts (Ryan et al., 2024). Autistic students often experience difficulties in turn-taking, topic maintenance, and interpreting implicit social cues, which can disrupt participation in classroom interaction (Andrés-Roqueta & Katsos, 2020). When echolalic utterances are misinterpreted as non-functional, opportunities for communication may be reduced rather than supported.

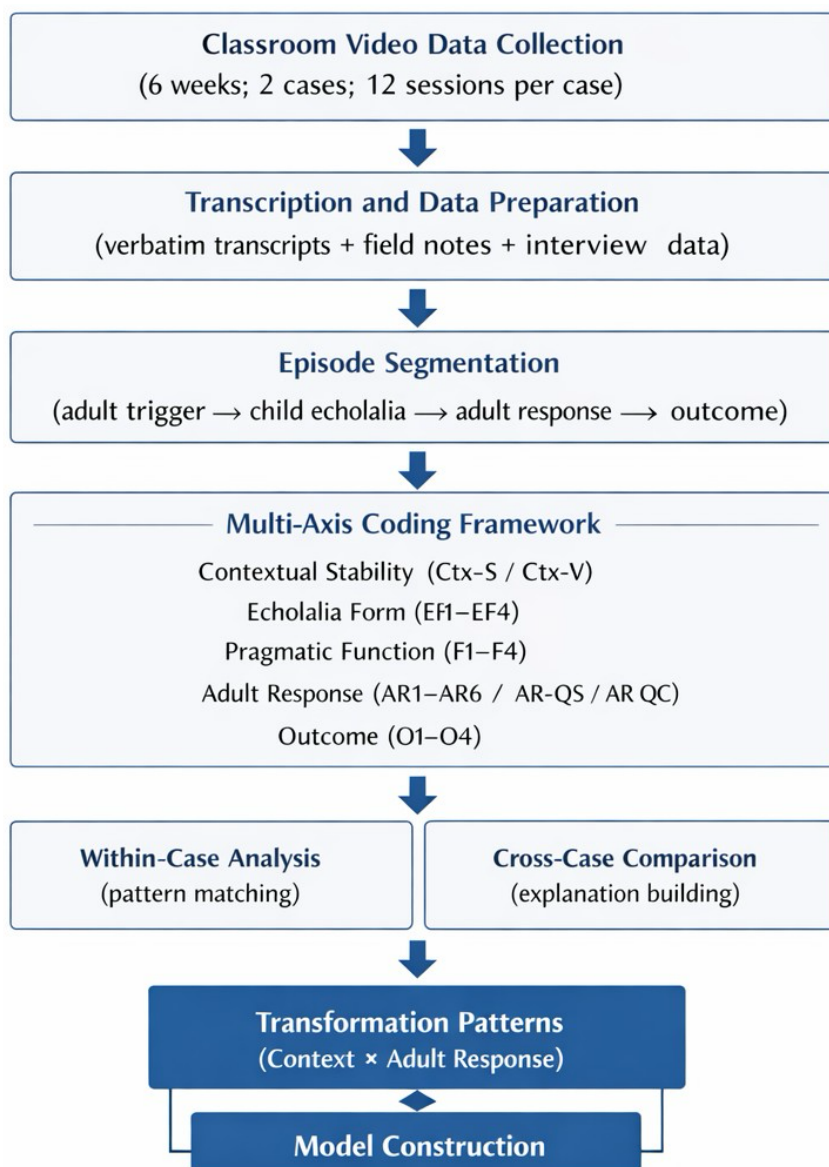
Recent studies highlight that echolalia varies across contexts such as classroom routines, instructional exchanges, and peer interaction (Cohn et al., 2022; Ryan et al., 2024). However, there remains a lack of systematic investigation into how specific interactional conditions shape the transformation of echolalia into meaningful communication.

In particular, the roles of contextual predictability and adult response orientation have not been sufficiently examined through fine-grained, episode-based analysis in natural settings. Given the context-sensitive and interactional nature of echolalia, case study approaches offer a valuable method for capturing these dynamics. Therefore, this study adopts an explanatory case study design to investigate how echolalia functions and transforms within real-time classroom interaction, addressing both theoretical and practical gaps in the literature.

Methods

Design and Analytic Unit

This study adopted an explanatory multiple-case design following Yin (2018), emphasizing explanation building through within-case pattern matching and cross-case comparison. An explanatory approach was selected because the purpose of the study was not merely to describe echolalic patterns, but to examine how structural conditions interact to influence communicative outcomes. An episode was defined as a contiguous sequence from (a) adult trigger (question, instruction, or contextual change) to (b) child echolalic response, (c) adult response, and (d) outcome. This episode structure supports within-case pattern matching and cross-case explanation building.

Figure 1*Research Workflow and Analytic Pipeline (Episode-Based Coding)*

Note. This figure presents the analytic workflow of the study, beginning with classroom video data collection, followed by transcription and episode segmentation. Each episode is defined as a sequence of adult trigger, child echolalic response, adult response, and interactional outcome. Episodes are subsequently analyzed through a multi-axis coding framework, including contextual stability, echolalia form, pragmatic function, adult response, and outcome. The analytic process integrates within-case pattern matching and cross-case comparison, leading to explanation building and model construction.

Participants and Setting

Participants were two boys (Case A; Case B), aged 7–8, placed in an inclusive arrangement combining half-day general education and half-day special education services. Both had multiple years of language intervention. Guardian written consent was obtained, and the researcher observed without intervening in instruction.

Table 1
Participant Profiles

Profile domain	Case A	Case B
Sex	Male	Male
Family context (summary)	Mother primary caregiver; father works away; one younger sibling	Mother primary caregiver; only child; three-person household
Age at autism diagnosis	4 years	3 years 4 months
Age at first spoken words	3 years	2 years 6 months
Years of language intervention	4 years 7 months	4 years 1 month
Learning profile (summary)	Age-appropriate basic literacy; weaker mathematics; low interest in fine-motor crafts	Age-appropriate learning; strong memory for events; attention drifts during class
Communication profile (summary)	Understands common directives; uses full sentences; clear articulation	Understands complex directives; prefers shorter sentences; expresses needs/opinions
Parent stance toward echolalia	Often reminds child “do not echolalia”	Less concerned; does not over-focus on echolalia
Cognitive test (Wechsler; reported)	Approx. 93	Approx. 89

Note. Demographic, family, and communication profiles of Case A and Case B to document comparability and potential sources of difference.

Data Collection and Timeline

Data collection consisted of six consecutive weeks of classroom video recording and transcription; each case was recorded for 12 sessions (4 per context type across three context types), 30 minutes per session. Supplementary data included semi-structured adult interviews and field notes to support triangulation and an auditable evidence chain.

Assumption retained: total minutes are treated as 360 minutes per case (720 total), because the source abstract and methods differ.

Episode Segmentation and Coding Procedure

To increase coding consistency and replicability, the source manuscript specifies decision rules for episode segmentation, including (a) task-goal continuity, (b) re-triggering, and (c) an interruption threshold: if interaction is interrupted for ≥ 10 seconds and the child’s attention/activity context shifts, the prior episode is coded as ended and a new episode begins.

Each episode was coded in a fixed order: (1) contextual stability (Ctx), (2) echolalia form (EF), (3) pragmatic function (F), (4) adult response (AR), and (5) outcome (O). Adult responses were also aggregated into supportive vs. controlling orientations (AR-QS vs. AR-QC).

Reliability procedures include 20% double-coding by a second coder and consensus discussion; however, no numerical agreement statistic is reported in the source, so none is added here.

Coding Framework

Table 2

Episode Coding Framework (Ctx / EF / F / AR / Outcome): Operational Definitions and Examples

Axis	Code	Label	Operational definition (source-based)	Example (source-based; translated where needed)
Context	Ctx-S	Stable / familiar context	Fixed teacher, fixed activity routine, high proportion of fixed scripts	Daily roll-call Q&A; routine clean-up sequence
Context	Ctx-V	Variable / unfamiliar context	New person, new dialogue type, new rules, or altered activity structure	Unfamiliar visitor asking questions; sudden rule change in an activity
Echolalia form	EF1	Immediate echolalia	Repeats key components of adult utterance within ~3 seconds	Adult: "Put the book away." → Child: "Put the book away."
Echolalia form	EF2	Delayed echolalia	Reproduces a previously heard utterance non-immediately	During transition repeats "Hurry up, hurry up"
Echolalia form	EF3	Partially transformed echolalia	Retains sentence frame but substitutes/adds/removes key words	Adult: "Which one do you want?" → Child: "I want the red one."
Echolalia form	EF4	Functional echolalia	Utterance has clear pragmatic intent and fits the context	Adult: "When it rains we use an umbrella." → Child: "He doesn't have an umbrella—he'll get wet. I want an umbrella."
Pragmatic function	F1-SR	Self-regulation / self-guidance	Echo immediately accompanies self-instruction that initiates or stabilizes	Child: "Line up, line up" → moves into line; body becomes

Axis	Code	Label	Operational definition (source-based)	Example (source-based; translated where needed)
Pragmatic function	F2-IR	Interactional responding	action Content aligns with question/interaction demand though echoes remain	calmer Asked color → answers “red” with copied intonation/frame
Pragmatic function	F3-CM	Context maintenance / transition support	Uses repetition to maintain pacing or avoid interruption	Repeats teacher’s routine command during transitions
Pragmatic function	F4-AV	Avoidance / delay	Repeats instead of answering, delaying/avoiding a response	Asked “why” → repeats the question or teacher’s prior clause
Adult response	AR1	Expansion / recast	Uptakes child meaning and grammaticalizes/extends it	Child: “Red, red” → Adult: “You want the red one.”
Adult response	AR2	Prompt / guided choice	Provides options or cues to elicit response	“Do you want red or blue?”
Adult response	AR3	Direct answer / speaking for child	Adult completes the answer for the child	“He wants red.”
Adult response	AR4	Clarification request	Adult requests elaboration or reformulation	“Red—red what?”
Adult response	AR5	Ignore / shift	Does not respond to echolalia content; moves on	No uptake; proceeds to next activity step
Adult response	AR6	Behavioral correction / suppression	Focuses on rule/policing speech form	“Don’t copy me—answer properly!”
Adult response (aggregate)	AR-QS	Supportive-contingent	Meaning-oriented, contingent uptake	Comprised primarily of AR1–AR4 when semantically contingent
Adult response (aggregate)	AR-QC	Controlling-corrective	Form-correcting or suppressive orientation	Typically AR6-based; may include coercive forms

Axis	Code	Label	Operational definition (source-based)	Example (source-based; translated where needed)
Outcome	O1	Task/response completed	Child completes target response/task	of AR5 Completes requested step with appropriate response
Outcome	O2	Transformation observed	Within-episode shift to higher pragmatic appropriateness (e.g., EF1→EF3)	Echo shifts into context-fitting answer/request
Outcome	O3	Breakdown / escalation	Interaction breaks; avoidance; affect escalates; off-task	Leaves activity; distress escalates
Outcome	O4	Echolalia maintained	Episode ends with echolalia without transformation	Repetition continues; no context-fitting response

Note. Translated codebook used for multi-axis episode coding.

Results

Quantitative Findings: Transformation Matrix and Rates

Based on the coded dataset derived from the collected interactional episodes, a cross-case transformation matrix was constructed, crossing contextual stability (Ctx-S vs. Ctx-V) with transformation outcomes (O2 vs. non-O2). The analysis indicates that transformation occurred more frequently in predictable contexts for both cases.

Table 3

Transformation Matrix by Contextual Stability (Reported Counts; Rates Computed)

Case	Context	Transformed (O2)	Not transformed (non-O2)	Total	Transformation rate
A	Ctx-S (predictable)	30	11	41	73.2% (30/41)
A	Ctx-V (variable)	20	28	48	41.7% (20/48)
B	Ctx-S (predictable)	22	18	40	55.0% (22/40)
B	Ctx-V (variable)	9	31	40	22.5% (9/40)

Note. Episode counts with/without transformation (O2) by context stability for Case A and Case B; rates computed from the reported matrix.

A derived descriptive comparison highlights the contextual effect size in percentage points: Case A shows a stable–variable gap of 31.5 points (73.2%–41.7%); Case B shows a gap of 32.5 points (55.0%–22.5%). This supports the source interpretation that reduced contextual predictability raises the threshold for pragmatic transformation.

Qualitative Findings: Pragmatic Functions and Transformation Pathways

Across cases, echolalia served multiple pragmatic functions consistent with the source coding framework (F1–F4): (a) self-regulation/self-guidance, (b) interactional responding, (c) context maintenance/transition support, and (d) avoidance/delay. These functions are interpreted as interactional resources whose meaning depends on sequential position and the adult’s subsequent uptake.

Table 4

Case A and Case B Exemplar Episodes

Case	Context	Excerpt (adult → child; translated)	Adult response orientation/type	Outcome	Source-noted “threshold” reading
A	Ctx-V	Teacher: “What are you doing?” Child: “Yes!” / “Yes, mom!” → (after reframed question) “I’m sunbathing.”	Supportive / semantic reframing (AR-QS; AR2/AR4-like)	Transformation	Pragmatic alignment difficulty; meaning-oriented reframe “pulls” response into fit
A	Ctx-V	“Dinosaur/police rule extension” (rule talk loops; adult does not clarify immediately)	Uptake insufficient	No transformation	Pragmatic alignment bottleneck; rule/self-narration loops maintain
B	Ctx-S	Teacher: “No splashing the cup—drink water.” Child: “No splash, drink water” (repeats twice, then drinks)	Rule prompt; supportive but task-focused	Compliance; template maintained	High behavioral compliance; utterance remains templated (structural stagnation)
B	Ctx-V	Assistant: “Do you want to leave, or cover your ears?” Child: “It’s too noisy... cover my ears.” (covers ears)	Supportive choice prompt (AR-QS; AR2)	Transformation	Needs external frame/options to cross into action-utterance
B	Ctx-V	Injury episode:	Supportive	Transformation	Transformation

Case	Context	Excerpt (adult → child; translated)	Adult response orientation/type	Outcome	Source-noted “threshold” reading
		Child: “I’m hurt.” Adult: “What to do?” Child: “You can put medicine.” Adult: “Does it still hurt?” Child: “It hurts—blow on it.”	contingent prompts and co-construction (AR-QS; AR2/AR4)	(scripted chain)	via learned frame; relies on adult structure for generativity

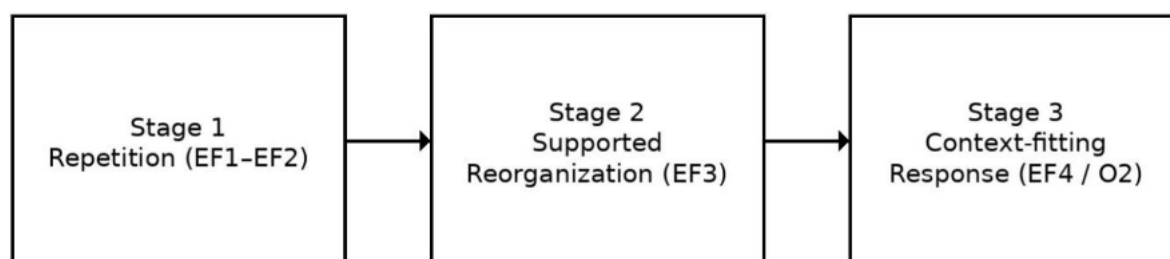
Note. Representative episodes showing (i) prior non-fitting echo/response, (ii) adult supportive uptake, and (iii) transformed, context-fitting response (or non-transformation), with code annotations.

Three-Stage Transformation Diagram

To further clarify the within-episode transformation process, the analysis identifies a recurring trajectory from non-fitting echolalia to context-fitting response. This trajectory is represented as a three-stage model aligned with the coding framework (EF/F/O), capturing how echolalia may reorganize into meaningful participation within interaction.

Figure 2

Three-Stage Echolalia Transformation Model



Facilitating: Ctx-S + AR-QS

Constraining: Ctx-V + AR-QC

Note. This figure illustrates the within-episode transformation process of echolalic utterances, progressing from non-context-fitting echolalia (EF1–EF2) to context-fitting responses (EF4/O2), mediated by supportive and semantically contingent adult responses (AR-QS). The model represents interactional progression within individual episodes and is not intended to imply a fixed developmental sequence. It serves as a process-oriented analytic framework for interpreting how echolalia reorganizes into meaningful participation under specific interactional conditions.

Transformation-Conditions Model (Context × Adult Uptake × Individual Threshold)

Across both cases, a consistent interactional pattern emerged: transformation is not an automatic outcome of echolalia, but a conditional process shaped by the interaction between contextual stability and adult response orientation. Specifically, transformation was more likely to occur in predictable contexts (Ctx-S) and under supportive, semantically contingent adult responses (AR-QS), whereas variable contexts (Ctx-V) combined with controlling or

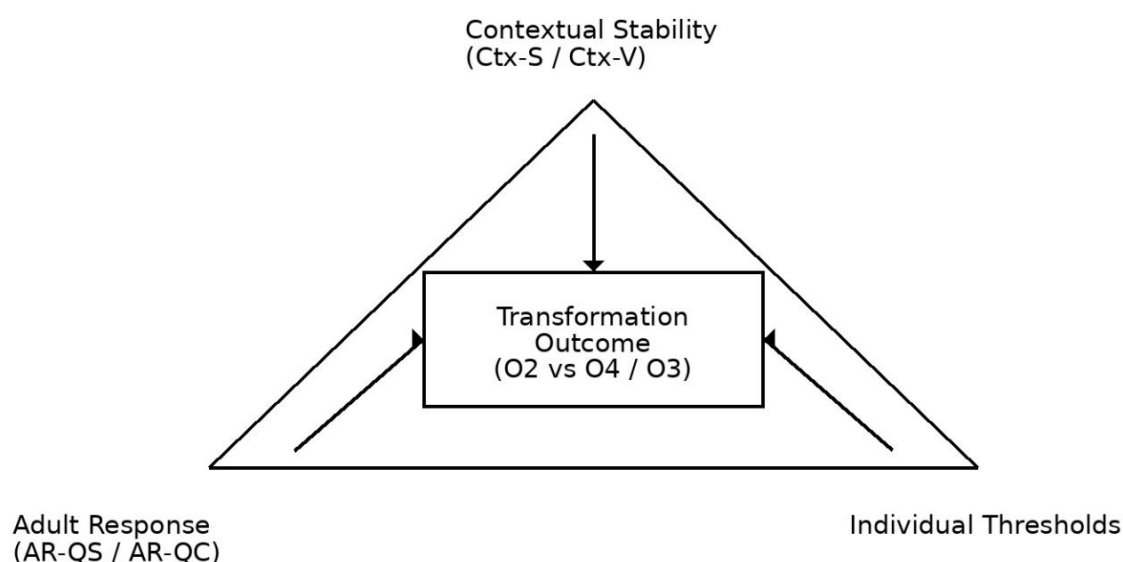
corrective responses (AR-QC) were more likely to result in maintenance of echolalia or interactional breakdown.

While both cases share this conditional structure, the location of the primary transformation constraint differs. For Case A, transformation is primarily limited by difficulties in pragmatic alignment under variable contexts, where supportive semantic reframing is required to re-establish interactional coherence. In contrast, Case B demonstrates relatively stable pragmatic compliance but shows constraints in generative flexibility, with transformation more likely to occur when externally provided linguistic scaffolds (e.g., options, prompts) reduce the generative demand.

Based on these cross-case patterns, transformation can be conceptualized as a conditional interaction process rather than a linear progression. This process is summarized as a transformation-conditions model, in which contextual stability (Ctx-S vs. Ctx-V) and adult response orientation (AR-QS vs. AR-QC) jointly influence the likelihood of transformation (O2), moderated by child-specific thresholds.

Figure 3

Conditional Interaction Model of Echolalia Transformation



Note. The model shows how contextual stability (Ctx-S vs. Ctx-V) and adult response orientation (AR-QS vs. AR-QC) jointly influence transformation outcomes, moderated by individual thresholds.

It represents transformation as an emergent outcome of interactional conditions rather than an inherent property of the child's language ability. Importantly, the model does not assume a fixed developmental sequence, but instead emphasizes the dynamic interplay between environmental structure, adult mediation, and individual constraints.

Taken together, these findings suggest that echolalia transformation is best understood as a context-sensitive and interactionally mediated process. Rather than being treated as a deficit requiring reduction, echolalia can function as a transitional communicative resource, whose transformation depends on the extent to which the interactional environment supports meaning-making and participation.

Discussion

Taken together, the findings of this study suggest that echolalia transformation should not be interpreted as a binary indicator of communicative ability, but as a dynamically regulated process shaped by conditional interaction. Rather than reflecting the presence or absence of pragmatic competence, transformation emerges through fluctuations in what may be conceptualized as a generative gap—the distance that must be bridged for an utterance to become context-fitting under specific interactional conditions.

This generative gap is not fixed, but expands or contracts depending on the interactional environment. When contextual uncertainty increases, task demands intensify, or interactional pace accelerates, the generative gap widens, and echolalic utterances are more likely to remain at the level of template maintenance or self-regulation. Conversely, when contextual predictability is enhanced and semantic frames are made explicit through supportive adult uptake, the generative gap narrows, allowing utterances to reorganize and move toward context-fitting participation.

Within this framework, adult uptake functions as a threshold-modulating mechanism rather than a direct teaching strategy. Semantically contingent responses do not simply correct language form; they alter the conditions under which transformation becomes possible by reducing semantic risk and restructuring the interactional frame. However, this catalytic function is neither independent nor sufficient in itself. Its effectiveness is mediated by contextual stability and by child-specific constraints in generative flexibility or pragmatic alignment.

Importantly, cross-case analysis indicates that individual differences are not indicative of separate models, but rather reflect different locations of constraint within the same conditional structure. In this sense, variability in echolalia should not be interpreted as categorical differences in ability, but as differences in where and how the generative gap is most likely to expand under varying conditions.

From a broader perspective, the inclusive classroom can be conceptualized as a dynamic threshold field, in which contextual demands, adult mediation, and individual constraints continuously interact to shape the trajectory of echolalic utterances. Within this field, transformation, partial alignment, and stagnation are not fixed states, but emergent outcomes of shifting interactional conditions.

This perspective carries important implications. It suggests that echolalia should be understood not as a stable deficit or a developmental stage, but as a context-sensitive communicative phenomenon. Accordingly, evaluation should not rely on isolated utterances, but on the interactional conditions under which those utterances are produced. More importantly, future research may build on this framework by operationalizing generative gap, threshold variation, and interactional load, thereby enabling more precise, testable models of echolalia transformation across contexts and individuals.

Conclusion

This study examined echolalia in naturalistic inclusive classroom settings and explored the conditions under which echolalic utterances transform into context-fitting, interpretable responses. Drawing on episode-based analysis of two autistic students, the findings suggest

that echolalia transformation should not be understood as a reflection of fixed communicative ability, but as a dynamically regulated process shaped by interacting conditions.

The results indicate that the progression or stagnation of echolalic utterances is not directly determined by the presence or absence of pragmatic competence. Instead, it reflects fluctuations in what may be conceptualized as a generative gap—the distance required for an utterance to become contextually appropriate under specific interactional conditions. When contextual uncertainty increases, interactional demands intensify, or response timing becomes more constrained, this generative gap tends to widen, and utterances are more likely to remain at the level of repetition or self-regulation. Conversely, when contextual predictability is enhanced and semantic frames are clarified through supportive adult uptake, the generative gap narrows, allowing utterances to reorganize and move toward context-fitting participation.

Within this process, adult uptake functions as a condition-modulating mechanism rather than a unidirectional instructional strategy. Supportive, semantically contingent responses do not simply correct language form; they reshape the interactional conditions under which transformation becomes possible by reducing semantic uncertainty and providing usable linguistic scaffolds. However, this effect is neither independent nor sufficient in itself. The likelihood of transformation depends on the interaction between contextual stability, adult response orientation, and child-specific constraints.

Cross-case comparison further indicates that individual differences are embedded within the same conditional structure rather than representing distinct models of functioning. While both cases follow similar interactional patterns, they differ in where transformation is most constrained. For one case, the primary difficulty lies in pragmatic alignment under variable conditions; for the other, it lies in generative flexibility and the ability to move beyond templated expressions. These findings suggest that variation in echolalia should be understood as differences in how and where the generative gap expands, rather than as categorical differences in communicative ability.

Taken together, the findings support a view of echolalia as a context-sensitive and interactionally mediated phenomenon, rather than a stable deficit or a fixed developmental stage. In inclusive classroom settings, echolalic utterances emerge within a dynamic interactional field in which contextual demands, adult mediation, and individual constraints continuously shape communicative trajectories. Within this field, transformation, partial alignment, and stagnation represent different possible outcomes of the same underlying process.

This study contributes to the literature in three ways. First, it adopts an episode-based analytic approach, allowing echolalia to be examined as an interactional process rather than as isolated linguistic form. Second, it proposes a conditional interaction perspective, highlighting how contextual and relational factors jointly shape transformation. Third, it introduces the concept of a generative gap as a way of understanding how interactional conditions influence the movement from repetition to meaningful participation. These contributions provide a basis for future research to further examine and refine the mechanisms underlying echolalia transformation.

Several limitations should be noted. The study is based on a small number of cases and cannot be generalized statistically. The data were collected in natural inclusive classroom settings, and the findings may not directly apply to clinical or highly structured instructional

contexts. In addition, the analysis relied on observational data and episode-based coding without standardized language or cognitive measures, and inter-rater reliability was not quantified. Future research may expand sample size and contextual diversity, adopt longitudinal designs to examine changes in transformation thresholds over time, and develop operational measures of adult uptake quality to enhance empirical testability.

Despite these limitations, the study offers a structural perspective for understanding echolalia transformation in inclusive educational contexts. By situating echolalia within the interaction of contextual load, adult mediation, and individual generative constraints, it provides a foundation for both more precise interpretation and further theoretical development.

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

The author declares that AI-assisted technologies (e.g., ChatGPT) were used in the writing process to support language refinement, structural organization, and clarity of expression. The use of AI was limited to editing, rephrasing, and improving readability of the manuscript. All conceptualization, research design, data collection, analysis, and interpretation were conducted by the author. The author takes full responsibility for the integrity and originality of the work.

References

- Andrés-Roqueta, C., & Katsos, N. (2020). A distinction between linguistic and social pragmatics helps the precise characterization of pragmatic challenges in children with autism spectrum disorders and developmental language disorder. *Journal of Speech, Language, and Hearing Research*, 63(5), 1494–1508.
https://doi.org/10.1044/2020_JSLHR-19-00263
- Blackburn, C., Tueres, M., Sandanayake, N., Roberts, J., & Sutherland, R. (2023). A systematic review of interventions for echolalia in autistic children. *International Journal of Language & Communication Disorders*, 58(6), 1977–1993.
<https://doi.org/10.1111/1460-6984.12931>
- Blanc, M. (2012). *Natural language acquisition on the autism spectrum: The journey from echolalia to self-generated language*. Communication Development Center.
- Cohn, E. G., McVilly, K. R., Harrison, M. J., & Stiegler, L. N. (2022). Repeating purposefully: Empowering educators with functional communication models of echolalia in autism. *Autism & Developmental Language Impairments*, 7.
<https://doi.org/10.1177/23969415221091928>
- Dapretto, M., Davies, M. S., Pfeifer, J. H., Scott, A. A., Sigman, M., Bookheimer, S. Y., & Iacoboni, M. (2006). Understanding emotions in others: Mirror neuron dysfunction in children with autism spectrum disorders. *Nature Neuroscience*, 9(1), 28–30.
<https://doi.org/10.1038/nn1611>
- Gee, J. P. (2004). *An introduction to discourse analysis: Theory and method* (2nd ed.). Routledge.
- Gumperz, J. J. (1982). *Discourse strategies*. Cambridge University Press.
- Hutchins, T. L., Knox, S. E., & Fletcher, E. C. (2024). Natural language acquisition and gestalt language processing: A critical analysis of their application to autism and speech language therapy. *Autism & Developmental Language Impairments*, 9.
<https://doi.org/10.1177/23969415241249944>
- Paul, R., Orlovski, S. M., Marchinko, H. C., & Volkmar, F. (2009). Conversational behaviors in youth with high-functioning ASD and Asperger syndrome. *Journal of Autism and Developmental Disorders*, 39(1), 115–125.
<https://doi.org/10.1007/s10803-008-0607-1>
- Prizant, B. M. (1983). Language acquisition and communicative behavior in autism: Toward an understanding of the “whole” of it. *Journal of Speech and Hearing Disorders*, 48(3), 296–307. <https://doi.org/10.1044/jshd.4803.296>
- Prizant, B. M., & Duchan, J. F. (1981). The functions of immediate echolalia in autistic children. *Journal of Speech and Hearing Disorders*, 46(3), 241–249.
<https://doi.org/10.1044/jshd.4603.241>

- Prizant, B. M., & Rydell, P. J. (1984). Analysis of functions of delayed echolalia in autistic children. *Journal of Speech and Hearing Research*, 27(2), 183–192. <https://doi.org/10.1044/jshr.2702.183>
- Ryan, S., Roberts, J., & Beamish, W. (2024). Echolalia in autism: A scoping review. *International Journal of Disability, Development and Education*, 71(5), 831–846. <https://doi.org/10.1080/1034912X.2022.2154324>
- Shriberg, L. D., Paul, R., McSweeney, J. L., Klin, A., Cohen, D. J., & Volkmar, F. R. (2001). Speech and prosody characteristics of adolescents and adults with high-functioning autism and Asperger syndrome. *Journal of Speech, Language, and Hearing Research*, 44(5), 1097–1115. [https://doi.org/10.1044/1092-4388\(2001/087\)](https://doi.org/10.1044/1092-4388(2001/087))
- Sterponi, L., & Shankey, J. (2014). Rethinking echolalia: Repetition as interactional resource. *Journal of Child Language*, 41(2), 275–304. <https://doi.org/10.1017/S0305000912000752>
- Tager-Flusberg, H. (2006). Defining language phenotypes in autism. *Clinical Neuroscience Research*, 6(3–4), 219–224. <https://doi.org/10.1016/j.cnr.2006.06.007>
- United Nations. (2006). *Convention on the Rights of Persons with Disabilities*. https://www.un.org/disabilities/documents/convention/convention_accessible_pdf.pdf
- Xie, F., Pascual, E., & Oakley, T. (2023). Functional echolalia in autism speech: Verbal formulae and repeated prior utterances as communicative and cognitive strategies. *Frontiers in Psychology*, 14. <https://doi.org/10.3389/fpsyg.2023.1010615>

Contact email: paggyho0806@gmail.com

Developing a Game-Based Learning Management Activities for Basic Passenger Assessment Training

Chayanit Pichitronnchai, King Mongkut's University of Technology Thonburi, Thailand
Tanapon Tomrongkunan, King Mongkut's University of Technology Thonburi, Thailand

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This research aimed to develop game-based learning activities for basic passenger risk assessment training and improve the learning achievement of immigration officers newly appointed to the Immigration Bureau. The researcher designed the learning activities by integrating pre- and post-learning tests with an interactive simulation game. The study population consisted of 116 police officers of immigration officers newly appointed to the Immigration Bureau in the 2025 fiscal year, selected using a purposive sampling method. Statistical analysis included percentage, mean, and standard deviation. The learning activity set and achievement test on Passenger assessment were created consisting of a passport security screening simulation game in the form of a matching game and a personal identity comparison in the form of a picture comparison game, as well as an achievement test on Passenger assessment in the form of a question-and-answer game within a specified time. Then, the created activity sets were examined for quality by experts and the results showed that the created learning activity set was appropriate in all aspects, with an IOC = 1, indicating that the activity set was consistent with the objectives and could be practically applied in training. From the evaluation results from experts, it was found that the created learning activity set was appropriate in all aspects, with an IOC value of 1, indicating that the activity set was consistent with the objectives and could be practically applied in training and the study found that out of 116 trainees, 23 persons (19.80%) scored more than 60% on the pre-test, while 111 persons (95.68%) scored more than 60% on the post-test. This indicates a statistically significant increase in learning achievement of 75.88% between the pre-test and post-tests. The average score of the trainees was 49.46 on the pre-test and 81.87 on the post-test. In conclusion, Game-based learning is an effective method for training frontline immigration officers who require specialized knowledge and skills to screen and assess the risk of passengers traveling into and out of the kingdom.

Keywords: basic passenger assessment, game-based learning, learning activities

iafor

The International Academic Forum
www.iafor.org

Introduction

Currently, human trafficking and illegal cross-border travel are significant problems in many countries worldwide, including Southeast Asia, where Thailand is often seen as a transit hub to third countries. Considering Thailand's land and maritime borders, which are crucial connecting points and share borders with numerous countries, this results in a large influx of migrant workers. This is a major cause of transnational crime, such as call center scams and fraud. Analyzing the root causes of this problem, it is found that destination countries with low living costs, lax immigration screening systems, and widespread corruption are ideal locations for establishing centers for technology-related crime and illegal cross-border land and maritime travel. Furthermore, considering air borders, specifically travel through international airports in Thailand, these airports are found to be major connecting points for international travel. According to international flight statistics from Airports of Thailand Public Company Limited, the trend of increasing international flights in the post-COVID-19 pandemic has seen a continuous and exponential increase in international flights, making international airports in Thailand one of the most suitable transit points for illegal border crossings or onward travel to third countries such as the United States, Canada, Australia, and European countries. With the increase in travelers, one of the problems often encountered and which is important for illegal border crossings is the falsification of travel documents and other identification documents such as passports, visa stickers, border passes, national identity cards, work permits, and driver's licenses.

According to statistics on arrests for forged travel documents by the Investigation and Suppression Department, Immigration Division 2, the number of arrests for offenses related to forged travel documents from 2021 to 2024 has shown a significant upward trend. The main causes are often the global economic downturn following the COVID-19 pandemic, social violence such as terrorism, civil war, and separatism, or financial difficulties in households. These individuals often seek migration as a way to survive, and they frequently fall victim to human trafficking and transnational crime (Investigation and Suppression Department, Immigration Division 2. [2025]).

One of the key methods to prevent illegal border crossings and human trafficking is to educate and train immigration officers, who are crucial frontline personnel in document verification, to be efficient and accurate within tight deadlines. This is because the standard for screening passengers at passport control counters at Thai international airports requires completion within one minute, a very short timeframe for screening and classifying incoming travelers. Therefore, the researchers developed a game-based learning activity on initial passenger risk assessment for newly appointed to the Immigration Bureau.

Under the constraints of the time required for immigration officers to screen foreign nationals entering the Kingdom, the researchers believe that game-based learning is a suitable approach for developing passenger risk assessment skills. Game-based learning simulates independent decision-making under time constraints, helps create motivation and enjoyment, increases learner participation, and provides immediate results from the activity. It helps learners learn about their weaknesses and also enables learners to have a deeper, more sustainable learning experience than simply reading or listening. Therefore, considering the national security situation and the increasing trend of transnational crime, as well as the working conditions of frontline officers who have to make decisions under tight time constraints and the limitations of traditional training which is often one-way communication, the researchers developed a set of learning activities on initial passenger risk assessment using game-based learning and

applied them to enhance decision-making skills under tight time constraints, so that immigration officers are prepared and can perform their duties effectively and in accordance with current national security standards.

Objectives

1. Develop game-based learning activities for basic passenger risk assessment training.
2. Improve the learning achievement of immigration officers newly appointed to the Immigration Bureau.

Literature Review

Basic Passengers Assessment

The definition of Passport is an official document issued by a government agency to certify the identity of its holder and grant the right to travel in and out of various countries. Passports are typically small books, either hard or softcover, with various security features. They contain personal information of the holder, details about the issuing country and agency, visas, entry/exit stamps, and other relevant information. Passports from different countries often vary in how they store holder information, such as embedding photos and data in microchips or using Machine Readable Zone (MRZ) data strips. and a document issued by each country's government to its citizens to certify their nationality and provide diplomatic protection.

According to The Immigration Act B.E. 2522 (1979), Section 12, states that foreign nationals with any of the following characteristics are prohibited from entering the Kingdom: lacking a valid and complete passport or equivalent travel document, or possessing one but without a valid visa issued by a Thai embassy or consulate abroad, except for special cases where no visa is required for certain types of foreign nationals.

The elaborates on the details of passport inspection and identity verification of the passport holder:

1. The passport cover should be smooth and flat, without folds, cuts on the spine, wrinkles from re-cutting or re-gluing, or excessive glue stains.
2. Passport pages must have security features within the paper itself, such as embossed printing and examination under ultraviolet light.
3. The quality of printed characters must be sharp, with consistent spacing and font size.
4. The number of pages and page numbers must be consistent throughout the booklet, with no signs of alteration or change of numbers.
5. Examine the perforations and quality of the punched numbers in the passport.

Initial identity verification of the passport holder:

1. Verify the facial features and distinguishing marks of the passport holder against the photo in the passport and other documents.
This involves checking the shape of the face, eyes, ears, nose, mouth, chin, and any facial marks such as moles, birthmarks, or scars. When examining facial features, one should consider changes due to age, weight, makeup, and cosmetic surgery.
2. Check the passport holder's fingerprints against the database.
The outlines principles for initial travel information inquiries: Brief inquiries about travel information or plans can help in initial passenger risk assessment. During the interview, the interviewer should maintain eye contact with the interviewee, ask general

questions (e.g., about their general feelings after a long journey, travel plans, and accommodation). They should avoid disturbing or rushing the interviewee for answers, use polite and friendly language to make the interviewee feel relaxed, and avoid judging them based on appearance. Throughout the interview, observe the interviewee's body language for any unusual signs, such as trembling, constantly clenching hands, avoiding eye contact, excessive sweating, or rambling speech.

Game-Based Learning

Game-based learning (GBL) refers to a learning management approach that uses “games” or “game mechanics” as tools to promote learning, using fun, challenge, decision-making, and immediate feedback as motivators for effective learning. Hamari et al. (2016) describe GBL as a process that integrates games into lessons to increase student engagement, create a state of focus, and enable deeper learning than typical lectures.

Li and Tsai (2013) further define that Game-based learning is a learning process that uses game structures such as rules, difficulty levels, scoring systems, and simulations to promote students' knowledge construction through interaction between students and the game environment, enabling students to practice problem-solving, analytical, and decision-making skills. In addition, Zhao et al. (2022) state that Game-based learning is a tool that improves learning outcomes, especially in complex subjects or content requiring practice, as games engage students actively and motivate them through the fun of the game.

In short, Game-based learning is a learning model that uses “games” as the primary motivator. Game-based learning promotes interaction, develops skills, and enables learners to learn through experimentation and decision-making within simulated environments.

In summary, numerous studies confirm that game-based learning can effectively improve academic achievement, enhance analytical thinking skills, and stimulate student motivation.

Learning Activities

Learning activities refer to processes or sets of experiences designed by instructors to promote meaningful learning among learners through participation, critical thinking, hands-on practice, and reflection. Learning activities act as a “mediator” that links learning outcomes, content, and evaluation into a unified system. This concept aligns with the principles of active learning, which indicates that learners should construct knowledge themselves through thinking and doing, not merely passively receiving information.

Types of Learning Activities in Research and Design Guides

Teaching is classified into several forms depending on the subject matter, learning goals, and the nature of the learners.

Examples of important forms include:

1. Active Learning Activities such as small group explanations, problem solving, questioning, demonstrations.
2. Hands-on/Procedural Activities such as experiments, practice, and simulations.
3. Collaborative Learning Activities such as cooperative learning and project work.

4. Reflective Activities such as diary writing, knowledge summarization, and lesson reflection.
5. Media/Technology-Based Activities (Technology-supported Learning Activities) such as the use of digital media, learning games, or online platforms in conjunction with real-time assessment.

The selection of activities must always be based on an analysis of learning outcomes first, so that the activities serve as “evidence of learning” and help learners clearly demonstrate the required knowledge and skills.

“Learning activities” are central to modern teaching and learning. Effective learning activities should be designed to align with learning goals, encourage student participation, foster hands-on experience, and promote reflective learning through rational thinking. This enhances motivation, achievement, and in-depth understanding of the content. Simultaneously, the success of learning activities depends on the quality of their design, appropriate feedback, and the creation of a safe and conducive learning environment for knowledge exchange.

Methodology

Data on preliminary passenger risk assessment was studied and analyzed from documents, textbooks, and training courses related to passenger risk assessment. This data was then used to determine guidelines, develop learning activities, and review relevant documents and research on game-based learning.

Two sets of learning activities on preliminary passenger risk assessment were designed using game-based learning. These included:

- 1) A 10-item simulation of passport security checks, where participants match passport inspection methods with different types of security checks in passports.
- 2) A 5-item personal identification comparison, where participants compare facial features.

A 15-item achievement test on preliminary passenger risk assessment was designed as a multiple-choice test in a question-and-answer format within a time limit.

The learning activities and achievement test were evaluated by three experts. The evaluation yielded an IOC value of 1, indicating the effectiveness of the developed learning activities and achievement test. Appropriate and aligned with the research objectives.

Implement improvements and development based on expert recommendations.

Implement the created learning activities and achievement assessment tools.

Evaluate the learning achievement of the sample group.

Research Tools

Learning activity sets on passenger risk assessment, consisting of 2 sets in game format, including:

- 1) A simulation of passport security checks, consisting of 10 questions, where trainees match passport inspection methods with different types of security checks in passports.

- 2) A comparison of personal identity, consisting of 5 questions, where trainees compare facial features of individuals.

A subjective learning achievement test on passenger risk assessment in the form of a question-and-answer game with a time limit, consisting of 15 questions.

The population consists of 116 police officers appointed and transferred to the Immigration Bureau in the 2025 fiscal year, selected using purposive sampling.

Statistical methods used in the research include mean, percentage, and standard deviation.

Result

The researchers collected research data in two parts: Part 1 involved analyzing the Index of Content Validity (IOC) of the learning activity set from three experts, and Part 2 involved the scores from the achievement test on passenger risk assessment using a game-based learning approach for 116 police officers appointed and transferred to the Immigration Bureau in the 2025 fiscal year. The learning outcomes were then analyzed using basic statistics, compared against established criteria, and the research findings are summarized as follows:

Table 1 shows the results of the quality assessment of the developed learning activity set on basic passenger risk assessment using a game-based learning model, as evaluated by three experts:

Table 1

The Results of the Quality Assessment of the Developed Learning Activity Set

No.	Item	Experts			Total	IOC score	Result
		1	2	3			
1	The content of the activity package covers key aspects of passenger risk assessment.	+1	+1	+1	3	1.00	Qualify
2	The accuracy of the information is consistent with passport verification and identity verification principles.	+1	+1	+1	3	1.00	Qualify
No.	Item	Experts			Total	IOC score	Result
3	The sequence of activities is appropriate for learning.	+1	+1	+1	3	1.00	Qualify
4	The created activities stimulate the interest of the trainees.	+1	+1	+1	3	1.00	Qualify
5	The created activities are suitable for the trainees.	+1	+1	+1	3	1.00	Qualify

Table 1 shows that the Analysis of the Index of Consistency (IOC) of the learning activity set indicates that it is suitable for use in teaching. The IOC score is 1 in all categories, demonstrating suitability and consistency with the established standards. The activity set can be used in practice.

Table 2 shows a comparison of scores from the achievement test, measuring pre-test and post-test scores. Participants were required to have a post-test score at least 60% higher than their pre-test score.

Table 2

A Comparison of Scores From the Achievement Test

Test type	Number of participants	Number of Passers (Scoring above 60%)	Percentage
Pre-test	116	23	19.80
Post-test	116	111	95.68
increasing		88	75.88

Table 2 shows the number of participants who passed the pre-test achievement test. It was found that 23 out of 116 participants passed the test (scoring above 60%), representing 19.80%. This compares to 111 out of 116 participants who passed the post-test, representing 95.68%. This represents an increase of 88 participants, or 75.88%.

Table 3 shows the mean and standard deviation scores of the pre-test and post-test results of the participants:

Table 3

The Mean and Standard Deviation Scores of the Pre-test and Post-test Results

Test type	Average	Standard deviation
Pre-test	49.46	23.71
Post-test	81.87	11.19

Table 3 shows the mean and standard deviation scores of the pre-test and post-test results for 15 items, considering the passing criterion of 60%. It was found that the mean score of the pre-test for 116 trainees was 49.46 points, and the mean score of the post-test for the trainees was 81.87.

From the application of the created learning activities to the trainees, it was found that the trainees were able to apply the acquired experience to real-life situations, and a report of the arrest of a counterfeit passport was received from one trainee. This demonstrates that the use of the created learning activities in teaching enabled trainees to apply the knowledge in real-life situations.

Conclusion

This research focuses on developing a learning activity set on preliminary passenger risk assessment using a game-based learning approach. The aim is to effectively train newly appointed and transferred personnel within the Immigration Bureau, ensuring compliance with established standards. The results of the Index of Content Validity (IOC) evaluation of the learning activity set, as presented by experts, are shown in Table 1.

The research results clearly demonstrate that the use of game-based learning activities significantly improved the learning achievement of trainees in passenger risk assessment. A clear difference of 75.88% was observed between the pre-test score (19.80%) and the post-test score (95.68%). Furthermore, the average pre-test score was 49.46, while the average post-test

score was 81.87. This underscores the crucial role of game-based learning in training personnel within the Immigration Bureau, who are key frontline staff responsible for screening foreign nationals entering and exiting the Kingdom. This experiment strongly aligns with the theoretical foundations of game-based learning.

Research by Lapat Chanruangsaeng (2009) mentioned one training need for immigration officers at Suvarnabhumi Airport on the principles of detecting counterfeit passports. Zhao et al. (2022) identified educational games as an effective mechanism for increasing student motivation and engagement, improving learning efficiency, and creating a better experience. This aligns with the research by Hussein et al. (2019) which stated that playing games can promote students' critical thinking abilities in science. The interactive nature of the developed games, which provide immediate feedback and require active decision-making, creates a learning environment where participants are not passive recipients of information but active contributors of knowledge. This perfectly aligns with the principles of constructive learning, where learners construct understanding through experience and reflection. In this study, simulations within learning activities and quizzes allowed immigration officers to practice complex passenger assessment and critical decision-making in a safe and controlled environment. This experiential learning opportunity was invaluable in developing the analytical and decision-making skills necessary for the job. In particular, practicing under time pressure at real immigration checkpoints and learning from mistakes within the game is crucial for enhancing the expertise of frontline officers.

Suggestions

Suggestions for Applying Research Findings

The developed activity set should be used for knowledge review among staff members to regularly refresh their knowledge and verification methods.

Suggestions for Future Research

The activity set should be developed to incorporate other skills such as observation, investigation, and analytical thinking. Therefore, the development of various skills should be integrated, and regular knowledge reviews should be provided to staff members.

References

- Airports of Thailand Public Company Limited. (2019–2024). *AOT Annual Report and Traffic Reports*.
- Biggs, J., & Tang, C. (2011). *Teaching for quality learning at university* (4th ed., pp. 80–95). Open University Press.
- Canada Border Services Agency. (2025). *Best practices exchange workshop*. Hyatt Regency Suvarnabhumi.
- Chanruangsang, L. (2009). *Study of training needs of immigration personnel at Suvarnabhumi Airport* [Master's thesis, Sukhothai Thammathirat Open University]. ThaiLIS.
https://www.thailis.or.th/tdc/browse.php?option=show&browse_type=title&titleid=242657
- Hamari, J., Shernoff, D. J., Rowe, E., Coller, B., Asbell-Clarke, J., & Edwards, T. (2016). Challenging games help students learn: An empirical study on engagement, flow and immersion in game-based learning. *Computers in Human Behavior*, 54, 170–179.
<https://doi.org/10.1016/j.chb.2015.07.045>
- Hou, H.-T., & Li, M.-C. (2014). Evaluating multiple aspects of a digital educational problem-solving-based adventure game. *Computers in Human Behavior*, 30, 29–38.
- Hussein, M. H., Ow, S. H., Cheong, L. S., & Thong, M.-K. (2019). A digital game-based learning method to improve students' critical thinking skills in elementary science. *IEEE Access*, 7, 96309–96318. <https://doi.org/10.1109/ACCESS.2019.2929089>.
- The Immigration Bureau. (2019). *Collected laws and regulations concerning immigration* (1st ed.). [n.p.].
- Li, M.-C., & Tsai, C.-C. (2013). Game-based learning in science education: A review of relevant research. *Journal of Science Education and Technology*, 22(6), 877–898.
- Prawsuntorn, N. (2013). *Immigration 24/7* (4th ed.). [n.p.].
- Zhao, D., Muntean, C. H., Chis, A. E., Rozinaj, G., & Muntean, G.-M. (2022). Game-based learning: Enhancing student experience, knowledge gain, and usability in higher education programming courses. *IEEE Transactions on Education*, 65(4), 502–513.
<https://doi.org/10.1109/TE.2021.3136914>

Why Otitis Media is Good for the Language Acquisition: Some Examples of Statistical Pitfalls in Language Assessment Programs

Eugen Zaretsky, Marburg University Hospital, Germany

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

Results of statistical calculations can vary depending on the sample size, comparability of subsamples, choice of statistical methods, coding of variables, use of imputation, and many other factors. It is up to the researcher whether the Bonferroni adjustment of p -values, or Bonferroni-Holm adjustment, or no adjustment at all is used, whether he or she utilizes parametrical or more conservative non-parametrical statistical methods, whether metrical data are z -transformed etc. This presentation shows some examples of statistical pitfalls in large-scale language assessment programs. First, data from German language screening programs are utilized to show why children with frequent otitis media seem to acquire German more quickly than children without frequent otitis media ($N = 1,628$). Another example shows why children born in January-July speak better German than those born in August-December ($N = 4,316$) and how one can reverse these results on the basis of another sample (the same age, the same region, the same language test; $N = 6,144$). One more example demonstrates how a link between stuttering and children's German language competence can be described as very close or non-existent depending on chosen statistical methods ($N = 748$). A high variability of results, in spite of very large samples, validated and standardized language tests, high quality of data in terms of the inter-rater and intra-rater reliability, can be traced back either to errors in the study design or to unexpected confounding variables. For instance, children with frequent otitis media acquired German under comparatively favourable sociodemographic conditions.

Keywords: statistics, language acquisition, language assessment, language screening, German language

iafor

The International Academic Forum
www.iafor.org

Introduction

Results of statistical calculations can vary depending on a number of factors: sample size, comparability of subsamples, coding of variables, use of imputation, use of the Bonferroni adjustment of p -values, or Bonferroni-Holm adjustment, or no adjustment at all, use of parametrical or more conservative non-parametrical statistical methods, z -transformation of metrical variables or no transformation etc. For instance, too low sample sizes often result in not statistically significant p -values (in spite of considerable effect sizes), whereas very large samples can make even smallest differences between subgroups statistically significant. Comparability means that the subgroups that are to be compared should be matched as far as possible regarding well-known influencing variables. For instance, if we compare reading habits of British and Spanish adults, it would be important to match them not only for age and biological sex (or gender), but also for the educational level and occupation because these factors influence reading habits. The term “imputation” refers to a number of statistical methods that fill gaps in data sets to increase sample sizes and make them more representative. For instance, missing values in language tests (no answer) can be filled by mean or median values of other answers. It allows to include in calculations children with a low compliance, that is, those who did not answer some questions in the test. But different methods of imputation deliver different results and we do not know which one can be considered more correct. Also, various methods of adjustment of p -values can be used in case of the multiple testing (e.g., five T -tests with five subtests of a language screening conducted on the same day with the same child). Use or non-use of such adjustments can influence results considerably, many relevant statistically significant results can be lost due to rigorous adjustments. Furthermore, it is up to the researcher whether he or she chooses parametrical or non-parametrical statistical methods. The latter are more conservative and should be used when certain criteria for parametrical methods are not met (first and foremost, normal distribution of metrical data). In reality, many researchers always use parametrical methods because these deliver more often statistically significant results. Usually, reviewers of manuscripts do not question the choice of parametrical methods and consider them a kind of default option, although, strictly speaking, researchers have to provide evidence that respective criteria were checked (e.g., results of the Kolmogorov-Smirnov test). Z -transformation is important when, among other things, two variables with different scales should be correlated (e.g., results of a language test ranging from 0 to 20 and results of an IQ-test ranging from 50 to 150). Usually, differences between correlation coefficients of z -transformed and not z -transformed values are minimal. But if the p -value is marginally significant (about $p = .05$), transformation or non-transformation can change much in the results.

There are many other possible sources of errors or misinterpretations in statistical calculations: missing inter-rater or intra-rater reliability, reporting of results of ANOVA for influencing factors, although the ANOVA model itself was not statistically significant (or explained only 5% of variance in the dependent variable, although 70–80% were achieved in other comparable studies), missing correlation interpreted as no association, although not all associations are linear, etc. Also, it is natural for humans to be satisfied with results if they found evidence in favour of their hypothesis and to keep on searching for possible confounding variables and other sources of errors if results did not confirm their hypothesis. Of course, if they kept on searching for the same statistical issues even in case of “favourable” results, they would sometimes also find some confounding variables and other errors that completely distorted their findings.

The current study focuses predominantly on the problem of confounding variables. Several examples of the influence of such variables are discussed on the basis of data from a large-scale language screening program in the German state of Hesse. Also, influence of the choice of statistical methods on results is shown for the language test data.

Methods

Several samples of children from studies on the development of two language tests were re-analysed retrospectively (Table 1). All monolinguals in Table 1 were children speaking German.

Table 1
Characteristics of Samples Used in the Current Study

	S1	S2	S3	S4	S5
<i>N</i>	1,628	1,791	4,316	6,144	748
Boys	843 (51.8%)	923 (51.5%)	2,306 (53.4%)	3,117 (50.7%)	391 (52.3%)
Girls	785 (48.2%)	868 (48.5%)	2,010 (46.6%)	3,027 (49.3%)	357 (47.7%)
Age range	4;0-4;11	4;0-4;11	4;0-5;11	4;0-4;5	3;10-8;3
Age (months)	53.5	53.5	54.2	—	69.9
Monolinguals	739 (45.4%)	785 (43.8%)	2,039 (47.2%)	4,280 (69.7%)	303 (40.5%)
Bi-/multilinguals	889 (54.6%)	1,006 (56.2%)	2,277 (52.8%)	1,864 (30.3%)	445 (59.5%)
Language tests	KiSS.2	KiSS.2	KiSS.2	KiSS.1	AWST-R, S-ENS, ETS

In samples S1–S4, children’s German language skills were assessed by the validated, standardized language screening “Kindersprachscreening” in two different versions (“Language screening for children”; KiSS; Holler-Zittlau et al., 2011). It contains (a) subtests on speech comprehension, vocabulary, articulation, grammar, and phonological short-term memory (repetition of non-words and sentences), (b) questionnaires for parents and kindergarten teachers to assess sociodemographic and medical characteristics of children and their families. Predominantly, the second version of this screening was used, KiSS.2. Results of this test can be dichotomized as follows:

- Need of additional educational assistance in acquiring German (a German language course): yes/no,
- Need of additional medical assistance in acquiring German (some language[-related] therapy, usually speech-language therapy): yes/no,
- “Pass/fail”, with “fail” meaning that the child needs educational and/or medical assistance in acquiring German.

In S1-S4, all children were tested in German kindergartens.

In the sample S5, three German language tests were used (for full names, see References):

- AWST-R: vocabulary (Kiese-Himmel, 2005),
- S-ENS: phonological awareness (filling gaps in words), phonological short-term memory (repetition of non-words and sentences), articulation (Döpfner et al., 2005),

- ETS: speech comprehension, grammar (Angermaier, 2007).

S-ENS is one of the German school enrolment tests. All three tests were conducted not in kindergartens (in contrast to S1–S4), but in public health departments. Most children were tested during the school enrolment examination.

The first example of possible pitfalls in statistical calculations is dedicated to children with otitis media. It is an inflammation or infection of the middle ear, the space behind the eardrum. Due to otitis media, children do not hear well, which can slow down the pace of the language acquisition (Nittrouer & Lowenstein, 2024). The KiSS.2 questionnaire for parents contains an item “Does the child often have otitis media?” (yes/no). It was up to parents to define what is meant by “often” (since such definitions are subjective, it represents a certain problem for statistical analyses). Sample S1 was used for these calculations. German language skills and sociodemographic characteristics of children with and without frequent otitis media were compared by means of Chi-Square tests, linear-by-linear associations (lbl), or Mann-Whitney *U*-tests depending on the coding of variables. Children with and without frequent otitis media had comparable age in months according to the Mann-Whitney *U*-test ($p > .05$).

The second example is dedicated to children with cases of dyslexia in the family, that is, with a familial predisposition for language disorders (questionnaire for parents: item “Are there cases of problems with reading and writing (dyslexia) in the family?”: yes/no). It was shown in previous studies that such children have relatively poor language competence (Caglar-Ryeng et al., 2019). German language skills and sociodemographic characteristics of children with and without cases of dyslexia in the family were compared by the same methods as described above. Here, sample S2 was used. There was no difference in age between children with and without cases of dyslexia in the family.

The third example is dedicated to months of birth: January–July vs. August–December. There is no reason to believe that children born in certain months should have better German language skills. The comparison of children born in the first vs. second half of the year was chosen to show how results can change, although children were tested in the same region by the same language test (KiSS.2). Here, samples S3 and S4 were used. Chronologically, children in S4 were tested several years earlier than children in S3. There were no differences in age between children born in January–July and those born in August–December in S3. For S4, such comparisons were not possible because no data on exact age in months were available.

The fourth example is dedicated to stuttering. Here, sample S5 was used. Stutterers and non-stutterers were compared regarding their German language skills by means of several univariate statistical methods. Stutterers and non-stutterers were of comparable age. Generally, stuttering is very vaguely associated with weaker language skills, that is, the difference between stutterers and non-stutterers is minimal (Ntouriou et al., 2013; Zaretsky et al., 2017). For other languages than German, some studies showed that stutterers can even outperform non-stutterers in language skills if sociodemographic conditions of the language acquisition are favourable (e.g., Reilly et al., 2013).

Results

Results on Otitis Media

According to KiSS.2, children with frequent otitis media were less often classified as needing additional educational assistance in acquiring German (38/108 (35.2%) vs. 717/1,518 (47.2%); $\chi^2_{(1)} = 5.9, p = .015$) and, therefore, failed less often in KiSS.2 (42/108 (38.9%) vs. 751/1,518 (49.5%); $\chi^2_{(1)} = 4.5, p = .033$). Also, in the subjective estimations of German language skills by kindergarten teachers (item “The child speaks German age-appropriately”, from 1 “never” to 5 “always”) children with frequent otitis media scored higher than children without frequent otitis media: $l_{bl} = 4.7, p = .030$. Thus, at first sight, it can be concluded that frequent otitis media is a factor that helps children in the German language acquisition. However, a comparison of sociodemographic characteristics of children with and without frequent otitis media shows that this conclusion would be wrong because there are some hidden confounding factors behind this finding. Generally, children with frequent otitis media acquire German under more favourable conditions. They...

- were more often monolingual Germans than bi-/multilinguals: $\chi^2_{(1)} = 14.4, p < .001$,
- were less often immigrants (definition: the child or at least one of parents immigrated to Germany): $\chi^2_{(1)} = 4.9, p = .047$,
- spoke more often only German at home: $l_{bl} = 16.5, p < .001$,
- began earlier to acquire German: $l_{bl} = 17.8, p < .001$,
- their mothers could read and write German better (self-estimation): $l_{bl} = 5.5, p = .019$,
- their mothers ($Z = -3.3, p = .001$) and fathers ($Z = -3.7, p < .001$) began earlier to acquire or to learn German.

On the other hand, children with frequent otitis media acquired German under several unfavourable medical conditions. Among other things, they...

- had more often regular medicine intake: $\chi^2_{(1)} = 8.9, p = .003$,
- had more often head injuries and operations: $\chi^2_{(1)} = 55.4, p < .001$,
- had to attend paediatricians more often than other children: $\chi^2_{(1)} = 73.4, p < .001$,
- had more often a permanent hearing disorder: $\chi^2_{(1)} = 24.9, p < .001$.

Nevertheless, obviously, their monolingual German, non-immigrant background outweighed negative medical factors and helped children with frequent otitis media in the German language acquisition. Therefore, comparisons of children with and without frequent otitis media should be carried out separately for monolingual Germans and bi-/multilinguals.

Exclusion of bi-/multilinguals indeed changed results radically. Among monolingual German children, those with frequent otitis media were classified more often as needing additional medical assistance in acquiring German (17/68 (25.0%) vs. 94/670 (14.0%); $\chi^2_{(1)} = 5.8, p = .016$) and, therefore, they failed marginally significantly more often in KiSS.2 (20/68 (29.5%) vs. 132/670 (19.7%); $\chi^2_{(1)} = 3.6, p = .059$). According to parents, such children also had more often language delay (first words after the second birthday; $\chi^2_{(1)} = 4.0, p = .046$), apart from other unfavourable medical factors mentioned above. Children with and without frequent otitis media did not differ in age (in months), that is, were comparable. Thus, monolingual German children with frequent otitis media had somewhat weaker German language skills than children without frequent otitis media.

In the subgroup of bi-/multilinguals, the strange finding that frequent otitis media is associated with better German language competence did not disappear, in spite of low sample sizes. Children with frequent otitis media were less often classified as needing educational assistance in acquiring German (22/40 (55.0%) vs. 612/848 (72.2%); $\chi^2_{(1)} = 5.5$, $p = .019$) and they also failed less often in KiSS.2 (22/40 (55.0%) vs. 619/848 (73.0%); $\chi^2_{(1)} = 6.2$, $p = .013$). This can be explained by the fact that in their families German was spoken more often than in the families of children without frequent otitis media ($|b| = 6.9$, $p = .009$). Again, there was no difference in age between children with and without frequent otitis media. It can be concluded that not otitis media, but the use of German at home resulted in better German language skills.

Results on Dyslexia in the Family

In dichotomized KiSS.2 results, there were no differences between children with and without cases of dyslexia in the family, but Mann-Whitney *U*-test identified minimal differences in KiSS.2 subtests. Whereas children with and without dyslexia in the family scored approximately at the same level in the German articulation, grammar, repetition of non-words and sentences as well as in the KiSS.2 total score, children with dyslexia in the family outperformed children without dyslexia in the family in the speech comprehension (5.4 ± 2.6 vs. 5.0 ± 2.8 ; $Z = -2.0$, $p = .048$) and vocabulary (15.5 ± 6.3 vs. 12.9 ± 7.3 ; $Z = -2.3$, $p = .022$). Again, this finding can be explained by a higher percentage of monolingual Germans among children with dyslexia in the family, compared to children without dyslexia in the family (115/732 (15.7%) vs. 65/884 (7.4%); $\chi^2_{(1)} = 28.3$, $p < .001$). Thus, children with dyslexia in the family spoke better German not because of dyslexia but because they were more often Germans.

Exclusion of bi-/multilinguals shows that, as expected, monolingual German children with cases of dyslexia in the family needed more often educational (33/115 (28.7%) vs. 85/617 (13.8%); $\chi^2_{(1)} = 16.0$, $p < .001$) and medical support (25/115 (21.7%) vs. 84/617 (13.6%); $\chi^2_{(1)} = 5.0$, $p = .025$) in the German language acquisition, and therefore, they failed more often in KiSS.2 (38/115 (33.0%) vs. 111/617 (18.0%); $\chi^2_{(1)} = 13.6$, $p < .001$). They showed weaker results in all subtests of KiSS.2 except speech comprehension and repetition of non-words ($p < .05$). However, even in the repetition of non-words the difference was marginally significant with $p = .068$ (and in the speech comprehension such differences only seldom become statistically significant due to a low number of items: only three). On the contrary, results of bi-/multilinguals were not statistically significant (Chi-Square and Mann-Whitney *U*-tests) because such variables as age of the German language acquisition are more important for them than the familial predisposition for language impairments and disorders.

Results on Children Born in the First vs. Second Half of the Year

According to KiSS.2, in S3 children born in January–July needed less often additional medical assistance in acquiring German than those born in August–December (164/907 (18.1%) vs. 205/874 (23.5%); $\chi^2_{(1)} = 7.8$, $p = .005$). Also, they needed marginally significantly less often educational assistance in acquiring German (368/907 (40.6%) vs. 392/874 (44.9%), $\chi^2_{(1)} = 3.3$, $p = .068$) and failed marginally significantly less often in KiSS.2 (383/907 (42.2%) vs. 405/874 (46.3%), $\chi^2_{(1)} = 3.1$, $p = .081$). Again, this finding is explained by a higher percentage of monolingual Germans in the subgroup of children born in January–July: 1,273/2,577 (49.4%) vs. 766/1,739 (44.0%); $\chi^2_{(1)} = 11.9$, $p = .001$.

In the subgroup of monolingual Germans, differences between children born in January-July and August-December did not exist. However, in the subgroup of bi-/multilinguals, children born in January-July were still less often classified as needing additional medical assistance in acquiring German than children born in August-December: 95/449 (21.2%) vs. 132/481 (27.4%); $\chi^2_{(1)} = 5.0$, $p = .026$. There was only one factor that might have contributed to this difference: mothers of children born in August-December had a lower educational level: $l_{bl} = 4.4$, $p = .036$. Thus, it would be possible to explain the difference in KiSS.2 by some variables related to the educational level (e.g., more neglect of children born in August-December). It is also noteworthy that children born in the first half of the year were more often tested in the years 2008-2012 (534/1,304 (41.0%) vs. 357/973 (36.7%)), when German language skills generally were better, and children born in the second half of the year were more often tested in the years 2017-2019 ($\chi^2_{(1)} = 4.3$, $p = .039$).

One can reverse the results if another sample is used. In S4, children born in the second half of the year showed better German language competence than children born in the first half of the year. They were less often classified in KiSS.2 as needing educational assistance in acquiring German (610/3,307 (18.4%) vs. 599/2,837 (21.1%); $\chi^2_{(1)} = 6.9$, $p = .009$) and also they failed less often in KiSS.2 (870/3,307 (26.3%) vs. 826/2,837 (29.1%); $\chi^2_{(1)} = 6.0$, $p = .014$). Here, percentages of monolinguals and bi-/multilinguals in the first and second halves of the year did not differ. Unfortunately, this sample contains almost no other sociodemographic or medical data. Therefore, the confounding variable(s) remain(s) unknown. Also, it should be emphasized that samples S3 and S4 used different versions of KiSS (KiSS.1 and KiSS.2), which reduces their comparability.

Results on Stuttering

Stutterers (children stuttering often or always according to the questionnaire for parents) made out 4.8% of the sample ($n = 36$), which is normal for children of the pre-school age, but represents a problem for statistical calculations because a very small subgroup should be compared with a large one.

Correlations between stuttering (ordinal: “never – seldom – sometimes – often – always”) and total scores of correct answers in language tests show that stutterers slightly lagged behind in the German language acquisition (Table 2).

Table 2

Associations Between Stuttering and Total Scores of Language Tests: Spearman's Correlations

	S-ENS: repetition non-words	S-ENS: repetition sentences	S-ENS: filling gaps in words	S-ENS: articulation	ETS: speech compre- hension	ETS: grammar	AWST-R: vocabu- lary
ρ	-.092*	-.111**	-.057	-.117**	-.126**	-.106**	-.155***
n	581	580	581	579	696	678	684

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

The first correlation in Table 2 (-.092) should be dismissed as too low: according to Cohen (1988), correlations $< .1$ should not be reported. The second correlation (-.111) would disappear if we apply the Bonferroni adjustment of p -values ($p = .05/7 = .007$) and would not if we apply the Bonferroni-Holm adjustment or do not apply adjustments at all. All other correlations can

be considered weak, but statistically significant even after the adjustment of p -values. They show that there was indeed a minimal, but statistically significant association between stuttering and poor German language skills. All p -values reported in Table 2 result from two-sided calculations. If we formulate a directional hypothesis (“there must be a negative association between stuttering and German language skills: more stuttering is associated with worse language skills”), then we can use one-sided calculations that deliver more statistically significant results. In case of the repetition of sentences, the p -value would go down from .007 to .004 and, thus, it would still remain significant even after the application of the Bonferroni adjustment. Alternatively, one can use Pearson’s correlations instead of Spearman’s. Pearson’s correlations are less conservative and deliver more often significant p -values. In case of the repetition of sentences, the p -value would go down from .007 to .003 and, again, it can be “saved” from the Bonferroni adjustment. On the other hand, inclusion of more correlations (e.g., total score of S-ENS) would automatically reduce the number of statistically significant results, if we still want to apply the Bonferroni adjustment ($.05/8 = .00625$). Thus, inclusion of just one more correlation would make us lose a statistically significant result on grammar. Also, different dichotomizations of ordinal variables can change results dramatically. If we dichotomize the variable “stuttering” as “never-seldom vs. sometimes-always” (instead of “never-sometimes vs. often-always”), then the point-biserial correlation with the S-ENS subtest “articulation” is no more significant and too low to be reported (-.082).

Also, minimal differences in sample sizes can change a lot in case of such a seldom phenomenon as stuttering. If an unselected sample is tested, then very few stutterers need to be compared with a lot of non-stutterers. Every new stuttering child can change the results. Thus, if we take into account the date of language tests, then the first 17-21 recruited stutterers showed in Pearson’s correlations that there is a significant (negative) association between stuttering and articulation, but after that the association got lost (children 22+). The association between stuttering and repetition of sentences became statistically significant in the last moment, after the last stuttering child was tested. On the contrary, association between stuttering and filling gaps in words got lost after the addition of the last child. Sample sizes of 200, 370, and 580 (all children taken together) would have resulted in the highest number of statistically significant Pearson’s correlations. Other sample sizes would deliver lower numbers of significant results. With 100 children, no results would be statistically significant. Thus, between zero and seven results can be “made” statistically significant in univariate tests depending on the sample size.

Instead of correlations, Mann-Whitney U -tests can be used to analyze the link between stuttering and language skills. For this purpose, stuttering should be dichotomized (e.g., “never-seldom vs. sometimes-always”). Here, results can change depending on (a) one-sided or two-sided calculations, (b) exact or approximate (asymptotic) calculations of the p -value, (c) dichotomization, (d) imputation, (e) application of p -value adjustments etc. For those researchers who do not want to rely on p -values only, various effect sizes were developed. Here, probability of superiority index was used ($\hat{p}$, Grissom & Kim, 2012). Values close to .5 can be considered a low effect size, those close to .0 high. In Table 3, results show that different calculation methods did not change much in the results. Significance values were, as always, higher in one-sided calculations but it did not make results qualitatively different. Also, we were lucky enough to receive in Mann-Whitney U -test results comparable to those in correlations in Table 2. Unfortunately, we cannot completely rely on the effect size because, for instance, a considerable effect size of .29 in the AWST-R vocabulary would not change even if we compare just five stutterers with 700 non-stutterers.

Table 3

Differences Between Children Stuttering Never-Seldom vs. Sometimes-Always in Total Scores of Language Tests: Mann-Whitney U-tests

	S-ENS: repetition non-words	S-ENS: repetition sentences	S-ENS: filling gaps in words	S-ENS: articula- tion	ETS: speech compre- hension	ETS: grammar	AWST-R: vocabu- lary
Two- sided (z)	-1.27	-2.39*	-1.05	-2.08*	-2.72**	-3.55***	-2.61**
MC two- sided (z)	-1.27	-2.39*	-1.05	-2.08*	-2.72**	-3.55***	-2.61**
MC one- sided (z)	-1.27	-2.39**	-1.05	-2.08*	-2.72**	-3.55***	-2.61***
$\hat{p}$	.43	.37	.44	.40	.36	.31	.29
n	581	580	581	579	696	678	684

Note. *** $p < .001$, ** $p < .01$, * $p < .05$, MC = Monte Carlo (exact calculation of p -values)

It is important to know that various statistical methods demand various minimal sample sizes (that can be calculated in special programs). If this requirement was not fulfilled, results of statistical calculations become unreliable. In our case, it does not matter how we dichotomize stuttering: “never-seldom vs. sometimes-always” or “never-sometimes vs. often-always” because the sample size in the subgroup of stutterers always remains too low for Mann-Whitney U -tests and, therefore, our results remain questionable. Mann-Whitney U -test requires at least 67 participants in each subgroup (two-sided calculations, effect size d .05, power .80, α error probability .05). Ideally, we would need 110 participants in each group (power .95). We cannot calculate sample sizes for a one-sided test because, as was shown above, sometimes stutterers outperform non-stutterers in language tests (one-sided tests demand less participants than two-sided tests).

Table 4 summarizes different univariate statistical methods that can be used for the analysis of associations between stuttering and language skills. In Table 4, the common denominator of all calculations is that the association with grammar skills is always significant (all correlations are significant and above .1, that is, can be reported). Results for all other linguistic domains vary depending on the (subjective) choice of the statistical method. Again, some results can be “made” statistically significant by means of, for instance, imputation. Thus, the T -test on the repetition of sentences did not deliver a significant result in Table 4, but if we use imputation with mean values, then it would become significant: $T = 2.01$, $p = .045$.

Table 4

Differences Between Children Stuttering Never-Seldom vs. Sometimes-Always in Several Language Tests: Various Univariate Statistical Tests

	S-ENS: repetition non-words	S-ENS: repetition sentences	S-ENS: filling gaps in words	S-ENS: articulation	ETS: speech compre- hension	ETS: grammar	AWST-R: vocabu- lary
<i>T</i> -test (<i>t</i>)	0.86	1.60	1.32	1.45	3.07**	3.38**	4.74***
<i>U</i> -test (<i>z</i>)	-1.27	-2.39*	-1.05	-2.08*	-2.72**	-3.55***	-2.61**
ρ correla- tion	-.092*	-.111**	-.057	-.117**	-.126**	-.106**	-.155***
<i>r</i> correla- tion	-.090*	-.124**	-.077	-.120**	-.141***	-.150***	-.162***
ϕ correla- tion	.032	.123**	.044	.086*	.056	.126**	.094*
Linear- by-linear	0.60	8.76**	1.11	4.23*	2.16	10.67**	5.95*

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

It should be noted that univariate methods deliver more uniform results than multivariate ones. Thus, with multivariate methods virtually any result is possible. In the current study, only univariate methods were applied.

Discussion

It was shown that if confounding variables are not taken into account, any most absurd result is possible in statistical calculations. Here, this confounding variable was the use of German at home. Children with frequent otitis media, cases of dyslexia in the family, and born in the first half of the year spoke better German simply because they were more often monolingual Germans or used more often German at home (if bi-/multilingual). Not always such confounding variables can be considered a matter of chance. In case of otitis media and dyslexia, one can assume that monolingual Germans as well as integrated immigrants (those who often use German at home) have an easier access to the German healthcare system (cf. Holz, 2022; Lechner & Mielck, 1998; Maier et al., 2015). Therefore, their medical issues are diagnosed more often and quickly (cf. Scharff Rethfeldt, 2019). It is hardly imaginable that bi-/multilinguals have less often otitis media and dyslexia but their medical issues remain longer undiagnosed and, thus, without treatment. This results in worse German language skills. In the example with the first vs. second halves of the year, there was another confounding variable, namely better German language skills of children tested in 2008-2012, compared to those in 2017-2019. Language assessment studies have their active phases that last for several months. In 2008-2012 such an active phase happened to be in the first half of the year, which resulted in inclusion of many monolingual Germans and bi-/multilinguals with comparatively good German language skills in the sample. In 2017-2019, more children were tested in the second half of the year. As was mentioned above, German language skills were much better in 2008-2012 than in 2017-2019. This is valid both for monolingual Germans (Zaretsky et al., 2022) and bi-/multilinguals (Zaretsky et al., 2020).

Example of stuttering shows that even studies with large sample sizes do not guarantee correct results because (a) a large sample size does not mean that the subgroups to be compared are also large (the subgroup of stutterers was very small), (b) the choice of statistical methods can influence results considerably. Especially the use of the Bonferroni adjustment of p -values is questionable and has been often criticized as too rigorous (Narum, 2006; Perneger, 1998), but is widely applied in the research. Even in case of relatively simple univariate methods one can present the link between stuttering and language skills as non-existent to considerable. Although language tests used in this study are well-known, validated, and standardized, there is still enough space for manipulations or errors. Among other things, imputation by mean values can make one or two results statistically significant (those that were on the verge of statistical significance before imputation). Imputation also influences some other statistical results (e.g., makes standard deviations smaller). One-sided calculations and parametrical statistical methods automatically make results more statistically significant. Effect sizes can be helpful in the recognition of “unreliable” p -values but sometimes do not “notice” other problems such as incomparable sample sizes.

Taking into account that in most studies sample sizes are too low and various adjustments of p -values are often applied without any clear motivation, many statistically significant results get lost. These lost results often remain unpublished, that is, invisible for the reader because scientific journals still prefer to accept manuscripts with clear, statistically significant findings. This leads to the so-called p -hacking, that is, various manipulations of subsamples, inclusion and exclusion criteria, or parameters of statistical methods with the aim of getting statistically significant results that can be published.

Conclusion

There is a considerable variability in statistical results depending on the choice of statistical methods, sample size, imputation, and many other factors. Also, confounding variables can change results of statistical calculations dramatically.

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

The authors declare that no AI or AI-assisted technologies have been used to generate, refine, or correct the content in the manuscript. The ideas, design, procedures, findings, analyses, and discussion are originally written and derived from careful and systematic conduct of the research.

References

- Angermaier, M. J. W. (2007). *ETS 4-8. Entwicklungstest Sprache für Kinder von 4 bis 8 Jahren* [ETS 4-8. Developmental test for children aged between 4 and 8 years]. Harcourt Test Services GmbH.
- Caglar-Ryeng, O., Eklund, K., & Nergard-Nilssen, T. (2019). Lexical and grammatical development in children at family risk of dyslexia from early childhood to school entry: A cross-lagged analysis. *Journal of Child Language*, 46(6), 1102–1126. <https://doi.org/10.1017/S0305000919000333>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. 2nd ed. Erlbaum.
- Döpfner, M., Dietmair, I., Mersmann, H., Simon, K., & Trost-Brinkhues, G. (2005). *S-ENS. Screening des Entwicklungsstandes bei Einschulungsuntersuchungen* [S-ENS. Screening of the developmental status for school enrolment examinations]. Hogrefe.
- Grissom, R. J., & Kim, J. J. (2012). *Effect sizes for research: Univariate and multivariate applications*. 2nd ed. Routledge.
- Holler-Zittlau, I., Euler, H. A., & Neumann, K. (2011). Kindersprachscreening (KiSS) – das hessische Verfahren zur Sprachstandserfassung [Language Screening for Children (KiSS) – a Hessian language screening tool]. *Sprachheilarbeit*, 5(6), 263–268.
- Holz, M. (2022). Health inequalities in Germany: Differences in the ‘Healthy migrant effect’ of European, non-European and internal migrants. *Journal of Ethnic and Migration Studies*, 48(11), 2620–2641. <https://doi.org/10.1080/1369183X.2021.1901675>
- Kiese-Himmel, C. (2005). *AWST-R. Aktiver Wortschatztest für 3- bis 5-jährige Kinder – Revision* [AWST-R. Test of active vocabulary for children aged between 3 and 5 years – revision]. Hogrefe.
- Lechner, I., & Mielck, A. (1998). Die Verkleinerung des “Healthy-Migrant-Effects”: Entwicklung der Morbidität von ausländischen und deutschen Befragten im sozioökonomischen Panel 1984-1992 [Decrease in the “healthy migrant effect”: Trends in the morbidity of foreign and German participants in the 1984-1992 Socioeconomic Panel]. *Das Gesundheitswesen*, 60(12), 715–720.
- Maier, I., Kriston, L., Härter, M., Hölzel, L. P., & Bermejo, I. (2015). Psychometrische Überprüfung eines Fragebogens zur Erfassung der Barrieren der Inanspruchnahme von Gesundheitsleistungen durch Personen mit Migrationshintergrund [Psychometric testing of a new scale assessing the reasons for non-utilisation of health care services by people with migration background]. *Gesundheitswesen*, 77(10), 749–756. <https://doi.org/10.1055/s-0034-1395641>
- Narum, S. R. (2006). Beyond Bonferroni: Less conservative analyses for conservation genetics. *Conservation Genetics*, 7, 783–787. <https://doi.org/10.1007/s10592-005-9056-y>

- Nittrouer, S., & Lowenstein, J. H. (2024). Early otitis media puts children at risk for later auditory and language deficits. *International Journal of Pediatric Otorhinolaryngology*, 176, 111801. <https://doi.org/10.1016/j.ijporl.2023.111801>
- Ntourou, K., Conture, E. G., & Lipsey, M. W. (2013). Language abilities of children who stutter: A meta-analytical review. *American Journal of Speech-Language Pathology*, 20(3), 163–179. [https://doi.org/10.1044/1058-0360\(2011/09-0102\)](https://doi.org/10.1044/1058-0360(2011/09-0102))
- Perneger, T. V. (1998). What's wrong with Bonferroni adjustments. *British Medical Journal*, 316, 1236. <https://doi.org/10.1136/bmj.316.7139.1236>
- Reilly, S., Onslow, M., Packman, A., Cini, E., Conway, L., Ukoumunne, O. C., Bavin, E. L., Prior, M., Eadie, P., Block, S., & Wake, M. (2013). Natural history of stuttering to 4 years of age: A prospective community-based study. *Pediatrics*, 132(3), 460–467. <https://doi.org/10.1542/peds.2012-3067>
- Scharff Rethfeldt, W. (2019). Speech and language therapy services for multilingual children with migration background: A cross-sectional survey in Germany. *Folia Phoniatrica et Logopaedica*, 71(2-3), 116–126. <https://doi.org/10.1159/000495565>
- Zaretsky, E., Lange, B. P., Euler, H. A., Robinson, F., & Neumann, K. (2017). Pre-schoolers who stutter score lower in verbal skills than their non-stuttering peers. *The Buckingham Journal of Language and Linguistics*, 10, 96–115.
- Zaretsky, E., van Minnen, S., Lange, B. P., & Hey, C. (2020). Sprachkompetenzen vierjähriger Kinder mit Migrationshintergrund in Hessen: eine Bestandsaufnahme [Language competence of children with immigrant background in Hesse: A survey]. *Praxis Sprache*, 65(2), 90–97.
- Zaretsky, E., van Minnen, S., Lange, B. P., & Hey, C. (2022). Sprachstand vierjähriger monolingual deutscher Kinder: eine Querschnittsanalyse [Language competence of four-year-old monolingual German children: A cross-sectional analysis]. *Kindheit und Entwicklung*, 31(1), 52–59. <https://doi.org/10.1026/0942-5403/a000363>

What Does Variance in the Language Test Data Tell Us About Influencing Factors on Children's Linguistic Development?

Eugen Zaretsky, Marburg University Hospital, Germany
Benjamin P. Lange, IU International University of Applied Sciences, Germany
Christiane Hey, Marburg University Hospital, Germany

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

Variance in the metrical data of language tests has seldom been analysed regarding its possible meaning for children's linguistic development. In the present study, variance in the language test results of German four-year-olds was analysed regarding its associations with some influencing factors on the children's linguistic development in German. Methods. All children ($n = 1,791$) were tested with language screenings KiSS.2, SSV as well as with "quasi-universal" non-words. Sociodemographic and medical characteristics of children and their families were documented in KiSS.2 questionnaires for parents and kindergarten teachers. Variance in the total scores of correct answers was compared for numerous dichotomous subgroups of children (e.g., "boys vs. girls") by means of the Levene's test. Results. Two subgroups of influencing factors on children's linguistic development were detected: (a) risk factors that are weakly associated with deficient German language skills, that is, with many exceptions, and (b) critically unfavourable risk factors that are almost always associated with deficient German language skills. The former show a large variance in the data, the latter a small variance. For instance, bilinguals (compared to German monolinguals) are those who tend to acquire German comparatively slowly and show a large variance. Children speaking Turkish language at home are among those who almost always lag behind in the German language acquisition, with minimal variance. Discussion. Most risk factors result in a large variance but there are also some critically unfavourable risk factors that show a minimal variance because they are closely associated with the deficient German language competence.

Keywords: statistics, language acquisition, language assessment, language screening, German language

iafor

The International Academic Forum
www.iafor.org

Introduction

Usually, when results of language tests are reported, authors focus either on total scores of correct answers or on the categorized findings (e.g., dichotomization: “pass/fail”; trichotomization: “normal language competence–marginal result–insufficient language competence”). However, some results of statistical calculations are usually not reported and often considered an unnecessary by-product of such calculations. One of them is variance (e.g., variance in the mean values of correct answers in a grammar test). Although variance can be easily derived from standard deviations (formula: $\text{standard deviation}^2$), and standard deviations are often reported together with mean values, no conclusions are drawn from the larger or smaller variance.

Variance is a measurement of how far each number in a data set goes from the mean (average) value, and thus from every other number in the data set. It is a statistical measurement of how large of a spread there is within a data set. Variance evaluates the dispersion of a data set relative to its mean. Mathematically, it is the average squared deviation of each data point from the mean. To put it simple, large variance means that there are many exceptions from the rule (represented by the mean value). For instance, if 40 four-year-old children get, on average, 20 points in a grammar test with the variance of 4 (small variance = small variability), then it means that most children scored approximately on the same level, with small deviations from the mean value. Variance of 20 in the same test means, on the other hand, that there were large differences in the results of these 40 children (high variability).

It is well-known, among other things, that boys show a larger variance in German language tests than girls in the first years of life (Lange et al., 2016). It means that girls score in language tests with a smaller variability than boys. Boys show more often the full spectrum of results, from zero points to the highest possible level. Other sociodemographic and medical factors that can influence children’s language competence seldom have been in focus of research regarding differences in the variance. In the current study, several such (sociodemographic and medical) factors were analysed for four-year-old children acquiring German (in Germany).

Special attention was paid to the tasks on the assessment of the phonological short-term memory (PSTM). PSTM is our innate ability to memorize and process acoustic signals within several seconds. PSTM is important for the language acquisition and, therefore, it is assessed in some language tests by various repetition tasks: repetition of non-words, seldom real words, sentences, and digit spans. If deficits in PSTM are found, it can mean that the child has some language(-related) impairment or disorder because many of them are associated with such deficits: Developmental Language Disorder (Schwob et al., 2021), severe hearing loss (Ching et al., 2019) or Attention-Deficit/Hyperactivity Disorder (Redmond et al., 2011). Therefore, deficits in PSTM are often considered a clinical marker for language(-related) impairments and disorders (e.g., Masoura et al., 2020; Penke, 2018). However, repetition tasks that are used to assess PSTM usually have one common problem: they are based on certain languages and, thus, also assess language skills. Linguistic interferences can be so strong that some repetition tasks are more suitable for the assessment of language competence than for PSTM (Polišenska et al., 2015). Even non-words (not existing words) can contain language-specific morphemes, consonant clusters, and phonemes, or they can rhyme with real words. Therefore, non-words with a low linguistic load were developed that are believed to be less language-dependent and to assess PSTM more directly. In the current study, different repetition tasks were analyzed regarding their variance. It was assumed that variance patterns in the repetition tasks can vary depending on whether respective tasks have a higher or lower linguistic load. Thus, sentence

repetition clearly assesses vocabulary and grammar and, therefore, variance patterns must be comparable to those of vocabulary and grammar tasks. Repetition of non-words, if they are German-based, can also assess children's phonotactic skills and, maybe, vocabulary or grammar (morphology) skills, but if non-words are not German-based, then, totally different variance patterns can be expected.

Methods

A sample of 1,791 German kindergarten children (age 4; 0–4; 11 years, $M = 53.5$ months; 923/51.5% boys, 868/48.5% girls) was re-analyzed retrospectively. More than a half of children spoke two or three languages (1,006/56.2%), all other children (785/43.8%) were monolingual Germans. The data were collected during a study on the development of two language tests. In the original prospective design, there were no other inclusion criteria expect age of four years and a written consent signed by parents.

Children's German language skills were assessed by the validated, standardized language screening "Kindersprachscreening" ("Language screening for children"; KiSS.2; Holler-Zittlau et al., 2011). It contains (a) subtests on speech comprehension, vocabulary, articulation, grammar, PSTM (repetition of non-words and sentences), (b) questionnaires for parents and kindergarten teachers to assess sociodemographic and medical characteristics of children and their families.

PSTM was assessed not only by (a) the repetition tasks from KiSS.2, but also by (b) the language screening "Sprachscreening für das Vorschulalter" ("Language screening for the preschool age"; SSV; Grimm, 2017)—by means of the repetition of non-words and sentences—and by (c) the so-called quasi-universal non-words (QUNW; Chiat, 2015). The latter are considered more or less language-independent, in contrast to repetition tasks in KiSS.2 and SSV that are German-based. Thus, our test battery contained three subtests on the repetition of non-words (KiSS.2, SSV, QUNW) and two subtests on the repetition of sentences (KiSS.2, SSV). Since the current study focuses on the non-word repetition, characteristics of non-words are described in more detail in Table 1.

Table 1
Characteristics of Non-words Used in the Present Study

Characteristics of non-words	KiSS.2	SSV	QUNW
<i>n</i> (non-words)	4	18	16
German prefixes	2	1	0
German suffixes	2	8	0
German stems	0	2	0
Consonant clusters	5	29	0
Phonemes* /r, ʒ, ʃ, η, ʔ/	4	12	0
Item length			
(a) 2 syllables	1	3	4
(b) 3	0	6	4
(c) 4	3	4	4
(d) 5	0	5	4
Non-word examples	<i>Triser, Nabolira</i>	<i>Kalifeng, Gattwutz</i>	<i>Lumika, Litisaku</i>

Note. * Phonemes characteristic of the German language

Differences between subgroups of children (e.g., boys vs. girls) in all language and PSTM tests were analyzed by *T*-tests. Information on the subgroups, that is, on various characteristics of children and their families, was taken from KiSS.2 questionnaires for parents and kindergarten teachers. Levene's test for equality of variances was utilized to quantify differences in the variance between the same subgroups.

Regression-based automatic linear modeling (offered by the software IBM SPSS 21; International Business Machines Corp., New York, USA) was utilized to understand in more detail influencing factors behind children's performance in the non-word repetition tasks. Three models were calculated: with KiSS.2 non-words, SSV non-words, and QUNW as dependent variables and KiSS.2 speech comprehension, vocabulary, articulation, and grammar as independent variables (total scores of correct answers). The selection model was "forward stepwise". Percentage of the explained variance of the dependent variable was derived from the adjusted R^2 .

Results

According to KiSS.2, out of 1,789 children 855 (47.8%) needed additional educational assistance in acquiring German, 300 (16.8%) needed additional medical assistance, and 895 children (50.0%) failed in KiSS.2. For two children, no dichotomized results were available (test abort). Almost all children who needed medical assistance (some language(-related) therapy) also needed educational assistance (a German language course). According to SSV, 723 out of 1,716 children (42.1%) did not pass this language screening. For 75 children, no dichotomized results were available due to the test abort (low compliance). For QUNW, no cut-off criteria exist.

Factors that are well-known for their negative influence on the German language acquisition were categorized as those with a large or small variance in the mean values of total scores of the language tests. The results section starts with the factors associated with a comparatively large variance in the answers of children who acquire German under the influence of the negative factors (factors that can be considered unfavorable for the German language acquisition).

The first variable to be analyzed was biological sex. Mean values and variance in the answers of boys were compared to those of girls. It is well-known from previous studies that boys often score lower than girls in language tests (see Introduction) and therefore male sex can be considered a negative factor (a factor that can slow down the acquisition of German). Indeed, boys showed slightly weaker results than girls in several subtests and also a larger variance, although differences in variance were statistically significant only in three cases (see Table 2).

Table 2

Differences in Test Results Between Boys and Girls: T-Test and Levene's Test

Differences in Test Results Between Boys and Girls: T-Test and Levene's Test							
Tests		Boys		Girls		T-test (T)	Levene's test (F)
		M	s ²	M	s ²		
KiSS.2	Speech comprehension	4.8	8.4	5.2	7.3	-2.8**	10.5**
	Vocabulary	12.6	51.8	13.1	56.3	-1.5	2.1
	Articulation	13.2	10.2	13.8	7.8	-4.7***	15.6***

	Grammar	13.6	94.1	13.9	94.1	-0.5	0.1
	Repetition of non-words	6.2	13.0	6.6	12.3	-2.2*	0.1
	Repetition of sentences	9.6	23.0	10.1	22.1	-2.2*	5.0*
	Total score	62.2	640.1	64.9	615.0	-2.2*	0.8
SSV	Repetition of non-words	9.6	23.0	9.8	15.2	-3.2**	1.2
	Repetition of sentences	66.3	967.2	66.9	918.1	-0.4	1.0
	Total score	75.7	1,122.3	76.8	1,062.8	-0.7	1.0
	“Quasi-universal” non-words	10.7	9.0	11.3	7.8	-4.0***	1.0

Note. M = mean, s^2 = variance, *** $p < .001$, ** $p < .01$, * $p < .05$

Next, differences in the results of monolingual German children and bi-/multilingual children were analyzed (see Table 3). Monolingual Germans outperformed bi-/multilinguals in almost all tests and subtests. The latter showed larger variance in almost all cases.

Table 3

Differences in Test Results Between Monolingual German Children (MO) and Bi-/Multilingual Children (BM): T-Test and Levene's Test

	Tests	MO		BM		T-test (T)	Levene's test (F)
		M	s^2	M	s^2		
KISS 2	Speech comprehension	6.4	4.4	3.9	7.3	21.8***	91.2***
	Vocabulary	17.7	16.0	9.0	49.0	32.9***	386.0***
	Articulation	14.1	6.8	13.0	10.2	7.7***	45.2***
	Grammar	20.9	41.0	8.0	64.0	37.7***	76.6***
	Repetition of non-words	6.7	11.6	6.1	13.0	4.0***	0.0
	Repetition of sentences	12.7	9.6	7.6	21.2	27.3***	277.2***
	Total score	80.7	216.1	49.8	533.6	33.5***	242.9***
SSV	Repetition of non-words	10.1	13.0	9.0	17.6	5.9***	24.4***
	Repetition of sentences	86.6	400.0	50.6	800.9	31.0***	163.8***
	Total score	97.1	484.0	59.7	961.0	29.2***	152.7***
	“Quasi-universal” non-words	10.9	7.3	11.0	9.6	-0.7	14.6***

Note. M = mean, s^2 = variance, *** $p < .001$, ** $p < .01$, * $p < .05$

In the following, children attending kindergartens for a full day and half a day were compared. Attendance of kindergartens for a full day clearly contributed to advanced German language skills, respective children showed better test results (see Table 4). Children attending kindergartens for half a day showed significantly higher variance in most calculations.

Table 4

Differences in Test Results Between Children Attending Kindergartens for a Full Day (FD) and Half a Day (HD): T-Test and Levene's Test

	Tests	FD		HD		T-test (T)	Levene's test (F)
		M	s ²	M	s ²		
KISS.2	Speech comprehension	5.1	7.3	4.5	8.4	-4.0***	7.1**
	Vocabulary	13.3	50.4	10.8	60.8	-5.7***	17.2***
	Articulation	13.7	7.8	12.8	12.3	-4.9***	30.9***
	Grammar	14.3	92.2	11.2	100.0	-5.4***	3.1
	Repetition of non-words	6.4	12.3	6.0	13.0	-2.4*	0.1
	Repetition of sentences	10.1	21.2	8.7	25.0	-5.0***	13.2***
SSV	Total score	65.1	595.4	56.3	702.3	-5.7***	11.4**
	Repetition of non-words	9.7	16.0	8.8	16.8	-3.9***	0.2
	Repetition of sentences	68.2	912.0	58.5	1,004.9	-5.2***	4.3*
	Total score	77.9	1,062.8	67.5	1,169.6	-5.3***	3.7
	“Quasi-universal” non-words	11.0	7.8	10.6	10.2	-2.6**	11.0**

Note. M = mean, s² = variance, *** $p < .001$, ** $p < .01$, * $p < .05$

Attendance of nursery schools was compared with non-attendance in Table 5. Children who attended nursery schools in the first two years of life showed better total scores of correct answers and a lower variance in all calculations. Respectively, children who did not attend nursery schools showed a higher variance.

Table 5

Differences in Test Results Between Children Who Attended (Yes) and Did Not Attend (No) Nursery Schools: T-Test and Levene's Test

	Tests	Yes		No		T-test (T)	Levene's test (F)
		M	s ²	M	s ²		
KISS.2	Speech comprehension	5.7	6.3	4.1	7.8	11.2***	24.4***
	Vocabulary	15.4	36.0	9.7	56.3	15.6***	98.9***
	Articulation	14.1	6.3	12.8	10.9	8.6***	69.7***
	Grammar	17.1	74.0	9.4	84.6	16.1***	9.1**
	Repetition of non-words	6.7	12.3	5.8	13.0	4.8***	0.4
	Repetition of sentences	11.4	16.0	7.9	24.0	14.4***	84.3***
SSV	Total score	72.4	424.4	52.0	640.1	16.0***	65.5***
	Repetition of non-words	10.2	14.4	8.5	16.8	8.3***	5.0*
	Repetition of sentences	77.3	681.2	53.0	942.5	15.5***	47.7***

Total score	87.7	789.6	61.7	1,102.2	15.4***	46.7***
“Quasi-universal” non-words	11.3	7.3	10.6	9.6	4.4***	8.3**

Note. M = mean, s^2 = variance, *** $p < .001$, ** $p < .01$, * $p < .05$

Also, attendance and non-attendance of associations and study groups were compared. Children who attended associations and study groups showed higher total scores of correct answers in all calculations (see Table 6). Also, they showed lower variance and the difference was statistically significant in almost all cases. Thus, non-attendance of associations and study groups can be considered another negative factor with a higher variance.

Table 6

Differences in Test Results Between Children Who Attended (Yes) vs. Did Not Attend Associations and Study Groups (No): T-Test and Levene's Test

Tests	Yes		No		T-test (T)	Levene's test (F)
	M	s^2	M	s^2		
KISS.2	Speech comprehension	6.0	5.8	4.0	7.3	14.8***
	Vocabulary	16.1	32.5	9.9	53.3	18.4***
	Articulation	14.2	6.3	12.9	10.9	8.5***
	Grammar	18.5	67.2	9.5	81.0	19.7***
	Repetition of non-words	7.0	11.6	5.9	13.0	5.7***
	Repetition of sentences	11.9	14.4	8.0	23.0	17.2***
SSV	Total score	75.6	372.5	52.4	600.3	19.8***
	Repetition of non-words	10.4	13.7	8.7	17.6	8.0***
	Repetition of sentences	80.8	600.3	53.4	882.1	19.0***
	Total score	91.2	702.3	62.3	1,043.3	18.4***
	“Quasi-universal” non-words	11.3	7.3	10.7	9.6	4.5***

Note. M = mean, s^2 = variance, *** $p < .001$, ** $p < .01$, * $p < .05$

Children who underwent some kind of therapy (except speech-language therapy) were compared to those who did not. Children who underwent therapies scored slightly lower in tests and showed a higher variance but the difference was statistically significant only in several cases (see Table 7). The gigantic variance of 4,651 in SSV sentences is not an error.

Table 7

Differences in Test Results Between Children Who Underwent (Yes) vs. Did Not Undergo Therapies (No): T-Test and Levene's Test

Tests	Yes		No		T-test (T)	Levene's test (F)
	M	s^2	M	s^2		
KISS.2	Speech comprehension	4.7	7.3	5.1	7.3	-1.3
	Vocabulary	12.6	56.3	13.2	51.8	-0.7

SSV	Articulation	12.7	13.7	13.6	8.4	-2.1*	7.9**
	Grammar	14.3	98.0	14.1	94.1	0.1	0.1
	Repetition of non-words	5.3	13.0	6.4	12.3	-2.8**	0.6
	Repetition of sentences	9.4	26.0	10.1	22.1	-1.3	2.6
	Total score	60.8	707.6	64.8	605.2	-1.4	1.7
	Repetition of non-words	7.9	21.2	9.7	15.2	-3.4**	5.3*
	Repetition of sentences	63.1	4,651.2	68.2	912.0	-1.3	7.3**
	Total score	70.9	1,436.4	78.0	1,056.3	-1.6	9.4**
“Quasi-universal” non-words		9.8	15.2	11.1	7.8	-3.0**	18.9***

Note. M = mean, s^2 = variance, *** $p < .001$, ** $p < .01$, * $p < .05$

Next, mothers' first languages were categorized as German vs. not German. This questionnaire item was filled out only for bi-/multilingual children. Children whose mothers' first language was German outperformed all other children in all tests but QUNW and showed lower variance in most cases (see Table 8). Children whose mothers acquired other languages than German as their first language, showed a higher variance.

Table 8

Differences in Test Results Between Children Whose Mothers Spoke German as Their First Language vs. Other Mothers: T-Test and Levene's Test

		German		Other		<i>T</i> -test (<i>T</i>)	Levene's test (<i>F</i>)
Tests		<i>M</i>	<i>s</i> ²	<i>M</i>	<i>s</i> ²		
KISS.2	Speech comprehension	6.3	4.8	3.8	7.3	20.4***	50.4***
	Vocabulary	17.5	18.5	8.6	47.6	31.3***	285.0***
	Articulation	14.1	7.3	13.0	10.2	7.0***	36.3***
	Grammar	20.3	46.2	7.7	60.8	34.2***	30.0***
	Repetition of non-words	6.7	11.6	6.0	13.0	4.2***	0.0
	Repetition of sentences	12.5	10.9	7.4	20.3	25.4***	170.9***
	Total score	79.4	252.8	48.6	510.8	31.1***	149.8***
SSV	Repetition of non-words	10.2	13.7	9.0	17.6	6.1***	14.4***
	Repetition of sentences	85.6	453.7	49.1	756.3	29.3***	91.5***
	Total score	96.1	552.3	58.2	912.0	27.6***	86.9***
“Quasi-universal” non-words		11.0	7.3	11.0	9.6	-0.0	10.4**

Note. M = mean, s^2 = variance, *** $p < .001$, ** $p < .01$, * $p < .05$

Next, the same calculations were repeated for fathers. This questionnaire item was filled out only for bi-/multilingual children. Again, acquisition of German as the first language by fathers was associated with better results of their children in all tests but QUNW and also with a lower variance in almost all cases (see Table 9).

Table 9

Differences in Test Results Between Children Whose Fathers Spoke German as Their First Language vs. Other Fathers: T-Test and Levene's Test

Tests	German		Other		T-test (T)	Levene's test (F)
	M	s ²	M	s ²		
KISS.2	Speech comprehension	6.3	4.8	3.7	7.3	20.8***
	Vocabulary	17.4	19.4	8.4	47.6	30.7***
	Articulation	14.1	6.8	12.9	10.2	8.0***
	Grammar	20.2	47.6	7.3	57.8	34.9***
	Repetition of non-words	6.8	11.6	5.8	13.0	5.4***
	Repetition of sentences	12.6	10.2	7.2	20.3	26.8***
SSV	Total score	79.3	249.6	47.5	501.8	31.7***
	Repetition of non-words	10.3	13.7	8.7	16.8	7.9***
	Repetition of sentences	85.6	432.6	47.9	756.3	30.1***
	Total score	96.2	519.8	56.7	906.0	28.6***
"Quasi-universal" non-words		11.1	7.3	10.9	9.6	1.2

Note. M = mean, s² = variance, *** $p < .001$, ** $p < .01$, * $p < .05$

Next calculations analyzed the questionnaire item "There is at least one more child in the kindergarten group who speak the same non-German language" (yes/no). This item was filled out only for bi-/multilingual children. This item was somewhere between two subcategories of sociodemographic/medical factors. Children who had non-German peers scored lower in almost all calculations but showed no clear tendencies in the variance (see Table 10). In some cases it was smaller, in other cases larger than in the other subgroup, or variances were equal.

Table 10

Differences in Test Results Between Children Who Had (Yes) vs. Did Not Have (No) Peers Who Spoke the Same Non-German Language in the Kindergarten Group: T-Test and Levene's Test

Tests	Yes		No		T-test (T)	Levene's test (F)
	M	s ²	M	s ²		
KISS.2	Speech comprehension	3.8	7.3	5.3	7.3	-10.4***
	Vocabulary	8.4	51.8	14.1	44.9	-14.9***
	Articulation	13.0	9.6	13.7	8.4	-4.2***
	Grammar	7.3	60.8	15.4	86.5	-17.3***
	Repetition of non-words	6.1	13.7	6.4	11.9	-1.6
	Repetition of sentences	7.3	20.3	10.6	20.3	-13.3***
	Total score	48.2	533.6	67.6	557.0	-14.8***

SSV	Repetition of non-words	8.9	18.5	9.7	15.2	-3.3**	15.5***
	Repetition of sentences	48.6	795.2	71.6	846.8	-14.3***	0.7
	Total score	57.6	954.8	81.4	986.0	-13.6***	0.0
	“Quasi-universal” non-words	10.9	10.2	11.0	7.8	-0.3	12.1**

Note. M = mean, s^2 = variance, *** $p < .001$, ** $p < .01$, * $p < .05$

The following factors were associated with a comparatively small variance in the answers of children acquiring German under the influence of unfavorable factors. The first factor in this category is “Turkish-speaking vs. other bi-/multilingual children”. Turkish-speaking children scored significantly lower in almost all calculations (even in QUNW) but, in contrast to previous negative factors, their variance was smaller than variance of other children (see Table 11). Just like in the most following calculations, articulation and non-word repetition subtests represented an exception: there were either no differences between two subgroups in the variance or children with the negative factor showed a larger variance (here: in the KiSS.2 articulation subtest and QUNW, although both results did not reach statistical significance).

Table 11

Differences in Test Results Between Turkish-Speaking Children and Other Children: T-Test and Levene’s Test

		Turkish		Other		T-test (<i>T</i>)	Levene's test (<i>F</i>)
Tests		<i>M</i>	<i>s</i> ²	<i>M</i>	<i>s</i> ²		
KiSS.2	Speech comprehension	3.4	7.3	4.0	7.3	-2.3*	0.2
	Vocabulary	7.0	42.3	9.3	50.4	-4.1***	3.9*
	Articulation	12.4	11.6	13.1	9.6	-2.8**	2.5
	Grammar	5.6	46.2	8.4	65.6	-4.6***	15.3***
	Repetition of non-words	5.6	13.0	6.1	13.0	-1.6	0.3
	Repetition of sentences	5.8	16.8	7.9	21.2	-5.6***	9.3**
	Total score	42.2	449.4	51.0	538.2	-4.5***	5.0*
SSV	Repetition of non-words	8.7	17.6	9.1	17.6	-1.2	0.0
	Repetition of sentences	40.4	645.2	52.3	806.6	-5.1***	10.7**
	Total score	49.2	784.0	61.5	967.2	-4.7***	7.4**
	“Quasi-universal” non-words	10.5	10.9	11.1	9.0	-2.4*	0.7

Note. M = mean, s^2 = variance, *** $p < .001$, ** $p < .01$, * $p < .05$

Calculations were repeated for Arabic-speaking vs. other bi-/multilingual children. Arabic-speaking children scored lower than other children in almost all calculations and showed a smaller variance in several cases (see Table 12).

Table 12

Differences in Test Results Between Arabic-Speaking Children and Other Children: T-Test and Levene's Test

		Arabic		Other		T-test (<i>T</i>)	Levene's test (<i>F</i>)
Tests		<i>M</i>	<i>s</i> ²	<i>M</i>	<i>s</i> ²		
KISS.2	Speech comprehension	3.1	6.3	4.0	7.3	-3.7***	5.8*
	Vocabulary	7.3	43.6	9.2	50.4	-3.0**	2.9
	Articulation	13.3	8.4	13.0	10.2	1.2	3.5
	Grammar	5.6	39.7	8.3	65.6	-4.3***	19.3***
	Repetition of non-words	5.8	12.3	6.1	13.0	-0.9	0.6
	Repetition of sentences	6.4	17.6	7.8	21.2	-3.2**	4.3*
SSV	Total score	43.9	412.1	50.6	547.6	-3.3**	7.8**
	Repetition of non-words	8.2	14.4	9.2	18.5	-2.8**	5.8*
	Repetition of sentences	42.5	610.1	51.7	818.0	-3.7***	7.9**
	Total score	50.8	734.4	60.9	979.7	-3.7***	6.6*
“Quasi-universal” non-words		10.7	8.4	11.1	9.6	-1.5	0.3

Note. *M* = mean, *s*² = variance, *** *p* < .001, ** *p* < .01, * *p* < .05

Successive bilinguals showed weaker results in most tests than simultaneous bilinguals and their variance was smaller, except in the vocabulary, non-word repetition, and articulation (see Table 13). Successive bilinguals were defined as those who acquired German from the second year of life or later. Simultaneous bilinguals acquired German and one more language since birth.

Table 13

Differences in Test Results Between Simultaneous (SIM) and Successive (SUC) Bilinguals: T-Test and Levene's Test

Test and Levene's Test							
Tests		SIM		SUC		T-test (<i>T</i>)	Levene's test (<i>F</i>)
		<i>M</i>	<i>s</i> ²	<i>M</i>	<i>s</i> ²		
KISS.2	Speech comprehension	5.0	7.3	3.3	6.3	8.7***	0.0
	Vocabulary	14.3	31.4	6.1	34.8	19.0***	2.6
	Articulation	14.0	6.8	12.5	10.9	7.1***	27.8***
	Grammar	14.1	59.3	4.8	36.0	17.2***	40.0***
	Repetition of non-words	6.5	12.3	5.8	13.0	2.9	0.0
	Repetition of sentences	10.8	14.4	6.1	16.0	15.9***	1.1
SSV	Total score	67.2	368.6	40.6	361.0	18.4***	0.1
	Repetition of non-words	10.3	15.2	8.4	17.6	6.1***	2.4
	Repetition of sentences	71.5	625.0	39.4	524.4	17.5***	4.5*

Total score	81.8	739.8	47.9	655.4	17.1***	1.9
“Quasi-universal” non-words	11.2	8.4	10.9	9.6	1.5	2.9

Note. M = mean, s^2 = variance, *** $p < .001$, ** $p < .01$, * $p < .05$

Children who did not play with German-speaking children beyond kindergarten also showed weaker results in most tests in combination with a smaller variance (see Table 14). However, in the non-word repetition tasks and articulation, their variance was larger.

Table 14

Differences in Test Results Between Children Who Played (Yes) vs. Did Not Play (No) With German-Speaking Children Beyond Kindergarten: T-Test and Levene's Test

		Yes		No		<i>T</i> -test (<i>T</i>)	Levene's test (<i>F</i>)
Tests		<i>M</i>	<i>s</i> ²	<i>M</i>	<i>s</i> ²		
KiSS.2	Speech comprehension	5.1	7.3	2.6	5.8	6.7***	3.5
	Vocabulary	13.4	50.4	3.2	17.6	15.0***	24.0***
	Articulation	13.6	8.4	12.0	10.2	3.6***	1.7
	Grammar	14.4	92.2	2.3	19.4	16.0***	63.0***
	Repetition of non-words	6.4	12.3	5.8	14.4	1.1	0.0
	Repetition of sentences	10.2	21.2	4.5	15.2	8.8***	9.9**
SSV	Total score	65.3	595.4	32.2	234.1	12.4***	20.7***
	Repetition of non-words	9.7	15.2	7.4	18.5	3.7***	1.7
	Repetition of sentences	68.7	900.0	32.7	595.4	8.9***	9.7**
	Total score	78.5	1,043.3	40.0	739.8	8.5***	6.4*
“Quasi-universal” non-words		11.0	8.4	10.2	11.6	1.8	3.2

Note. M = mean, s^2 = variance, *** $p < .001$, ** $p < .01$, * $p < .05$

Late language onset (first words after the second birthday) was also associated with weaker results in all calculations and a smaller variance, except in articulation and non-word repetition tasks (see Table 15).

Table 15

Differences in Test Results Between Children With the Late Language Onset (Yes) vs. Normal Language Onset (No): T-Test and Levene's Test

		Yes		No		<i>T</i> -test (<i>T</i>)	Levene's test (<i>F</i>)
Tests		<i>M</i>	<i>s</i> ²	<i>M</i>	<i>s</i> ²		
KiSS.2	Speech comprehension	3.8	7.3	5.3	7.3	-8.1***	2.1
	Vocabulary	10.4	46.2	13.6	51.8	-6.8***	1.2
	Articulation	11.9	14.4	13.9	7.3	-8.3***	74.6***
	Grammar	9.0	65.6	15.1	96.0	-11.0***	28.6***

	Repetition of non-words	4.8	13.0	6.7	11.6	-8.4***	2.3
	Repetition of sentences	7.5	22.1	10.6	20.3	-10.3***	2.3
	Total score	49.3	538.2	67.4	580.8	-11.5***	1.3
SSV	Repetition of non-words	7.6	17.6	10.0	14.4	-8.6***	7.6**
	Repetition of sentences	50.6	835.2	71.1	888.0	-10.3***	0.1
	Total score	58.3	998.6	81.2	1,017.6	-10.7***	0.0
	“Quasi-universal” non-words	9.6	10.2	11.3	7.3	-8.0***	12.5***

Note. M = mean, s^2 = variance, *** $p < .001$, ** $p < .01$, * $p < .05$

The same is valid for cases of late language onset in the family (first words after the second birthday or later). Children with such cases in the family were weaker in all tests and showed comparatively small variance except in the non-word repetition and articulation (see Table 16). However, very few differences in variance were statistically significant.

Table 16

Differences in Test Results Between Children With Cases of Late Language Onset in the Family (Yes) vs. No Such Cases (No): T-Test and Levene's Test

	Tests	Yes		No		T-test (T)	Levene's test (F)
		M	s^2	M	s^2		
KISS.2	Speech comprehension	4.0	7.3	5.1	7.3	-3.9***	0.5
	Vocabulary	10.4	49.0	13.3	51.8	-4.0***	0.0
	Articulation	12.1	16.0	13.7	7.8	-4.1***	36.8***
	Grammar	9.1	72.3	14.5	94.1	-6.1***	7.9**
	Repetition of non-words	4.7	10.9	6.5	12.3	-4.8***	0.2
	Repetition of sentences	7.7	24.0	10.2	21.2	-5.2***	2.8
	Total score	49.8	580.8	65.5	595.4	-6.2***	0.0
SSV	Repetition of non-words	7.6	17.6	9.7	15.2	-5.2***	0.8
	Repetition of sentences	53.3	882.1	68.7	918.1	-4.9***	0.1
	Total score	61.0	1,069.3	78.6	1,062.8	-5.1***	0.0
	“Quasi-universal” non-words	9.7	12.3	11.1	7.8	-4.8***	11.1***

Note. M = mean, s^2 = variance, *** $p < .001$, ** $p < .01$, * $p < .05$

Children who did not speak their first (non-German) language age-appropriately according to parents also showed comparatively weak results in most language tests and a smaller variance, except in the repetition of non-words and articulation (see Table 17). This item was answered only by the families of bi-/multilingual children.

Table 17

Differences in Test Results Between Children Who Spoke Their First Language Age-Appropriately (Yes) vs. Those Who Did Not (No): T-Test and Levene's Test

Appropriately (Yes) vs. Those who Did Not (No): T-Test and Levene's Test							
Tests		Yes		No		T-test (<i>T</i>)	Levene's test (<i>F</i>)
		<i>M</i>	<i>s</i> ²	<i>M</i>	<i>s</i> ²		
KiSS.2	Speech comprehension	4.0	7.3	3.5	7.3	1.7	0.1
	Vocabulary	9.1	50.4	9.1	42.3	0.0	5.3*
	Articulation	13.3	8.4	11.8	16.8	3.8***	35.1***
	Grammar	8.4	67.2	7.1	51.8	1.7	8.4**
	Repetition of non-words	6.3	13.0	4.6	13.0	4.7***	0.7
	Repetition of sentences	7.9	21.2	6.7	19.4	2.6**	1.2
SSV	Total score	51.2	529.0	44.7	510.8	2.8**	0.9
	Repetition of non-words	9.4	16.8	7.3	20.3	4.9***	1.9
	Repetition of sentences	52.3	812.3	43.7	670.8	3.2**	5.7*
	Total score	61.8	967.2	51.2	864.4	3.5**	3.0
“Quasi-universal” non-words		11.3	8.4	9.9	13.7	3.9***	11.9**

Note. *M* = mean, *s*² = variance, *** *p* < .001, ** *p* < .01, * *p* < .05

Results of the automatic linear modeling are reported in Table 18. All associations were positive, that is, higher values on one scale (e.g., grammar) were associated with higher values on the other scale (e.g., SSV non-words). For all non-words, articulation skills were most important (for QUNW more important than for German-based non-words). Only for SSV non-words, vocabulary skills were necessary. For German-based non-words, grammar skills were also of certain importance, although clearly not as important as articulation. All three models explained < 25% of the dependent variable because the most important factor – memory – was not tested separately and could not be included in the models.

Table 18

Linguistic Influencing Factors on the Non-word Repetitions: Automatic Linear Modeling

KiSS.2 subtests	Importance	Coefficients	Adjusted <i>R</i> ²
KiSS.2 non-words			
Speech comprehension	.088	.110**	
Vocabulary	–	–	.119
Articulation	.628	.244***	
Grammar	.284	.059***	
SSV non-words			
Speech comprehension	.045	.116**	
Vocabulary	.033	.050*	.235
Articulation	.802	.391***	

Grammar	.120	.072***	
“Quasi-universal” non-words			
Speech comprehension	.225	.295***	
Vocabulary	—	—	.130
Articulation	.775	.161***	
Grammar	—	—	

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

Discussion

Two subgroups of negative factors (that is, factors that are unfavorable for the German language acquisition) were identified. Negative factors associated with a large variance in children's answers were of secondary importance. Children who acquired German under the influence of such factors had a good chance to achieve age-appropriate German language skills in spite of these factors. Large variance shows that there were enough exceptions from the rule (worse German language skills) and some children made it to perform on the same level with those who were not under the influence of these factors. Negative factors associated with a small variance were, on the contrary, very strong and only very few children could speak German age-appropriately in spite of these factors.

Factors with a large variance were:

- boys compared to girls,
- bi-/multilinguals compared to monolingual German children,
- attendance of a kindergarten for half a day, compared to attendance for a full day,
- non-attendance of a nursery school in the first two years of life, compared to attendance,
- non-attendance of associations and study groups, compared to attendance,
- therapies (excluding speech-language therapies), compared to no therapies,
- first language of the father and mother not German, compared to German.

It means that, for instance, although boys tend to score lower in linguistic tests than girls, there were enough boys who scored on the same level with girls or even higher.

Factors with a small variance were:

- Turkish- and Arabic-speaking children, compared to other bi-/multilinguals,
- successive bilinguals, compared to simultaneous bilinguals,
- those who do not play with German-speaking children after kindergarten time, compared to those who play,
- child's late language onset in the first language (other than German), compared to normal onset,
- cases of late language onset in the family, compared to no such cases (= no familial predisposition for language disorders),
- language delay in the non-German first language, compared to age-appropriate language skills (subjective estimation by parents).

It means that, for instance, Turkish-speaking children very seldom achieve the same level of German language skills (at the age of four years) as their peers speaking other non-German languages at home.

Presence of at least one more child in the kindergarten group who speaks the same non-German language as the child was somewhere in between, with no clear tendencies in the variance, probably because presence itself does not mean that the child plays with this/these peer(s). Some children do it and this is probably a strong negative factor, other children do not and then this negative factor is of secondary importance.

Usually, variance patterns in the grammar, speech comprehension, vocabulary, and repetition of sentences were the same, that is, if variance was large in the grammar, then it was also large in other linguistic domains. Other subtests represented an exception from this rule. Since children's articulation and repetition of non-words are only vaguely related to grammar, vocabulary, and speech comprehension skills, tendencies described above were not valid for these subtests. Sometimes, although not always, children acquiring German under unfavourable conditions with a small variance (the "worst" factors) showed larger variance than other children in these subtests, or their variance was comparable. One can draw the conclusion that in case of articulation and non-word repetition other variables influenced the results (e.g., memory, attention, length or other linguistic characteristics of non-words). Generally, results on the non-word repetition and articulation were comparable, which shows that respective tasks assess closely inter-connected skills, although non-word repetition is supposed to assess PSTM (cf. Zaretsky & Lange, 2022). On the contrary, repetition of sentences showed totally different results than the repetition of non-words because, apart from PSTM, it assesses vocabulary and grammar skills.

The next question is whether German-based and language-independent non-words showed different results. First, it is noteworthy that monolingual German children outperformed bi-/multilingual children in all language tests but could not outperform them in QUNW (Table 3). Numerically, bi-/multilinguals showed even slightly better results. This phenomenon is called "bilingual advantage" (Zaretsky et al., 2022) and is explained by the better PSTM of bi-/multilinguals, compared to monolinguals. Two or more languages "train" memory more than one and, therefore, sometimes bi-/multilinguals outperform monolinguals in language-independent repetition tasks (Zaretsky et al., 2023). In the German-based tasks, bi-/multilinguals cannot show their better memory because for the repetition of these items German language skills are more important than memory. Therefore, bi-/multilinguals scored lower than monolingual German children in KiSS.2 and SSV non-words (Table 3). Regarding variance, associations between non-word repetition and articulation performance were very strong. Variance in the repetition of QUNW always followed patterns in the articulation subtest, that is, if the variance under the influence of some negative factor was larger in articulation than the variance under the influence of a positive factor then the same was valid for the variance in the QUNW repetition (and vice versa). Repetition of German-based non-words also followed this pattern, but with a couple of exceptions (Turkish-speaking children: KiSS.2, SSV, speaking the first non-German language age-appropriately: KiSS.2, late language onset in the family: KiSS.2). All these exceptions can be found in the subgroup of negative factors with a small variance, that is, in the subgroup of negative factors with a large variance there were no exceptions at all and all non-words (KiSS.2, SSV, QUNW) always followed variance patterns of articulation tasks. Thus, we can draw the conclusion that variance in the repetition performance in case of language-independent non-words heavily depends on children's articulation skills, and in case of language-dependent non-words this inter-

connection is less obvious because other German language skills also influence the results. In other words, language-independent non-words measure PSTM and articulation skills, whereas German-based non-words measure PSTM, articulation, and some other language skills (vocabulary, grammar). This finding was confirmed by the automatic linear modelling.

The fact that differences in the variance were often significant in case of SSV non-words and QUNW, and not in KiSS.2 non-words, is explained by a lower number of items in KiSS.2 (only four non-words). A lower number of items means smaller standard deviations and smaller variance, and if the variance is small then it is more difficult for the Levene's test to find statistical significance. Thus, this result has nothing to do with linguistic characteristics of KiSS.2 non-words. The same phenomenon can be found if we compare results of the Levene's test in the subcategories of negative factors with a large and small variance: in the subcategory of factors with a large variance the Levene's test was significant in almost all cases, in the other subcategory only in four out of seven calculations.

All of the sociodemographic and medical factors mentioned above are well-known influencing factors on the German language acquisition at the pre-school age (e.g., Zaretsky & Lange, 2023; Zaretsky et al., 2021). In this respect, present study did not reveal any contra-intuitive or unexpected findings.

Conclusion

Variance in language test results is not just yet another by-product of statistical calculations. It shows, among other things, which conditions of the German language acquisition slightly slow down the pace of the language acquisition and which ones constitute a serious obstacle. Although we do not believe that it is necessary to make the analysis of variance an obligatory part of language tests, such analyses can be used in the research to identify subgroups of children who are at risk of stagnation in the language acquisition. Children who acquire German under influence of critically unfavorable sociodemographic or medical factors should be considered candidates for German language courses and speech-language therapies.

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

The authors declare that no AI or AI-assisted technologies have been used to generate, refine, or correct the content in the manuscript. The ideas, design, procedures, findings, analyses, and discussion are originally written and derived from careful and systematic conduct of the research.

References

- Chiat, S. (2015). Non-word repetition. In S. Armon-Lotem, J. de Long, & N. Meir (Eds.), *Assessing multilingual children. Disentangling bilingualism from language impairment* (pp. 125–150). Multilingual Matters.
<https://doi.org/10.21832/9781783093137-008>
- Ching, T. Y. C., Cupples, L., & Marnane, V. (2019). Early cognitive predictors of 9-year-old spoken language in children with mild to severe hearing loss using hearing aids. *Frontiers in Psychology*, 10, 2180. <https://doi.org/10.3389/fpsyg.2019.02180>
- Grimm, H. (2017). *SSV. Sprachscreening für das Vorschulalter. Kurzform des SETK 3-5* [SSV. Language Screening for the Preschool Age. Short form of SETK 3-5] (2nd ed.). Hogrefe.
- Holler-Zittlau, I., Euler, H. A., & Neumann, K. (2011). Kindersprachscreening (KiSS) – das hessische Verfahren zur Sprachstandserfassung [Language Screening for Children (KiSS) – a Hessian language screening tool]. *Sprachheilarbeit*, 5(6), 263–268.
- Lange, B. P., Euler, H. A., & Zaretsky, E. (2016). Sex differences in language competence of 3- to 6-year-old children. *Applied Psycholinguistics*, 37(6), 1417–1438.
<https://doi.org/10.1017/S0142716415000624>
- Masoura, E., Gogou, A., & Gaterhcole, S. E. (2020). Working memory profiles of children with reading difficulties who are learning to read in Greek. *Dyslexia*, 27(3), 312–324.
<https://doi.org/10.1002/dys.1671>
- Penke, M. (2018). Verbal agreement inflection in German children with Down syndrome. *Journal of Speech, Language, and Hearing Research*, 61(9), 2217–2234.
https://doi.org/10.1044/2018_JSLHR-L-17-0241
- Polišenska, K., Chiat, S., & Roy, P. (2015). Sentence repetition: What does the task measure? *International Journal of Language and Communication Disorders*, 50(1), 106–118.
<https://doi.org/10.1111/1460-6984.12126>
- Redmond, S. M., Thompson, H. L., & Goldstein, S. (2011). Psycholinguistic profiling differentiates specific language impairment from typical development and from attention-deficit/hyperactivity disorder. *Journal of Speech, Language, and Hearing Research*, 54(1), 99–117. [https://doi.org/10.1044/1092-4388\(2010/10-0010\)](https://doi.org/10.1044/1092-4388(2010/10-0010))
- Schwob, S., Eddé, L., Jacquin, L., Leboulanger, M., Picard, M., Oliveira, P. R., & Skoruppa, K. (2021). Using nonword repetition to identify developmental language disorder in monolingual and bilingual children: A systematic review and meta-analysis. *Journal of Speech, Language, and Hearing Research*, 64(9), 3578–3593.
https://doi.org/10.1044/2021_JSLHR-20-00552

- Zaretsky, E., & Lange, B. P. (2023). Sprachkontaktdauer: Auswirkungen auf den Sprachstand im Deutschen abhängig vom Alter des Deutscherwerbs und Sprachgebrauch im familiären Umfeld [Length of the language contact: Influence on the language competence in German dependent on the age of the German language acquisition and language use in the family]. *Linguistik online*, 122(4), 115–137. <http://doi.org/10.13092/lo.122.10201>
- Zaretsky, E., & Lange, B. P. (2022). Language-specific non-words for the assessment of working memory: Dealing with bilingual children. *Communication Disorders Quarterly*, 44(4). <https://doi.org/10.1177/15257401221113064>
- Zaretsky, E., & Lange, B. P., & Hey, C. (2023). The assessment of phonological short-term memory via “quasi-universal” vs. language-specific nonwords as a clinical marker for language impairments. *Studies in Applied Linguistics*, 14(2), 48–69.
- Zaretsky, E., Lange, B. P., & Hey, C. (2022). Phonological short-term memory: When bilingualism matters. *Language Learning and Development*, 19(1), 34–48. <https://doi.org/10.1080/15475441.2021.2014846>
- Zaretsky, E., van Minnen, S., Lange, B. P., & Hey, C. (2022). Sprachkontakt und soziale Interaktion im Spiel als Einflussfaktoren auf den Sprachstand ein- und mehrsprachiger Kinder im Alter von vier Jahren [Language contact and social interaction in games as influencing factors on the language competence of monolingual and multilingual children aged four years]. *Forschung Sprache*, 9(1), 52–66.

Evaluating a Practice-Based Program With Foreign Intern Trainees: Impact on Japanese High School Students' Intercultural Understanding and English Learning Motivation

Tomoshige Yamaguchi, Hyogo Prefectural Yokawa High School, Japan
Rika Iwami, Hyogo University of Teacher Education, Japan

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This study examines the educational impact of a community-based intercultural education program involving foreign technical intern trainees, implemented with Japanese high school students. This study aims to foster intercultural understanding and enhance English learning motivation among 54 third-year students through structured interaction in English with three Mongolian trainees working at a local hospital. The seven-session program included photo language activities, artifact exploration using materials from the National Museum of Ethnology, jigsaw reading, and a roundtable exchange. To evaluate changes in students' attitudes and motivation, pre- and post-program questionnaires (21 items, 4-point Likert scale) were administered. Paired-samples *t*-tests revealed statistically significant improvements in 8 of the 21 items ($p < .05$), including willingness to talk to foreigners ($t = -3.67, p < .001, d = 0.64$), interest in diverse cultures ($t = -3.03, p = .005, d = 0.53$), and the desire to use English ($t = -3.47, p = .002, d = 0.60$). Medium effect sizes were also observed in items related to the belief that learning English can broaden future possibilities and the importance of expressing one's feelings in English. In addition, qualitative data from students' reflections were analyzed through thematic coding and text-mining techniques. The results indicated increased empathy, reduced anxiety about English communication, and more proactive engagement in intercultural interaction. These findings suggest that short-term, community-based intercultural programs can produce measurable changes in both cognitive and affective dimensions of global education. The study highlights how collaboration with foreign residents in local communities can function as a practical approach for promoting intercultural awareness and strengthening English learning motivation in non-urban Japanese high schools.

Keywords: foreign technical intern trainees, English learning motivation, community-based program, intercultural communicative competence, mixed-methods research

iafor

The International Academic Forum
www.iafor.org

Introduction

The purpose of this study is to examine the effects of a short-term, community-based intercultural education program on Japanese high school students' intercultural understanding and English learning motivation in a non-urban context. In contemporary Japanese society, increasing cultural diversity has intensified the need to cultivate individuals who can respect others and collaborate across differences to build a sustainable society (MEXT, 2018). This orientation aligns with the frameworks of Education for Sustainable Development (ESD) and global education (Abe, 2009; Ishimori, 2019).

Although the number of foreign residents has rapidly increased in regional cities—such as Miki City, where the growth rate exceeded 50% between 2017 and 2022—opportunities for meaningful intercultural interaction remain limited in many high schools. At the target school, students have had few authentic encounters with foreign residents and often demonstrate low motivation or anxiety toward using English in real communication contexts.

To address this gap, the present study designed and implemented a practice-based program that connected students with local foreign intern trainees. Moving beyond knowledge-transmission approaches, the program emphasized experiential learning and structured interaction. This study therefore investigates whether such a short-term intervention can produce measurable changes in students' attitudes toward intercultural engagement and English communication.

Literature Review

Experiential learning has been widely recognized as a crucial component in fostering intercultural competence and deep psychological transformation among learners. Traditional forms of global education have often relied on classroom-based knowledge transmission; however, recent studies emphasize the importance of participatory and experience-oriented approaches. Ishida and Kawasaki (2022), for example, demonstrate that short-term, intensive international programs can significantly influence high school students' global awareness. Similarly, research on active learning highlights the importance of carefully designed learning environments that stimulate intrinsic motivation and student agency (Makino, 2018; Ohno, 2012).

Another important dimension of intercultural education involves the use of authentic and tactile materials. Goya (2016) and Morimo (2016) argue that hands-on engagement with cultural artifacts enhances learners' concrete understanding of cultural diversity. The outreach kit "MINPACK," developed by the National Museum of Ethnology, exemplifies how museum resources can bridge abstract cultural knowledge and lived human experience. Such materials enable learners to move beyond superficial impressions toward embodied cultural understanding.

At the same time, scholars have pointed out the limitations of school-based international understanding education. Ichinose (2019) notes that collaboration between schools and local stakeholders remains insufficient, particularly in regional areas. Although the number of foreign residents has increased nationwide, educational practices that meaningfully incorporate local foreign residents into classroom learning remain limited.

Furthermore, while previous studies have described various international exchange practices, empirical research that systematically evaluates the impact of community-based intercultural programs on both English learning motivation and intercultural empathy is still scarce. Many reports remain descriptive in nature or focus primarily on urban contexts. There is a need for research that quantitatively and qualitatively examines how localized, short-term programs influence students' attitudes in non-urban settings.

In response to these gaps, the present study employs a mixed-methods approach, integrating paired-samples t-tests and computational text analysis, to evaluate a seven-stage instructional design centered on interaction with Mongolian intern trainees in a regional Japanese high school. By focusing on community-based collaboration, this study contributes to the development of empirically grounded models for sustainable intercultural education.

Research Methodology

This study adopted a mixed-methods research design to examine the effects of a short-term, practice-based intercultural program on students' intercultural understanding and English learning motivation. Quantitative data were collected through pre- and post-program questionnaires, while qualitative data were derived from students' reflection sheets and speech drafts. The integration of statistical analysis and text mining enabled a comprehensive evaluation of both measurable attitudinal changes and deeper shifts in students' perceptions.

Procedure

The program was implemented over a two-month period (April–May 2025) and consisted of seven sequential activities designed to move from cognitive exploration to communicative production.

- 1) Photo Language: Students analyzed images related to Mongolian culture in small groups. Through gallery walks and English worksheets, they generated hypotheses and questions, encouraging inductive reasoning and collaborative meaning-making.
- 2) Jigsaw Reading: Students read English texts on Mongolian history using a peer-teaching format. This structure reduced anxiety toward English texts while promoting shared responsibility for comprehension.
- 3) Self-Introduction Activity: Students read handwritten profiles of the Mongolian trainees and practiced introducing them in English. Digital translation tools (e.g., DeepL) were used to support comprehension and production.
- 4) Hands-on Engagement with MINPACK: Students explored cultural artifacts from the National Museum of Ethnology (e.g., traditional clothing and equestrian equipment). This tactile engagement grounded abstract cultural knowledge in concrete experience.
- 5) Roundtable Exchange: This central session involved direct interaction with three Mongolian intern trainees. Students conducted self-introductions in English, asked prepared questions, and participated in cultural exchange activities.
- 6) Thank-You Letter Writing: Students composed formal letters in English to express gratitude, focusing on communicative accuracy and intercultural etiquette.
- 7) One-Minute Speech: As a summative task, students delivered short reflective speeches in English. Rubrics and pronunciation support tools were used to scaffold performance and peer feedback.

The program was conducted primarily in English to maximize communicative practice, with limited Japanese support provided when necessary for comprehension.

Participants

Participants were 54 third-year students (Grade 12) enrolled in a general academic course at a public high school in Miki City, Hyogo Prefecture. Although the region has experienced rapid growth in its foreign resident population, students have limited opportunities for authentic intercultural interaction.

Students were organized into small groups (four to five members) for collaborative activities. Due to absences and incomplete responses, valid questionnaire data were obtained from 33 students for statistical analysis.

Instructional Design and Implementation

The instructional design was grounded in a learner-centered philosophy emphasizing facilitation rather than direct instruction. The teacher adopted a supportive role, structuring tasks to stimulate curiosity and encourage autonomous participation.

Placing the roundtable exchange at the midpoint of the program functioned as a motivational catalyst, allowing students to recognize the practical necessity of English communication. The integration of authentic artifacts (MINPACK) and digital translation tools reduced linguistic barriers and enabled students to experience successful communication.

This design aimed to transform the classroom into a collaborative learning environment where students could explore cultural diversity through direct engagement rather than passive reception.

Data Collection and Analysis

Quantitative data were collected using a 21-item questionnaire on a four-point Likert scale administered before and after the program. Paired-samples *t*-tests were conducted using JASP (JASP Team, 2023) to compare pre- and post-program mean scores.

Effect sizes (Cohen's *d*) were calculated to assess the magnitude of change. Reverse-scored items were included to reduce response bias and ensure more reliable measurement of students' attitudes, and they were statistically adjusted prior to analysis.

Thematic Coding

Qualitative data were analyzed through thematic coding. Student reflections were coded inductively and categorized into five analytical domains:

- a) Deepening of Intercultural Understanding
- b) Transformation of Stereotypes
- c) Positive Attitudes toward English Use
- d) Proactiveness in Intercultural Exchange
- e) Understanding of Diversity and Coexistence

Computational Text Analysis

Vocabulary frequency analysis and co-occurrence networks were generated using KH Coder (Higuchi, 2022) to visualize patterns across student responses. By integrating statistical and

computational analyses with qualitative interpretation, this study provides a multidimensional evaluation of short-term intercultural intervention effects.

Results and Discussion

Quantitative Findings

The quantitative analysis (Table 1) indicated no statistically significant difference in the overall mean scores between the pre- and post-program surveys. This result may reflect students' prior exposure to intercultural topics (Yamaguchi, 2025) as well as the relatively short duration of the intervention. However, statistically significant improvements were observed in 8 of the 21 individual items. In particular, items related to willingness to talk to foreigners and interest in diverse cultures showed medium effect sizes ($|d| \geq 0.5$).

Taken together with the qualitative findings, these results suggest that the program contributed to reducing students' psychological barriers toward intercultural communication and encouraged more proactive attitudes toward engaging with people from different cultural backgrounds.

Table 1

Pre- and Post-program Questionnaire Results for Intercultural Understanding and English Learning Motivation (N = 33)

Items	Pre		Post		<i>t</i>	Cohen's <i>d</i>	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
1. I think it is fun to get to know people from various countries	3.21	0.65	3.49	0.51	-2.324*	0.405	0.027
2. I believe that getting to know people from different countries broadens my perspective	3.33	0.48	3.58	0.61	-1.966	0.342	0.058
3. I would like to try talking to foreigners, even if I am meeting them for the first time	2.55	0.75	3.00	0.79	-3.672***	0.639	< .001
4. I think it is a good thing to interact with foreign residents living in my local community	2.85	0.71	3.33	0.60	-3.502**	0.61	0.001
5. I believe that an attitude of trying to understand others is important, even if our cultures are different	3.64	0.49	3.61	0.50	0.273	0.048	0.786
6. I believe that the opinions of people from any country should be respected	3.58	0.56	3.61	0.50	-0.255	0.044	0.801
7. I want to respect the differences in cultures and customs of each country	3.49	0.57	3.67	0.48	-1.53	0.266	0.136
8. I think that experiencing different cultures is an interesting experience	3.36	0.55	3.64	0.49	-3.032**	0.528	0.005
9. I believe that if I could actually interact with people from another country, I would want to know more about that country	3.03	0.68	3.39	0.61	-3.2**	0.557	0.003
10. I believe that I will come to feel a sense of familiarity by experiencing different cultures.	3.27	0.67	3.42	0.66	-1.305	0.227	0.201
11. I am not very interested in experiencing different cultures. (Reverse-scored item)	2.76	0.79	2.73	0.91	0.205	0.036	0.839
12. I believe that learning English is helpful for understanding other cultures.	3.27	0.57	3.46	0.62	-1.53	0.266	0.136
13. I believe that learning English will broaden my future possibilities	3.21	0.78	3.55	0.67	-2.602*	-0.453	0.014
14. I want to try my best in English classes.	3.33	0.54	3.42	0.56	-0.902	-0.157	0.374
15. I believe that I can learn about foreign cultures through English classes	3.24	0.61	3.42	0.56	-1.644	-0.286	0.11

16. I believe that learning English provides an opportunity to think about other countries and cultures.	3.18	0.68	3.39	0.61	-1.875	-0.326	0.07
17. I believe it is important to try to convey my feelings in English, even if I cannot speak it perfectly.	3.24	0.71	3.55	0.51	-2.39*	-0.416	0.023
18. I would like to express my own thoughts using the English I have learned	2.73	0.91	3.18	0.64	-3.464**	-0.603	0.002
19. I would be happy if I could communicate even simple things in English.	3.39	0.66	3.55	0.56	-1.538	-0.268	0.134
20. I want to take a proactive approach to activities that involve using English.	3.15	0.71	3.24	0.61	-1	-0.174	0.325
21. I feel that it is difficult for me to talk to foreigners using English.	1.46	0.56	1.67	0.54	-1.56	-0.272	0.129
Total	3.11	0.65	3.33	0.60	-1.848	-0.322	0.209

Note. Items 11 and 21 were reverse-scored before analysis.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Qualitative Analysis by Activity Phases

To capture the progression of learning across the seven activities, the qualitative findings were organized into three phases.

Phase 1: Knowledge Construction (Activities 1–3)

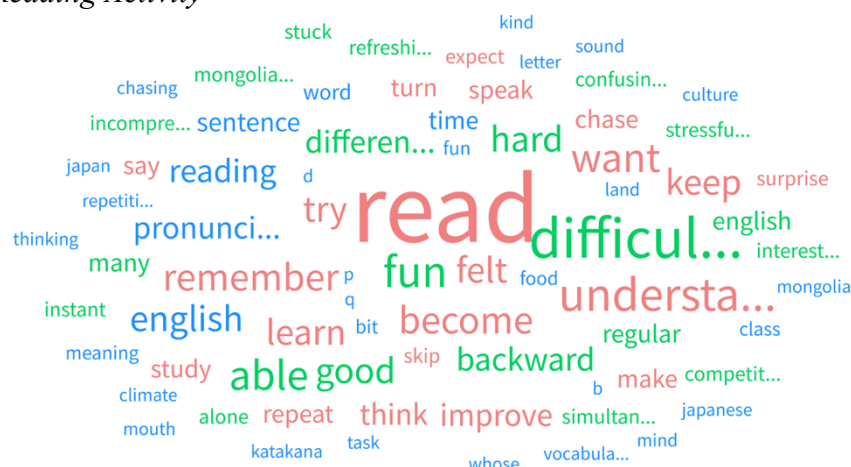
During the initial activities, such as Photo Language and Jigsaw Reading, text-mining analysis (Figure 1 and 2) revealed a frequent occurrence of the words “difficult” and “fun,” often appearing alongside “understand.” Although many students reported challenges in understanding English expressions and sentence structures, the visual and collaborative nature of the tasks appeared to foster enjoyment and curiosity. Students frequently described a sense of satisfaction when they were able to “understand” or “communicate” their ideas with peers, suggesting that these activities helped create a supportive environment for early intercultural learning by balancing linguistic challenges with engaging content.

Figure 1
Word Cloud of Frequent Used Words Related to Learning in Reflections After the Photo Language Activity



Figure 2

Word Cloud of Frequent Used Words Related to Learning in Reflections After the Jigsaw Reading Activity



Phase 2: Direct Interaction and Experiential Learning (Activities 4–5)

The Roundtable Exchange (Activity 5) emerged as the most influential activity in the program. Text-mining analysis (Figure 3) revealed a high frequency of words such as “fun,” “learn,” and “able,” along with specific references to “Mongolia.” This suggests that students’ attention shifted from passive learning to an active awareness of their ability to communicate with people from a different culture. The co-occurrence network (Figure 4) centered on the words “English,” “talk,” and “understand,” further indicates that direct interaction fostered a positive communicative environment in which students experienced a sense of accomplishment. These findings suggest that face-to-face engagement with the trainees helped bridge the gap between linguistic challenges and the enjoyment of communication, thereby encouraging more active participation in intercultural dialogue.

Figure 3

Word Cloud of Frequent Used Words in Reflections During the Roundtable Exchange

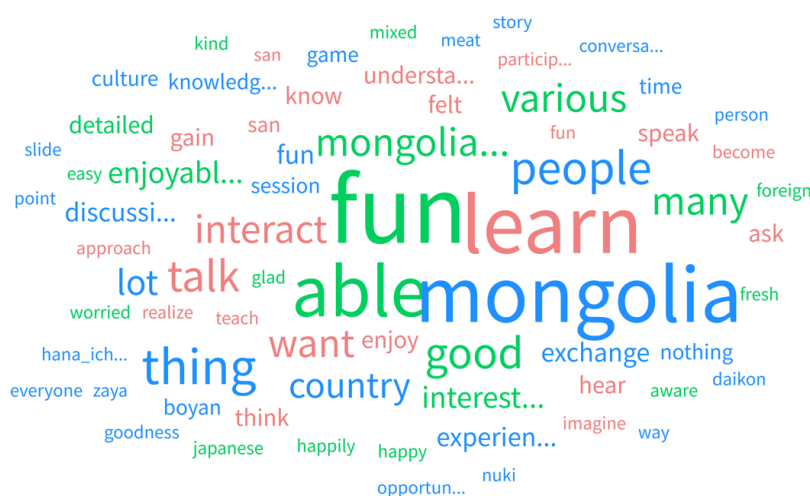
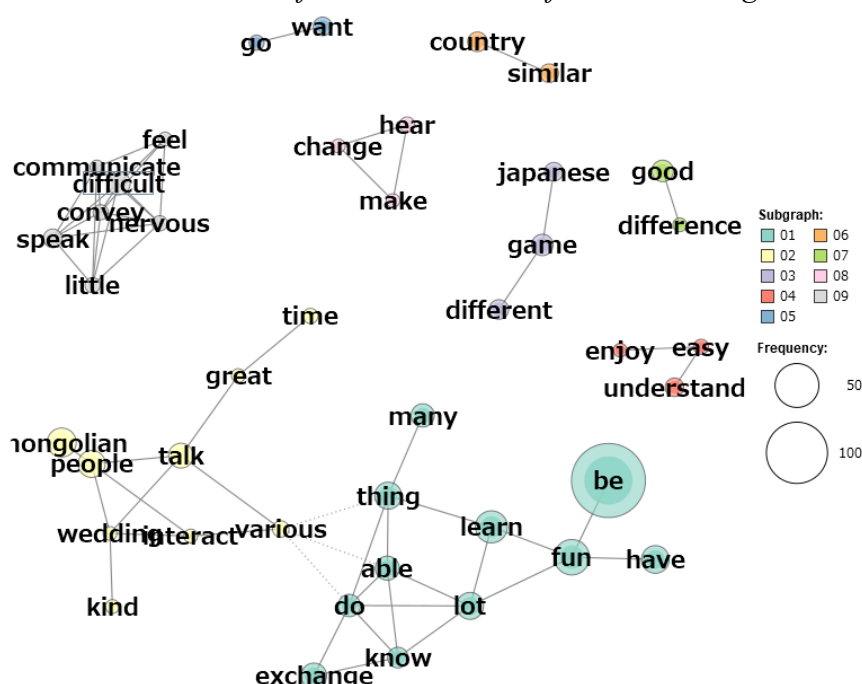


Figure 4*Co-occurrence Network of Used Words in Reflections During the Roundtable Exchange***Phase 3: Reflection and Output (Activities 6–7)**

During the final activity, the One-Minute Speech, students moved from exploratory learning to active expression. Although some students continued to report challenges related to pronunciation and translation, the qualitative coding revealed a notable increase in statements categorized as Positive Attitude Toward English Use (Category C). Many students expressed a desire to communicate more effectively in English and to further improve their language skills in the future.

Comprehensive Discussion and Integration of Analytical Results

The qualitative analysis of students' open-ended responses suggests that the program had a notable influence on several aspects of students' learning. In particular, the findings indicate positive shifts in students' attitudes toward using English, deeper intercultural understanding, and more proactive engagement in intercultural exchange. These results provide an integrated perspective on how the activities contributed to changes in students' perceptions and learning experiences.

Integrated Discussion by Analytical Category**Deepening of Intercultural Understanding**

Through specific learning activities such as Photo Language, MINPACK, and the Roundtable Exchange, students encountered various aspects of Mongolian culture, including daily life, food, traditions, and cultural perspectives. These experiences appeared to deepen their understanding of cultural diversity.

Text-mining analysis revealed frequent occurrences of terms such as “cultural differences” and “tradition.” In addition, the co-occurrence of words such as “culture,” “experience,” and “learn” suggests that students were able to develop a more concrete awareness of cultural diversity through experiential learning.

Transformation of Stereotypes and Prejudices

Although relatively few initial codes were categorized under this theme, several student comments suggested a shift in their perceptions of the Mongolian trainees. Positive remarks such as “the trainee was kind” and “their Japanese was very good” indicate that students began to develop a sense of familiarity and closeness toward the participants.

Some students initially expressed hesitation about interacting with foreigners, with comments such as “Mongolia seemed unfamiliar and distant” or “I was not very interested in Mongolia and did not want to talk to foreigners.” However, direct interaction during the activities appeared to transform these initial impressions, allowing students to reconsider their assumptions and engage more openly with people from different cultural backgrounds.

Positive Attitudes Toward English Use

Across all activities, many students acknowledged the difficulty of using English. At the same time, they expressed comments such as “I could understand a little,” “I was able to communicate,” “I want to try harder,” and “I want to study more.” These responses suggest a growing willingness to confront linguistic challenges and an increase in motivation to improve their English skills.

Text-mining analysis revealed that positive words such as “fun,” “understand,” and “try harder” frequently appeared alongside terms such as “English” and “difficult.” Furthermore, the co-occurrence network showed that action-oriented verbs such as “speak,” “think,” “write,” “read,” and “present” were closely connected with English-related terms. These patterns suggest that successful experiences in using English for authentic communication may have strengthened students’ sense of self-efficacy and encouraged more proactive attitudes toward language learning.

Proactiveness in Intercultural Exchange

Student comments such as “it was fun,” “it was refreshing,” “I want to participate in similar exchanges again,” and “I want to speak up more” were frequently observed in reflections related to the Roundtable Exchange and Photo Language activities. These responses suggest that students experienced positive emotions toward intercultural encounters and developed a stronger willingness to engage in future intercultural exchanges.

Text-mining analysis also showed a frequent occurrence and strong co-occurrence of the words “exchange” and “fun.” This pattern indicates that direct interaction with the Mongolian trainees helped lower psychological barriers and encouraged students to engage more proactively in intercultural communication.

Understanding of Diversity and Coexistence

Through activities such as Photo Language, MINPACK, and self-introduction exchanges, students expressed comments such as “we could share various ideas with each other,” “it felt like a space different from Japan,” and “I understood cultural differences.” These responses suggest that students became more aware of the existence of diverse cultures and values and began to develop attitudes of acceptance toward them.

In addition, frequent references to group work and collaborative activities indicate that working together with peers from different backgrounds provided students with opportunities to recognize the importance of cooperation in a multicultural and coexisting society.

The observed deepening of intercultural understanding and the positive shifts in students’ attitudes toward English may be related to the instructional approach adopted in this program, which emphasized lesson design that respected students’ autonomy rather than direct knowledge transmission. For example, students’ active communication during the Roundtable Exchange and their increased willingness to express themselves in the One-Minute Speech suggest that authentic communicative experiences helped them gain confidence and a sense of success in using English. These experiences appear to have promoted deeper engagement than traditional teacher-centered instruction.

Furthermore, by adopting a facilitative role—encouraging students to think independently, allowing time for responses, and providing supportive guidance—the teacher created an environment in which students could challenge themselves without fear of failure, collaborate with peers, and develop problem-solving skills. This suggests that learner-centered lesson design can play an important role in enhancing students’ motivation and the quality of their learning outcomes.

Conclusion

This study examined the educational impact of a community-based intercultural program involving foreign technical intern trainees on Japanese high school students’ intercultural understanding and attitudes toward English use. The findings suggest that the program contributed to fostering more positive attitudes toward using English, deeper intercultural understanding, and more proactive engagement in intercultural exchange, even though students continued to recognize the challenges associated with English communication.

The results highlight the potential of community-based intercultural learning in regions where opportunities for direct interaction with foreign residents are limited. By engaging students in participatory activities such as the Roundtable Exchange and collaborative tasks, the program provided authentic communicative experiences that supported students’ motivation and confidence in using English. The instructional approach, which emphasized student autonomy and the teacher’s role as a facilitator, appears to have played an important role in encouraging active learning and intercultural awareness. This study also contributes to the literature by demonstrating how collaboration with foreign residents in local communities can function as a practical model for intercultural education in regional high schools.

Although the overall quantitative results did not show statistically significant differences, several individual items demonstrated significant improvements with medium effect sizes. When considered alongside the qualitative findings derived from reflection data and text-

mining analysis, these results suggest that the program contributed to meaningful changes in students' attitudes toward intercultural communication and English learning.

Nevertheless, several limitations should be acknowledged. Because the study relied primarily on post-activity reflections and questionnaire data, it was not possible to fully examine long-term changes in students' attitudes or learning retention. Future research should therefore incorporate follow-up surveys, interviews, and additional performance-based assessments in order to capture longer-term learning outcomes. In addition, because the study employed a single-group pre-post design without a control group, caution is required when interpreting causal relationships between the intervention and the observed changes. It will also be important to consider variations in participation, including students who were absent from certain activities.

Future studies may also explore comparative implementations across different regions or age groups and examine how intercultural exchange programs can be integrated with inquiry-based learning in other subjects. Through continued practice and further empirical investigation, such efforts may contribute to the development of sustainable educational models that connect schools with local communities and promote intercultural understanding in increasingly diverse societies.

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

AI-assisted technologies, including DeepL Write for translation, were used to support the writing process. All translations were reviewed and revised by the authors to ensure accuracy and appropriateness.

References

- Abe, O. (2009). The current status and challenges of Education for Sustainable Development (ESD). *Japanese Journal of Environmental Education*, 19(2), 21–30. [in Japanese]
- Goya, J. (2016). Report on educational practice using museum materials: A case study of connecting the classroom and the world with MINPACK. *Senri Ethnological Reports*, 138, 81–90. [in Japanese]
- Ichinose, T. (2019). How do teachers perceive educational practices of ESD in schools? An analysis of questionnaire survey results. *Journal of ESD Research*, 2, 3–12. [in Japanese]
- Ishida, K., & Kawasaki, Y. (2022). Significance of short-term global education practice for high school students. *JAILA Journal*, 8, 28–37. [in Japanese]
- Ishimori, H. (2019). *Practice of global education to foster “Zest for Living”: Active, interactive, and deep learning that resonates with students' hearts*. Akashi Shoten. [in Japanese]
- JASP Team. (2023). *JASP* (Version 0.17.3) [Computer software]. <https://jasp-stats.org/>
- Makino, M. (2018). An attempt at international understanding education in English remedial classes. *Japan Association for Remedial Education*, 12, 67–76. [in Japanese]
- Ministry of Education, Culture, Sports, Science and Technology (MEXT). (2018). *The Course of Study for High Schools*. https://www.mext.go.jp/content/1384661_6_1_3.pdf
- Morimo, T. (2016). Connecting cultural anthropology and schools: Reflecting on the educational activities of the National Museum of Ethnology. *Senri Ethnological Reports*, 138, 21–36. [in Japanese]
- National Museum of Ethnology. (n.d.). *MINPACK: Loanable learning kit*. <https://www.minpaku.ac.jp/teacher/school/minpack>
- Ohno, J. (2012). A study on a curriculum focusing on the “connection” between the self and global issues: A challenge in the “International Area” of a general course integrated elective high school. *Notre Dame Seishin University Journal*, 42, 119–130. [in Japanese]
- Yamaguchi, T. (2025, September). *Impact of exchange activities with local foreign residents on high school students' intercultural awareness: Through classroom practice in collaboration with an international exchange association* [Poster presentation]. The 13th National Conference of the Japan Association for International Liberal Arts (JAILA), Online (hosted by Tokyo City University, Setagaya Campus, Japan). [in Japanese]

The Impact of the “Career Fun” Project on the Vocational Attitudes of Middle School Students in Ratchaburi’s Opportunity Expansion Schools

Tanapon Tomrongkunan, King Mongkut’s University of Technology Thonburi, Thailand
Chayanit Pichitronnchai, King Mongkut’s University of Technology Thonburi, Thailand
Tanes Tanitteerapan, King Mongkut’s University of Technology Thonburi, Thailand

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This research aimed to: 1. Examine the satisfaction levels regarding the development of foundational skills and knowledge for pursuing vocational careers among students in opportunity expansion schools in Ratchaburi Province. And 2. Collect problems and suggestions related to the development of foundational skills and knowledge for pursuing vocational careers among students in opportunity expansion schools in Ratchaburi Province and analyzed across four key topics. The sample group consisted of 30 students studying in 3rd year of middle school from selected opportunity expansion schools in Ratchaburi Province. A questionnaire, with a reliability coefficient of .95, was used as the research instrument. Statistical analyses included percentage, mean, and standard deviation. The study revealed the following: Part 1: Participant Satisfaction with the Activity are 1. Knowledge and Understanding: Participants' average knowledge scores were higher after the training compared to before it. 2. Usefulness for Further Study: 100% of participants found the knowledge and information gained from the camp useful for choosing their future studies, with an average usefulness rating of 4.31 (SD = 5.61). 3. Usefulness for Career Choice: 100% of participants also found the knowledge and information useful for choosing a career, with an average usefulness rating of 4.24 (SD = 4.90). 4. Interest in Vocational Fields: Students' interest in vocational careers, in descending order, was: Computer Technician (28%), Mechanical Technician (21%), Electrical Technician (19%), Civil Technician (19%), and Welder (13%). Part 2: Overall Participant Satisfaction are 1. Applicability to Further Study: Participants rated the usefulness of the knowledge and information.

Keywords: opportunity expansion school, vocational careers, basic knowledge

iafor

The International Academic Forum
www.iafor.org

Introduction

Nowadays in Thai society is increasingly focused on developing knowledge, skills, and information. The belief is that when person, organizations, and communities have the right knowledge and can apply it effectively, solving the problems, overcome obstacles, and increase their competitiveness in a knowledge-based society. Knowledge is seen as a valuable resource that stands apart from other production factors. This is because knowledge constantly changes and expands, creating a competitive advantage, especially in a learning-driven society. Therefore, the concepts and principles of knowledge management play an importance situation. Giving students the chance to learn about and explore their interests before choosing a field of study helps them make more informed decisions. This proactive approach can also help prevent students from dropping out of the formal education system prematurely. This issue is particularly relevant for opportunity expansion schools in remote areas. A study by Kuruna Paripurana looked at students who graduated from 3rd year of middle school (ninth grade) in expansion schools in remote areas, in Suan Phueng, Ban Kha, and Chom Bueng districts, as well as smaller schools near King Mongkut's University of Technology Thonburi's Ratchaburi campus. The research, covering the academic years 2015–2021, found that 80% of these students continued their education. However, of those who continued, only 33% chose general education, and other 67% pursued vocational programs. The discussions of the school administrators revealed a significant problem: students often choose to continue their studies in vocational fields based on what institutions recruit at their school or what older students have pursued, rather than understanding their own aptitudes or genuine interests. This often leads to a number of students dropping out of the education system each year for various reasons, including disliking their chosen subject. Therefore, providing students with opportunities to learn about and explore their preferences and aptitudes before selecting a field for further study helps them make better decisions and can potentially prevent them from leaving the education system early. Furthermore, opportunity expansion schools in remote or small areas have the challenges with an insufficient number of teachers covering all subjects. This means some schools lack teachers skilled in teaching electricity, or they don't have the necessary equipment for students to conduct practical experiments. This cut off the students from the valuable learning and hands-on experience. Most importantly, if a teacher lacks real-world experience, they may not be able to cover the content comprehensively. This includes topics like applying energy by converting electrical energy into other forms, safe electricity usage precautions, and essential first aid and basic life support for electrical shock. Moreover, incorporating experts who have graduated or are currently working in electricity-related fields with diverse occupations like skilled air conditioning technicians, electrical engineers in companies, business owners, and university professors can provide students with valuable real-world examples and career guidance. This also helps ensure students gain foundational electrical knowledge, both theoretical and practical, that aligns with the curriculum. They learn to use electricity properly and safely, know how to protect themselves from electrical accidents from the start, and are better prepared if they're interested in a career as an electrician. In 2022, seven opportunity expansion schools in Suan Phueng, Ban Kha, and Chom Bueng districts participated in the project. These included three mediums to large sized schools in remote areas under the Education Fund project (with 458–1,172 students): Rujiraphat School, Ban Tako Lang School, and Ban Pong Krating Bon School. There were also three medium-sized schools in semi-rural, semi-urban areas (149–275 students): Ban Lam Phra School, Wat Nong Phan Chan School, and Ban Berk Phrai School. Finally, one medium-sized school in a sub-district municipality (323 students) is Anuban Suan Phueng school. The researchers, experts, and teachers at these schools are selecting students who wish to pursue vocational studies to help

them develop the foundational skills and knowledge needed for further education in electrical careers.

This project aims to help middle school students in opportunity expansion schools who plan to pursue vocational careers. It will give them the chance to discover their interests and aptitudes within various vocational fields. The project also focuses on preparing these students for vocational education and exposing them to potential career paths in five key trades: electrical, computer, civil, mechanical, and welding after their graduation.

Research Objectives

1. To study the satisfaction levels regarding the development of foundational skills and knowledge for pursuing vocational careers among students in opportunity expansion schools in Ratchaburi Province.
2. To enable middle school students in opportunity expansion schools to self-discover and analyze their aptitudes in order to choose a suitable vocational path.

Research Methodology

Research Population

3rd year high school students from 7 opportunity expansion school in Suan Phueng, Ban Kha and Chom Bueng districts Ratchaburi Province, 321 people.

The Sample

3rd year middle school students from 7 opportunity expansion school in Suan Phueng, Ban Kha and Chom Bueng districts Ratchaburi Province, 200 people by researchers, lecturers and teachers at the school select students who want to continue their vocational studies to develop basic skills and knowledge to further study in vocational careers.

Research Tools

The satisfaction in developing basic skills and knowledge in order to further study in Electrical vocational education of the student in opportunity expansion school in Ratchaburi Province. The tools for this research have been created.

1. The curriculums for developing basic skills and knowledge in order to further study in vocational education.
2. The learner's satisfaction questionnaire consisted of 4 aspects: 1) Knowledge and understanding of the participants before and after the training, 2) Satisfaction aspect, 3) Lecturer aspect, 4) Overall aspect of activities towards the course provide teaching and learning skills and basic knowledge in order to further study vocational education. The questionnaire is a questionnaire with a 5-level estimation scale.

Data Collection

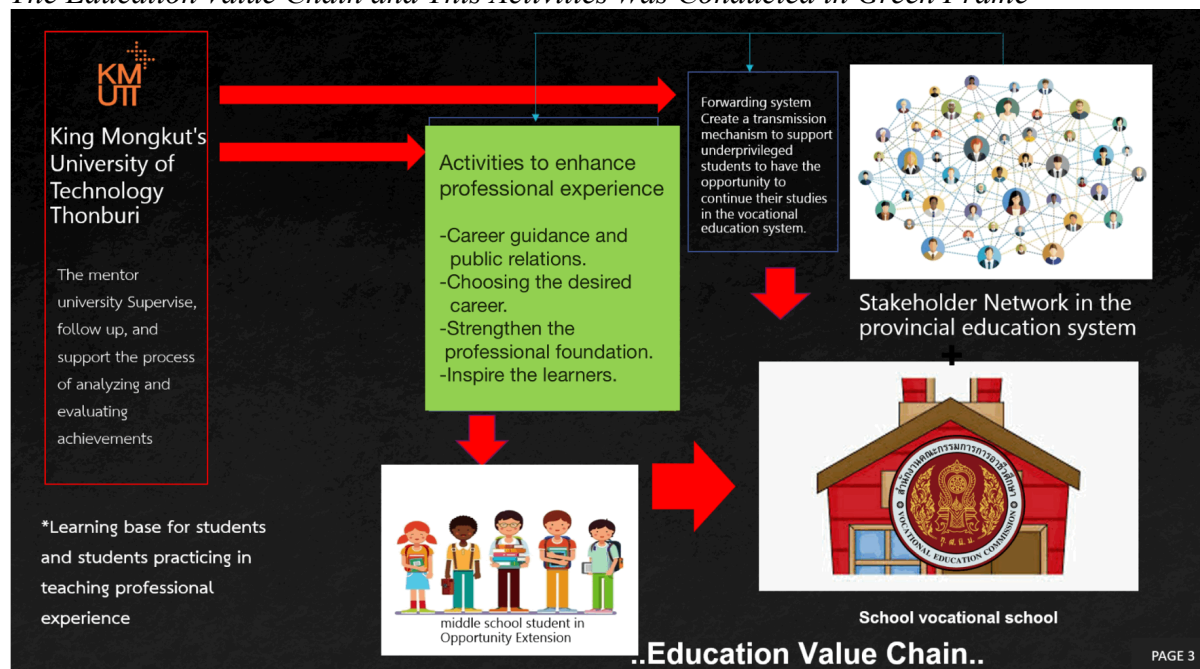
The data collection in this research. The results were collected after the sample group had passed the training with the curriculum and measure student satisfaction in all 4 aspects.

Scope of the Research

1. Design learning activities for five vocational skill areas: electrical, computer, civil, mechanical, and welding.
2. Organize hands-on learning activities (workshops) to allow students to acquire vocational skills through practical experience.
3. Guide students in self-assessment to help them discover and analyze their aptitudes for choosing a suitable vocational path.

Figure1

The Education Value Chain and This Activities Was Conducted in Green Frame



Data Analysis

This research explores the change in attitude and career interest among 3rd year of middle school students after participating in the “Career Fun” project at opportunity expansion schools in Ratchaburi Province. The study's findings are divided into two main sections: Part 1: Participant Satisfaction with the Training Curriculum and part 2: Overall Participant Satisfaction.

Table 1*The Conclusion of the Satisfaction From the Participant*

The satisfaction from the participant	Satisfaction level					Sum	Average	SD
	Excellent (5)	Very good (4)	Average (3)	Poor (2)	Very poor (1)			
1.Knowledge and understanding of the participants before and after the training								
Before the level of the knowledge about the training subject.	13	25	49	18	3	90	3.25	2.76
After the level of knowledge about the training subject.	39	52	5	2	0	90	4.18	1.45
2. Satisfaction								
The benefit of activities	51	46	11	0	0	90	4.42	1.29
Able to apply knowledge in everyday life	49	46	13	0	0	90	4.30	1.38
Format and topics inorganizing activities are appropriate	45	49	14	0	0	90	4.29	1.37
The duration of the activities is appropriate	52	42	13	0	0	90	4.32	1.89
3. Lecturer								
The speaker can communicate understand easily	42	52	13	1	0	90	4.25	1.40
The atmosphere conducive to learning	57	36	15	0	0	90	4.39	1.51
Given the opportunity to ask question and answer question clearly.	75	24	9	0	0	90	4.61	1.19
4. Overview in organizing this event								
Overall satisfaction in organizing this event	72	31	5	0	0	90	4.62	0.95

From Table 1. the satisfaction from the participant. 1) Knowledge and understanding of the participants after training are higher than before training 2) The satisfaction of this training has the average in the topic of the benefit of this event are in very good level (average = 4.42 SD = 1.29) 3) the topic of the lecturers, the topic: Give the opportunity to ask questions and answer questions clearly in the excellent level (average = 4.61 SD = 1.19) 4) The overall of this event are in excellent level (average = 4.62 SD = 0.95) by collecting the data of the trainees taking 3 days to participate.

Table 2*The Conclusion From the Participant Satisfaction Assessment*

The Conclusion From the Participant Satisfaction Assessment

1. The knowledge and information received from this activities take advantage to choose a field to continue studying.					Yes		No	
					30		0	
Useful level								
Very important (5)	Fairly important (4)	Important (3)	Slightly important (2)	Not at all important (1)	total	average	SD	
16	17	1	0	0	30	4.44	0.31	
2. The knowledge and information gained from this activities can be used for the benefit of choosing a career.					Yes		No	
					30		0	
Useful level								
Very important (5)	Fairly important (4)	Important (3)	Slightly important (2)	Not at all important (1)	total	average	SD	
16	17	1	0	0	30	4.44	0.31	

Table 2 the conclusion from the participant satisfaction assessment. 1) the knowledge and information received from this activities take advantage to choose a field to continue studying is in fairly important level. 2) the knowledge and information gained from this activities can be used for the benefit of choosing a career is in fairly important level. In the overall of 2 topics, the overall of creating the activities in excellent level by collecting the data of the trainees taking 3 days to participate.

Table 3*The Post-intervention Assessment Measured Knowledge, Skills and Attitude Score (KSA) of Each Field*

Field	Knowledge (%)	Skills (%)	Attitude (%)
Electrical	77.41	80.94	82.35
Computer	73.4	79	92.8
Civil	79.71	73.92	88.35
Mechanical	93	88.75	82.5
Industrial	73.23	65.38	82.76

Table 3 present the post-intervention assessment score across 5 field of studies into Knowledge, skills and attitude (KSA). The summarized as follows:

The overall performance: the results indicate a generally high level of achievement across all categories. Especially, the attitude domain is the highest score across almost all field, with values ranging from 82.35%–92.8% this mean that the activities was highly effective in creating positive perceptions and creating inspiration among the participants.

Field- specific highlight: Mechanical field has the high proficiency in both knowledge (93%) and skills (88.75%). Computer field has the highest attitude score (92.8%). Industrial field showed the lowest score in almost every assessment score.

Research Conclusion

The “Careers Fun” project was evaluated by 185 participants (76 male students, 109 female students). The findings indicate:

100% of participants felt the knowledge and information gained from these activities would be useful for choosing further education, with a usefulness rating of 4.31 (SD = 5.61).

100% of participants also believed the knowledge and information from these activities would be useful for choosing a career, with a usefulness rating of 4.24 (SD = 4.90).

Student interest in vocational careers, in descending order, was: Computer Field (28%), Mechanical Field (21%), Electrical Field (19%), Civil Field (19%), and Industrial Field (13%). (Note: “Civil Field 19%” was listed twice; I’ve kept it as one entry representing that percentage of interest.)

The satisfaction with activity participation was further evaluated by 200 participants, with results summarized in Table 1 (not provided here, but implied) and highlighted below:

Satisfaction With Each Vocational Station

Electrical Station

Participants rated the overall organization of the activity as Very Good (4.55). Specific aspects rated as Good include:

- The activity's usefulness to participants (4.29)
- Ability to apply knowledge in daily life (4.41)
- Appropriateness of the activity format/topics (4.35)
- Appropriateness of the activity duration (4.24)
- Clarity of communication by organizers (4.47)
- Organizers' ability to create a conducive learning environment (4.42)
- Organizers' willingness to allow questions and provide clear answers (4.44)

Industrial Station

Participants rated the overall organization of the activity as Very Good (4.56). Specific aspects rated as Good include:

- The activity's usefulness to participants (4.32)
- Ability to apply knowledge in daily life (4.25)
- Appropriateness of the activity format/topics (4.28)
- Appropriateness of the activity duration (4.32)
- Clarity of communication by organizers (4.48)
- Organizers' ability to create a conducive learning environment (4.37)
- Organizers' willingness to allow questions and provide clear answers (4.38)

Mechanical Station

Participants rated the overall organization of the activity as Very Good (4.54). Specific aspects rated as Good include:

- The activity's usefulness to participants (4.38)
- Ability to apply knowledge in daily life (4.43)
- Appropriateness of the activity format/topics (4.31)
- Appropriateness of the activity duration (4.34)
- Clarity of communication by organizers (4.45)
- Organizers' ability to create a conducive learning environment (4.47)
- Organizers' willingness to allow questions and provide clear answers (4.39)

Civil Station

Participants rated the overall organization of the activity as Very Good (4.54). Specific aspects rated as Good include:

- The activity's usefulness to participants (4.35)
- Ability to apply knowledge in daily life (4.26)
- Appropriateness of the activity format/topics (4.19)
- Appropriateness of the activity duration (4.27)
- Clarity of communication by organizers (4.45)
- Organizers' ability to create a conducive learning environment (4.40)
- Organizers' willingness to allow questions and provide clear answers (4.38)

Computer Station

Participants rated the overall organization of the activity as Good (4.49). Specific aspects rated as Good include:

- The activity's usefulness to participants (4.29)
- Ability to apply knowledge in daily life (4.08)
- Appropriateness of the activity format/topics (4.26)
- Appropriateness of the activity duration (4.23)
- Clarity of communication by organizers (4.26)
- Organizers' ability to create a conducive learning environment (4.33)
- Organizers' willingness to allow questions and provide clear answers (4.26)

References

- Ananchanok Sakonthawat. (2015). *Poverty and inequality*. Documents for the 10th lecture, Human Resource Economics Course, Chulalongkorn University.
- Antoine. (2011). *Inequality in education*. Inequality Project.
<https://inequalityproject.wordpress.com/inequality-in-education>
- Archawanantakul, S. (2011). *Portable edition of inequality: The main idea of inequality (1st ed.)*. Pentai Publishing.
- Chongsathityu, J., & Jitjang, A. (2012). *A geospatial network to promote learning development of children and youth*. Office of the Science Promotion Commission for Research and Innovation.
- Machin, S., & Vignoles, A. (2004). Educational inequality: The widening socio-economic gap. *Fiscal Studies*, 25(2), 107–128.
- Monkanpai, J. (1990). *The reasons for continuing education of students in the project to expand educational opportunities at the junior high school level*. In Collection of thesis abstracts, academic year 1990. Graduate School, Chulalongkorn University.
- Mount, F. (2008). *Five types of inequality*. Joseph Rowntree Foundation.
<https://www.jrf.org.uk/report/five-types-inequality>
- Nin, K. (1987). *Research strategies*. National Research Council of Thailand.
- Saengmahamad, R. (2017). *Policing people's values against politics, administration, and culture*.

Advancing English Proficiency Through AI-Enhanced and Cross-Cultural Learning: A Longitudinal Study of Integrated Pedagogical Frameworks

Hiroyuki Obari, Globiz Professional University, Japan

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This longitudinal study investigates the efficacy of an integrated pedagogical framework that synthesizes generative Artificial Intelligence (AI), cross-cultural competence (CQ), and philosophical reflection within a university-level English language curriculum. Conducted over a 30-week period (April 2025 to January 2026) at Globiz Professional University, the research involved a cohort of eight students ($n = 8$). The methodology centered on an “Iterative Learning Loop” where students engaged in daily three-minute English Central AI video practice and the production of ten weekly 200-word reflections. These reflections were initially handwritten to promote embodied cognition and subsequently refined using a sophisticated “Technical Stack” (ChatGPT, NotebookLM, Claude, Gemini, Copilot, Perplexity, and Grammarly) to reach B1/B2 CEFR proficiency levels. The program culminated in a 2,000-word capstone thesis. A critical dimension of the study was the integration of “Worldview Literacy,” drawing upon Rom Harré’s three realms of scientific observation and Edward Hall’s Iceberg Model of Culture to move beyond “Surface Culture” into “Deep Culture.” Quantitative results demonstrated statistically significant gains in TOEIC scores, with the cohort mean shifting from 581.3 to 661.9 ($t = 2.53$, $p < 0.05$). Speaking proficiency, measured via the Progos AI test, advanced from A2 High to B1. Qualitative assessments, including PeerEval and interactions with twelve native speakers, indicated enhanced cross-cultural sensitivity and logical delivery. The findings advocate for a paradigm of “Integrated Ability,” where AI functions as a cognitive scaffold for lower-order tasks, enabling human learners to serve as “Guardians of Higher-Order Thinking.”

Keywords: AI in ELT, cross-cultural competence, worldview literacy, society 5.0, socio-constructivism, higher-order thinking, professional identity crisis, ontological matrix

iafor

The International Academic Forum
www.iafor.org

Introduction: The Paradigm Shift in Language Education

The contemporary landscape of foreign language education is currently undergoing a profound “Professional Identity Crisis.” With the emergence of Large Language Models (LLMs) and advanced generative AI, the traditional role of the educator is being systematically deconstructed. AI has moved beyond simple automation; it is now mastering both the “What” (content) and the “How-to” (procedural implementation) of language instruction. It can generate comprehensive lesson plans, provide instantaneous and nuanced grammar feedback, analyze complex student struggle patterns, and automate grading with a speed and precision that far exceeds human capacity.

This technological encroachment forces us to ask a difficult, existential question: “If a machine can perform the mechanical aspects of teaching faster and better than a human, what is the unique mandate of the educator?” To navigate this “technological fog,” we cannot simply resort to adopting more technology. We must look deeper into the foundations of human knowledge. We are transitioning from an era of information processing to the era of “Society 5.0,” where technology is meant to serve human-centric values. In this new paradigm, the focus of language education must shift from the “Base” of learning—rote memorization and basic syntax—to the “Peak,” which comprises Higher-Order Thinking: Analysis, Evaluation, and Creation.

The research presented here addresses two fundamental questions:

1. How can AI and human teachers be integrated to create more effective and personalized language learning environments?
2. How does combining AI-driven feedback with human interaction influence learners’ communicative competence and motivation?

By exploring the “Integrated Ability” of the learner—the intersection of human empathy and worldview with AI-augmented data processing—this study seeks to provide a roadmap for navigating this paradigm shift. We move beyond linguistic proficiency into the realm of “Worldview Literacy,” ensuring that students are not just proficient speakers, but critical thinkers capable of navigating diverse ontologies and epistemologies in a globalized world.

Previous Studies: AI, Ethics, and the Limits of Imitation

The academic discourse surrounding AI in English Language Teaching (ELT) has evolved rapidly. Early studies by Kim and Lee (2020) focused on the role of AI in personalizing learning trajectories, emphasizing its capacity to adapt to individual student needs. However, the release of ChatGPT and other generative tools triggered a “growth explosion” in AI capabilities, with ChatGPT becoming the fastest-growing application in human history (Tung, 2023). This shift necessitated a move from viewing AI as a simple tutor to viewing it as a “collaborative agent.”

My previous work (Obari, 2024) highlighted the integration of AI and Web 3.0 within the framework of Society 5.0, arguing that technological advancement must be balanced with socio-constructivist values. Nevertheless, as AI becomes more proficient at “generative imitation,” a significant gap has appeared in the literature regarding its ability to facilitate “Deep Culture” (Obari, 2025a). While AI can simulate “Surface Culture”—the observable elements such as vocabulary, food references, and holiday descriptions—it lacks the consciousness required for “Deep Culture,” which includes the submerged architecture of human society: unspoken rules, emotional nuances, and ethical frameworks.

Current studies (Obari, 2025b) suggest that AI is fundamentally an amoral instrument. It lacks ethical agency and spiritual empathy, making it an insufficient tool for fostering true intercultural competence on its own. The “Surface Culture” capabilities of AI provide a necessary foundation, but they cannot replace the high-quality human interaction required for trust and empathy. This study aims to fill this gap by proposing a model that leverages AI for “lower-order” language tasks while reserving “higher-order” cultural and philosophical exploration for human-to-human interaction.

Theoretical and Conceptual Framework: The Invisible Foundations of Knowledge

To properly evaluate the role of AI in education, we must establish a robust philosophical foundation. This study utilizes an “Ontological Matrix” that draws from three primary frameworks: the philosophy of science, cultural anthropology, and worldview theology.

Rom Harré’s Three Realms and the Kamiokande Analogy

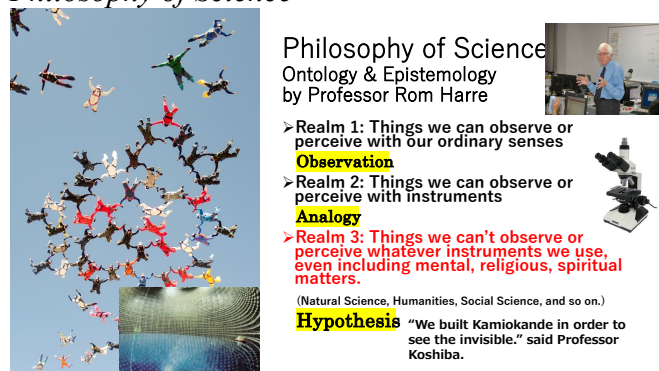
Professor Rom Harré’s work on the ontology of scientific observation provides a critical lens for understanding “seeing the invisible.” Harré (1986) describes three distinct realms of observation:

- **Realm 1:** Entities and phenomena observable with our ordinary senses (e.g., spoken words, body language, surface behavior).
- **Realm 2:** Phenomena that require instruments for perception (e.g., microbes via microscopes, or syntax patterns and semantic density via AI algorithms).
- **Realm 3:** Entities that remain unobservable even with instruments, including mental states, spiritual beliefs, and the fundamental worldviews that guide human interpretation.

A vital metaphor in this study is the “Kamiokande” neutrino detector. Professor Harré noted that humans built the Kamiokande in order to “see the invisible” neutrinos that pass through matter. In this research, AI is conceptualized as the “Kamiokande of language.” It allows students to perceive invisible linguistic patterns and “deltas” in their writing that they could not see with their ordinary senses alone. However, we must acknowledge that Realm 3—the spiritual and moral core—remains beyond the reach of the instrument.

Figure 1

Philosophy of Science



Philosophy of Science
Ontology & Epistemology
by Professor Rom Harré

- Realm 1: Things we can observe or perceive with our ordinary senses
Observation
- Realm 2: Things we can observe or perceive with instruments
Analogy
- Realm 3: Things we can't observe or perceive whatever instruments we use, even including mental, religious, spiritual matters.

(Natural Science, Humanities, Social Science, and so on.)
Hypothesis “We built Kamiokande in order to see the invisible.” said Professor Koshiba.

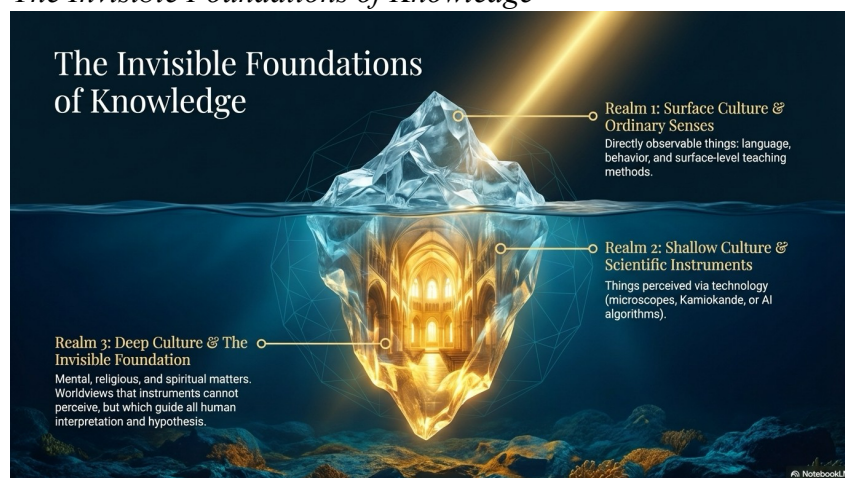
Edward Hall's Iceberg Model of Culture

The Iceberg Model by Edward Hall perfectly maps onto Harré's realms (Figure 2).

- **Surface Culture (Realm 1):** Visible elements like language, music, and dress.
- **Shallow Culture (Realm 2):** Unspoken rules and social norms that AI can analyze through data patterns.
- **Deep Culture (Realm 3):** The submerged architecture of human society, including ontological beliefs and epistemological frameworks. Effective communication requires learners to dive beneath the surface. While AI assists in navigating the transition from Realm 1 to Realm 2, the human teacher is essential for exploring Realm 3.

Figure 2

The Invisible Foundations of Knowledge

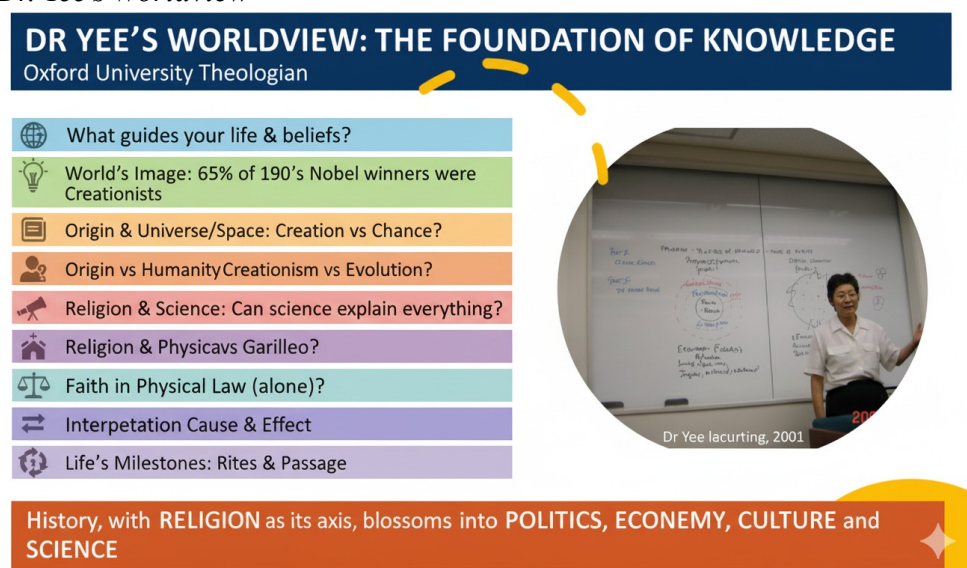


Dr. Yee's Worldview Foundation

The “Foundation of Knowledge,” as articulated by Oxford theologian Dr. Yee, provides the ethical and metaphysical axis for the program. Dr. Yee posits that history, politics, and science all blossom from a central axis of belief. Students were encouraged to engage with five core conceptual questions (Figure 3):

1. **Origin:** Is the universe the result of Creation or Chance?
2. **Humanity:** Are we the product of intentional Creationism or accidental Evolution?
3. **Epistemology:** Can science explain everything, or is there a religious/spiritual dimension to truth?
4. **Physicality:** Is reality limited to physical law, or is there a “higher law”?
5. **Interpretation:** How do our foundational beliefs act as a “Compass of Life”?

By integrating these questions into the English curriculum, we moved the learning objective from “fluency” to “literacy”—the ability to understand the world through diverse philosophical lenses.

Figure 3*Dr. Yee's Worldview*

Methodology: Technical Stack and the Iterative Loop

The research was conducted at Globiz Professional University with a select group of eight students. The curriculum was designed to be rigorous, combining high-tech augmentation with high-touch human interaction over 30 weeks.

The Technical Stack

To facilitate “AI Augmented Ability,” we deployed a sophisticated suite of tools, each selected for its specific cognitive function:

- **ChatGPT & Claude:** Used for creative synthesis and stylistic refinement.
- **Gemini & Copilot:** Employed for real-time information retrieval and drafting support.
- **Perplexity & NotebookLM:** Utilized as research partners for deep inquiry and the organization of source material for the final thesis.
- **Grammarly:** Used for granular syntactic accuracy.

The Iterative Learning Loop and Weekly Task Flow

The core of the methodology was a cyclic process of expression and refinement, designed to move students toward B1/B2 CEFR levels:

1. **Input (Daily Habits):** Students watched a three-minute English Central AI video every day, totaling five core videos per week. This formed the habit of listening to authentic input.
2. **The Handwritten Draft:** Every week, students wrote a 200-word reflection on paper. This “analog” step was mandatory to ensure cognitive engagement and to prevent “copy-paste” dependency on AI.
3. **Digitization:** Students photographed their handwritten drafts with smartphones and converted the text using Optical Character Recognition (OCR) or manual typing into the AI stack.
4. **AI Processing & Delta Analysis:** Students used the Technical Stack to adjust their syntax and vocabulary. The critical “Learning Goal” was not the final output, but the

analysis of the “delta”—the gap between their original draft and the AI-enhanced version. They were required to reflect on *why* the AI chose certain structures over others.

5. **Output & Interaction:** The cycle produced 10 major essays over the course of the program.

The Capstone: The 2,000-Word Thesis

The final 15 weeks of the program were dedicated to a **2,000-word thesis**. This assignment served as the ultimate test of “Integrated Ability.” Students used NotebookLM and Gemini to conduct literature reviews and organize their findings, but the “original creation” and moral responsibility of the thesis remained with the student. This capstone required the synthesis of their 30 weeks of reflection into a cohesive academic argument.

Authentic Human Interaction

To balance the AI loop, the program included a 6-week intensive interaction phase with 12 native speakers from the United States. These 1-on-1 sessions with “Crus” (international exchange partners) focused on “High-Quality Interaction.” These were not mere language drills but meaningful exchanges requiring active listening, empathy, and the building of trust—capacities that remain the sole province of the “Imago Dei.”

Results: Empirical Evidence of Macroscopic Growth

The data gathered from the 30-week intervention suggests that the integration of AI-assisted loops and philosophical inquiry yields significant linguistic and qualitative gains.

TOEIC and CASEC Quantitative Analysis

The cohort showed “high-yield absolute growth” in standardized testing. The mean TOEIC score increased from **581.3 to 661.9**, a shift of +80.6 points.

- **Statistical Significance:** A paired t-test confirmed the reliability of these results. With a t-statistic of **2.53** and a standard deviation of 90.2, the null hypothesis was rejected at **$p < 0.05$** .
- **Analysis of Micro-Variance:** The growth lines for individual students were non-parallel, indicating that the AI intervention allowed for personalized learning trajectories.
 - **Student 1:** Demonstrated a surge from 754 to 856, showing that even high-proficiency students benefited from the “delta analysis.”
 - **Student 4:** Shifted from 601 to 732.
 - **Student 6:** Moved from 497 to 598. These macroscopic gains confirm that the combination of daily AI video practice and the iterative writing loop creates a powerful engine for proficiency.

Progos AI Speaking Test

The Progos test, which utilizes AI to measure conversational fluency, showed that the cohort successfully crossed the threshold into the “Independent User” category.

- **Pre-Test Mean:** 4.38 (A2 High/High Beginner).

- **Post-Test Mean: 5.25 (B1 Independent User).** The students gained the ability to cope with flexible language situations and express their own opinions on complex topics—a direct result of the weekly presentation requirements.

PeerEval: Real-Time Human Assessment

To measure the “Physical/Human Ability” involved in delivery, we utilized the PeerEval system. Students were evaluated across six categories (totaling 30 points). The average score was a high 4.4 out of 5.0.

- **Highest Category: Visual Aids/Slide Design (4.6).** This suggests that the AI-enhanced preparation allowed students to focus more on the aesthetic and logical structure of their presentations.
- **Logical Sequence (4.5) and Enthusiasm/Content (4.5):** These scores reflect the success of the “Worldview Literacy” component, as students were more engaged with the topics they were presenting.
- **Delivery and Eye Contact (4.2):** While still high, this was the lowest category, highlighting that even with AI assistance, the physical and embodied aspects of communication remain the most challenging and human-dependent skills to develop.

Discussion: The Ontological Matrix and the Mandate of Humanity

The results lead us to a critical reevaluation of the relationship between the human learner and the AI instrument.

The Ontological Divide: Instrument vs. Imago Dei

This study conceptualizes AI as a **Created Tool**—an amoral, data-driven instrument devoid of consciousness. Its output is characterized by “generative imitation.” In contrast, humanity is viewed as the **Imago Dei** (the image of the Creator), endowed with spirit, emotion, will, and consciousness. The human output method is “original creation.”

The Paradigm of Integrated Ability

The “new frontier of education” is not found in choosing between AI and human effort, but in the synthesis of both.

- **AI Augmented Ability:** Excels in data processing, research scaling, and content optimization. It handles the “Lower-Order Thinking” (rote memorization and basic grammar).
- **Physical/Human Ability:** Excels in empathy, authorship, worldview development, and high-quality interaction. The human remains the “Guardian of Higher-Order Thinking.”

As Osborne (2025) noted in the *Harvard Business Review*, AI does not replace us; it forces a reevaluation of what makes us unique. By offloading material grading and assessment to AI (as seen in the success of the Progos and socio-constructivist trials), human teachers are finally freed to engage in active listening and empathetic dialogue. The statistically significant jump from B1 to B2 proficiency levels in several students is not merely a technical achievement; it is the result of students being empowered to focus on the “Deep Culture” of their message while the AI scaffolded the “Surface Culture” of their syntax.

Limitations

Several limitations must be noted for future researchers:

1. **Small Sample Size:** With $n = 8$, the findings are indicative rather than definitive for larger populations.
2. **Institutional Specificity:** Globiz Professional University provides an environment with high technological access and a specific professional focus.
3. **AI Dependency Risk:** There is a risk of “Learner Agency” being eroded if the handwriting and reflection steps are skipped. Educators must “carefully guard” against students becoming passive consumers of AI outputs.

Conclusion: The Future of High-Quality Interaction

This study has demonstrated that an integrated pedagogical model—combining AI practice, intercultural exchange, and philosophical inquiry—can successfully equip 21st-century learners with the collective intelligence required to solve complex societal problems. We have shown that the “Technical Stack” is a powerful instrument, but it remains just that: an instrument.

As we venture further into the age of algorithms, the “Invisible Foundations of Knowledge” become more critical than ever. We must remember that “the fear of the Lord is the beginning of knowledge” (Proverbs 1:7). A foundational worldview is the “light” (Psalms 27:1) that allows us to navigate the technological fog. By embracing our unique mandate—authorship, empathy, and moral responsibility—we can ensure that technology serves to amplify the human spirit rather than replace it. The future of education lies in cultivating “Integrated Ability,” where the machine enhances the process, but the human retains the soul.

Acknowledgment

This work was supported by JSPS KAKENHI Grant (C) Number JP25K04301. This research was conducted from April 2025 to January 2026 and consisted of 30 weeks of lessons. During the process of writing this paper, several AI tools were used to refine the proceedings, including improving the clarity, coherence, grammar, vocabulary, and overall academic style of the manuscript. These tools were used only as supplementary writing-support tools, while the author remained responsible for the final content, interpretation, and academic integrity of the paper.

References

- Hall, E. T. (1976). *Beyond culture*. Anchor Books.
- Harré, R. (1986). *Varieties of realism: A rationale for the natural sciences*. Blackwell.
- Kim, J. H., & Lee, S. Y. (2020). The role of AI in modern English language learning: An analysis. *Journal of Language & Technology*, 23(1), 45–63.
- Ng Lian, M., & Tan, C. K. (2023). *A report of Scribo platform*. Marshall Cavendish Education Company.
- Obari, H. (2024). Integrating AI and Web 3.0 in English education: A study of technological advancements in Society 5.0. *Aoyama Keizai Ronshu*, 75(3–4), 273–297.
- Obari, H. (2025a, August). *Ethical dimensions of AI in language learning: Student voices* [Paper presentation]. International Conference on Language, Literature, and Arts (ICLLA), Bangkok, Thailand.
- Obari, H. (2025b, August). *Beyond surface culture: The limits of AI in fostering intercultural competence* [Paper presentation]. 8th FLEAT Conference, Honolulu, HI, United States.
- Osborne, J. (2025). *The human mandate: Why AI makes soft skills the hard skills of the future*. Harvard Business Review.
- Tung, L. (2023, February 3). *ChatGPT just became the fastest-growing 'app' of all time*. ZDNet. <https://www.zdnet.com/article/chatgpt-just-became-the-fastest-growing-app-of-all-time/>
- Weakley, D. (2022). *Cross-cultural IQ and global leadership*. International Press.
- Yee, S. (2001). *The foundation of knowledge: Philosophical axis in the 21st century* [Lecture notes]. Oxford University.

Contact emails: obari119@gmail.com
h_obari@gpu.ac.jp

Self-Professional Development of Faculty Members Between Conventionality and Globalization

Faiza Adil Gonaim, University of Jeddah, Saudi Arabia

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

The professional development of faculty members is considered a strategic priority at both global and local levels due to its prominent and long-lasting impact. A faculty member's professional and knowledge development reflects a dynamic ability to meet the rapidly growing and changing demands of the 21st century. Self-professional development is distinct from other professional development approaches due to its flexibility in time, place, and content, in addition to its diverse tools, methods, and techniques. It moves beyond the narrow traditional scope of workshops and training courses to embrace continuous and sustainable learning and the concept of lifelong education. This paper aims to identify modern approaches and strategies related to faculty members' self-professional development through reviewing the relevant literature addressing self-Professional development across different sectors, with emphasis on the educational field. The review reveals several strategies that can be categorized into five main domains: psychological strategies, scientific strategies, research strategies, behavioral strategies, and technological alignment strategies.

Keywords: self-professional development, faculty members, higher education, professional growth strategies, academic competency

iafor

The International Academic Forum
www.iafor.org

Introduction

Higher education is a central driver of development and progress in any nation and serves as a catalyst for advancement across multiple dimensions, including economic, social, and health sectors. Higher education institutions are increasingly viewed as anticipated developmental engines; therefore, interest has grown in concepts of Total Quality Management and institutional accreditation as essential pillars of an efficient educational system capable of meeting international and local demands amid rapid changes. Accordingly, investing in the human capital that fuels the movement of higher education institutions defines the standards of excellence for their outputs. Moreover, educational quality, research productivity, and community services are among the key criteria for institutional evaluation of educational establishments (Kuznetsova et al., 2022).

Professional development for faculty members has thus become a strategic objective both globally and locally, given its significant and lasting impact. The ongoing professional and cognitive development of faculty reflects dynamism and responsiveness to the demands of the rapidly evolving 21st century. Within the context of Saudi Vision 2030, the development of educational personnel represents one of the general goals of education. Additionally, one of the strategic objectives of the Ministry of Education is the enhancement and development of the competencies and skills of educational professionals (Ministry of Education, 2021). International standards also align in recognizing faculty professional development as a global benchmark for the qualitative performance of higher education institutions and their outcomes (Al-Ajaji, 2017).

Although numerous initiatives and programs have emerged to support faculty development including quality centers and development deanships adopted by most universities many studies have reported persisting shortcomings in the professional development of faculty members (Al-Dosari & Issa, 2022). Given the variability observed in faculty performance within university settings, and the resulting impact on educational outcomes and intended goals, it has become essential to explore methods and strategies that ensure the professional growth of faculty members. When the academic environment does not provide structured development programs, professional growth must originate through self-directed efforts which an issue examined in the present scholarly paper.

Faculty Members as Teachers, Researchers, and Social Developers

The roles assigned to faculty members are multifaceted; their responsibilities are not limited to teaching alone. They are also expected to contribute research that enhances human life and creates better lived experiences, in addition to leaving a meaningful impact in serving and developing their communities. According to Article Twenty-Five of the Bylaw Regulating Faculty Affairs, the criteria for faculty promotion include: scholarly production, teaching, and community service. The role of faculty members is therefore diverse and rich in terms of their contributions to the personal and societal development of students and the broader community.

Faculty members are capable of fostering students' intellectual awareness, as confirmed by Al-Noor (2021) in her study, and of reinforcing values of national reconciliation, as illustrated in the study of Al-Dhuwadi (2024). They also play a key role in cultivating a culture of peace, as demonstrated by the findings of Al-Zarzakh, Osman, and Khairiyah (2020). Furthermore, they prepare students to become academically, professionally, and

ethically qualified individuals of high caliber, and they serve as sources of knowledge generation through the production of rigorous scientific research that enriches the field (Al-Bawi & Ibrahim, 2017).

The role of faculty members in community service is reinforced through research that translates into practical applications and practices contributing to community growth and development, in addition to strengthening the role of scientific research within society (Al-Bawi & Ibrahim, 2017).

Professional Development of Faculty Members

Professional development refers to the process through which individuals learn directly or indirectly via planned experiences and programs that enhance both the individual and the work environment. The professional development of faculty members is of substantial importance, as it directly influences the quality of academic performance in higher education institutions and, consequently, the quality of education (Gülbahar & Adnan, 2020). This development serves as a means of enhancing faculty competence and increasing their competitive advantage in the academic sphere.

Hejazi (2020) emphasized that professional development is essential for sustaining faculty members' resilience and maintaining their effectiveness amid the inevitable changes facing higher education institutions changes driven by knowledge and technological expansion, labor market demands, educational funding, sustainability, and globalization. Living in an era defined by digital advancement makes changes in teaching methods inevitable, and keeping pace with such developments is no longer optional for faculty members (Pratama et al., 2024).

Despite the critical importance of professional development, the methods typically employed tend to be conventional and do not adequately address the individual needs of faculty members. Although various professional development centers and units exist, their work often remains confined to offering sessions that resemble theoretical lectures, without sufficiently accommodating the diverse needs required for contemporary and anticipated faculty roles (Al-Dosari & Issa, 2022). Traditional approaches such as workshops and training courses are not ineffective; however, they are no longer adequate given the rapid advancements of the modern age and the intensifying global competitiveness.

Layla and Mustafa (2024) highlighted the importance of considering time and effort in employee development and emphasized enabling individuals to choose the developmental approach that best supports their long-term professional growth, in ways that align with their unique needs.

Self-Directed Professional Development

Since the late twentieth century, and with the accelerating pace of institutional and global growth, the concepts of professional development began to expand beyond the narrow scope of traditional training to encompass continuous and sustainable learning and the broader notion of lifelong education. This concept further evolved to include educational institutions themselves, giving rise to what is known as the "learning organization," all indicating a shift toward continuous self-directed learning not confined to formal training alone.

In some literature, this concept has been expressed as *continuous professional development* as a reference to self-directed professional development, as seen in the study by Pratama et al. (2024) conducted among aviation lecturers. Their findings indicated that self-directed and continuous professional development had not reached the level required by the field, with notable shortcomings in research and scholarly advancement. Due to its importance for faculty members, the term “building teaching strength” is used in Vietnam to describe this process, reflecting its continuous nature aimed at strengthening teaching capacity (Pham, 2021).

Given the effectiveness of this mode of development, numerous studies have recommended the activation of self-directed learning for faculty members, including the studies of Abu Zneid (2022) and Al-Enazi (2021). It has increasingly become recognized as one of the essential tasks and responsibilities of faculty members.

Self-directed professional development differs from other development approaches by offering flexibility in time, place, and content, alongside the diversity of its tools, methods, and techniques. It also accommodates variations in individual differences and differing job needs (Nurhayati, 2018). Several studies have highlighted the efficiency of self-directed professional development in promoting active learner engagement and increasing motivation by enabling individuals to tailor content according to their own needs, thereby creating a fertile environment for learning (Khatoon, 2015).

Self-directed professional development holds particular significance in the modern era for several reasons, as noted by Madani (2020). These include:

- The extensive technological advancement that facilitates training, development processes, and access to updates both locally and globally, enabling individuals to acquire necessary skills.
- Global competitiveness, which places higher education institutions under worldwide evaluation regarding their efficiency and quality.
- Contemporary emphasis on concepts of creativity and scientific and research innovation, which necessitate ongoing self-development.
- The multiplicity of faculty responsibilities, which require high levels of competence and balanced performance.
- The need to develop essential skills that require continuous training and development such as a range of specialized competencies identified by Nurhayati (2018) in his study of English-as-a-second-language instructors.

Key Outcomes of Self-Directed Professional Development

Among the most significant outcomes are:

1. Enhancing job satisfaction and sense of responsibility.
2. Improving scientific research skills and fostering independence in scholarly creativity.
3. Promoting scientific and intellectual exchange among different educational institutions.
4. Equipping faculty members with diverse and necessary skills tailored to their specific needs.
5. Aligning faculty performance with contemporary demands.
6. Strengthening institutional belonging and loyalty, thus increasing intrinsic motivation among faculty.
7. Fostering creativity in both teaching and research performance.

Barriers to Self-Directed Professional Development

Despite the various obstacles cited in the literature regarding faculty members' motivation for self-directed professional development, Nurhayati (2018) affirmed that such development is largely shaped by the individual's perception, awareness, and understanding of it, even though external environmental factors may impose additional challenges. Among these barriers are:

1. Insufficient awareness of self-development skills.
2. Limited understanding of the importance and impact of self-directed professional development.
3. Technological illiteracy and lack of familiarity with modern technologies.
4. Adherence to traditional practices.
5. Lack of motivation and absence of intrinsic or moral reinforcement.
6. Weak proficiency in foreign languages, particularly English.

Method

This study adopted a qualitative literature review approach to explore contemporary practices of self-professional development among faculty members. The methodology included:

1. Reviewing scholarly literature and empirical studies addressing professional development in higher education.
2. Examining international and local studies discussing self-directed professional development practices.
3. Analyzing recurring themes and practices related to faculty development.

Classifying the identified strategies into five main domains of self-professional development.

This analytical process enabled the development of a conceptual framework describing key strategies that support continuous professional growth among faculty members.

Self-Directed Professional Development Locally and Globally

The Conventional Nature of Self-Directed Professional Development for Faculty Members

A wide range of studies have addressed the professional development of faculty members, highlighting diverse strategies, dimensions, and challenges. For example, Abu Samra and Touthah (2017), in their study on the reality of self-directed professional development among faculty members at Al-Quds Open University in Palestine, found high levels of self-directed development, though not without obstacles such as heavy professional workloads and difficulties in obtaining academic leave.

Similarly, the findings of Al-Muhaidib and Al-Dawood (2019) aligned with Abu Samra and Touthah's study regarding barriers to self-training, noting extensive academic and administrative responsibilities. His study, which focused on self-training among academic leaders at King Saud University, also highlighted the benefits of professional development, including enhanced personal competencies and skills, and improved problem-solving abilities characterized by a high degree of positivity.

In Al-Dosari and Issa study (2022), which explored faculty self-directed professional development from the perspective of academic leaders, results showed that participants acknowledged its importance while simultaneously recognizing the presence of significant obstacles.

Self-Directed Professional Development for Faculty Members Globally

Methods and strategies for self-directed professional development vary widely, with opportunities expanding as technological advancements progress (Abou Assali, 2024). A review of literature across various sectors—particularly studies focusing on educational personnel reveals multiple strategies that support self-directed professional development and assist faculty members in planning their academic growth autonomously.

These strategies can be categorized into five primary domains, referred to here as *strategies*:

- Psychological strategies
- Academic strategies
- Research strategies
- Behavioral strategies
- Technological alignment strategies

First: psychological strategies. Belief in the importance of self-directed professional development represents one of the key strategies for ensuring the continuity and sustainability of self-development. This has been emphasized by several studies (Abou Assali, 2024; Nurhayati, 2018). An individual's perception of the value of learning and self-development constitutes a primary motivational driver for formulating self-directed development plans. Abou Assali (2024) further confirmed that the outcomes individuals experience from self-directed development such as self-empowerment, self-confidence, and a sense of autonomy are among the strongest motivators for believing in the importance of self-development. These outcomes, in turn, are reflected in increased engagement and sustainability in self-directed professional development.

For instance, participants in Abou Assali's study reported that the confidence, empowerment, and autonomy teachers gained through self-directed professional development enabled them to design and adapt their teaching methods creatively in ways that align with academic content, students' developmental stages, and classroom environments.

Another psychological strategy that supports self-directed professional development is self-regulation, which has been implemented within higher education in Ukraine. This approach involves developing a personal roadmap and possessing the ability and flexibility to modify and enhance it according to emerging needs. Such practices have been identified as core methodologies of self-directed professional development, as confirmed by the study of Lynova and Bulvinska (2020). The authors noted that activating this approach enables faculty members to select focused training aligned with their individual needs. However, they also emphasized the importance of formally assessing self-directed development and producing reports that document personal efforts in this domain, as well as unifying evaluation practices across higher education institutions rather than relying on isolated individual monitoring of faculty self-directed professional development.

Flexibility in education and work is also considered one of the psychological strategies that encourage and motivate learning, by framing education through its diverse modes of delivery

as a lifelong process. This is particularly important in light of continuous changes that require adaptation to future transformations. For example, Harvard University has adopted the concept of flexible work arrangements and established policies that ensure distinguished performance, effective balance between learning and work, and equity. Such practices help reduce psychological pressure on faculty members and provide them with greater opportunities for learning and self-directed professional development (Harvard Information for Employees, 2024).

Second: Academic Strategies. Attending conferences represents a valuable professional development opportunity due to the exchange of expertise and ideas they facilitate, in addition to enhancing skills related to scholarly dialogue and academic discussion. Faculty members may also benefit from available distance-learning opportunities, such as participating in workshops and training courses both specialized and non-specialized that are aligned with their academic roles and responsibilities. Furthermore, making use of scholarship opportunities and academic sabbaticals allows faculty members to focus intensively on self-directed professional development.

In Indonesia, the government offers programs that enable teachers to enroll for the purpose of self-directed professional development. These programs also allow faculty members to contribute by delivering courses and workshops, equipping teachers with diverse instructional methods based on the latest research-driven practices, while simultaneously benefiting from teachers' experiential knowledge to meet the needs of the general educational field (Nurhayati, 2018).

In China, which has achieved significant progress in the quality of its higher education system, professional development for faculty members is viewed as a necessity that must be sustainable. Opportunities are intentionally created to support faculty scientific advancement through the establishment of high academic standards and national policies designed to ensure continuous and sustainable scientific development (Pham, 2021).

Similarly, in the United States, strong emphasis on self-directed professional development is considered a key factor influencing the quality of educational outcomes and students' successful performance in international assessments. Consequently, the evaluation of faculty professional competence is regarded as an ongoing process to ensure the continuity of self-directed professional development (Pham, 2021).

Third: Research Strategies. Employing diverse research methodologies is essential for identifying the most effective local and international practices that support professional development. The use of research observation as a methodological tool has been highlighted by Abou Assali (2024) in her study, where it was utilized to explore and examine teachers' instructional creativity.

Vietnamese universities view the professional development of faculty members as a shared societal and governmental responsibility, given its direct impact on economic growth and societal well-being. Pham (2021), in his study focusing on faculty professional development, emphasized that scientific research and annual publication output measured across the study sample contribute significantly to the self-growth of faculty members, as well as to the development of their institutions and stakeholders. Accordingly, encouraging scientific research and establishing incentive systems for scholarly productivity are considered key strategies for both personal and institutional growth.

Fourth: Behavioral Strategies. Several studies have highlighted self-directed behavioral practices that support professional self-development. Among these practices is self-reflection, which was identified by Abou Assali (2024) in her study as a strategy that supports creative teaching. Reflection on one's own behavior and its analysis was found to be one of the factors that foster creativity, alongside technological self-development. Such reflective practices include writing, peer dialogue, and self-assessment.

Another behavioral strategy involves the ability to balance individual behaviors related to fulfilling academic responsibilities with ongoing self-development. This aspect was emphasized by Saric and Steh (2017), who underscored the importance of maintaining equilibrium between professional obligations and personal growth. Innovation in communication skills was also identified as a critical factor requiring focused attention in Ukraine, as it enhances professional development and should be adopted as a general workplace culture supported by educational leaders, in addition to technological competence (Nychkalo et al., 2022).

Further studies focusing on self-directed professional development in Ukraine have indicated that collaborative behavior in professional development represents one of the motivating strategies for sustaining professional growth (Kuznetsova et al., 2022). This strategy is also implemented at the level of the European Union, where peer interaction within the same academic discipline supports interactive learning, thereby contributing to the professional growth of faculty members through shared disciplinary understanding (Huijboom et al., 2020).

Among the behavioral strategies that intersect with psychological strategies is the development of self-leadership skills. Jooste and Frantz (2017) confirmed in their study that enhancing self-leadership skills plays a vital role in self-influence and motivation, guiding individuals toward optimal behavior. Self-leadership encompasses self-development and the ability to confront the inherent challenges of higher education institutions. The authors further noted that self-leadership increases levels of mindfulness, contributes to transforming challenges into opportunities, reinforces belief in self-development as a pathway to personal success, and ultimately directs individual behavior toward achieving personal vision. They also emphasized that self-leadership is not limited to those holding formal leadership positions; rather, it is a necessary behavioral competency for every faculty member to construct and pursue their personal vision.

Fifth: Technological Alignment Strategy. In the study by Abou Assali (2024), participants emphasized the effectiveness of technology and the efficiency of its use in supporting self-directed professional development, particularly in enhancing creative teaching practices. For example, they indicated that familiarity with and proficient use of diverse digital applications serve as key resources in strengthening the effectiveness of the teaching and learning process.

Similarly, Pham (2021) emphasized that achieving high levels of educational competence at both global and local levels requires the optimal activation of distance training and online education, as these modalities provide a high degree of diversity and flexibility for learners.

Manifestations of Self-Directed Professional Development

Self-directed professional development is not a random or unstructured process; rather, it is implemented through the development of a structured self-directed professional development

plan that aligns with an individual's interests and needs, is responsive to contemporary demands, and remains flexible and adaptable according to evolving requirements. Such a plan must also be associated with a clearly defined and feasible time frame for implementation.

Components of Self-Directed Professional Development

1. Developing a personalized self-directed professional development plan.
2. The role of the immediate supervisor in supporting faculty members and enhancing aspects of their professional growth.
3. The role of professional development units and departments in fostering motivating orientations toward self-directed development.
4. Periodic exploration of barriers to self-directed professional development and providing support to identify solutions for overcoming these challenges.

Discussion

A review of the literature and previous studies reveals that self-directed professional development has a significant impact on individuals' professional competence at both the personal level and in terms of professional performance. The findings also indicate that professional development methods and approaches are not confined to a single framework, strategy, or dimension; rather, they represent an integrated combination of development across multiple domains, collectively leading to effective self-directed professional growth. The literature consistently affirms that continuous self-development fosters a sustainability-oriented mindset within education. Among the most prominent strategies supporting self-directed professional development are technological flexibility and continuous alignment with emerging technological advancements.

When examining the barriers to self-directed professional development most of which are related to the heavy academic workload and responsibilities the importance of balancing academic duties with self-development becomes evident. This finding is supported by Saric and Steh (2017), who emphasized the necessity of achieving equilibrium between professional obligations and ongoing development. Moreover, higher education institutions bear responsibility for adopting a culture of self-directed professional development by providing supportive opportunities and resources that facilitate this process, motivate faculty members, and remove obstacles that hinder progress, such as technological constraints or excessive workloads that limit opportunities for self-directed growth.

Finally, self-directed professional development is not limited to individual advancement alone; rather, its benefits and outcomes extend to the institutional level, where the positive impact is realized collectively and not solely at the personal level.

Recommendations

1. University development centers should prioritize the preparation and enhancement of self-directed professional development.
2. Promoting a culture of continuous self-directed and institutional learning.
3. Updating professional development philosophies to explicitly include self-directed professional development.
4. Engaging specialists in designing self-directed professional development plans.

5. Providing financial and career-based incentives for participants in self-directed professional development initiatives.
6. Recognizing faculty members' professional competence and self-directed development as part of promotion requirements.
7. Increasing training programs aimed at enhancing faculty members' technological competencies.
8. Encouraging academic departments to organize seminars and scholarly discussion forums.
9. Strengthening the role of centers of expertise in enhancing self-directed professional development by designing training programs tailored to individual needs.
10. Establishing continuous evaluation standards to assess faculty members' professional competence and self-directed development.
11. Encouraging Ministries of Education to adopt unified strategies and standards for evaluating faculty self-directed development.
12. Developing mechanisms and reference frameworks by Ministries of Education for self-directed professional development, based on expert opinions and recent studies in the field.

Conclusion

Professional development of faculty members constitutes a strategic objective at both global and local levels, given its significant and far-reaching impact. It reflects the dynamism of faculty members' professional and cognitive growth and their responsiveness to the demands of a rapidly evolving and changing century—an era in which higher education institutions are compelled to pursue continuous development and engage in global competitiveness.

Self-directed professional development is distinguished from other development approaches by its flexibility in time, place, and content, as well as by the diversity of its tools, methods, and techniques. It transcends the narrow traditional model confined to workshops and training courses, expanding to encompass continuous and sustainable learning and the concept of lifelong education. A review of the literature and studies addressing self-directed professional development across various sectors particularly within the educational field examined in the present study reveals multiple strategies that underpin self-directed professional growth.

These strategies can be classified into five main domains: psychological strategies, academic strategies, research strategies, behavioral strategies, and technological alignment strategies.

References

- About Assali, M. (2024). Enhancing pedagogical creativity: A comprehensive study of self-professional development among ESL educators. *Research Journal in Advanced Humanities*, 5(2). <https://doi.org/10.58256/et4a4a30>
- Abu Samra, M., & Tutah, L. (2017). Professional development of faculty members at Al-Quds Open University: Reality and challenges. *Arab Universities Association Journal for Higher Education Research*, 38.
- Abu Zneid, M. S. A. (2022). *Possession of upper-basic science teachers of action research skills and its relationship to their attitudes toward self-professional development* [Doctoral dissertation, Al-Quds University].
- Al-Ajaji, A. (2017). Requirements for self-professional development among general education teachers in the Kingdom of Saudi Arabia. *Scientific Journal of the Faculty of Education – Assiut University*, 22.
- Al-Bawi, M. A., & Ibrahim, M. (2017). The role of university faculty members in linking science, technology, and society in light of the university's social responsibility concept. *Educational Creativity*, 2(2), 21–28.
- Al-Dhawadi, R. S. (2024). The role of faculty members in enhancing the value of national reconciliation among university students. *University of Al-Zawiya Journal – Faculty of Arts*, 24(1), 1–20.
- Al-Dosari, K., & Issa, A. (2022). Self-professional development of faculty members in Saudi universities from the perspective of academic leaders. *Assiut University Journal of the Faculty of Education*, 38(2.2), 230–274.
- Al-Enazi, A. M. (2021). Reality and obstacles of self-professional development among secondary school female teachers in Riyadh from their perspective. *Journal of Educational and Psychological Sciences*, 5(18), 28–50.
- Al-Muhaidhib, H., & Al-Dawood, I. (2019). Self-training for academic leaders at King Saud University as an approach to achieving administrative efficiency. *Journal of Educational Sciences*, 1.
- Al-Noor, H. A. R. (2021). The role of faculty members in promoting intellectual awareness. *Research in Educational & Human Sciences, Arts & Languages*, 8(1).
- Al-Zarzah, M., Bin Othman, M., & Khairiya. (2020). The role of faculty members in promoting a culture of peace among university students.
- Gülbahar, Y., & Adnan, M. (2020). Faculty professional development in creating significant teaching and learning experiences online. In *Handbook of research on creating meaningful experiences in online courses* (pp. 37–58). IGI Global.
- Harvard Information for Employees (2024). *Flexwork at Harvard*. <https://hr.harvard.edu/flexwork>

- Hejazi, A. (2020). Determining the components of professional development of faculty members of Farhangian University. *Research in Teacher Education (RTE)*, 3(1), 41–61.
- Huijboom, F., Van Meeuwen, P., Rusman, E., & Vermeulen, M. (2020). How to enhance teachers' professional learning by stimulating the development of professional learning communities: operationalising a comprehensive PLC concept for assessing its development in everyday educational practice. *Professional Development in Education*, 46(5), 751–769. <https://doi.org/10.1080/19415257.2019.1634630>
- Jooste, K., & Frantz, J. (2017). Self-leadership traits of academics to conform to a changing higher education environment. *African Journal of Health Professions Education*, 9(4), 199–202.
- Khatoon, N. (2015). Emotional stability, self-professional development and its role in effective teaching. *International Journal of Business and General Management (IJBGM)*, ISSN (P), 2319–2267.
- Kuznetsova, O., Shtefan, L., Matvieieva, O., Fazan, V., & Simonok, V. (2022). University Academic Staff Professional Development: Didactic Aspect. *Journal of Positive School Psychology*, 4206–4219.
- Layla, & Mustafa. (2024). The impact of human resource management practices on achieving administrative creativity: An applied study at Al-Buraimi University. *Scientific Journal of the Faculty of Arts – Assiut University*, 31(91), 551–600.
- Lynova, I. O., & Bulvinska, O. (2020). Continuing professional development of academic staff: Theoretical approaches and models. *Continuing Professional Education: Theory and Practice*, (4), 14–22.
- Madani, G. (2020). Higher education development as a pillar of human development in Saudi Arabia. In *Symposium on the Future Vision of the Saudi Economy until 2020* (pp. 19–23). Ministry of Planning.
- Ministry of Education. (2021/1442 AH). *Strategic objectives*. <https://moe.gov.sa/>
- Nurhayati, D. A. W. (2018). Investigating Self Professional Development in Teaching English: The Case of English College Teachers' Role as Models. *Dinamika Ilmu*, 18(1), 89–105.
- Nychkalo, N., Muranova, N., Voliarska, O. S., & Kudina, V. (2022). Professional development of academic staff by means of information and communication technologies: the ukrainian experince. *Information Technologies and Learning Tools*, 4(90), 162–172.
- Pham, D. H. (2021). The professional development of academic staff in higher education institution. *Journal of Teacher Education for Sustainability*, 23(1), 115–131.

Pratama, A., Samani, M., & Buditjahjanto, A. (2024). Implementation of Continuing Professional Development in Self Professional Development Factors Amongst Aviation Polytechnic's Lecturers. *Asian Journal of Social and Humanities*, 2(9), 1872–1887.

Saric, M., & Steh, B. (2017). Critical reflection in the professional development of teachers: Challenges and possibilities. *Center for Educational Policy Studies Journal*, 7(3), 67–85. <https://doi.org/10.26529/cepsj.288>

Steinert, Y. (2025). Faculty development: core concepts and principles. *Faculty development in the health professions: A focus on research and practice*, 3-28.

Contact emails: fghonaim@uj.edu.sa
fgonim16@gmail.com

Empowering College Students With Generative AI Literacy in Higher Education

Kay Coates, Georgia Southern University Libraries, United States

Lili Li, Georgia Southern University Libraries, United States

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This study aims to optimize excellence in teaching, learning, and research among institutions of higher education via the revolution of generative AI. To promote generative AI literacy in higher education, this paper encourages institutions of higher education worldwide to establish specific generative AI guidelines for academic executives, faculty, librarians, and students in ever-changing academic learning environments. Based on their teaching practice at Georgia Southern University (<https://www.georgiasouthern.edu/>) and Georgia Southern University Libraries (<https://www.georgiasouthern.edu/library>), this paper suggests 25 primary generative AI tools for college students to boost their skills of critical thinking, decision-making, and problem solving in higher education. Also discussed are the relevant impacts of AI integrity, AI literacy, and generative AI literacy concerned by academic faculty, librarians, and students in the age of artificial intelligence.

Keywords: academic integrity, academic learning environments, AI literacy, artificial intelligence (AI), college students, generative AI, generative AI literacy, higher education

iafor

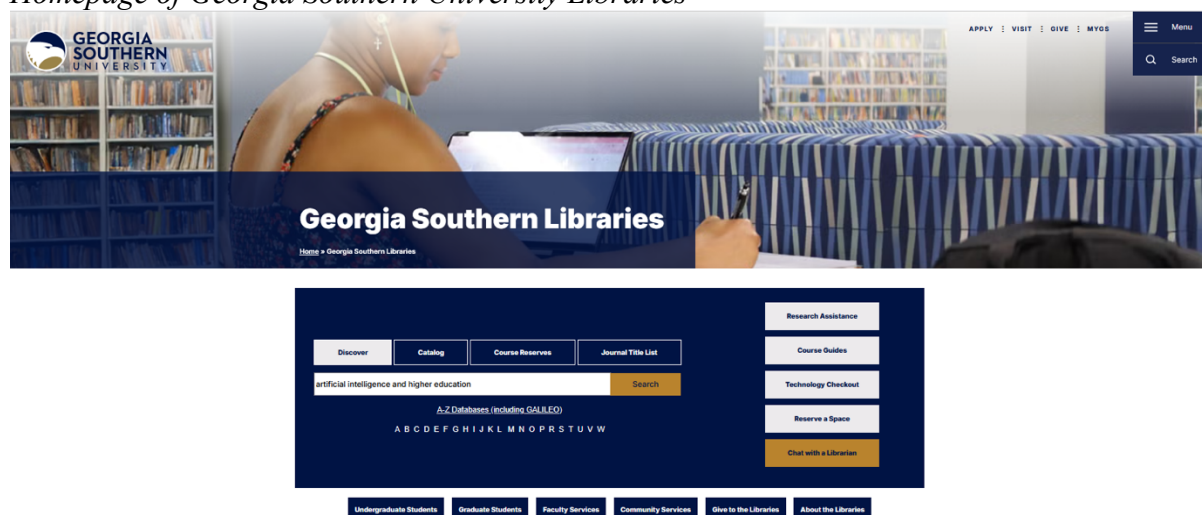
The International Academic Forum
www.iafor.org

Introduction

Since Dr. John McCarthy coined this term with his colleagues in 1955 (Computer History Museum, 2001), the definition of artificial intelligence (AI) keeps evolving with the rapid advance of AI technology, especially machine learning, deep learning, large language models (LLMs), machine translation, natural language processing (NLP), etc. Defined by IBM experts, “Artificial intelligence (AI) is technology that enables computers and machines to simulate human learning, comprehension, problem solving, decision making, creativity and autonomy” (Stryker & Kavlakoglu, n.d.). After OpenAI released the world’s first generative AI chatbot called ChatGPT on November 30, 2022, the rise of generative AI has been disrupting academic learning environments worldwide. Academic executives, faculty, IT specialists, librarians, and students in higher education must confront the impact of generative AI on existing modes of teaching and learning across academic learning environments. Explained by IBM experts, “Generative AI, sometimes called *gen AI*, is artificial intelligence (AI) that can create original content such as text, images, video, audio or software code in response to a user’s prompt or request” (Stryker & Scapicchio, n.d.). During the process of human-machine interaction, generative AI tools, like ChatGPT (<https://chatgpt.com/>), Claude (<https://claude.ai>), DeepSeek (<https://www.deepseek.com/>), Google Gemini (<https://gemini.google.com/app>), Microsoft Copilot (<https://copilot.microsoft.com/>), Meta AI (<https://www.meta.ai/>), Midjourney (<https://www.midjourney.com/home>), Perplexity (<https://www.perplexity.ai/>), xAI Grok (<https://grok.com/>), etc., can quickly generate new contents to satisfy dynamic user needs. Trained from massive token vectors stored within large language models (LLMs), generative AI tools can explore, learn, and predict the semantic relationships between abstract concepts and natural language words before responding to user prompts.

Figure 1

Homepage of Georgia Southern University Libraries



Note: From <https://www.georgiasouthern.edu/library>

Background

Georgia Southern University and Georgia Southern University Libraries

As one of the twenty-eight member institutions of University System of Georgia (<https://www.usg.edu/>), Georgia Southern University (<https://www.georgiasouthern.edu/>) is

classified as an “R2” high research institution by the Carnegie Classification of Institutions of Higher Education (<https://carnegieclassifications.acenet.edu/>) in the United States. Founded in 1906 at the Southeast Georgia, Georgia Southern University now has 27,506 students across 10 colleges offering undergraduate, graduate, and doctoral degrees. To support the missions of the university, Georgia Southern University Libraries (<https://www.georgiasouthern.edu/library>) serve faculty, staff, students, and community users across four campuses. Impacted by the surge of generative AI, the University System of Georgia, like many higher education institutions worldwide, released an AI guide (University System of Georgia, 2025) to provide guidelines for ethical and legal practice of AI applications and tools in higher education.

Research Design

From the perspectives of academic librarians, this study is designed to identify key generative AI tools that promote critical thinking, decision-making, and problem-solving skills for college students in higher education. This study addresses two research questions:

RQ1: Which generative AI tools are needed for college students in higher education?

RQ2: How to promote AI literacy and generative AI literacy in higher education?

Literature Review

The rapid advance of generative AI, the latest breakthrough of AI technology, has been disrupting higher education beyond expectations. A large body of research (An et al., 2025; Assaf et al., 2024; Bodur et al., 2025; Crompton & Burke, 2025; Iatrellis et al., 2025; Jin et al., 2025; Kituku et al., 2025; Rai et al., 2025; Shahzad et al., 2025) has explored the impacts of generative AI on teaching, learning, and research excellence in higher education institutions.

Generative AI Tools in Academic Learning Environments

Three years after ChatGPT’s release on November 30, 2025, a variety of generative AI tools (Beer, 2025; Dreamhunter, 2024; Gwilym, 2024; Huang, 2024; Michel-Villarreal et al., 2023) have emerged in the marketplace. They can increasingly be embedded into higher education courses, as they can generate new content including images, music, programming codes, texts, and videos based on prompts input by users. Faculty and students are increasingly eager and enthusiastic to explore the range and scope of generative AI tools across the academic landscape. However, several prominent universities in the United States: Columbia University (<https://www.columbia.edu/>), Dartmouth College (<https://home.dartmouth.edu/>), Duke University (<https://duke.edu/>), Liberty University (<https://www.liberty.edu/>), Princeton University (<https://www.princeton.edu/>), University of North America (<https://uona.edu/>), and University of Notre Dame (<https://www.nd.edu/>), maintain strict policies regarding the use of generative AI in those learning environments.

Generative AI Tools and Academic Integrity

The generative AI boom led by ChatGPT is continually challenging the principles of academic integrity (Duke Univ., 1999; Eaton, 2024; Kofinas et. al., 2025; Macfarlane et al., 2014; Vallespir Adillón et al., 2024) in higher education. Defined by the online encyclopedia Wikipedia,

Academic integrity is a moral code or ethical policy of academia. Academic integrity supports the enactment of educational values through behaviours such as the avoidance of cheating, plagiarism, and contract cheating, as well as the maintenance of academic standards; honesty and rigor in research and academic publishing. (Wikipedia, 2025)

The high tide of generative AI has prompted instructors and academic librarians to consistently remind students to follow academic integrity policies and AI ethics when competing assignments, projects, and term papers (Gonsalves, 2025; Hill & Hargis, 2025; Jafry & Vorstermans, 2025; Laflamme & Bruneault, 2025; Yang et al., 2025).

Methodology

Research Methods

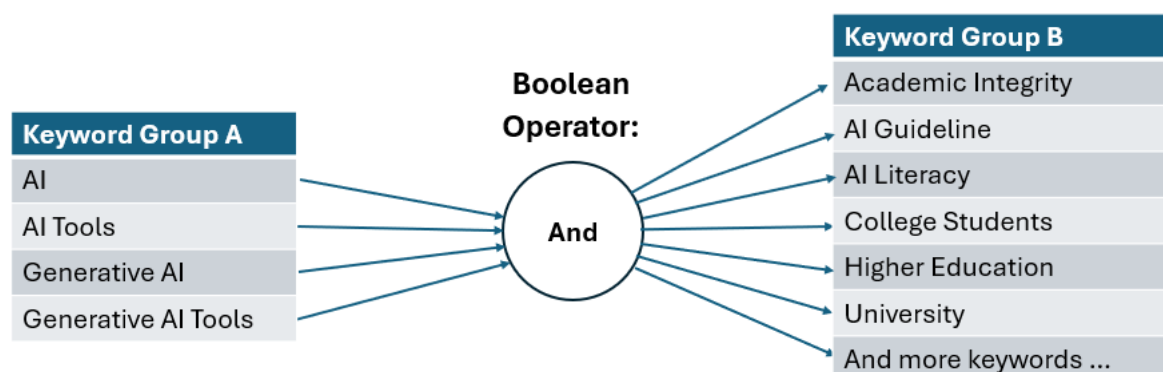
This quantitative study used the content analysis to review the collected research literature, while the descriptive analysis method was used to select generative AI tools in higher education.

Keyword Search and Boolean Operators

A keyword search refers to an information retrieval method of using important words to focus on research topics. Since 1990s, keyword searches have been widely used to find web-based information resources on the World Wide Web (Kargar et al., 2015; Liu et al., 2006; Zhou & Pei, 2012). Also, Boolean Operators (AND, OR, and NOT) are often combined with keyword(s) to further optimize information search results (Aliyu, 2017; Picalho et al., 2022; Scells et al., 2020). In this study, keywords and the Boolean Operator (And) are combined to locate scholarly peer-reviewed resources.

Keyword Processing

To identify AI tools for college students, the selected keywords were divided into two groups. Keyword Group A contains the primary keyword(s) selected in the fields of artificial intelligence, while Keyword Group B includes the selected keywords or keyword phrases for students from institutions of higher education. A Boolean Operator “And” was used to combine with the selected keywords from Group A and Group B. as a formula: Keyword A + And (Boolean Operator) + Keyword B, such as “academic integrity and higher education”, “AI literacy and generative AI” “generative AI tools and college students”, “generative AI tools and higher education”, “AI literacy and college students”, “AI literacy and undergraduates”, etc. The finalized keyword process and information retrieval were optimized to support this study:

Figure 2*Optimized Keyword Search Combined With a Boolean Operator (And)*

Research Resources and Web Search Engines

The primary resources selected for this study are library databases, such as Academic Search Complete (EBSCO), Business Source Complete (EBSCO), Computer Source (EBSCO), ERIC (Education Resources Information Center), IEEE Xplore Digital Library, ProQuest Databases, ScienceDirect, Scopus, Web of Science, etc., available from the collections of Georgia Southern University Libraries (<https://ww2.georgiasouthern.edu/library/>). To identify top generative AI tools for college students, the EBSCO Folio Services (<https://www.ebsco.com/academic-libraries/products/ebsco-folio>), Google (<https://www.google.com>), and Google Scholar (<https://scholar.google.com/>) are web search engines interchangeably used to seek general sources and peer-reviewed scholarly literature.

Findings

Top Generative AI Tools Recommended

In response to the RQ1 previously presented, the following 25 generative AI tools are selected based on the latest reports for the generative AI tools applicable in academic learning environments (Adwani, 2025; Bradley, 2025; CogniPark, 2025; Lukan, 2025; Mojahar, 2025; Muchmore & Circelli, 2025). From the perspectives of academic librarians, these generative AI tools are recommended to promote student's experience, knowledge, and skills of using generative AI in their current academic learning environments and future career development beyond higher education:

Table 1*List of Generative AI Tools for College Students*

No.	Generative AI Tools	Applications	Notes
1.	Andi ai https://andisearch.com/	AI-powered search engine	Andi is an AI-powered search assistant delivering fast accurate answers.
2.	Blackbox ai https://www.blackbox.ai/	AI-powered code generator	Blackbox AI is highly appraised by users for transforming complicated enterprise software development.
3.	ChatGPT https://chatgpt.com/	Generative AI platform	ChatGPT is the world's first generative AI-powered platform to complete a wide range of tasks based on the prompts input by users.

4.	Claude https://claude.ai/	Generative AI platform	Compared to ChatGPT, Claude stands out for handling large documents, detailed writing, in-depth research, etc.
5.	Connected Papers https://www.connectedpapers.com/	AI-powered visual search tool	Connected Papers is an AI-powered search tool for researchers to graphically track scholarly papers via similarity metric.
6.	Consensus https://consensus.app/	AI-powered search engine	Consensus is an AI-powered search engine for seeking peer-reviewed scholarly papers.
7.	DeepSeek https://www.deepseek.com/en	Generative AI platform	As the world's first open-sourced generative AI chatbot, DeepSeek is widely used to solve complex tasks including content generation, data analysis, business consultation, code optimization, etc. via natural language processing (NLP).
8.	Elicit https://elicit.com/	AI-assisted research assistant	Elicit is an AI-powered assistant to help researchers optimize their research process, such as gathering papers, extracting insights, generating reports, etc.
9.	GitHub Copilot https://github.com/features/copilot	AI-powered coding assistant	GitHub Copilot is an AI-powered coding assistant to streamline professional coding development by using different programming languages.
10.	Google Gemini https://gemini.google.com/app	Generative AI platform	Google Gemini is a generative AI assistant designed to complete a wide range of tasks via its large language models (LLMs).
11.	Google Lens https://lens.google/	Generative AI assistant	Google Lense is an AI-powered assistant to identify information via images taken.
12.	Google NotebookLM https://notebooklm.google/	AI-powered note-taking assistant	Developed by Google, NotebookLM is the world's first AI-powered notebook, which can closely summarize the documents uploaded by users.
13.	Grammarly https://www.grammarly.com/	AI-powered writing assistant	Grammarly AI provides AI-powered writing assistance, including citation generation, grammar check, plagiarism checking, text generation, writing correction, etc., for users to write more effectively.
14.	Jasper https://www.jasper.ai/	AI-powered content generator	Jasper is an AI-powered content creation platform to generate academic papers, blog articles, books, YouTube videos, etc.
15.	Litmaps https://www.litmaps.com/	AI-powered literature review tool	Limaps is an AI-powered research tool to assist researchers to analyze, review, and track scholarly literature visually.
16.	Microsoft Copilot https://copilot.microsoft.com/	AI-powered assistant	Microsoft Copilot is an AI-powered assistant integrated within the Microsoft 365 ecosystem like Word, Outlook, and Excel for new content generation.
17.	NaturalReader https://www.naturalreaders.com/	AI-powered voice generator	NaturalReader is an AI-powered software to transform text to speech via natural-sounding voices.
18.	Perplexity https://www.perplexity.ai/	AI-powered search engine	Perplexity is an AI-powered search engine to search for scholarly resources.

19.	Quillbot https://quillbot.com/	AI-powered writing assistant	Quillbot is an AI-powered writing assistant for citation generation, essay check, grammar check, plagiarism check, writing assistance, etc.
20.	Research Rabbit https://www.researchrabbit.ai/	AI-powered tools for deep research	Research Rabbit is an AI-powered tool for scholarly information discovery.
21.	Scite https://scite.ai/	AI-powered Tools for Deep Research	Scite is an AI-powered search platform for researchers to search for scientific literature.
22.	Semantic Scholar https://www.semanticscholar.org/	AI-powered Tools for Deep Research	Semantic Scholar is a free AI-powered search engine for scholarly information.
23.	Synthesia https://www.synthesia.io/	AI-powered video generator	Synthesia is a free AI-powered platform to turn text into video.
24.	Teal https://www.tealhq.com/	AI-powered tool to build resumes	Teal is an AI-powered tool for users to optimize their career management, job search, resume builder, etc.
25.	Tutor ai https://tutorai.me/	AI-powered software for personalized learning	Tutor ai is an AI-powered tool offering one-to-one personalized online learning in many subjects.

Discussions

Academic Integrity

Debate continues over the impact of generative AI on academic integrity and student engagement in higher education. Among institutions of higher education in the United States, academic integrity remains a primary concern discussed among academic executives, faculty, librarians, scholars, and other professionals. Based on the scholarly literature reviewed for this study, the evolution of generative AI has consistently disrupted the principles of academic integrity and assessment in tertiary learning environments. Many researchers, such as (Gonsalves, 2025; Gruenhagen et al., 2024; Issa & Hall, 2024; Peterson, 2025; Petricini et al., 2025; Yusuf et al., 2024), warned that some college students do not comply with AI policies and regulations while using generative AI tools to complete their academic assignments, projects, and term papers. A key question is whether over-reliance on generative AI could erode students' critical thinking, decision making, and problem-solving competencies in higher education? Additional studies should be conducted to further explore the integration among generative AI, academic integrity, and student engagement in higher education.

AI Literacy vs. Generative AI Literacy

From academic librarians' perspectives, AI literacy refers to the ability to understand the general application, concept, components, and usage of AI, while generative AI literacy (Annapureddy et al., 2025; Chen et al., 2025; Jomezai et al., 2025) focuses on the skills to learn, evaluate, and use a variety of generative AI tools. Recent studies conducted by (Ali & Richardson, 2025; Chigwada, 2024; Ndungu, 2024; Ru & Tang, 2025; Zhang et al., 2025), suggest academic libraries are a practical sector for promoting both AI literacy and Generative AI literacy.

AI Literacy Frameworks

For institutions of higher education, establishing AI literacy frameworks, which is in response to the RQ2 previously presented, is urgent to meet the evolving needs for excellence in teaching, learning, and research based on their specific academic programs. Initially developed by Barnard College (<https://barnard.edu/>) in New York City, New York, United States, the Educause AI Literacy Framework (Hibbert et al., 2024) can serve as a template for higher education worldwide to promote AI literacy and generative AI literacy. To follow the guidance set by the University System of Georgia, Georgia Southern University is currently developing an institutional AI Guide to help faculty and student engage excellent in teaching, learning, and research.

Promote AI Literacy and Generative AI Literacy in Higher Education

Academic librarians play a pivotal role as teaching partners in promoting AI literacy and Generative AI literacy in service-oriented and student-centered learning environments (Chaudhuri & Terrones, 2025; Ndungu, 2024; Ru & Tang, 2025; Solomon et al., 2025; Willenborg & Withorn, 2025). Academic faculty and librarians can collaborate on strategic plans and syllabi that include joint academic publications, embedded onsite or online library instructions, and new AI-related courses, and outreach such as library guides, seminars, workshops, etc. to advance AI literacy and Generative AI literacy across academic programs at institutions of higher education.

Conclusion

The surge of generative AI is transforming current and future modes of organizing higher education (Hashmi & Bal, 2024; Klein, 2025; Linden et al., 2025; Maurya & DeDiego, 2025; Verboom et al., 2025; World Bank Group, 2025). This AI revolution epoch will shape students' future career development and lifelong learning beyond college and university. The continued evolution of generative AI will drive greater creativity and innovation for higher throughout the 21st century.

References

- Adwani, K. (2025, October 1). *19 Best AI tools for students in 2025 (mostly free)*.
<https://kripeshadwani.com/best-ai-tools-for-students/>
- Ali, M. Y., & Richardson, J. (2025). AI literacy guidelines and policies for academic libraries: A scoping review. *IFLA Journal*, 51(3), 588–599.
<https://doi.org/10.1177/03400352251321192>
- Aliyu, M. B. (2017). Efficiency of Boolean search strings for information retrieval. *American Journal of Engineering Research (AJER)*, 6(11), 216–222.
- An, Y., Yu, J. H., & James, S. (2025). Investigating the higher education institutions' guidelines and policies regarding the use of generative AI in teaching, learning, research, and administration. *International Journal of Educational Technology in Higher Education*, 22(1), 1–23. <https://doi.org/10.1186/s41239-025-00507-3>
- Annapureddy, R., Fornaroli, A., & Gatica-Perez, D. (2025). Generative AI Literacy: Twelve Defining Competencies. *Digital Government: Research & Practice*, 6(1), 1–21.
<https://doi.org/10.1145/3685680>
- Assaf, R., El-Qanni, A., Alsurakji, I. H., & Assad, M. (2024). The ChatGPT Dilemma: Opportunities vs. Risks in Engineering Education. *An-Najah University Journal for Research, B: Humanities*, 38(10), 1985–2002.
<https://doi.org/10.35552/0247.38.10.2285>
- Beer, S. (2025, August 6). *20 AI content creation tools every marketer needs in 2025*.
<https://www.clarity-ventures.com/artificial-intelligence-ecommerce/ai-content-generation-tools>
- Bodur, G., Cakir, H., Turan, S., Seren, A. K. H., & Goktas, P. (2025). Artificial intelligence in nursing practice: a qualitative study of nurses' perspectives on opportunities, challenges, and ethical implications. *BMC Nursing*, 24(1), 1–14.
<https://doi.org/10.1186/s12912-025-03775-6>
- Bradley, A. (2025, May 1). *5 Powerful AI tools you've probably never heard of*.
<https://www.pcmag.com/articles/5-powerful-ai-tools-youve-probably-never-heard-of#>
- Chaudhuri, J., & Terrones, L. (2025). Reshaping Academic Library Information Literacy Programs in the Advent of ChatGPT and Other Generative AI Technologies. *Internet Reference Services Quarterly*, 29(1), 1–25.
<https://doi.org/10.1080/10875301.2024.2400132>
- Chen, K., Tallant, A. C., & Selig, I. (2025). Exploring Generative AI Literacy in Higher Education: Student Adoption, Interaction, Evaluation and Ethical Perceptions. *Information and Learning Sciences*, 126(1–2), 132–148. <https://doi.org/10.1108/ILS-10-2023-0160>

- Chigwada, J. (2024). A proposed framework for a digital literacy course for artificial intelligence in academic libraries. *South African Journal of Libraries & Information Science*, 90(2), 1–8. <https://doi.org/10.7553/90-2-2388>
- CogniPark. (2025, March 8). *15 Best AI tutors for students & professionals*. <https://www.cognispark.ai/guide/best-ai-tutors/>
- Computer History Museum. (2001). *The 1956 workshop and its immediate consequences: The origins of artificial intelligence*. <https://computerhistory.org/events/1956-dartmouth-workshop-its-immediate/>
- Crompton, H., & Burke, D. (2025). *Artificial Intelligence Applications in Higher Education: Theories, Ethics, and Case Studies for Universities*. Routledge.
- Dreamhunter, J. (2024, July 2). *15 types of content you can generate with AI*. <https://www.godaddy.com/resources/skills/15-types-of-content-you-can-generate-with-ai>
- Duke Univ., D. N. C. for A. I. (1999). *The Fundamental Values of Academic Integrity: Honesty, Trust, Respect, Fairness, Responsibility*.
- Eaton, S. E. (2024). Decolonizing academic integrity: knowledge caretaking as ethical practice. *Assessment & Evaluation in Higher Education*, 49(7), 962–977. <https://doi.org/10.1080/02602938.2024.2312918>
- Gonsalves, C. (2025). Addressing student non-compliance in AI use declarations: implications for academic integrity and assessment in higher education. *Assessment & Evaluation in Higher Education*, 50(4), 592–606. <https://doi.org/10.1080/02602938.2024.2415654>
- Gruenhagen, J. H., Sinclair, P. M., Carroll, J.-A., Baker, P. R. A., Wilson, A., & Demant, D. (2024). The rapid rise of generative AI and its implications for academic integrity: Students' perceptions and use of chatbots for assistance with assessments. *Computers and Education: Artificial Intelligence*, 7. <https://doi.org/10.1016/j.caeai.2024.100273>
- Gwillym, N. (2024, March 1). *28 social media tools every content creator needs*. <https://digitalmarketinginstitute.com/blog/11-social-media-content-tools-every-content-creator-needs1>
- Hashmi, N., & Bal, A. S. (2024). Generative AI in higher education and beyond. *Business Horizons*, 67(5), 607–614. <https://doi.org/10.1016/j.bushor.2024.05.005>
- Hibbert, M., Altman, E., Shippen, T., & Wright, M. (2024, June 3). *A framework for AI literacy*. <https://er.educause.edu/articles/2024/6/a-framework-for-ai-literacy>
- Hill, C., & Hargis, J. (2025). An ethics module on academic integrity and generative AI. *New Directions for Teaching & Learning*, 2025(182), 41–50. <https://doi.org/10.1002/tl.20626>

- Huang, B. (2024, June 3). *11 best AI content writing tools (reviews included)*.
<https://www.clearscope.io/blog/best-ai-content-writing-tools>
- Iatrellis, O., Kosmopoulou, I., Samaras, N., & Kokkinos, K. (2025). Educators' Adoption and Perceptions of Generative AI Tools in Higher Education. *2025 6th International Conference of the Portuguese Society for Engineering Education (CISPEE), Portuguese Society for Engineering Education (CISPEE), 2025 6th International Conference of The*, 1–7. <https://doi.org/10.1109/CISPEE64787.2025.11124027>
- Issa, T., & Hall, M. (2024). A teamwork framework for preventing breaches of academic integrity and improving students' collaborative skills in the AI era. *Heliyon*, *10*(19).
<https://doi.org/10.1016/j.heliyon.2024.e38759>
- Jafray, A., & Vorstermans, J. (2025). Evolving intersections: AI, disability, and academic integrity in higher education. *New Directions for Teaching & Learning*, *2025*(182), 67–80. <https://doi.org/10.1002/tl.20629>
- Jin, Y., Yan, L., Echeverria, V., Gašević, D., & Martinez-Maldonado, R. (2025). Generative AI in higher education: A global perspective of institutional adoption policies and guidelines. *Computers and Education: Artificial Intelligence*, *8*.
<https://doi.org/10.1016/j.caeai.2024.100348>
- Jogezai, N. A., Baloch, F. A., Jaffar, M., & Khilji, G. (2025). Generative AI in Higher Education: University Faculty Perspectives on Opportunities and Challenges. *Turkish Online Journal of Distance Education*, *26*(3), 128–143.
- Kargar, M., An, A., Cercone, N., Godfrey, P., Szlichta, J., & Yu, X. (2015). Meaningful keyword search in relational databases with large and complex schema. *2015 IEEE 31st International Conference on Data Engineering, Data Engineering (ICDE), 2015 IEEE 31st International Conference On*, 411–422.
<https://doi.org/10.1109/ICDE.2015.7113302>
- Kituku, B., Araka, E., & Muuro, E. (2025). Integrating Generative Artificial Intelligence in Assessment Generation for Higher Education: Computer Science Use Case. *2025 IST-Africa Conference (IST-Africa), IST-Africa Conference (IST-Africa), 2025*, 1–10.
<https://doi.org/10.23919/IST-Africa67297.2025.11060533>
- Klein, E. (2025, January 15). *How Artificial Intelligence is transforming higher education*.
<https://ace.edu/blog/ai-in-higher-education/>
- Kofinas, A. K., Tsay, C. H., & Pike, D. (2025). The Impact of Generative AI on Academic Integrity of Authentic Assessments within a Higher Education Context. *British Journal of Educational Technology*, *56*(6), 2522–2549.
<https://doi.org/10.1111/bjet.13585>
- Laflamme, A. S., & Bruneault, F. (2025). Redefining Academic Integrity in the Age of Generative Artificial Intelligence: The Essential Contribution of Artificial Intelligence Ethics. *Journal of Scholarly Publishing*, *56*(2), 481–509. <https://doi.org/10.3138/jsp-2024-1125>

- Linden, T., Yuan, K., & Mendoza, A. (2025). The Potential and Challenges of Integrating Generative AI in Higher Education as Perceived by Teaching Staff: A Phenomenological Study. *Information Systems Education Journal*, 23(3), 16–30.
- Liu, F., Yu, C., Meng, W., & Chowdhury, A. (2006). Effective keyword search in relational databases. *Proceedings of the 2006 ACM SIGMOD International Conference on Management of Data*, 563–574. <https://doi.org/10.1145/1142473.1142536>
- Lukan, E. (2025, September 15). *The 45 best AI tools for 2025 (tried and tested)*. <https://www.synthesia.io/post/ai-tools>
- Macfarlane, B., Zhang, J., & Pun, A. (2014). Academic integrity: A review of the literature. *Studies in Higher Education*, 39(2), 339–358.
- Maurya, R. K., & DeDiego, A. C. (2025). Artificial intelligence integration in counsellor education and supervision: A roadmap for future directions and research inquiries. *Counselling & Psychotherapy Research*, 25(1), 1–5. <https://doi.org/10.1002/capr.12727>
- Michel-Villarreal, R., Vilalta-Perdomo, E., Salinas-Navarro, D. E., Thierry-Aguilera, R., & Gerardou, F. S. (2023). Challenges and opportunities of generative AI for higher education as explained by ChatGPT. *Education Sciences*, 13(9), 1–18. <https://doi.org/10.3390/educsci13090856>
- Mojahar, A. (2025, June 10). *6 Best AI tools for deep research*. <https://www.index.dev/blog/best-ai-tools-for-deep-research>
- Muchmore, M., & Circelli, R. (2025, September 17). *Tired of Google search? These are the best AI search engines*. <https://www.pcmag.com/picks/the-best-ai-search-engines#>
- Ndungu, M. W. (2024). Integrating basic artificial intelligence literacy into media and information literacy programs in higher education: A framework for librarians and educators. *Journal of Information Literacy*, 18(2), 1–18. <https://doi.org/10.11645/18.2.641>
- Peterson, S. (2025). Addressing student use of generative AI in schools and universities through academic integrity reporting. *Frontiers in Education*, 10. <https://doi.org/10.3389/educ.2025.1610836>
- Petricini, T., Zipf, S., & Wu, C. (2025). RESEARCH-AI: Communicating academic honesty: teacher messages and student perceptions about generative AI. *Frontiers in Communication*, 10. <https://doi.org/10.3389/fcomm.2025.1544430>
- Picalho, A. C., Lucas, E. R. O., & Amorim, I. S. (2022). Boolean logic applied to the construction of search expressions. *AtoZ*, 11. <https://doi.org/10.5380/atoz.v11i0.81838>
- Rai, M. E., Ngaw, M., & Nannas, N. J. (2025). Artificial Intelligence Performance in Introductory Biology: Passing Grades but Poor Performance at High Cognitive Complexity. *Education Sciences*, 15(10), 1400. <https://doi.org/10.3390/educsci15101400>

- Ru, K. C., & Tang, R. (2025). Promoting AI literacy through U.S. academic libraries: an analysis of LibGuides from ARL and Oberlin group libraries using the EDUCAUSE AI literacy framework. *Information Research*, 30, 848–865.
<https://doi.org/10.47989/ir30iConf47182>
- Scells, H., Zuccon, G., Koopman, B., & Clark, J. (2020). Automatic Boolean Query Formulation for Systematic Review Literature Search. *Proceedings of The Web Conference 2020*, 1071–1081. <https://doi.org/10.1145/3366423.3380185>
- Shahzad, M. F., Xu, S., & Asif, M. (2025). Factors affecting generative artificial intelligence, such as ChatGPT, use in higher education: An application of technology acceptance model. *British Educational Research Journal*, 51(2), 489–513.
<https://doi.org/10.1002/berj.4084>
- Solomon, D., Baydoun, S., & Samarakoon, T. (2025). Advancing AI Literacy: An Analysis of AI Library Research Guides at R1 Universities. *RUSQ: A Journal of Reference & User Experience*, 60(4), 194–203.
- Stryker, C., & Kavlakoglu, E. (n.d.). *What is AI?* <https://www.ibm.com/think/topics/artificial-intelligence>
- Stryker, C., & Scapicchio, M. (n.d.). *What is generative AI?*
<https://www.ibm.com/think/topics/generative-ai>
- University System of Georgia. (2025, May 5). *USG student guide to Generative AI literacy*.
https://www.downes.ca/files/docs/USG_Student_Guide_to_Generative_AI_Literacy.pdf
- Vallespir Adillón, M., Espiñeira Bellón, E. M., Muñoz Cantero, J. M., & Comas Forgas, R. L. (2024). Academic integrity in pre-service teacher education: a review of the literature. *Práxis Educativa*, N°. 19, 2024 (*Ejemplar Dedicado a: Publicação Continua*).
- Verboom, A. D. P. R., Pais, L., Zijlstra, F. R. H., Oswald, F. L., & Santos, N. R. dos. (2025). Perceptions of artificial intelligence in academic teaching and research: a qualitative study from AI experts and professors' perspectives. *International Journal of Educational Technology in Higher Education*, 22(1), 1–23.
<https://doi.org/10.1186/s41239-025-00546-w>
- Wikipedia. (2025, November 7). *Academic integrity*.
https://en.wikipedia.org/wiki/Academic_integrity
- Willenborg, A., & Withorn, T. (2025). Generative AI for College Students: A Collaboratively Developed Online Microcourse on GenAI in the College Classroom. *Communications in Information Literacy*, 19(1), 113–130.
<https://doi.org/10.15760/comminfolit.2025.19.1.7>
- World Bank Group. (2025, May 5). *Surging waves of artificial intelligence in higher education*. <https://www.worldbank.org/en/region/lac/publication/ia-educacion-superior-inteligencia-artificial>

- Yang, T., Cheon, J., Cho, M.-H., Huang, M., & Cusson, N. (2025). Undergraduate students' perspectives of generative AI ethics. *International Journal of Educational Technology in Higher Education*, 22(1), 1–22. <https://doi.org/10.1186/s41239-025-00533-1>
- Yusuf, A., Pervin, N., & Román-González, M. (2024). Generative AI and the future of higher education: a threat to academic integrity or reformation? Evidence from multicultural perspectives. *International Journal of Educational Technology in Higher Education*, 21(1), 1–29. <https://doi.org/10.1186/s41239-024-00453-6>
- Zhang, C., Wang, B., Ye, S., & Khamo. (2025). Proposing A Critical AI Literacy Framework for Academic Librarians. *International Journal of Librarianship*, 10(2). <https://doi.org/10.23974/ijol.2025.vol10.2.431>
- Zhou, B., & Pei, J. (2012). Aggregate keyword search on large relational databases. *Knowledge & Information Systems*, 30(2), 283–318. <https://doi.org/10.1007/s10115-011-0379-3>

Contact email: lilili@georgiasouthern.edu

Enhancing Pre-service Teachers' Learning of Water Quality and Microalgae Through the *Water Ranger* Educational Board Game

Phatcharida Inthama, Srinakharinwirot University, Thailand
Suwicha Wansudon, Srinakharinwirot University, Thailand
Panitta Wongphanich, Srinakharinwirot University, Thailand
Aungsiya Krataytong, Srinakharinwirot University, Thailand
Sugrid Sunthong, Srinakharinwirot University, Thailand

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

Active learning through educational board games can effectively enhance learners' interest and participation. This study aimed to (1) design and develop an educational board game to promote learning about water quality and microalgae classification for pre-service teachers, (2) examine the learning achievement of students who used the board game, and (3) investigate users' satisfaction with the board game *Water Ranger*. The participants were 18 pre-service science teachers majoring in Learning Management. Research instruments included a board game usage questionnaire, an achievement test, and a satisfaction survey. Data were analyzed using mean, standard deviation, and Dependent t-test. The results revealed that the *Water Ranger* board game was appropriate for promoting active learning related to water quality and microalgae classification. Students' post-test scores were significantly higher than pre-test scores at the .05 level. Overall satisfaction with the board game was at the highest level ($M = 4.57$). The study suggests further improvement of the gameplay to increase diversity and challenge to enhance learner engagement. Future implementation with larger groups is recommended to evaluate the board game's potential in promoting knowledge and fostering environmental awareness.

Keywords: board game, game-based learning, microalgae, pre-service teachers, water quality

iafor

The International Academic Forum
www.iafor.org

Introduction

Water quality is a critical environmental issue that affects ecosystems, public health, and sustainable development worldwide. Microalgae, as bioindicators of aquatic ecosystems, play a significant role in assessing water quality, yet understanding their classification and ecological functions remains challenging for many learners due to the abstract and complex nature of the content (Bellinger & Sigee, 2015). In science education, particularly at the pre-service teacher level, developing a deep conceptual understanding of environmental topics such as water quality and microalgae is essential, as future teachers must be equipped not only with content knowledge but also with the ability to convey these concepts effectively to their students (Darling-Hammond, 2006).

Traditional lecture-based instruction, while commonly used in higher education, has been increasingly criticized for its limited capacity to foster meaningful learning, critical thinking, and student engagement (Freeman et al., 2014). In response, active learning approaches have gained considerable attention as effective alternatives that promote learner participation, collaboration, and deeper understanding (Bonwell & Eison, 1991). Active learning encompasses a range of instructional strategies that require students to engage in higher-order thinking processes such as analysis, synthesis, and evaluation, rather than passively receiving information (Prince, 2004).

Among active learning approaches, game-based learning (GBL) has emerged as a particularly promising strategy in educational contexts. Educational games create immersive learning environments in which learners can experiment, make decisions, and receive immediate feedback, thereby supporting both cognitive and affective dimensions of learning (Mayer, 2019). A growing body of research has demonstrated the effectiveness of educational games in improving academic achievement and fostering positive attitudes toward learning across various subjects and age groups (Hattie, 2009; Tokac et al., 2019).

Among the various types of educational games, board games have attracted renewed interest as accessible, low-cost, and socially interactive tools for learning. Unlike digital games, board games facilitate face-to-face interaction, collaboration, and communication among players, making them particularly well-suited for classroom environments (Booth, 2015). Studies have shown that educational board games can effectively promote content knowledge, scientific reasoning, and environmental awareness in both formal and informal educational settings (Nebot et al., 2022; Santos et al., 2023).

Despite the growing evidence supporting the use of board games in science education, their application in pre-service teacher education remains underexplored, particularly in the context of environmental science topics such as water quality and microalgae. Pre-service teachers represent a unique and important target group, as their learning experiences during teacher preparation programs significantly shape their future pedagogical beliefs and classroom practices (Zeichner, 2010). Exposing pre-service teachers to innovative instructional tools not only enhances their subject matter knowledge but also broadens their repertoire of teaching strategies, which can ultimately benefit the students they will teach (Darling-Hammond & Bransford, 2005).

In response to this gap, the present study designed and developed an educational board game, named *Water Ranger*, specifically intended to support pre-service science teachers in learning about water quality parameters and microalgae classification. Grounded in the principles of

active learning and game-based learning, the *Water Ranger* board game aimed to provide an engaging, interactive, and educationally meaningful experience that could complement traditional instruction.

Research Objectives

1. To design and develop the *Water Ranger* educational board game to promote learning about water quality and microalgae classification among pre-service science teachers.
2. To examine the learning achievement of pre-service science teachers before and after using the *Water Ranger* board game.
3. To investigate the satisfaction of pre-service science teachers toward the *Water Ranger* educational board game.

Methodology

Research Paradigm

This study adopted a quantitative research paradigm with elements of educational research and development (R&D). The research design employed was a One-Group Pretest-Posttest Design, which is appropriate for examining changes in learning achievement before and after an instructional intervention within a single group of participants. The study also incorporated a descriptive research component to evaluate users' satisfaction. The conceptual framework was grounded in Active Learning Theory (Bonwell & Eison, 1991) and Game-Based Learning (Plass et al., 2015), which together informed the design, development, and evaluation of the *Water Ranger* educational board game.

Participants and Research Context

The study was conducted in the context of pre-service science teacher education at Srinakharinwirot University, Thailand. The participants were 18 pre-service science teachers enrolled in the Learning Management major, selected through purposive sampling. The course in which the board game was implemented focused on science learning management, where pre-service teachers are expected to develop both subject matter knowledge and pedagogical competencies related to environmental science, including water quality and microalgae classification.

Research Instruments

Three research instruments were used in this study. First, a board game usage questionnaire was employed to evaluate the appropriateness of the *Water Ranger* board game by content and pedagogical experts. Second, an achievement test covering water quality parameters and microalgae classification content was administered as both pre-test and post-test. Third, a five-point Likert scale satisfaction survey was used to assess participants' overall experience with board games across four dimensions: content and accuracy, perceived learning value, game design and components, and gameplay and mechanics. All instruments were validated for content validity prior to use.

Research Procedures

The research was conducted in three phases. In Phase 1 (Design and Development), the *Water Ranger* board game was developed through an iterative prototyping process. Content accuracy, instructional design, and gameplay mechanics were validated by a panel of content and pedagogical experts. In Phase 2 (Implementation), participants completed a pre-test, engaged in a facilitated *Water Ranger* gameplay session, and then completed a post-test. In Phase 3 (Data Analysis), data were analyzed using descriptive statistics (mean and standard deviation) and a Dependent t-test to compare pre-test and post-test scores. Satisfaction data were interpreted according to a five-point Likert scale classification: 4.51–5.00 = highest level, 3.51–4.50 = high level, 2.51–3.50 = moderate level, 1.51–2.50 = low level, and 1.00–1.50 = lowest level.

Results

Appropriateness of the *Water Ranger* Educational Board Game

The expert evaluation indicated that the *Water Ranger* board game was appropriate for promoting active learning related to water quality and microalgae classification. Content accuracy, instructional design, gameplay mechanics, and alignment with learning objectives were all rated positively. The game's design successfully reflected the principles of active learning, as the scientific content was embedded directly into the gameplay mechanics, enabling learners to encounter and apply content knowledge in a contextualized and interactive manner.

Learning Achievement

The learning achievement of the 18 participants was assessed using a pre-test and post-test. The results are presented in Table 1.

Table 1

Comparison of Pre-test and Post-test Scores of Pre-service Science Teachers (n = 18)

	Pre-test		Post-test		t
	M	SD	M	SD	
Pre-service Science Teachers (n = 18)	15.83	3.12	22.67	2.45	8.21*

Note. *p < .05

As shown in Table 1, the mean post-test score (M = 22.67, SD = 2.45) was significantly higher than the mean pre-test score (M = 15.83, SD = 3.12) at the .05 level of statistical significance (t = 8.21, p < .05). This finding confirmed Hypothesis 2. Furthermore, the decrease in standard deviation from pre-test (SD = 3.12) to post-test (SD = 2.45) suggests that the group became more consistent in their knowledge of water quality and microalgae classification following the gameplay session.

Satisfaction With the *Water Ranger* Board Game

Participants' satisfaction with the *Water Ranger* board game was assessed using a five-point Likert scale. The results are summarized in Table 2.

Table 2

Overall Satisfaction of Pre-service Science Teachers Toward the “Water Ranger” Board Game (n = 18)

Aspect	M	SD	Level
1. Content and accuracy	4.62	0.48	Highest
2. Perceived learning value	4.61	0.49	Highest
3. Game design and components	4.55	0.51	Highest
4. Gameplay and mechanics	4.50	0.54	Highest
Overall	4.57	0.50	Highest

As shown in Table 2, the overall satisfaction of participants was at the highest level ($M = 4.57$, $SD = 0.50$), confirming Hypothesis 3. All four aspects—content and accuracy ($M = 4.62$), perceived learning value ($M = 4.61$), game design and components ($M = 4.55$), and gameplay and mechanics ($M = 4.50$)—were rated at the highest level. These results suggest that participants viewed *Water Ranger* not only as a scientifically accurate and well-designed tool but also as a genuinely valuable learning experience.

Discussion

Appropriateness of the Board Game Design

The positive expert evaluation of the *Water Ranger* board game is consistent with the broader literature on educational game design, which emphasizes the importance of aligning game mechanics with clearly defined learning objectives (Plass et al., 2015). Effective educational board games translate complex academic content into accessible and engaging gameplay experiences without sacrificing instructional rigor (Booth, 2015). By embedding water quality parameters and microalgae classification into a structured game format, *Water Ranger* allowed learners to encounter scientific content in a contextualized and meaningful manner, which is considered essential for deep learning (Mayer, 2019). The game's design also reflects the active learning principles articulated by Bonwell and Eison (1991), who argue that effective instruction should engage learners in activities that require analysis and problem-solving rather than passive listening.

Learning Achievement

The significant improvement in post-test scores observed in this study is consistent with a substantial body of research demonstrating the effectiveness of game-based learning in enhancing academic achievement. Tokac et al. (2019), in a meta-analysis, reported that

educational games consistently produced positive effects on student achievement compared to traditional instruction. Hattie (2009) similarly identified interactive and engaging instructional strategies as among the most influential factors in learning outcomes. The improvement in this study can be attributed to three features of the *Water Ranger* board game: immediate feedback that allowed learners to correct misconceptions in real time, collaborative gameplay that encouraged peer discussion and explanation (Prince, 2004), and motivational appeal that increased learners' willingness to engage with challenging content (Plass et al., 2015). These findings extend the evidence base for game-based learning to the domain of pre-service environmental science teacher education.

Satisfaction With the Board Game

The highest level of overall satisfaction ($M = 4.57$) reflects the strong potential of *Water Ranger* as an engaging and effective instructional tool. High learner satisfaction with educational games is generally attributed to intrinsic motivational qualities, including challenge, curiosity, and social interaction (Malone & Lepper, 1987). These affective outcomes are recognized as important complements to cognitive gains, as positive emotional experiences during learning enhance long-term motivation and engagement (Plass et al., 2015). The satisfaction results are also consistent with findings from related studies on environment-themed educational board games (Nebot et al., 2022; Santos et al., 2023). Despite the overall high ratings, participants indicated room for improvement in gameplay diversity and challenge, aligning with recommendations that educational games should provide an appropriate and progressive level of challenge to sustain engagement (Csikszentmihalyi, 1990).

Implications and Limitations

The findings carry important implications for science education and pre-service teacher preparation. Educational board games can serve as effective and engaging supplements to traditional instruction, particularly for conceptually challenging and environmentally significant topics. Exposing pre-service teachers to game-based tools during training may expand their pedagogical repertoire and inspire them to incorporate innovative approaches in their own future classrooms (Darling-Hammond & Bransford, 2005; Zeichner, 2010).

However, limitations must be acknowledged. The small sample size of 18 participants limits generalizability. The One-Group Pretest-Posttest Design does not permit direct comparison with a control group, making it difficult to rule out alternative explanations for the observed gains. Future research should employ larger, more diverse samples, experimental designs with control groups, and longitudinal measures to more rigorously assess the long-term effectiveness of the *Water Ranger* board game.

Conclusion

This study designed, developed, and evaluated the *Water Ranger* educational board game as an active learning tool for pre-service science teachers' understanding of water quality and microalgae classification. Findings across three areas—game appropriateness, learning achievement, and user satisfaction—collectively demonstrate that the *Water Ranger* board game is an effective and engaging instructional resource.

The expert evaluation confirmed the game's appropriateness in terms of content accuracy, instructional design, and alignment with active learning principles. The statistically significant

improvement in post-test scores ($t = 8.21$, $p < .05$) provides empirical evidence of meaningful learning gains in water quality and microalgae knowledge. The highest-level overall satisfaction rating ($M = 4.57$) affirms that the game was not only effective but also well received as an engaging learning experience.

Future development of the *Water Ranger* board game should incorporate greater diversity and challenge in the gameplay to sustain learner motivation. Implementation with larger groups across varied educational contexts is recommended to evaluate scalability and broader impact. As environmental literacy becomes an increasingly urgent priority in science education, tools such as the *Water Ranger* board game offer valuable contributions to the preparation of knowledgeable, motivated, and pedagogically versatile science teachers.

Acknowledgements

The corresponding author would like to express their gratitude to the Faculty of Education, Srinakharinwirot University, Thailand, for their support and research funding.

References

- Bellinger, E. G., & Sigee, D. C. (2015). *Freshwater algae: Identification, enumeration and use as bioindicators* (2nd ed.). Wiley-Blackwell.
- Bonwell, C. C., & Eison, J. A. (1991). *Active learning: Creating excitement in the classroom* (ASHE-ERIC Higher Education Report No. 1). George Washington University.
- Booth, P. (2015). *Game play: Paratextuality in contemporary board games*. Bloomsbury Academic.
- Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. Harper & Row.
- Darling-Hammond, L. (2006). Constructing 21st-century teacher education. *Journal of Teacher Education*, 57(3), 300–314. <https://doi.org/10.1177/0022487105285962>
- Darling-Hammond, L., & Bransford, J. (Eds.). (2005). *Preparing teachers for a changing world: What teachers should learn and be able to do*. Jossey-Bass.
- Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences*, 111(23), 8410–8415. <https://doi.org/10.1073/pnas.1319030111>
- Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge.
- Malone, T. W., & Lepper, M. R. (1987). Making learning fun: A taxonomy of intrinsic motivations for learning. In R. E. Snow & M. J. Farr (Eds.), *Aptitude, learning, and instruction: Vol. 3. Cognitive and affective process analyses* (pp. 223–253). Lawrence Erlbaum Associates.
- Mayer, R. E. (2019). Computer games in education. *Annual Review of Psychology*, 70, 531–549. <https://doi.org/10.1146/annurev-psych-010418-102908>
- Nebot, G., Sánchez-Hernández, D., & López-García, Á. (2022). ‘The Game of the Sea’: An interdisciplinary educational board game on the marine environment and ocean awareness for primary and secondary school students. *Education Sciences*, 12(1), 57. <https://doi.org/10.3390/educsci12010057>
- Nganji, J. T., & Fossey, M. (2019). Board games for education: Opportunities and challenges. *International Journal of Information and Communication Technology Education*, 15(2), 1–13. <https://doi.org/10.4018/IJICTE.2019040101>
- Omidvar, I., & Burak, A. (2021). Games for sustainability and water management: A review. *Sustainability*, 13(4), 2036. <https://doi.org/10.3390/su13042036>
- Plass, J. L., Homer, B. D., & Kinzer, C. K. (2015). Foundations of game-based learning. *Educational Psychologist*, 50(4), 258–283. <https://doi.org/10.1080/00461520.2015.1122533>

- Prince, M. (2004). Does active learning work? A review of the research. *Journal of Engineering Education*, 93(3), 223–231. <https://doi.org/10.1002/j.2168-9830.2004.tb00809.x>
- Santos, R., Silva, H., & Duarte, J. (2023). Development and application of an environmental education board game for teaching integrated resource management of the water cycle. *Sustainability*, 14(24), 16562. <https://doi.org/10.3390/su142416562>
- Tokac, U., Novak, E., & Thompson, C. G. (2019). Effects of game-based learning on students' mathematics achievement: A meta-analysis. *Journal of Computer Assisted Learning*, 35(3), 407–420. <https://doi.org/10.1111/jcal.12347>
- Zeichner, K. (2010). Rethinking the connections between campus courses and field experiences in college- and university-based teacher education. *Journal of Teacher Education*, 61(1–2), 89–99. <https://doi.org/10.1177/0022487109347671>

Contact email: phatcharida@g.swu.ac.th

Exploring Student Engagement and Learning Outcomes in an Intensive Interdisciplinary Course on Biomedical Device Innovation: A Pilot Study in Taiwan

Wei-Hung Huang, National Taiwan Normal University, Taiwan

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This exploratory pilot study examined student engagement and learning outcomes in an intensive interdisciplinary summer course, *Biomedical Device Design and Development*. The original 18-week course was redesigned into a four-week modular program consisting of medical device regulations and risk management, artificial intelligence applications, biomedical sensor and microcontroller practice, and a Biodesign project emphasizing clinical needs. Thirteen students from diverse academic backgrounds at a research-oriented university in northern Taiwan participated. A convergent mixed-methods design was employed, integrating Likert-scale course evaluations (Cronbach's $\alpha = .89$) with weekly learning reflections analyzed using thematic analysis. Quantitative results indicated that overall satisfaction increased across the four weeks (Week 1: $M = 4.56$; Week 4: $M = 4.92$). The biomedical sensor practice ($M = 4.30$) and Biodesign project ($M = 4.15$) received the highest ratings. Qualitative findings showed that hands-on and project-based modules promoted strong cognitive and emotional engagement and supported interdisciplinary knowledge integration. In contrast, the regulations module ($M = 3.85$) posed challenges due to abstract content and varied prior knowledge. Although limited by the small sample size ($n = 13$), the findings provide preliminary evidence that intensive interdisciplinary programs can enhance engagement and interdisciplinary learning, while highlighting the importance of scaffolding, module integration, and practice-oriented design.

Keywords: interdisciplinary education, student engagement, learning outcomes, intensive course, curriculum innovation

iafor

The International Academic Forum
www.iafor.org

Introduction

Background

In recent years, significant advancements in medical technology—especially in the domains of artificial intelligence (AI), biosensing technologies, and intelligent medical devices—have catalyzed the convergence of medicine and engineering, emerging as a prominent global trend within both educational and industrial sectors (Topol, 2019). The educational focus on biomedical innovation extends beyond the mere transmission of technical knowledge; it seeks to develop students' capacities to synthesize clinical requirements, engineering methodologies, and practical contexts, thereby enhancing interdisciplinary creativity and problem-solving competencies (Zenios et al., 2010).

Conventional semester-based courses, which typically span 16 to 18 weeks, frequently lead to fragmented learning experiences due to prolonged intervals between instructional sessions (Kember, 2004). Conversely, intensive course formats provide concentrated learning environments that facilitate deeper immersion, sustained engagement, and more effective integration of knowledge (Scott, 2003). Consequently, intensive courses are increasingly favored, particularly within interdisciplinary and practice-oriented educational programs.

Research Motivation and Problems

Interdisciplinary courses necessitate that students engage with multiple disciplinary languages, conceptual frameworks, and methodologies, resulting in heightened cognitive demands relative to single-discipline instruction (Newell, 2001). Within the context of biomedical device education, learners are required to concurrently comprehend regulatory frameworks, engineering technologies, clinical requirements, and innovation processes. This multifaceted integration poses considerable challenges, particularly for students with heterogeneous academic backgrounds (Klein, 2010).

Although there is an increasing interest in interdisciplinary education, empirical investigations focusing on intensive interdisciplinary courses in biomedical innovation remain scarce. Prior research predominantly addresses engineering or clinical education in isolation, rather than exploring integrated curricula that encompass regulatory aspects, artificial intelligence, sensor technologies, and Biodesign within a unified course structure.

Course Context

The course examined in this study, *Biomedical Device Design and Development*, was redesigned from an 18-week semester course into a four-week intensive summer program. The curriculum was organized into four modules:

1. Regulations and risk management
2. AI applications in healthcare
3. Biomedical sensors and microcontrollers
4. Biodesign innovation project

The course aimed to develop students' abilities in integrating technology, clinical needs, and innovation practices, aligning with the global Biodesign education model (Yock et al., 2015).

Research Purposes

This study aims to: (1) examine students' overall learning experiences in an intensive interdisciplinary course; (2) compare learning experiences across different modules; (3) identify learning challenges and support needs; and (4) integrate quantitative and qualitative findings to inform course design improvements.

Research Questions

1. What are students' overall learning experiences and engagement levels?
2. Are there differences in learning outcomes across modules?
3. What challenges do students encounter?
4. How do qualitative reflections explain quantitative results?

Literature Review

Interdisciplinary Education in Higher Education

Interdisciplinary education emphasizes the integration of knowledge, skills, and perspectives from multiple disciplines, enabling learners to understand and solve complex problems from diverse viewpoints. This approach has gained increasing attention in recent years, particularly in response to the rapid convergence of healthcare, engineering, and information technology (Holley, 2017). Klein (2010) noted that interdisciplinary education not only promotes innovative thinking and knowledge transfer, but also enhances students' problem-solving abilities in authentic contexts. Related studies further indicate that interdisciplinary collaboration fosters critical thinking, creativity, and teamwork skills among students (Borrego & Newswander, 2010).

However, interdisciplinary courses often face practical challenges, including large differences in students' academic backgrounds, variations in disciplinary language, and difficulties in integrating knowledge structures (Mansilla & Duraishigh, 2007). These challenges are particularly pronounced in biomedical device, medical engineering, or technological innovation programs, where students must simultaneously understand clinical needs, engineering design, regulatory requirements, and clinical workflows. As a result, interdisciplinary learning may impose a higher cognitive load on students. Therefore, providing appropriate scaffolding, supporting knowledge bridging, and facilitating collaborative processes are critical issues in interdisciplinary course design.

Student Engagement and Learning Outcomes

Student engagement is a central concept in learning research and is widely regarded as a key predictor of learning outcomes and motivation (Trowler, 2010). Fredricks et al. (2004) categorized student engagement into three dimensions: (1) behavioral engagement—participation in class activities, task completion, and effort investment; (2) emotional engagement—interest, enjoyment, and affective connection; and (3) cognitive engagement—deep thinking, strategy use, and knowledge construction.

A substantial body of research suggests that higher levels of student engagement are associated with deeper understanding, increased learning motivation, and improved knowledge transfer (Kahu & Nelson, 2018). In interdisciplinary courses, student engagement

is particularly important, as such courses often involve complex content that requires higher levels of cognitive and emotional investment (Luo et al., 2020). Moreover, practice-oriented or problem-based learning approaches are known to enhance engagement. In engineering and healthcare technology education, hands-on activities, clinical cases, and project-based tasks have been shown to promote authentic learning engagement (Prince, 2004).

Intensive and Modular Programs

Intensive courses have gained prominence as a preferred instructional approach, distinguished by the delivery of concentrated learning within a condensed timeframe to facilitate immersive educational experiences. According to Scott (2003), such courses contribute to maintaining students' attention, fostering the integration of knowledge, and enhancing the overall focus of the curriculum. This instructional format is particularly well-suited to disciplines that demand practical application, technical skill development, or project-based learning, such as engineering, healthcare, and technology-related fields. Nonetheless, the accelerated nature of intensive courses can introduce challenges, including heightened course-related stress and increased cognitive load (Hyun et al., 2006). Moreover, in the absence of effective integrative activities, the learning process may become disjointed.

Modular course design segments complex interdisciplinary subject matter into thematic units, thereby enabling students to progressively build their understanding (Lockyer et al., 2017). However, in the absence of explicit linkages between these modules, learners may encounter difficulties in comprehending the overarching framework, which can lead to the acquisition of fragmented rather than cohesive knowledge (Brunton et al., 2018). Within the context of biomedical device innovation education, topics such as regulatory frameworks, artificial intelligence technologies, sensor design, and clinical needs assessment vary considerably in terms of learning pace, levels of abstraction, and requisite skill sets. Consequently, the integration of modules emerges as a pivotal element in the design of effective curricula.

Biomedical Device Innovation Education

Biomedical device innovation education emphasizes the integration of clinical needs, engineering design, and regulatory management. The Biodesign model, developed at Stanford University, proposes using clinical needs as the starting point for innovation. Through the Identify–Invent–Implement process, students are guided to conceptualize and design feasible medical technologies within authentic clinical contexts (Yock et al., 2015). This model integrates medicine, engineering, management, and regulatory considerations, making it a representative example of interdisciplinary education.

Hands-on learning with sensors and microcontrollers plays an important role in biomedical device education. Practical experience with physiological signal sensing—such as ECG, pulse oximetry, and pressure sensing—can enhance students' understanding of biological mechanisms, electronic circuits, and data processing, while also improving engineering practice skills. In addition, medical device design must comply with regulatory requirements and risk assessment procedures. Integrating regulatory education into the curriculum helps students understand commercialization feasibility and product lifecycle management (Shah et al., 2019). Overall, biomedical device innovation education is inherently interdisciplinary, encompassing technical, clinical, regulatory, and entrepreneurial competencies, which aligns closely with the course examined in this study.

Research Gap

A review of existing studies indicates that interdisciplinary education, student engagement, and intensive courses have each been discussed independently in higher education research. However, the intersection of these three areas remains underexplored in the following respects:

1. Limited research on interdisciplinary biomedical device innovation courses: Previous studies primarily focus on engineering or medical education separately, with few examining comprehensive course models integrating regulations, AI, sensors, and clinical needs.
2. Insufficient research on intensive summer programs in technology and medical innovation education: Existing studies on intensive courses are largely concentrated in management, language learning, or general education contexts.
3. Lack of mixed-methods studies integrating student engagement, learning reflection, and module comparison: This gap is particularly salient in small-class interdisciplinary courses with diverse student backgrounds, where mixed-methods approaches are needed to analyze engagement levels and sources of learning difficulty across modules (Kahu & Nelson, 2018).

Accordingly, the present study seeks to address these identified gaps through the utilization of a mixed-methods approach to examine students' engagement and learning experiences within an intensive interdisciplinary biomedical device course. Furthermore, the study aims to offer recommendations for course enhancement. This investigation is explicitly framed as a pilot exploratory study, with the primary objective of delivering a comprehensive contextual analysis rather than generating widely generalizable findings, thereby laying the groundwork for subsequent large-scale research endeavors.

Methodology

Research Design

This study adopted a convergent mixed-methods design, in which quantitative and qualitative data were collected concurrently and integrated during the analysis stage to provide a more comprehensive understanding of students' learning processes (Creswell & Plano Clark, 2018). Quantitative data were primarily derived from a five-point Likert-scale course evaluation questionnaire used to capture students' evaluations of different aspects of the course. Qualitative data were drawn from students' weekly learning reflections, which complemented the quantitative findings by revealing deeper learning experiences, difficulties, and suggestions that could not be fully captured through questionnaire responses alone.

The purposes of adopting a mixed-methods design were threefold: (1) to identify the overall tendencies of the entire student group through quantitative data; (2) to gain an in-depth understanding of the challenges and contextual features of interdisciplinary learning through qualitative data; and (3) to enhance the trustworthiness and validity of the findings through triangulation of multiple data sources. The data collection procedures were reviewed and approved by the institutional ethics committee. All students participated anonymously and signed informed consent forms prior to participation.

Research Setting and Course Structure

The course investigated was an intensive summer interdisciplinary course titled *Biomedical Device Design and Development*, offered at a research university in northern Taiwan. It was organized in a modular format consisting of four major modules:

1. Regulations and Risk Management: This module covered the regulatory frameworks of the TFDA and FDA, medical device classification, risk management procedures (ISO 14971), and product life-cycle evaluation. Instruction mainly involved lectures, case analysis, and risk assessment practice.
2. AI Applications in Healthcare: This module introduced fundamental concepts of machine learning, examples of medical image interpretation, and applications of large language models in healthcare. Learning activities included demonstrations, data-processing exercises, and scenario-based discussions.
3. Biomedical Sensors and Microcontrollers: This module covered physiological signal sensing principles, the MAX30102 pulse oximeter sensor, the AD8232 ECG sensor, and ESP32 microcontroller programming. It emphasized hands-on practice, group collaboration, and interdisciplinary problem solving.
4. Biodesign Innovation Project: Based on the Stanford Biodesign needs-driven model, this module guided students through the Identify–Invent–Implement process. Student groups were required to develop conceptual solutions addressing real clinical needs.

The four modules were designed in a progressive sequence. The regulations module provided the industrial and institutional foundation; the AI and sensors modules offered technical competencies; and the project module integrated the preceding knowledge to support innovation design. This structure provided an appropriate context for examining interdisciplinary learning, module transition, and student engagement.

Participants

A total of 13 students participated in this study. All were voluntary enrollees and ranged from undergraduate to graduate levels. Participants came from diverse disciplinary backgrounds, including biomedical engineering, electrical engineering, nursing, physical therapy, rehabilitation science, clinical medicine, occupational therapy, education, and business administration (EMBA). The sample included 7 male and 6 female students.

The diversity of participants' backgrounds made the course an important context for observing interdisciplinary learning processes, learning gaps, and collaborative interactions. It should be noted that this study was a single-class pilot study, and the sample size ($n = 13$) is consistent with the scale commonly seen in exploratory case study research (Miles et al., 2014). However, it is insufficient for statistical inference or representative generalization. This limitation is further discussed in Section 7.

Research Instruments and Data Collection

Data collection involved two main instruments administered at the end of each week to ensure timeliness and completeness.

Five-Point Likert-Scale Course Evaluation Questionnaire

The researchers developed a course evaluation questionnaire using a five-point Likert scale (1 = strongly disagree, 5 = strongly agree) comprising three dimensions and eight items in total:

- Dimension 1: Student Engagement (2 items). Example: “I actively participated in discussions and hands-on activities during the course.”
- Dimension 2: Learning Outcomes (3 items). Examples: “This course helped improve my understanding of biomedical sensing technologies.” “I am able to apply what I learned in this course to real-world problem solving.”
- Dimension 3: Course Structure and Organization (3 items). Examples: “The relationships among different modules were clear and easy to understand.” “The course schedule was appropriate for learning.”

The questionnaire was administered online via Google Forms after the final class session of each week, requiring approximately 5 to 10 minutes to complete. To ensure anonymity, no names or student identification numbers were collected. Two experts in biomedical education reviewed the questionnaire for content validity, and item wording was revised based on their feedback. A pilot test was conducted prior to formal implementation. The overall scale yielded a Cronbach's α of .89, with all subscale internal consistency coefficients above .80, indicating good reliability.

Weekly Learning Reflections

Qualitative data were derived from students' weekly learning reflections collected anonymously through Google Forms. A structured guiding framework required students to address four aspects: (1) What did I learn?; (2) What do I still find challenging?; (3) What feedback do I have for the instructor?; and (4) How did I engage with peers or hands-on activities?

Each reflection typically ranged from 150 to 400 words. Across the four weeks, a total of 49 reflections were collected (14 in Week 1, 12 in Week 2, 10 in Week 3, and 13 in Week 4). Responses were anonymized using codes such as S01_W1, representing the first student's reflection in Week 1.

Data Analysis

Quantitative Data Analysis

The quantitative data were analyzed using descriptive statistics, including the mean (M) and standard deviation (SD) for each item and dimension. Given the small sample size ($n = 13$), no inferential significance tests (e.g., t tests or ANOVA) were conducted. Instead, descriptive statistics were used to present overall trends and relative differences among modules, interpreted in conjunction with the qualitative findings. Analyses included: (1) week-by-week comparison of mean dimension scores; (2) module-level comparison of learning outcome items; and (3) examination of standard deviations to assess consistency of student ratings.

Qualitative Data Analysis: Thematic Analysis

The qualitative data were analyzed using the six-step thematic analysis approach proposed by Braun and Clarke (2006): (1) familiarization with the data; (2) open coding; (3) generating

initial themes; (4) reviewing themes; (5) defining and naming themes; and (6) producing the report. Original quotations were used as supporting evidence to ensure transparency and traceability of interpretation.

To enhance reliability, intercoder checking was conducted. A second researcher independently coded approximately 30% of the reflections (about 15 entries), and the level of agreement reached 84% (Cohen's $\kappa \approx .81$), indicating good coding reliability. Any discrepancies were resolved through discussion until consensus was achieved.

Integration of Quantitative and Qualitative Data: Triangulation

Quantitative and qualitative data were integrated through triangulation using three strategies: (1) explanatory integration—qualitative themes were used to explain reasons behind quantitative differences; (2) convergent validation—convergent patterns across data sources strengthened conclusions; and (3) exploration of divergence—inconsistencies between data sources were revisited and interpreted rather than dismissed. This integrative approach enhances the interpretive depth of findings in complex learning contexts (Creswell & Plano Clark, 2018).

Results

Quantitative Results: Overall Course Evaluation Trends

Students' overall evaluations demonstrated a consistent upward trend over the course of the four weeks, with mean scores increasing from 4.56 (SD = 0.31) in Week 1 to 4.92 (SD = 0.15) in Week 4. The reduction in standard deviations over time indicates that students' assessments became increasingly uniform as the course advanced. Furthermore, all dimension scores surpassed the threshold of 4.0, indicating a generally favorable learning experience.

In Week 4, the course integration dimension attained the highest mean rating ($M = 4.30$), reflecting an enhanced student appreciation of the overall course structure following the completion of the Biodesign project. Items pertaining to instructor–student interaction consistently garnered elevated ratings ($M \approx 4.6$ – 4.8), indicating that this aspect served as a significant positive influence throughout the duration of the course.

Regarding the comparison of individual modules, the Biomedical Sensors and Microcontrollers module ($M = 4.30$, $SD = 0.34$) and the Biodesign Project ($M = 4.15$, $SD = 0.38$) received the most favorable evaluations, suggesting that students particularly valued experiential learning and clinically focused, project-based activities. Conversely, the Regulations and Risk Management module obtained the lowest mean score ($M = 3.85$, $SD = 0.52$) and exhibited the greatest standard deviation, implying a wider range of student perceptions and indicating that this module posed more substantial learning challenges for certain participants.

Table 1*Module-Level Mean Scores and Standard Deviations for Learning Outcomes*

Module	Mean (M)	SD
Regulations and Risk Management	3.85	0.52
AI Applications	4.05	0.41
Biomedical Sensor Practice	4.3	0.34
Biodesign Project	4.15	0.38

Qualitative Results: Thematic Analysis

The thematic analysis generated four core themes, each supported by representative student quotations.

Theme 1: Hands-On Learning Promoted Strong Cognitive and Emotional Engagement

Practical engagement with the sensor module—encompassing activities such as MicroPython programming and the wiring and calibration of the MAX30102 pulse oximeter—emerged as the most commonly reported positive learning experience. For instance, student S07_W2 remarked, “The moment I completed soldering and observed my heartbeat displayed on the screen, I truly comprehended the essence of biomedical engineering.” Similarly, S03_W2 reflected, “Transitioning from unsuccessful wiring attempts to successfully detecting oxygen saturation was a frustrating yet significantly more meaningful experience than merely attending lectures.” This theme corresponds closely with the dimensions of cognitive and emotional engagement as articulated by Fredricks et al. (2004).

Theme 2: The Regulations Module Created Learning Barriers Due to Abstract Content and Lack of Context

Several students lacking regulatory backgrounds, such as those in nursing, physical therapy, and education, indicated that the regulations module was excessively abstract and insufficiently linked to clinical practice. For instance, student S11_W1 remarked, “The FDA classification system is complex. The explanation was clear, but I couldn't connect it to my clinical experience.” Similarly, student S02_W1 proposed, “Using real medical device failure cases to explain regulations would make the content easier to understand.” This qualitative theme aligns with the quantitative result showing that the regulations module received the lowest average rating ($M = 3.85$).

Theme 3: Expansion of Interdisciplinary Perspectives and Knowledge Integration

Throughout the progression of the course, especially during the Biodesign project, students demonstrated a growing awareness of the interrelationships among the various modules. For instance, student S05_W4 remarked, “When working on the need statement, I realized that the regulations, sensors, and AI we learned earlier were all helping us design better solutions.” Similarly, student S09_W4 noted, “This course made me think for the first time about how my medical background can integrate with engineering and business, instead of being separate fields.” These reflections underscore the integrative impact of the modular course design observed during the concluding phase.

Theme 4: Clear Demand for Instructional Support and Module Integration

Students proposed specific suggestions for course improvement in the following areas:

1. **Pre-course foundational support:** Some students lacked programming or electronics backgrounds and struggled initially. For example, S06_W2 noted, “Providing introductory MicroPython materials before class would reduce frustration.”
2. **Explicit module connections:** Students suggested that instructors clarify how each week's content connects with other modules.
3. **More industry-based examples:** Students requested additional real-world Taiwanese biomedical industry cases, including failure cases.
4. **Increased discussion time:** Students expressed a desire for more opportunities for group discussion and interdisciplinary interaction.

Discussion

The results indicate that an intensive interdisciplinary summer course can effectively enhance students' interdisciplinary perspectives and learning motivation, particularly within modules that integrate theoretical frameworks with practical application. This outcome corroborates Scott's (2003) assertion that intensive courses facilitate immersive learning experiences, as well as Prince's (2004) emphasis on the role of practice-oriented instruction in fostering student engagement.

Nonetheless, several challenges emerged. The Regulations and Risk Management module exhibited the lowest mean score alongside the highest standard deviation ($SD = 0.52$), reflecting considerable variability in student perceptions. This variability suggests that students from diverse disciplinary backgrounds engaged with the module in markedly different ways, supporting Klein's (2010) contention that learners from distinct disciplinary cultures interpret shared content divergently. Additionally, insufficient interconnections among modules impeded students' ability to synthesize knowledge across topics, despite their comprehension of individual modules. This finding aligns with Brunton et al.'s (2018) characterization of modular learning structures as prone to “knowledge accumulation without genuine integration.”

Qualitative data further revealed a pronounced student preference for case-based instruction and interactive discussions. The integration of industry-relevant examples and collaborative learning activities may enhance sustained motivation and facilitate the practical application of knowledge. The Biodesign project appeared to serve as a pivotal mechanism for knowledge integration during the course's final phase, indicating that project-based learning components should be expanded and potentially introduced earlier in future iterations of the course.

It is important to emphasize that the quantitative results represent descriptive trends rather than inferential statistics. Differences observed between module scores (e.g., Sensors module $M = 4.30$ versus Regulations module $M = 3.85$) should not be construed as statistically significant due to the limited sample size; rather, these findings should be regarded as exploratory and interpreted in conjunction with the qualitative data.

Conclusion

This pilot study provides several preliminary findings with implications for the design of future intensive interdisciplinary courses:

1. Intensive summer interdisciplinary courses can effectively enhance students' interdisciplinary perspectives and overall learning satisfaction, with satisfaction improving throughout the course (Week 1: $M = 4.56 \rightarrow$ Week 4: $M = 4.92$).
2. Modular course design supports knowledge construction, but explicit connections among modules are critical for promoting integrated learning outcomes.
3. Students face notable challenges related to foundational knowledge (e.g., programming and regulatory concepts) and abstract content, indicating the need for additional scaffolding.
4. Case-based instruction and group interaction are important strategies for maintaining student motivation and engagement.

Based on these findings, the following course design recommendations are proposed:

- Provide preparatory materials prior to the course (e.g., MicroPython introduction, overview of Taiwanese medical device regulations) to reduce differences in prior knowledge.
- Strengthen module connections through cross-module integration tasks, weekly bridging discussions, or explicit linking of technical knowledge within the Biodesign project.
- Introduce more real-world cases in the regulations module, including both successful and failed medical device examples, to contextualize abstract concepts.
- Design more structured group discussions and interdisciplinary collaboration activities to enhance behavioral and emotional engagement.

Limitations and Future Work

This study has several limitations that should be considered when interpreting the findings.

Small Sample Size and Lack of Statistical Inference

The principal limitation of this study is the limited sample size ($n = 13$), which precludes the application of inferential statistical methods such as ANOVA or correlation analyses. Consequently, all quantitative results should be regarded solely as descriptive, and it is not feasible to statistically assess differences across disciplinary backgrounds. To enable preliminary inferential analyses, future research should aim to increase the sample size to a minimum of 30 to 50 participants.

Single-Site Context and Limited External Validity

This investigation concentrated on a single course offered at a research university located in northern Taiwan. The course structure, instructional approach, and student demographics are highly specific to this particular context, thereby constraining the extent to which the findings can be generalized to other institutions or cultural settings. Subsequent studies could employ multi-site research designs to facilitate comparative analyses of courses across different universities or national contexts.

Cross-Sectional Design Without Long-Term Follow-Up

Data collection occurred throughout the duration of the four-week course; however, the study did not assess long-term learning outcomes, knowledge retention, or the persistence of interdisciplinary thinking. Subsequent research could incorporate follow-up assessments, such as surveys administered three months after course completion, or employ longitudinal methodologies to evaluate enduring effects.

Limitations of Self-Reported Data

Both the questionnaire responses and reflective accounts were self-reported, potentially introducing social desirability bias. To enhance the validity of future studies, it is recommended to integrate supplementary data sources, including classroom observations, performance evaluations (e.g., project grades), and interviews, in order to triangulate and corroborate the findings.

Potential Researcher Bias

The researchers' engagement in course-related activities may have introduced confirmation bias. While intercoder reliability was assessed, yielding an agreement rate of 84%, to address this concern, it is recommended that future research incorporate independent investigators in both data collection and analysis processes to improve objectivity.

Despite these limitations, this pilot study provides valuable exploratory insights and a detailed contextual description in an area with limited existing research. Future studies may expand sample sizes, conduct cross-institutional comparisons, incorporate control-group designs, and integrate additional learning outcome measures to further strengthen both theoretical and practical contributions to interdisciplinary course research.

References

- Borrego, M., & Newswander, L. K. (2010). Definitions of interdisciplinary research: Toward graduate-level interdisciplinary learning outcomes. *The Review of Higher Education*, 34(1), 61–84.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
- Brunton, J., Brown, M., Costello, E., & Farrell, O. (2018). Head start online: Flexibility, transitions and student success. *Educational Media International*, 55(4), 347–360.
- Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). Sage.
- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, 74(1), 59–109.
- Friedman, A. J., Cosby, R., Boyko, S., Hatton-Bauer, J., & Turnbull, G. (2011). Effective teaching strategies and methods of delivery for patient education: A systematic review and practice guideline recommendations. *Journal of Cancer Education*, 26(1), 12–21.
- Holley, K. A. (2017). Interdisciplinary curriculum and learning in higher education. *Oxford Research Encyclopedia of Education*. Oxford University Press.
- Hyun, E., Ediger, R., & Lee, D. (2006). Students' stress in practicum teaching. *Journal of Early Childhood Teacher Education*, 27(2), 171–184.
- Kahu, E. R., & Nelson, K. (2018). Student engagement in the educational interface: Understanding the mechanisms of student success. *Higher Education Research & Development*, 37(1), 58–71.
- Kember, D. (2004). Interpreting student workload and the factors which shape students' perceptions of their workload. *Studies in Higher Education*, 29(2), 165–184.
- Klein, J. T. (2010). *Creating interdisciplinary campus cultures*. Jossey-Bass.
- Lockyer, L., Heathcote, E., & Dawson, S. (2017). Informing pedagogical action: Aligning learning analytics with learning design. *American Behavioral Scientist*, 57(10), 1439–1459.
- Luo, N., Zhang, M., & Qi, D. (2020). Effects of different interactions on students' sense of community in e-learning environment. *Computers & Education*, 115, 153–160.
- Mansilla, V. B., & Duraisingh, E. D. (2007). Targeted assessment of students' interdisciplinary work. *The Journal of Higher Education*, 78(2), 215–237.
- Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). Sage.

- Newell, W. H. (2001). A theory of interdisciplinary studies. *Issues in Integrative Studies*, 19, 1–25.
- Prince, M. (2004). Does active learning work? A review of the research. *Journal of Engineering Education*, 93(3), 223–231.
- Scott, P. A. (2003). Attributes of high-quality intensive courses. *New Directions for Adult and Continuing Education*, 97, 29–38.
- Shah, S. G. S., Robinson, I., & Smith, S. (2019). How well is user involvement in health informatics research? A systematic review. *Health Informatics Journal*, 25(4), 1738–1770.
- Topol, E. J. (2019). High-performance medicine: The convergence of human and artificial intelligence. *Nature Medicine*, 25(1), 44–56.
- Trowler, V. (2010). *Student engagement literature review*. The Higher Education Academy.
- Yock, P. G., Brinton, T. J., & Zenios, S. A. (2015). *Biodesign: The process of innovating medical technologies* (2nd ed.). Cambridge University Press.
- Zenios, S., Makower, J., & Yock, P. (2010). *Biodesign: The process of innovating medical technologies*. Cambridge University Press.

Contact email: onelfisher@gmail.com

Private Preschool Teachers' Preparedness in Implementing the Kurikulum Prasekolah 2026 (KP2026) in Malaysia

Menn Sze Chua, HELP University, Malaysia

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

Kurikulum Prasekolah 2026 (KP2026) will replace the Kurikulum Standard Prasekolah Kebangsaan (KSPK) Semakan 2017 as Malaysia's new preschool curriculum. KP2026 marks the first of the six stages of the Ministry of Education's focus on Kurikulum Persekolahan 2027, with the preschool implementation in January 2026, followed by Primary 1 and Secondary 1 students in 2027. While government teachers were trained months before the official implementation, private teachers and operators must finance their own training, which was only made available towards the end of 2025. This study investigates the private preschool teachers' preparedness in implementing the KP2026, focusing on three key areas: their concerns in the implementation of KP2026, how years of teaching experience influence these concerns, and the measures taken in preparation for the implementation of KP2026. Guided by Bandura's (1997) Self-Efficacy Theory and Fuller's (1969) Concerns-Based Model, this study employed a qualitative design. 6 private school teachers were interviewed, and the data collected were analysed via content analysis and categorised into themes to answer the research questions. Findings indicate that teachers, despite their years of teaching experience, express concerns for children's learning outcomes and the adequacy of resources and guidance for the effective teaching and learning process. The common theme highlighted confusion and anxiety about implementing KP2026.

Keywords: preschool, teacher preparedness, Kurikulum Prasekolah 2026, Concerns-Based Model, self-efficacy

iafor

The International Academic Forum
www.iafor.org

Introduction

Malaysian children aged four to six attend preschool, also known as Tadika (Taman Didikan Kanak-kanak), where they receive pre-primary education before entering formal schooling in Primary 1.

Malaysia's national preschool curriculum is developed by the Curriculum Development Division of the Ministry of Education, with the mission of developing an integrated and useful school curriculum for the full development of individual potential and to meet the nation's needs (Kementerian Pendidikan Malaysia [Ministry of Education Malaysia], n.d.-a). As part of this mission, Kurikulum Prasekolah 2026 [Preschool Curriculum 2026] will replace the National Preschool Standard-based Curriculum 2017 (KPSK 2017) as Malaysia's new preschool curriculum.

KP2026 is the first of the six stages of the Ministry of Education's focus on the 2027 School Curriculum, with the preschool implementation in January 2026, followed by Primary 1 and Secondary 1 students in 2027 (Aeria, 2023; Bernama, 2023; Kementerian Pendidikan Malaysia [Ministry of Education Malaysia], n.d.-b).

While government teachers were trained months before the official implementation, as early as July 2025 (Bahagian Pembangunan Kurikulum [Curriculum Development Division], 2025). However, private teachers and operators must finance their own training, which was only made available towards the end of 2025 (ECCE Council, 2025). As such, the research questions for this study are as follows:

1. What are the private preschool teachers' concerns in implementing KP2026?
2. How do years of teaching experience influence these concerns?
3. What are the measures taken by private preschool teachers in preparing for the implementation of KP2026?

Underpinning Theory

Concerns-Based Model

Fuller's (1979) model investigates the developing concerns of teachers as they grow and gain experience. It was concluded that teachers in the Early Teaching Phase tend to be concerned about themselves and they are trying to discover the parameters of the school situation. For instance, how adequate are they in terms of content, class control, self-adequacy, as well as evaluation of supervisors and students. On the other hand, teachers in the Late Teaching Phase tend to be concerned with the students. To them, when their students gain or learn, that is their own gain as well. They want to learn about their students' capacities and work on how to help them improve. They are still self-evaluating, but in terms of students' gain or learning outcomes. The theory supports the first two research questions, to explore whether the years of teaching experience influence their concerns about implementing the KP2026.

Self-Efficacy Theory

According to Bandura (1977), self-efficacy is one's belief in one's ability to complete a task or achieve a goal successfully. There are four different sources of self-efficacy: experience (successful experience from the past), vicarious experience (live modelling or watching others perform a task successfully), verbal persuasion (positive feedback from others on

one's ability to succeed) and physiological and emotional arousal (how one's feeling can affect their confidence and perceived self-efficacy). An individual with high self-efficacy tends to feel more positive and excited over the change, however, one with low self-efficacy may feel more negative and anxious over the transition. The theory provides an interesting perspective on how private preschool teachers' perceptions of their capabilities may influence their concerns and responses to the implementation of KP2026.

Methodology

Research Design

A qualitative research method was employed, as it provides a rich and intricate understanding of individuals' meanings, actions, attitudes, intentions, and behaviours in the study (Gonzales et al., 2008 as cited in Cohen et al., 2018). This approach is appropriate as the study aims to explore private preschool teachers' concerns regarding the implementation of KP2026, whether years of teaching experience influence these concerns, and the measures taken to prepare for its implementation of KP2026.

Participants and Sampling

Purposive sampling was chosen because it allows researchers to select participants based on specific characteristics that meet the study's aims (Cohen et al., 2018). In this study, six participants were recruited based on the following criteria: they were currently teaching children between the ages of four and six in private preschools in Malaysia, were aware of KP2026, and had not yet attended training related to the implementation.

Data Collection and Analysis

Interviews made a significant contribution to this study as it collected information that directly supported the aim of the study (Cohen et al., 2018). It also allows participants to share perspectives and motivations behind their practice. This approach provides participants with a platform to share underlying issues. A standardised open-ended interview was conducted with the participants, everyone was asked the same exact questions in the same exact order, which allows for more consistent responses (Patton, 1980 as cited in Cohen et al., 2018). Each participant's consent was obtained prior to the interview session, and the purpose of the interview, how the data were being stored and utilised were also disclosed (Mukherji & Albion, 2018). Their privacy was protected through the promise of confidentiality, where their identity is unidentifiable and not traceable (Cohen et al., 2018). Hence, only pseudonyms were mentioned, namely CW, WK, LY, VS, JY and MS. Content analysis was employed in this study to analyse the data collected from the interviews and transcripts (Cohen et al., 2018).

Findings and Discussion

Concerns About Implementing KP2026

The participants appear to be confused and uncertain due to limited information and late training opportunities. Their thoughts and feelings about the KP2026 are on a spectrum, with a majority of them on the confused, uncertain and showing hints of anxiety. CW was "speechless... nobody from HQ told us", LY stated that it was "so sudden... and then you see

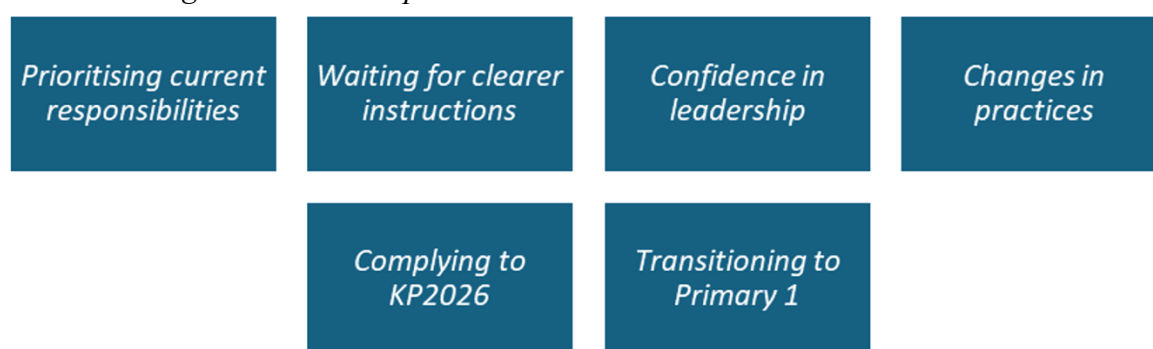
you have to implement a new curriculum... (a) few months before we enter a new year. So how?"

Being “lost” and “blur” was a recurring subtheme. WK and VS both shared that they were “very lost and very blur” because “nothing (news) came to us” and they “don’t know what to expect” as they do not know “what changes they’re going to bring that is going to affect us.” MS, however, is neutral as the new curriculum does not affect her “day to day.” On the other hand, JY and LY have a more positive outlook. JY is happy because special needs are included in the new changes, and LY’s excitement stems from her curiosity about what the changes are.

Several themes appeared from their concerns.

Figure 1

Themes Emerged From Participants’ Concerns



LY and WK were concerned about prioritising their current responsibilities as they are trying to “settle curriculum for the year first.” WK’s preschool just switched owners, from Montessori based to Mandarin academic based. To her, it is “already like a 360 degree change... suddenly... they say about this (KP2026) curriculum, I’m like whatever... this (current one) I (am) also not settled yet.” VS is waiting for clearer instructions from the ministry so that she can “make a decision and go on from there.”

Some participants have confidence in their leadership. MS mentioned that “they’re very experienced, so they know how to implement it quite well.” LY also mentioned that “My boss attended a training for the principal only, right after they announced the KP2026,” which convinced her principal to bring them along for a training. She appears confident to wait for her principal’s decision.

JY, on the other hand, is worried about the change in practices, “there might be some teachers (and their) way of teaching. They may need to change to adjust to the new curriculum.” She was speaking from her experience of attending a professional course with her colleagues to learn about the Finnish Early Education Curriculum. She is open to change and willing to adapt but is more worried about her colleagues. She is also worried about complying with KP2026, she stated,

How do we be very sure that we are actually implementing exactly the same curriculum as KP2026 is ... because it's like we don't know...how much are they changing and how much we need to adjust on our own school curriculum (to match) with KP2026.

Transition to Primary seems to be a concern for CW, she perceives that the current KSPK 2017 is “too easy for them.” Her school bought extra workbooks to supplement. Now that there is a change, she hopes the “new curriculum can help them do better when they go to big school in Primary 1.”

Teachers' Confidence Level of the Transition to KP2026

The participants appeared confident of what is expected of them for the transition, but it comes with conditions, categorised into three key areas:

Current Practices in the Preschool

CW and MS indicated that their confidence stems from their preschool's current practices. For instance, CW noted that “we (are) already doing extra homework for children (to) get ready for Primary 1. This shouldn't be so difficult for us.” Confidence is also drawn from practices of the school's management,

I wouldn't say I'm so confident myself. I think right now I'm very confident in the principals. I'm very confident in the team. I know it will be an adjustment, of course. I don't think that the principals will make crazy changes in such a short time, (I'm) expecting to just roll with it.

This suggests that for her, confidence is filtered through her trust in school-level management to facilitate a smooth transition.

Qualifications of Teachers

WK highlighted that she is confident despite having concerns because she believes she is “well trained” by her undergraduate lecturers. She thinks that “university really helps you get ready... thesis writing also, after you can go (thesis writing, you can) through any of the challenge.” To WK, she credited the resilience she gained from her undergraduate thesis writing to her ability to tackle new challenges.

Need for More Training and Guidance

The findings indicate that without formal workshops, the participants remain in a state of uncertainty. WK admitted that KP2026 is “doable,” provided there is guidance, “You let me attend the course, then I would know what to do.” Because workshops are not offered yet, she thinks “of course, I would be blurred, confused.” This sentiment was echoed by JY as well, she believes that she “needs more training, guidance and sharing among the teachers to be more confident in implementing effectively.”

Aside from the conditions, the data also highlighted the psychological and strategic approaches the participants adopted toward KP2026. The participants perceive the transition as an intrinsic opportunity for professional evolution, rather than an external burden. “That's why I don't feel like it's a challenge,” WK reframed her mindset. She stated that the new curriculum implementation “really is a nice way... You challenge yourself, you learn new things, this is called upskilling.”

Years of Teaching Experience Plays an Influence on Teachers' Concerns

The participants are private preschool teachers with 6 to 13 years of teaching experience. When mapped against Fuller's (1969) Concerns-Based Model, all of them appear to not be in the "Early Teaching Phase," where they have concerns about themselves or their ability to adapt and transition to this new KP2026 curriculum on short notice. Instead, they seem to be in the "Late Teaching Phase," where they are more concerned about their children's (students') learning outcomes. VS (11 years), JY (5 years), and MS (6 years) expressed similar views: they are "used to the changes" happening in their preschools and throughout their experiences working in different types of preschools and their practices. They noted that with experience comes an understanding of children's behaviours, differentiation of lessons to meet individual learning needs, assessment of children's learning outcomes, and, most importantly, seeking support from colleagues when they are struggling.

The findings suggest that the teachers' experience significantly influences their concerns about implementing KP2026, especially their confidence in adapting to the change. However, experience alone did not determine their preparedness, as mindset, personality, and management support also played important roles. They all displayed consistent willingness to adapt. CW (13 years), the most senior participant, maintained a rather stoic and adaptive mindset, she said, "whatever comes, just come." MS (6 years), on the other hand, stated that "I've already acknowledged that change is going to happen either way, whether or not you're ready. So there's no point in stressing about it. We just go with it." This indicates that seasoned teachers have a "positive outlook" (as noted by VS, 11 years) on the transition.

The teachers' preparedness for KP2026 can be further understood through Bandura's (1977) Sources of Self-Efficacy. In terms of experience, the participants' years of teaching experience helped them gain confidence. As years go by, they are used to the changes in the preschool, especially in children's development, behaviours, learning styles, as well as their own teaching pedagogy and methodology. Next, vicarious experiences were gained by modelling their colleagues' successful experiences. JY witnessed and experienced first-hand, adapting activities from an American curriculum to meet the Malaysian context, as well as the current KSPK 2017 curriculum. This helps her perception that transitioning to KP2026 is not a big concern. Verbal persuasion from colleagues played a big role. MS shared that she enjoyed the camaraderie at her preschool. She stated, "That's the good thing about having a good management team. If you're struggling, you can always be like, hey, you know, ... I'm having kind of a tough time ... and it opens up a discussion with the whole team." The last source is physiological and emotional arousal, the responses ranged from "anxiety and confusion" (low efficacy) to "excitement and curiosity" (high efficacy). LY expressed curiosity about the changes, indicating a positive emotional state conducive to learning.

Measures Taken in Preparation for the Implementation

Attending formal training or workshops was acknowledged by participants as a necessary and non-negotiable step in preparation for the implementation of KP2026. Beyond formal channels, collaboration amongst staff members in the preschool was also essential. JY stated that it should be done to ensure that classroom activities are "aligned with KP2026." She further underlined that constant communication with colleagues is crucial to ensure expectations and outcomes align with the initial plan and do not deviate from it. MS emphasised the necessity of discussion to ensure that changes are integrated into the school and align with current practices, without "shocking" teachers and students.

Some of the participants adopted a wait-and-see approach in preparation for the transition. LY, for instance, is relying entirely on school leadership, stating that everything is “based on the boss (principal)” and that her principal “settled everything in school from 0–100,” therefore, they just follow their principal’s instructions and guidelines. Participants also relied on book suppliers to provide materials aligned with the “government standards” of KP2026. CW and VS were waiting for “reputed book suppliers” so that they could “buy good books.”

Spectrum of Teacher Preparedness

The findings show that teachers’ preparedness exists on a continuum, broadly categorised into not prepared, neutral, and prepared. VS and MS expressed that they were not prepared for the transition. “Just waiting for the books to come and hoping that the seller will give me some direction,” stated VS. MS perceived that how can they be expected to plan and implement with so little information made known about the curriculum.

One participant demonstrated a neutral stance. JY thought the curriculum change was manageable, but she needed more discussions to feel more confident in implementing KP2026.

In contrast, some participants reported feeling prepared for KP2026. They attributed their readiness to prior training (resilience from undergraduate studies), confidence in training and workshops available prior to the 2026 academic school year, and their mindset of “always ready.”

Overall, the findings indicate that participants used a variety of strategies to prepare for the transition to KP2026, including attending training and workshops, discussing with colleagues, and seeking advice from school management. However, some participants also adopted a wait-and-see approach, depending on principals or book vendors for additional guidance and instructional materials.

Conclusion

The current study investigated Malaysian private preschool teachers’ preparedness for implementing the Kurikulum Prasekolah 2026 (KP2026). The findings revealed that limited information and delayed training opportunities for KP2026 left many of them confused, uncertain, and anxious. Despite these concerns, teachers appeared to have moderate confidence in adapting to the new curriculum, supported by their years of teaching experience and professional mindset.

The findings suggest that teachers’ preparedness was influenced not only by experience but also by management support, collaboration with colleagues, and access to training resources. Many private preschool teachers expressed willingness to adapt to curriculum changes, however, their preparedness was shaped by access to training, institutional guidance, and professional collaboration.

These results can be explained by Bandura’s (1977) Self-Efficacy Theory, which proposes that teachers’ confidence in implementing a new curriculum is influenced by prior experience of success, vicarious experience, support from colleagues, and emotional state, all of which affect their confidence and perceived self-efficacy. Moreover, Fuller’s (1969) Concerns-

Based Model is also reflected in the results, as teachers in the Late Teaching Phase expressed concerns related to actual implementation of the curriculum and its possible effects on children's learning.

The study's overall findings highlight the significance of strengthening private preschool teachers' support systems and providing earlier training opportunities to further enhance teachers' readiness and facilitate smoother implementation of KP2026 in private preschool settings.

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

The author declares that Grammarly, an AI-assisted writing software, was used in proofreading and refining the language used in the manuscript. The usage was limited to correcting grammatical and spelling errors and rephrasing statements for accuracy and clarity. The author further declares that, apart from Grammarly, no other AI or AI-assisted technologies have been used to generate content in writing the manuscript. The ideas, design, procedures, findings, analyses, and discussion are originally written and derived from careful and systematic conduct of the research.

References

- Aeria, S. (2023, December 24). *Revamping school learning*. The Star.
<https://www.thestar.com.my/news/education/2023/12/24/revamping-school-learning>
- Bahagian Pembangunan Kurikulum [Curriculum Development Division]. (2025, July 28). *Bengkel Penataran Kurikulum Prasekolah 2026 Zon Selatan: Bermula 21 hingga 24 Julai 2025, Bengkel Kerja Penataran Kurikulum Prasekolah 2026 berjaya* [Southern Zone Kurikulum Prasekolah 2026 Dissemination Workshop: From 21 to 24 July 2025, the Kurikulum Prasekolah 2026 Dissemination Workshop was successfully conducted.] [Status update]. Facebook.
https://www.facebook.com/story.php?story_fbid=1059303353058421&id=100069362972851&rdid=cyGQx0KyazrmQjrx#
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioural change. *Psychological Review*, 84(2), 191–215. <https://doi.org/10.1037/0033-295X.84.2.191>
- Bernama. (2023, December 6). *Ministry adopting fresh approach for 2027 school curriculum*. <https://bernama.com/en/news.php?id=2251743>
- Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in Education*. (8th ed). Routledge. <https://doi.org/10.4324/9781315456539>
- ECCE Council. (2025, October 13). *REGISTRATION OPEN! KP2026 MASTER TRAINER PROGRAMME Organised by ECCE Council in collaboration with OUM & BPK, KPM*. Date: [Status update]. Facebook.
<https://www.facebook.com/eccecouncil/posts/pfbid02RGvcVN2vfNnpKWtkNSAffpuzYWFZLtZ5qW7EuXFEzoApE4Gov2TiGgVC8MF7fsXNl?rdid=nRxBK8rhrJKsSBYi#>
- Fuller, F. F. (1969). Concerns of teachers: A developmental conceptualization. *American Educational Research Journal*, 6(2), 207–226. <https://doi.org/10.2307/1161894>
- Kementerian Pendidikan Malaysia [Ministry of Education Malaysia]. (2025). *Kurikulum Prasekolah 2026: Dokumen Kurikulum Prasekolah* [Preschool Curriculum 2026: Preschool Curriculum Document]. Bahagian Pembangunan Kurikulum [Curriculum Development Division].
- Kementerian Pendidikan Malaysia [Ministry of Education Malaysia]. (n.d.-a). *Curriculum Development Division*. <https://www.moe.gov.my/bahagian-pembangunan-kurikulum>
- Kementerian Pendidikan Malaysia [Ministry of Education Malaysia]. (n.d.-b). *Kurikulum Persekolahan 2027* [School Curriculum 2027] [Brochure].
https://www.moe.gov.my/storage/files/shares/images/KPM/UKK/2023/12_Dis/Kurikulum%20Persekolahan%202027%20Terkini.pdf?t=1704163931
- Mukherji, P., & Albon, D. (2018). *Research methods in early childhood: An introductory guide* (3rd ed.). SAGE.

Contact email: mennsze.c@help.edu.my

Designing HyFlex Learning for the “RU for All” Learning Center

Chuthaphon Masantiah, Ramkhamhaeng University, Thailand
Manika Wisessathorn, Ramkhamhaeng University, Thailand
Kritchaya Poompin, Ramkhamhaeng University, Thailand
Wanatphong Benjaphong, Ramkhamhaeng University, Thailand

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This study aimed (1) to assess the needs of the “RU for All” Learning Center and (2) to design a HyFlex Learning model for the “RU for All” Learning Center, aligned with the identified needs. The participants included 279 stakeholders: administrators, faculty members, staff, teachers, students from affiliated schools, and community members. Data were collected using a dual-response format needs assessment questionnaire. The Priority Needs Index ($PNI_{modified}$) was used to analyze and rank the needs. Additionally, 40 participants – teachers, staff, and community representatives in Bangkok – evaluated the quality of the Learning Center. Evaluation data were analyzed using descriptive statistics, specifically the mean and standard deviation. The findings showed that the top-ranked need was “promoting self-directed learning through online platforms” ($PNI_{modified} = 0.854$). In response, the “RU for All” Learning Center was developed as a HyFlex Learning model incorporating three instructional modalities: Face-to-Face (F2F) Live, Online Livestream (OL), and Online Asynchronous (OA). Evaluation results indicated that the training courses achieved the highest quality level ($M = 4.81$, $SD = 0.32$), demonstrating high perceived quality and feasibility of the HyFlex Learning approach for promoting sustainable community learning.

Keywords: hyflex learning, learning center, needs assessment

iafor

The International Academic Forum
www.iafor.org

Introduction

Lifelong learning has been widely recognized as a fundamental mechanism for human resource development throughout life and as a cornerstone of sustainable social development. This principle aligns with United Nations Sustainable Development Goal 4 (SDG 4), which emphasizes inclusive, equitable, and quality education, as well as the promotion of lifelong learning opportunities for all. Despite global progress in expanding educational access, challenges persist regarding learning quality, educational inequality, and equitable access to learning resources, especially among marginalized groups and socioeconomically diverse urban communities.

Ramkhamhaeng University, following the “open admission” philosophy, has significantly expanded educational opportunities and reduced inequality. Consistent with its mission to promote social justice and sustainable community development, the Faculty of Education has enhanced its academic service initiatives to meet community needs. A needs survey in the Thepleela community in Bangkok identified demands for career-related skills, recreational activities, and positive youth engagement to improve quality of life and prevent social problems.

In response, the “RU for All” Learning Center was established using the HyFlex Learning framework proposed by the Columbia Center for Teaching and Learning (2020). This model combines hybrid and flexible learning modalities, enabling learners to choose face-to-face synchronous, online synchronous, or asynchronous participation without compromising learning quality. Because it can overcome constraints of time, location, and access, HyFlex Learning is especially suitable for lifelong and community-based education.

Therefore, this study uses an evidence-based design approach to develop the “RU for All” Learning Center, aligning it with stakeholder needs. By integrating lifelong learning principles, educational equity, and HyFlex flexibility, the research aims to establish a sustainable model of academic engagement that contributes to community empowerment and long-term social development in Thailand.

Literature Review

This study reviews relevant literature in four areas: informal learning and learning centers, the educational context of the Faculty of Education at Ramkhamhaeng University, needs assessment, and HyFlex learning.

Informal Learning and Learning Centers

Informal learning occurs outside formal schooling and is driven by learners’ interests, readiness, opportunities, and potential. It involves learning from individuals, experiences, social contexts, environments, media, and other knowledge sources in daily life. Thai legislation, including the National Education Act B.E. 2542 (1999) and its 2002 amendment (Office of the National Education Commission, 2002), as well as the Non-Formal and Informal Education Promotion Act B.E. 2551 (Ministry of Education, 2008), emphasizes learner-centered, lifelong learning accessible to all citizens. Studies on informal education management identify four essential components: principles and philosophy of informal education; learning promotion activities and programs; supporting factors such as learning resources, technology, and networks; and experiential learning with appropriate evaluation. Research on community-

based learning centers highlights participatory processes, collaboration among stakeholders, systematic management structures, and diverse service formats as critical to sustainability and effectiveness.

Institutional Context of the Faculty of Education

The Faculty of Education at Ramkhamhaeng University was established under the Ramkhamhaeng University Act B.E. 2514 (1971). Its philosophy promotes lifelong educational opportunities and the cultivation of graduates with knowledge and moral integrity. Its objectives include producing academically and professionally competent graduates, expanding educational equity, strengthening research capacity, enhancing administrative effectiveness, preserving cultural heritage, and integrating technology into teaching. The Faculty's vision emphasizes producing graduates who can adapt to change and use technology for academic excellence. Its policy on academic and professional services to society supports diverse outreach initiatives that respond to community needs, forming the policy foundation for the "RU for All" Learning Center.

Needs Assessment

Needs assessment is a systematic process for identifying discrepancies between the current and desired states, prioritizing these gaps, and selecting key improvement needs (Wongwanich, 2015). Priority setting is the final stage, ensuring that identified needs are analyzed and ranked systematically. Among various techniques, the Modified Priority Needs Index ($PNI_{modified}$) is widely used for dual-response data, enabling clear prioritization to guide program development.

HyFlex Learning

HyFlex, conceptualized by Beatty (2019), combines hybrid and flexible learning by allowing students to choose face-to-face, synchronous online, or asynchronous participation. The model addresses diverse learner constraints and supports learner autonomy. Recent research (Intasena & Worapun, 2024; Mahrishi et al., 2025; Santandreu Calonge et al., 2023) demonstrates its effectiveness in both school and higher education contexts. However, successful implementation requires careful instructional design to ensure students have comparable learning experiences regardless of participation mode. This literature supports integrating needs assessment and HyFlex design in developing a sustainable, community-oriented learning center aligned with lifelong learning principles.

Methodology

This research project received ethical approval from the Human Research Ethics Committee in Social Sciences and Behavioral Sciences at Bangkokthonburi University (Approval No. 2567/214 (17)). Approval was granted on December 14, 2024, and is valid until December 13, 2026. The study was authorized to collect data from the specified target groups and samples. The research procedures were divided into two phases based on the research objectives.

Phase 1: Needs Assessment of the “RU for All” Learning Center

Participants

Stakeholders included: (1) 15 administrators, lecturers, and staff members from the Faculty of Education involved in learning center management; and (2) beneficiaries of the learning center, comprising 113 teachers, staff, and students from two network schools in Bangkok, and 151 community members receiving services. The total sample size was 279 participants.

Research Instrument

A needs assessment questionnaire was developed, consisting of three parts: (1) respondents' demographic information (checklist format); (2) a dual-response five-point rating scale assessing the current situation (D) and the desired situation (I); and (3) 33 items categorized into context, input, and process dimensions. Content validity was determined using the Index of Item–Objective Congruence (IOC), with all items achieving an IOC of 1.00 as evaluated by three experts. Reliability analysis from a pilot test with 30 participants yielded a Cronbach's alpha coefficient of 0.977.

Data Collection

Official letters requesting permission to collect data were sent to the target schools and communities. The researchers conducted on-site data collection using self-administered questionnaires. Participants were informed of the research objectives and provided voluntary consent before completing the questionnaire. All completed questionnaires were collected directly by the researchers.

Data Analysis

Demographic data were analyzed using frequencies and percentages. Mean scores were calculated to determine the levels of the current state (D) and the desirable state (I). Priority needs were identified and ranked using the Modified Priority Needs Index ($PNI_{modified} = \frac{(I-D)}{D}$).

Phase 2: Curriculum Design Under the “RU for All” Learning Center for Sustainable Community Learning

Target Groups

A total of 40 participants evaluated the curriculum quality: 20 representatives from teachers, school administrators, and Faculty of Education network schools in Bangkok, and 20 community representatives and leaders from Thepleela community who had lived in the area for more than three years. Participants in Group 1 had at least three years of experience in academic or professional service projects.

Research Instrument

The curriculum quality evaluation form consisted of two parts: (1) a checklist for respondents' demographic information and (2) a 5-point rating scale (20 items) covering four dimensions: curriculum content, instructional methods, media and support resources, and measurement and

evaluation. Content validity ($IOC = 1.00$) was confirmed by three experts, and reliability testing ($n = 30$) showed a Cronbach's alpha of 0.970.

Data Collection

Official letters were sent to target schools and communities. The researchers collected data on-site using self-administered questionnaires. Participants were informed of the research objectives and provided voluntary consent before participating.

Data Analysis

Quantitative data were analyzed using descriptive statistics, including mean and standard deviation.

Results and Discussion

Needs Assessment of the “RU for All” Learning Center for Sustainable Community Learning

The needs assessment used the Modified Priority Needs Index ($PNI_{modified}$) to identify and prioritize gaps between the desirable state (I) and the current state (D). The analysis was divided into three dimensions: Context, Input, and Process. The findings showed that the highest priority need was in the Context dimension ($PNI_{modified} = 0.651$), followed by Input ($PNI_{modified} = 0.611$), and Process ($PNI_{modified} = 0.557$). The overall $PNI_{modified}$ was 0.604, indicating a substantial discrepancy between expected and actual conditions. Details are presented in Table 1.

Table 1

Overall Needs Assessment of the “RU for All” Learning Center

Dimensions	Mean (I)	Mean (D)	Needs Assessment	
			$PNI_{modified}$	Rank
1. Context	4.36	3.02	0.651	1
2. Input	4.48	3.12	0.611	2
3. Process	4.37	3.08	0.557	3
Total	4.40	3.07	0.604	

Further analysis within the Context dimension identified the three highest priority needs among 33 items: (1) promoting self-directed learning through online platforms ($PNI_{modified} = 0.854$), (2) knowledge related to physical health, sports, and recreation ($PNI_{modified} = 0.842$), and (3) basic communication language skills, such as English and Chinese ($PNI_{modified} = 0.714$). Details are presented in Table 2.

Table 2*Needs Assessment Results: Context Dimension*

Contexts	Mean (I)	Mean (D)	Needs Assessment	
			PNI _{modified}	Rank
1. Promoting self-directed learning through online platforms	4.34	2.84	0.854	1
2. Knowledge related to physical health, sports, and recreation	4.49	2.93	0.842	2
3. Basic communication language skills (e.g., English and Chinese)	4.28	2.81	0.714	3
4. Inclusive access for diverse learners	4.40	3.03	0.706	4
5. Supporting income generation for families	4.24	2.90	0.648	5
6. Mental health and drug prevention knowledge	4.37	2.96	0.637	6
7. Reducing education and training expenses	4.34	3.03	0.581	7
8. Cooking and nutrition knowledge	4.50	3.27	0.552	8
9. Collaboration with external organizations	4.37	3.22	0.517	9
10. Appropriate physical learning spaces	4.31	3.23	0.460	10
Total	4.36	3.02	0.651	

Design Results of HyFlex Learning for the “RU for All” Learning Center in Alignment With Identified Needs

The design outcomes for the “RU for All” Learning Center: Education to Community for Sustainable Learning, based on stakeholders’ identified needs, were divided into two main components: development of the learning center in response to users’ needs, and quality evaluation of the training programs implemented by the center.

Development of the “RU for All” Learning Center

Based on the previous needs assessment conducted across the dimensions of context, input, and process, the findings provided essential information to guide the establishment of the learning center. The design focused on community-based instructional packages consisting of four training programs, each with 24 instructional hours: (1) Health Hub: Healing Mind, Strengthening Thai Well-being; (2) Talk Pro: Language Development for Opportunity Creation; (3) Cooking to Cash: Signature Recipes for Income Generation; and (4) R&D for Expert Teachers: A Pathway to Professional Expertise through Research and Development.

All programs were implemented using a HyFlex learning model that integrated three instructional modalities: Face-to-Face (F2F) Live, Online Livestream (OL), and Online Asynchronous (OA).

Table 3*Design of the “RU for All” Learning Center Under the Hyflex Learning Framework*

Program	Face-to-Face (F2F) Live (Ramkhamhaeng University)	Online Livestream (Google Meet)	Online Livestream (Google Meet)
1. Health Hub	✓	-	✓
2. Talk Pro	✓	-	✓
3. Cooking to cash	✓	-	✓
4. R&D for Expert Teachers	✓	✓	✓

Note. A check mark (✓) indicates that the instructional modality was implemented in the program.

As shown in Table 3, all four programs included Face-to-Face instruction as a core modality. Online Asynchronous access was available in all programs to increase flexibility and expand participation. The Online Livestream was used only in the R&D for Expert Teachers program, reflecting the specific characteristics and readiness of its target group.

This design illustrates a context-sensitive application of the HyFlex framework, ensuring instructional modalities were chosen based on community needs, program characteristics, and learner readiness while maintaining accessibility and quality.

Implementation of Face-to-Face (F2F) Live for the “RU for All” Learning Center

The design results showed that all programs included Face-to-Face (F2F) Live delivery, with instructors physically present at the venue. This decision was based on the nature of two out of four programs, which required hands-on demonstrations and access to specialized facilities. For example, the Health Hub: Healing Mind, Strengthening Thai Well-being program involved demonstrations and practice using resistance bands and yoga stretching techniques. Similarly, the Cooking to Cash: Signature Recipes for Income Generation program required the use of a food laboratory equipped with heating devices and specialized culinary equipment.

On-site instruction at Ramkhamhaeng University was therefore prioritized to ensure safety, quality control, and close supervision. This approach aligns with experiential learning activities that depend on specific resources and controlled environments. As noted by Beatty (2019), HyFlex does not diminish the role of in-person learning; rather, it emphasizes providing learners with meaningful choices under the equivalency principle. Accordingly, programs requiring specialized tools may retain F2F as the core modality while supplementing access through livestreaming or recorded materials.

Implementation of Online Livestream (OL)

Only one program, R&D for Expert Teachers: A Pathway to Professional Expertise through Research and Development, used Online Livestream (OL) via Google Meet. The target participants were in-service teachers seeking professional development who could not travel. Because the course content was primarily theoretical and participants showed adequate digital readiness, synchronous online delivery enabled real-time interaction.

This approach aligns with the Community of Inquiry (CoI) framework proposed by Garrison et al. (2000), which highlights the importance of social, cognitive, and teaching presence in synchronous interaction. Mayer (2014) also emphasized that well-designed online instruction

can effectively support theoretical learning when learners have appropriate technological resources. The importance of aligning instructional design with contextual factors, such as learner characteristics and content type, is also supported by Graham (2013).

Implementation of Online Asynchronous (OA)

All four programs offered recorded sessions on Facebook and YouTube, enabling asynchronous access. This feature was especially helpful for participants who could not attend live sessions. Delivering content through familiar platforms could reduce barriers related to time and location and enable self-paced review.

Providing asynchronous access demonstrates the flexibility of the HyFlex model and supports equitable learning opportunities. It aligns with lifelong learning principles that encourage continuous and diverse access to knowledge (United Nations Educational, Scientific and Cultural Organization, 2015). Beatty (2019) also identified learner choice as a core principle of HyFlex design. Knowles (1975) emphasized self-directed learning, highlighting learners' ability to plan, regulate, and review their own learning processes independently.

Quality Evaluation of Training Programs Under HyFlex Learning for the “RU for All” Learning Center

The quality evaluation of the training programs at the “RU for All” Learning Center: Education to Community for Sustainable Learning was conducted with two groups of stakeholders. The sample included 20 representatives from teachers and educational personnel at schools within the Faculty of Education network in Bangkok, and 20 community participants who received the services, totaling 40 respondents.

Overall, the quality of the training programs was rated at the highest level ($M = 4.81$, $SD = .317$), as shown in Table 4.

Table 4

Quality of the Training Programs Under HyFlex Learning for the “RU for All” Learning Center

Program Quality Dimensions	<i>M</i>	<i>SD</i>	Quality Level
1. Course content	4.88	.291	Highest level
2. Instructional methods	4.83	.357	Highest level
3. Media and learning support	4.79	.346	Highest level
4. Measurement and evaluation	4.75	.423	Highest level
Overall	4.81	.317	Highest level

Course content received the highest mean score ($M = 4.88$, $SD = .291$), followed by instructional methods ($M = 4.83$, $SD = .357$), media and learning support ($M = 4.79$, $SD = .346$), and measurement and evaluation ($M = 4.75$, $SD = .423$). All dimensions were rated at the highest level.

The findings regarding course content indicate its appropriateness and alignment with community needs. As noted by Darling-Hammond and Rothman (2015), high-quality curriculum content should be purposefully designed to match the needs and context of the target

community. It should strengthen essential knowledge and skills that support sustainable learning, remain current and relevant, and be applicable to learners' real-life experiences.

Conclusion

The needs assessment of the “RU for All” Learning Center: Education to Community for Sustainable Learning found that, among 33 evaluated items, the three highest priority needs were all related to contextual factors. The highest-ranked item was the center's emphasis on promoting self-directed learning through online systems. The second priority was the provision of knowledge related to physical health, sports, and recreation. The third focused on foundational language skills for communication, particularly English and Chinese.

Based on identified needs across the dimensions of context, input, and process, the researchers developed guidelines for establishing the learning center. Four community-based training programs (24 hours each) were created: (1) Health Hub: Healing Mind, Strengthening Thai Well-being; (2) Talk Pro: Language Development for Opportunity Creation; (3) Cooking to Cash: Signature Recipes for Income Generation; and (4) R&D for Expert Teachers: A Pathway to Professional Expertise through Research and Development. The programs were implemented using a HyFlex learning model that integrated Face-to-Face (F2F) Live, Online Livestream (OL), and Online Asynchronous (OA) modalities.

Evaluation results from two stakeholder groups – teachers and educational personnel within the Faculty of Education network schools in Bangkok – showed that the overall quality of the training programs was rated at the highest level.

Based on the development of the “RU for All” Learning Center, which introduced four community-based programs—(1) Health Hub: Healing Mind, Strengthening Thai Well-being; (2) Talk Pro: Language Development for Opportunity Creation; (3) Cooking to Cash: Signature Recipes for Income Generation; and (4) R&D for Expert Teachers: A Pathway to Professional Expertise through Research and Development—implemented through a HyFlex learning model integrating Face-to-Face (F2F) Live, Online Livestream (OL), and Online Asynchronous (OA) modalities, several practical implications are proposed.

For the Online Livestream (OL) modality, it is essential to assess participants' technological readiness and digital literacy before implementation. If participants lack adequate access to technological resources, greater emphasis should be placed on Face-to-Face (F2F) Live sessions and Online Asynchronous (OA) formats, which allow for flexible access through recorded materials. This approach ensures equitable participation and supports sustainable learning outcomes.

Recommendations

Recommendations for Practical Application

Based on the development of the “RU for All” Learning Center, which introduced four community-based programs—(1) Health Hub: Healing Mind, Strengthening Thai Well-being; (2) Talk Pro: Language Development for Opportunity Creation; (3) Cooking to Cash: Signature Recipes for Income Generation; and (4) R&D for Expert Teachers: A Pathway to Professional Expertise through Research and Development—implemented through a HyFlex learning model integrating Face-to-Face (F2F) Live, Online Livestream (OL), and Online Asynchronous (OA)

modalities, several practical implications are proposed. For the Online Livestream (OL) modality, it is essential to assess participants' technological readiness and digital literacy before implementation. If participants lack adequate access to technological resources, greater emphasis should be placed on Face-to-Face (F2F) Live sessions and Online Asynchronous (OA) formats, which allow for flexible access through recorded materials. This approach ensures equitable participation and supports sustainable learning outcomes.

Recommendations for Future Research

This study evaluated program quality across four dimensions: course content, instructional methods, media and learning support, and measurement and evaluation. Future research on learning center design within the HyFlex framework should expand evaluation to additional dimensions for more comprehensive insights. Researchers are encouraged to incorporate the Community of Inquiry (CoI) framework proposed by Garrison et al. (2000), which emphasizes Social Presence, Teaching Presence, and Cognitive Presence. Integrating these dimensions would offer a deeper understanding of how online and blended learning environments foster meaningful and transformative learning experiences.

Acknowledgements

This research was funded by the Thailand Science Research and Innovation Fund, Fiscal Year 2025, Ramkhamhaeng University, under the program for knowledge creation in community-engaged universities. Ethical approval was obtained from the Human Research Ethics Committee in Social and Behavioral Sciences, Bangkok Thonburi University (BTUIRB No.: 2567/214 [17]). The study was completed in September 2025. The researchers sincerely thank all contributors and community partners for their invaluable support.

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

No generative artificial intelligence (AI) or AI-assisted technologies were used in the conceptualization, research design, data collection, data analysis, interpretation of findings, or manuscript preparation. All ideas, procedures, analyses, and discussions in this manuscript are the original intellectual work of the researchers.

References

- Beatty, B. J. (2019). *Hybrid-flexible course design: Implementing student-directed hybrid classes*. EdTech Books.
- Columbia Center for Teaching and Learning. (2020). *Hybrid/HyFlex teaching & learning*. Columbia University. <https://ctl.columbia.edu/resources-and-technology/teaching-with-technology/teaching-online/hyflex/>
- Darling-Hammond, L., & Rothman, R. (2015). *Teaching in the flat world: Learning from high-performing systems*. Teachers College Press.
- Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, 2(2–3), 87–105. [https://doi.org/10.1016/S1096-7516\(00\)00016-6](https://doi.org/10.1016/S1096-7516(00)00016-6)
- Graham, C. R. (2013). Emerging practice and research in blended learning. In M. G. Moore (Ed.), *Handbook of distance education* (3rd ed., pp. 333–350). Routledge. <https://doi.org/10.4324/9780203803738.ch21>
- Intasena, A., & Worapun, W. (2024). Exploring the efficacy of HyFlex learning for enhancing reading comprehension skills of secondary school students: A research and development study. *International Journal of Learning, Teaching and Educational Research*, 23(1), 24–38. <https://doi.org/10.26803/ijlter.23.1.2>
- Knowles, M. S. (1975). *Self-directed learning: A guide for learners and teachers*. Association Press.
- Mahrishi, M., Abbas, A., Siddiqui, M. K., & Aladhadh, S. (2025). The genesis and prevalence of the HyFlex model: A systematic review and bibliometric analysis. *International Journal of Educational Research Open*, 8, Article 100410. <https://doi.org/10.1016/j.ijedro.2024.100410>
- Mayer, R. E. (Ed.). (2014). *The Cambridge handbook of multimedia learning* (2nd ed.). Cambridge University Press. <https://doi.org/10.1017/CBO9781139547369>
- Ministry of Education. (2008). *Non-Formal and Informal Education Promotion Act B.E. 2551 (2008)*.
- Office of the National Education Commission. (2002). *National Education Act B.E. 2542 (1999) and amendments (Second National Education Act B.E. 2545 [2002])*.
- Santandreu Calonge, D., Thompson, M., Hassock, L., & Yaqub, M. (2023). Hybrid flexible (HyFlex) learning space design and implementation at graduate level: An iterative process. *Cogent Education*, 10(2), Article 2277001. <https://doi.org/10.1080/2331186X.2023.2277001>
- United Nations Educational, Scientific and Cultural Organization. (2015). *Rethinking education: Towards a global common good?* UNESCO Publishing.

Wongwanich, S. (2015). *Needs assessment research* (3rd ed.). Chulalongkorn University Press.

Contact email: chuthaphon.star@rumail.ru.ac.th

Gaps in Bear Research: A Qualitative Study of Plus-Size and GMPD Inclusion in University Education (Theory of Change Analysis)

Lothar Filip Rudorfer, Charles University, Czech Republic

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

Plus-size gay men and Bear/GMPD communities remain marginal in educational research, despite growing scholarship on fat stigma and queer experiences in higher education. This pilot study explores how Bear-identified and plus-size gay men working in academia understand their visibility, wellbeing and sense of belonging within university environments. Five cisgender gay men aged 26–40 completed an anonymous online questionnaire distributed via academic and Bear/GMPD networks. All had at least a master's degree and 1–15 years of academic or research experience in Europe, with one participant originating from South America and now working in Czechia. The questionnaire combined demographic items, open-ended questions about identity, representation and wellbeing, and the Satisfaction with Life Scale. Data were analysed using reflexive thematic analysis. Three overarching themes were identified: (1) “Visible bodies, invisible identities” – participants sometimes experienced their size as neutral or even protective, yet saw almost no explicit representation of Bears or plus-size gay men in curricula, policy or senior academic roles; (2) “Belonging at the margins of multiple communities” – participants negotiated partial belonging in both academia and Bear scenes, describing exclusion based on body, sexuality, nationality or neurodivergence; and (3) “Carrying the weight of academic cultures” – high performance demands, reviewer hostility and subtle discrimination undermined wellbeing, with Bear/GMPD spaces sometimes offering counter-narratives of desirability and acceptance. Life satisfaction scores suggested generally mixed to low satisfaction. The study argues for developing body diversity literacy in universities and for closer connections between Bear/GMPD communities and educational institutions.

Keywords: bear culture, LGBTI+, self-perception, plus-size, stigmatization, SWLS test, RTA

iafor

The International Academic Forum
www.iafor.org

Introduction

Bear and GMPD¹ communities provide important spaces of belonging for large-bodied gay, bi and queer men, yet they have only recently begun to receive sustained academic attention. Previous projects in the field document how fatGBTQI+ men experience both comfort and fat stigma in UK Bear scenes, revealing complex geographies of inclusion and exclusion (McGlynn, 2022). At the same time, scholarship on LGBTQI+ people in higher education has highlighted persistent patterns of invisibility, marginalisation and conditional belonging for students and staff (Nutter et al., 2019). Parallel work in fat and body-diversity studies shows that weight stigma is pervasive across social institutions yet often left unexamined in equity and inclusion policies (Brown et al., 2022). However, research specifically examining plus-size gay men in academic roles remains virtually non-existent (Edmonds & Zieff, 2010). Existing work tends to focus either on fat queer men in community or leisure settings, or on LGBTQI+ scholars (McGlynn, 2022) more broadly without attention to body size as a dimension of inequality (Edmonds & Zieff, 2015).

In East and Southeast Asia, LGBTQI+ rights remain uneven, shaping the social positioning of Bear and GMPD communities. In 2025, Japan's Supreme Court upheld the national ban on same-sex marriage despite growing public support and ongoing legal challenges (BBC News, 2025; Speed, 2025). Although some local governments issue symbolic partnership certificates, these provide no binding legal protections in areas such as taxation, inheritance, or healthcare. Legal uncertainty surrounding same-sex relationships contributes to broader patterns of invisibility and intersects with cultural norms surrounding heteronormativity, thinness, and traditional masculinity. For plus-size gay men, particularly those identifying with Bear or GMPD communities, this combination of legal exclusion, body stigma, and gender expectations may intensify marginalisation within both society and institutional settings such as universities. Similar tensions exist in Europe, where legal recognition of LGBTQ+ relationships remains uneven despite a 2025 Court of Justice of the European Union ruling requiring member states to recognise same-sex marriages performed elsewhere in the EU (Court of Justice of the European Union, 2025). Together, these legal and cultural contexts highlight the importance of cross-cultural research examining how body politics, sexuality, and institutional recognition shape the experiences of Bear/GMPD individuals in academia.

Figure 1

The Japan Times. (Speed, 2025). Photograph of Protests to Tokyo High Court Ruling on Same-Sex Marriage.



Note. From The Japan Times. Photo by Taro Yamada, licensed under CC BY 4.0.

¹ GMPD refers to “Gay Men of Physical Diversity”, including the Japanese body-type terms **gachi** (ガチ – solid/muscular), **mochi** (モチ – soft/plush), **pochari** (ぽっちゃり – chubby), and **debu** (デブ – fat).

This pilot study responds to that gap by exploring how Bear-identified and plus-size gay men working in universities make sense of their educational and career trajectories, their visibility, and their wellbeing. It is conceptually aligned with cultural literacies and inclusion in European education and builds on earlier work documenting the psychological wellbeing of plus-size gay men in Japan, the Czech Republic and beyond.

This study is also informed by two complementary impact-oriented frameworks increasingly used in education and social policy: Theory of Change (ToC) and Social Return on Investment (SROI). Theory of Change provides a structured way to articulate how specific activities and institutional practices are expected to lead to short-, medium-, and long-term outcomes, making explicit the assumed causal pathways between interventions and social change (Connell & Kubisch, 1998; Weiss, 1995). SROI, in turn, focuses on identifying and evidencing the broader social value generated by such changes, particularly in domains such as wellbeing, inclusion, and participation, which are not easily captured by economic indicators alone (Fujiwara, 2015; Nicholls et al., 2012). Although the present study does not conduct a formal ToC or SROI analysis, these frameworks provide a useful lens for interpreting the findings, as they foreground the importance of linking institutional practices (e.g., diversity policies, curriculum representation, support structures) to outcomes such as wellbeing, sense of belonging, and sustained participation in academic life.

The main research questions for creating the pilot study were:

1. *How do plus-size / Bear-identified gay men in academia describe their experiences of representation, inclusion and visibility?*
2. *How do academic cultures and Bear/GMPD communities shape their wellbeing and sense of belonging?*
3. *What forms of support or change do they consider necessary in universities?*

Given its small scale, this study aims not to generalise but to generate rich, exploratory insights that can inform larger qualitative and mixed-methods projects.

Methodology

The study employed an online qualitative questionnaire consisting of open-ended questions, supplemented by demographic items and a brief life-satisfaction measure. Data were collected via Google Forms using a convenience sampling strategy, targeting academics who self-identify as members of the LGBTI+ community and are currently active in research or higher education. Participants were recruited through the researcher's existing professional and community networks, including academic conferences, research collaborations, and interest-based groups (e.g., online Bear and GMPD communities). This approach enabled access to a hard-to-reach population and allowed geographically dispersed participants to engage with the questionnaire anonymously and at their own pace, which was particularly important given the sensitivity of topics related to sexuality, body size, and wellbeing. While this sampling strategy limits generalisability, it is appropriate for exploratory qualitative research aiming to generate in-depth insight into under-researched populations rather than statistically representative findings.

Eligibility criteria: (a) identify as plus-size gay men and/or belong to Bear/GMPD communities; (b) currently or recently engaged in academic or research work (including PhD); (c) aged 18+. The questionnaire link was distributed through academic networks, an international Bear research network, and informal Bear/GMPD contacts. Five participants

completed the full survey. While small, the sample is diverse in geography and disciplinary background and appropriate for pilot exploratory purposes.

All five respondents: cis-male, gay, aged 26–40, at least MA, 1–15 years academic/research experience; currently based across EU and one originally from South America and one from Japan.

Data Collection & Ethics

The questionnaire asked about academic background, Bear/plus-size identity and its perceived impact on career, experiences of inclusion/exclusion and visibility in academic settings, connection to Bear/GMPD networks, wellbeing and coping strategies, and suggestions for institutional change. Participation was anonymous and voluntary; no personal identifiers were collected. Data were stored on password-protected institutional drives accessible only to the researcher and supervisor. Ethical clearance was obtained from the relevant university ethics committee. This study employed a qualitative online questionnaire design supplemented by descriptive quantitative measures. The questionnaire was constructed using Google Forms and combined (1) demographic and identity-related items, (2) open-ended qualitative questions targeting experiences of body size, sexuality, and academic life, and (3) a standardized measure of life satisfaction (Diener et al., 1985). The aim was to capture both narrative depth and contextual quantitative indicators of wellbeing to support interpretation of participants' accounts.

The questionnaire included **three integrated sections**:

1. Demographic and Academic Background

Closed-ended questions asked about:

- **Gender identity**
- **Age group**
- **Region of origin and current academic location**
- **Highest level of education completed**
- **Length of academic or research practice**
- **Route into academic work**

These items provided contextual information used to describe the sample and frame individual experiences.

2. Identity, Inclusion, and Academic Experiences (Qualitative Section)

This section contained **25 open-ended questions**, designed to elicit in-depth reflections on:

- personal experiences of being plus-size or Bear/GMPD within academia;
- perceived influence of body size or sexuality on career pathways;
- experiences of inclusion/exclusion, representation, and visibility;
- relationships with colleagues, supervisors, and students;
- access to any gay/LGBTI+ media and sources (manga, novels, idol bands, etc.);
- institutional practices related to diversity, wellbeing, and LGBTI+ support;
- involvement in Bear/GMPD communities (e.g., events, elections, social groups);
- wellbeing, coping strategies, and mental-health challenges;
- perceived connections between Bear identity and academic sense of belonging;

- suggestions for improving body diversity representation in universities.

The open design allowed participants to choose which aspects of identity and experience felt meaningful, aligning with reflexive thematic analysis principles.

3. Standardized Wellbeing Measure: Satisfaction With Life Scale (SWLS)

The final section the Satisfaction With Life Scale (Diener et al., 1985) measuring global cognitive judgments of one's life satisfaction.

Participants rated each statement on a **5-point Likert scale** from *strongly disagree (1)* to *strongly agree (5)*:

1. *In most ways my life is close to my ideal.*
2. *The conditions of my life are excellent.*
3. *I am satisfied with my life.*
4. *So far I have gotten the important things I want in life.*
5. *If I could live my life over, I would change almost nothing.*

Scores were not used for inferential statistics due to the small sample size but served as descriptive indicators to contextualise narratives of wellbeing. Because the questionnaire addressed experiences associated with sexuality, body size, and potential discrimination, participants were reminded that they could skip any question.

Qualitative responses were analysed using reflexive thematic analysis (RTA) following the framework of Braun and Clarke (2006). Analysis proceeded through:

1. familiarisation with the dataset;
2. initial coding across the entire corpus;
3. generating preliminary themes;
4. reviewing and refining themes;
5. theme definition and labelling;
6. writing up with illustrative extracts.

RTA emphasises researcher subjectivity and iterative interpretation rather than coding reliability metrics, making it appropriate for identity-focused qualitative inquiry. Quantitative SWLS data were examined descriptively. Open-ended responses were analysed using reflexive thematic analysis (Braun & Clarke, 2006). Initial codes (e.g. "*being the only Bear*," "*reviewer hostility*," "*comfort in Bear events*") were developed and then structured into themes through iterative interpretation. Given the small sample, analysis prioritised depth and nuance over saturation. Quantitative life-satisfaction responses were summarised descriptively.

Results

This section presents findings from a mixed-methods pilot study combining qualitative questionnaire responses with descriptive quantitative measures. Due to the small sample size ($N = 5$), quantitative results are interpreted contextually rather than inferentially. Participants, despite differing in nationality, discipline, and institutional context, shared several characteristics: they were early- or mid-career plus-size Bear/GMPD-identifying academics who reported varying experiences of marginalisation related to sexuality, body size, or both. Descriptive findings suggested generally low visibility of body diversity within academic institutions, with participants reporting feeling more invisible than represented, while

connections to LGBTI+ and Bear/GMPD networks were consistently described as important sources of belonging and recognition.

Table 1
Descriptive Statistics of the SWLS Scale Divided by Age Group

Item	<i>In most ways my life is close to my ideal</i>		<i>The conditions of my life are excellent.</i>		<i>I am satisfied with my life.</i>		<i>So far I have gotten the important things I want in life.</i>		<i>If I could live my life over, I would change almost nothing.</i>	
	26–35	36–40	26–35	36–40	26–35	36–40	26–35	36–40	26–35	36–40
Age Group	26–35	36–40	26–35	36–40	26–35	36–40	26–35	36–40	26–35	36–40
Valid	4	1	4	1	4	1	4	1	4	1
Missing	0	0	0	0	0	0	0	0	0	0
Mean	4.750	2.000	4.500	2.000	5.250	5.000	3.750	2.000	5.500	3.000
Std. Deviation	1.258	NaN	0.577	NaN	0.500	NaN	1.500	NaN	1.291	NaN
Skewness	-1.129	NaN	0.000	NaN	2.000	NaN	-0.370	NaN	0.000	NaN
SE Skewness	1.014	0.000	1.014	0.000	1.014	0.000	1.014	0.000	1.014	0.000
Kurtosis	2.227	NaN	-6.000	NaN	4.000	NaN	-3.901	NaN	-1.200	NaN
SE Kurtosis	2.619	0.000	2.619	0.000	2.619	0.000	2.619	0.000	2.619	0.000
Shapiro-Wilk	0.895	NaN	0.729	NaN	0.630	NaN	0.849	NaN	0.993	NaN
P-value of Shapiro-Wilk	0.406	NaN	0.024	NaN	0.001	NaN	0.224	NaN	0.972	NaN
Minimum	3.000	2.000	4.000	2.000	5.000	5.000	2.000	2.000	4.000	3.000
Maximum	6.000	2.000	5.000	2.000	6.000	5.000	5.000	2.000	7.000	3.000

Note. ^a All values are identical

This pattern directly mirrors the qualitative narratives, in which participants described academia as largely indifferent or structurally silent on body diversity, while Bear and GMPD networks were more frequently identified as spaces of affirmation, even if imperfect or exclusionary in other ways. The quantitative results therefore reinforce the qualitative theme of “**visible bodies, invisible identities**”: participants are embodied and present in academic spaces, yet lack meaningful institutional recognition.

Across the full sample (N = 5) in the SWLS scale, mean scores on the Satisfaction With Life Scale items indicate **moderate but uneven well-being**:

- *In most ways my life is close to my ideal*: M = 4.20
- *The conditions of my life are excellent*: M = 4.00
- *I am satisfied with my life*: M = 5.20
- *So far I have gotten the important things I want in life*: M = 3.40

While overall life satisfaction cannot be considered low, the variability across items and participants suggests ambivalence rather than stability. Notably, participants reported relatively high satisfaction with life in general, but lower endorsement of having achieved important life goals, which aligns with qualitative accounts of career precarity, publication pressure, and constrained academic mobility. SWLS Responses Participants completed all five items of the Satisfaction With Life Scale (Diener et al., 1985). Because the questionnaire used verbal Likert anchors rather than numerical scores, responses were analysed descriptively rather than converted into standard SWLS totals. Across the five participants, responses indicate generally low to moderate life satisfaction, with no respondent reporting uniformly positive evaluations of their life conditions.

Table 2
Descriptive Statistics of the SWLS Scale Overall

	<i>In most ways my life is close to my ideal</i>	<i>The conditions of my life are excellent.</i>	<i>I am satisfied with my life.</i>	<i>So far I have gotten the important things I want in life.</i>	<i>If I could live my life over, I would change almost nothing.</i>
Valid	5	5	5	5	5
Missing	0	0	0	0	0
Mean	4.200	4.000	5.200	3.400	5.000
Std. Deviation	1.643	1.225	0.447	1.517	1.581
Skewness	-0.518	-1.361	2.236	0.315	0.000
Std. Error of Skewness	0.913	0.913	0.913	0.913	0.913
Kurtosis	-1.687	2.000	5.000	-3.081	-1.200
Std. Error of Kurtosis	2.000	2.000	2.000	2.000	2.000
Shapiro-Wilk	0.914	0.833	0.552	0.803	0.987
P-value of Shapiro-Wilk	0.490	0.146	< .001	0.086	0.967
Minimum	2.000	2.000	5.000	2.000	3.000
Maximum	6.000	5.000	6.000	5.000	7.000

Note. N = 5 for all items. M = mean; SD = standard deviation. Skewness and kurtosis standard errors were 0.91 and 2.00, respectively. Shapiro–Wilk tests assess normality; significant p values indicate departures from normality.

Boxplots derived from the table results further illustrate heterogeneity rather than clustering, reinforcing the interpretation that wellbeing among plus-size/Bear academics is not uniform and likely shaped by intersecting factors such as career stage, national context, institutional climate, and community access.

Table 3
Regression Analysis of the SWLS Scale

		95% CI					
Model		Unstandardized	Standard Error	Standardized t	p	Lower	Upper
1	(Intercept)	6.043	11.632	0.520	0.695	-141.755	153.842
	In most ways my life is close to my ideal	-1.435	0.948	-1.589	0.372	-13.475	10.605
	The conditions of my life are excellent.	2.391	1.375	1.975	0.332	-15.078	19.861
	I am satisfied with my life.	-1.304	2.431	-0.393	0.686	-32.187	29.578
2	(Intercept)	-0.040	2.093	-0.019	0.986	-9.044	8.964
	In most ways my life is close to my ideal	-1.320	0.741	-1.782	0.217	-4.507	1.867
	The conditions of my life are excellent.	2.120	1.026	2.066	0.175	-2.295	6.535
3	(Intercept)	0.714	2.692	0.265	0.808	-7.852	9.280
	The conditions of my life are excellent.	0.531	0.666	0.797	0.484	-1.589	2.650
4	(Intercept)	2.778	0.698	3.978	0.016	0.839	4.717

Several linear regression models were tested to explore whether life satisfaction variables predicted perceived links between Bear community acceptance and academic belonging (p. 5). Although some models showed relatively high R^2 values (e.g., $R^2 = .75$ in Model 1), none of the models reached statistical significance, and degrees of freedom were extremely limited ($df_2 \leq 3$). Given the very small sample size, these regression results should not be interpreted as

evidence of causal or predictive relationships. Instead, they are best understood as exploratory pattern checks. Importantly, the directionality of coefficients is theoretically meaningful even if statistically unreliable: higher perceptions of life satisfaction and positive life conditions tended to align with stronger perceived links between Bear community acceptance and academic belonging. This supports, at a conceptual level, the qualitative finding that community-based acceptance may act as a psychological buffer against institutional invisibility—a relationship that warrants investigation in larger future samples. Shapiro–Wilk tests reported across several variables were significant or indeterminate due to identical values (pp. 1–3), indicating non-normal distributions and limited variance. This further confirms that parametric inference is inappropriate for this dataset and reinforces the methodological choice to treat quantitative findings as descriptive and contextual, not inferential.

Table 4

Model Summary of the Item: Do You See a Link Between the Bear Community's Sense of Acceptance and the Sense of Belonging in Academia?

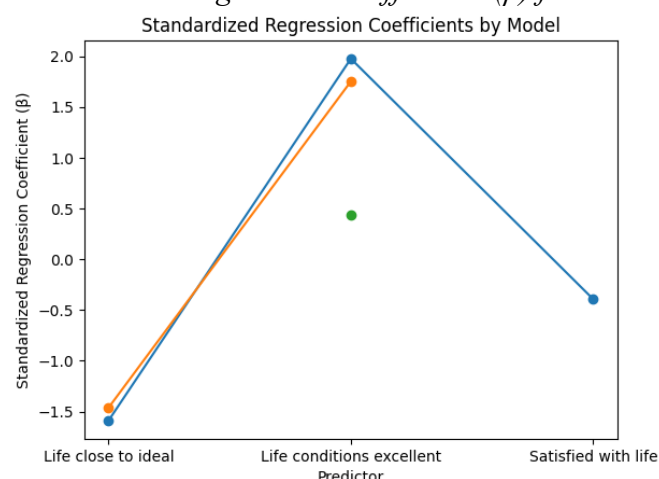
Model	R	R ²	Adjusted R ²	RMSE	R ² Change	F Change	df1	df2	p	Durbin-Watson	
										Autocorrelation	Statistic
1	0.867	0.752	0.009	2.085	0.752	1.013	3	1	0.606	-0.261	1.630
2	0.825	0.681	0.362	1.673	-0.071	-0.447	1	2	1.000	-0.253	1.968
3	0.418	0.175	-0.100	2.198	-0.506	-1.841	1	3	1.000	-0.287	2.314
4	0.000	0.000	0.000	2.095	-0.175		1	4		-0.457	2.840

Note. p-value for Durbin-Watson test is unavailable for weighted regression.

Taken together, the quantitative data **do not contradict** the qualitative findings—rather, they **stabilise and contextualise them**:

1. Participants report **moderate overall life satisfaction**, but not a strong sense of having achieved personal or professional goals.
2. Academic environments appear **structurally neutral or silent** regarding body diversity, producing experiences of invisibility.
3. Bear and GMPD communities function as **alternative sites of belonging**, with measurable psychological relevance.
4. The relationship between community acceptance and academic belonging appears **conceptually strong**, but empirically underpowered in this pilot sample.

This convergence supports the framing of the study as an exploratory mixed-methods pilot, whose primary contribution lies in theoretical articulation and qualitative insight, rather than statistical generalisation.

Figure 2*Standardized Regression Coefficients (β) for Each Predictor Across Models 1–3*

As shown in *Figure 1*, the conditions of my life are excellent demonstrated the strongest positive standardized association with the outcome across models, whereas perceiving life as close to ideal showed a negative association.

Reflexive thematic analysis yielded **three overarching themes**:

Participants described a complex relationship between visibility, belonging, and wellbeing within both academia and Bear/GMPD communities. Although their bodies were often physically visible in academic environments, their identities as plus-size or Bear gay men remained largely absent from institutional diversity narratives, curricula, and representation. While explicit fat stigma was uncommon, respondents reported subtle exclusion through overlooked networking opportunities, homophobic remarks (ILGA World, 2023), reviewer hostility, or feelings of invisibility (Amnesty International Australia, 2025) connected to sexuality and body type. Academic environments were frequently described as stressful and precarious due to publication pressure, funding insecurity, and heavy workloads, negatively affecting wellbeing and body confidence. In contrast, Bear/GMPD communities often functioned as spaces of affirmation, self-acceptance, and emotional support, particularly in opposition to mainstream gay ideals centred on thinness and muscularity. However, participants also noted exclusion within these communities related to class, nationality, neurodivergence, or social capital, suggesting that belonging remained conditional rather than universal. Overall, participants relied on peer networks, selective community engagement, and personal coping strategies to navigate environments where institutional recognition of body diversity remained limited.

A summary of each participant's response pattern is presented below:

Participant 1 (EU Citizen – Origin: Czech Republic)

This profile suggests **moderately low life satisfaction**, with dissatisfaction on three items and only one item indicating agreement. The participant appears ambivalent about past achievements and current circumstances. The participant feels like the bear community in the Czech Republic is somewhat exclusive and it is difficult to get in and feels excluded. He admits that *there are many men in his academic field would classify as plus-size and body size is not generally an issue*.

Participant 2 (EU Citizen – Origin: Estonia)

This participant exhibited the **lowest satisfaction profile** in the sample. All five responses fell on the disagreement side, indicating substantial dissatisfaction with life conditions and a *sense of not having achieved important personal goals*. He *feels excluded mainly for gender reasons* as there is a predominantly female presence in his academic field. He does not feel excluded in the original sense as there seems very little exclusion, just a lack of highlighting diversity. As his experience with bear events, he claims they have been both positive and negative. It is *comforting to be around similar body type people and feel free without judgment*, but at the same time, *local events have been quite insular and exclusionary* to outsiders or newcomers based on appearance, income and neurodivergence as well.

Participant 3 (EU Citizen – Origin: Japan)

This profile reflects **mixed or ambivalent satisfaction**, with small positive endorsements on some items but corresponding mild dissatisfaction on others. The participant's overall life satisfaction appears **moderate and unstable** rather than firmly positive. He *does not see any strong connections between body-size, sexuality and academia*.

Participant 4 (EU Citizen – Origin: Germany)

This participant displayed the **highest life satisfaction** in the sample, with consistently positive evaluations across all items, including one “*strongly agree*.” This suggests a comparatively strong sense of personal fulfilment or stability. Despite the presence of institutional LGBTQ+ wellbeing programmes, the participant reported only limited connection to LGBTI+ or Bear networks and described feeling “*out of the loop*” within both academic and gay professional contexts. Comparisons to highly muscular “gym” masculinities highlighted exclusion within gay subcultures as well as academia. Academic pressures—especially project-based deadlines—negatively affected sleep and wellbeing, though moments of community connection were described as psychologically protective. Notably, this participant reported consistently high life satisfaction, suggesting that strong professional identity and self-acceptance may coexist with, and partially mitigate, experiences of embodied exclusion.

Participant 5 (EU Citizen – Origin: South America)

This profile also reflects **low life satisfaction**, with small positive endorsements on some items but corresponding mild dissatisfaction on others. The participant's overall life satisfaction appears **somewhat low and ambivalent in comparison to others**. This profile reflects the lowest in terms of sense of belonging to a particular group and seems to score lower than others in the sample. In his technical/scientific field, where larger bodies among heterosexual men were common—but sexuality was. Although he identified moments of safety within informal university-adjacent spaces, such as a campus pub where he felt defended by peers, he described limited institutional initiatives addressing either sexuality or body diversity. His reflections emphasised respect over forced acceptance, underscoring a *pragmatic ethic shaped by long-term exposure to exclusion*. Overall, his narrative highlights how migration, generation, and sexuality intersect to produce forms of marginalisation that are not reducible to body size alone.

Discussion

This pilot study suggests that plus-size and Bear-identified gay men in academia experience a complex interplay of visibility, invisibility, belonging, and marginalisation. Although participants' bodies were often visible within academic spaces, their identities as Bear or plus-size LGBTQI+ men remained largely absent from institutional diversity frameworks. Consistent with previous research on fat stigma and LGBTQ+ experiences in higher education, participants described academic institutions as structurally silent regarding body diversity, resulting in limited representation, weak institutional support (Brown et al., 2022), and experiences of symbolic invisibility (Nutter et al., 2019). Bear and GMPD communities simultaneously functioned as spaces of affirmation and conditional belonging: several participants associated these communities with improved self-acceptance and emotional support (McGlynn, 2022), while others described exclusion related to class, nationality, neurodivergence, or desirability, reflecting findings that Bear spaces may reproduce internal hierarchies rather than fully resist them (Edmonds & Zieff, 2010). The SWLS results further indicated heterogeneous wellbeing, with participants reporting varying levels of life satisfaction connected to institutional climate (Meyer, 2003), career precarity, and access to supportive communities. These patterns align with minority stress theory, which highlights the buffering role of community affiliation against stigma-related stress (Woodford et al., 2015).

The findings also underscore the importance of wider legal and sociocultural contexts shaping LGBTQI+ visibility and belonging. Ongoing legal uncertainty surrounding same-sex marriage in Japan and uneven recognition of LGBTQ+ partnerships across Europe illustrate how institutional inclusion exists within broader systems of legal and cultural precarity (Amnesty International, 2024; Court of Justice of the European Union, 2025). Participants' narratives suggest that formal recognition alone does not automatically translate into inclusive academic environments. Overall, the study highlights the need for greater body diversity literacy within higher education, including explicit recognition of body size within diversity and wellbeing frameworks, inclusive supervision practices, and stronger collaboration between universities and Bear/GMPD communities. Interpreted through a Theory of Change and Social Return on Investment (SROI) lens, the findings suggest that institutional recognition and community support may generate meaningful social value by improving wellbeing, strengthening belonging, and fostering healthier academic climates.

Limitations

This study's sample ($N = 5$) is very small and based on convenience sampling, so findings are not generalisable. All participants were cisgender gay men; thus, experiences of trans, nonbinary or queer-of-other-genders Bear/GMPD persons remain unexamined. Data were collected via an online questionnaire, which lacks depth compared with in-person interviews, and prevented probing or follow-ups. Life-satisfaction scores were limited to a brief scale and not statistically analysed.

Still, the richness of qualitative responses justifies further, more extensive research.

Conclusion

Plus-size and Bear-identified gay men working in universities navigate a challenging landscape: their bodies may be seen, but their identities and needs are often ignored. Bear/GMPD communities offer partial refuge but are uneven in inclusivity. To foster real

equity, universities should expand diversity frameworks to include body diversity literacy, address weight- and sexuality-based stigma, and collaborate with community groups. Future research should build on this pilot with larger, multi-site qualitative studies and participatory community-based projects. Taken together, the findings suggest that plus-size and Bear/GMPD gay men in academia occupy positions of partial and conditional belonging. Their bodies are present but institutionally unrecognised; their communities are supportive yet stratified; and their wellbeing is uneven rather than uniformly compromised. By integrating qualitative narratives with descriptive wellbeing data, this study advances existing literature on LGBTQI+ academics and fat stigma and underscores the need for institutional approaches that recognise embodiment as central to academic life.

References

- Amnesty International. (2024, October 30). *Japan: Momentum for marriage equality grows with Tokyo High Court ruling*. <https://www.amnesty.org/en/latest/news/2024/10/japan-momentum-for-marriage-equality-grows-with-tokyo-high-court-ruling/>
- Amnesty International Australia. (2025, December 2). *Japan: Last High Court ruling a damaging step backwards on same-sex marriage*. <https://www.amnesty.org.au/japan-last-high-court-ruling-damaging-step-backwards-same-sex-marriage/>
- BBC News. (2025, October 30). *Japan's Supreme Court upholds ban on same-sex marriage*. <https://www.bbc.com/news/articles/clyz7njqwvvo>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Brown, A., Flint, S. W., Kalea, A. Z., O’Kane, M., Williams, S., & Batterham, R. L. (2022). Pervasiveness, impact and implications of weight stigma. *eClinicalMedicine*, 50, 101580. <https://doi.org/10.1016/j.eclinm.2022.101580>
- Connell, J. P., & Kubisch, A. C. (1998). Applying a theory of change approach to the evaluation of comprehensive community initiatives: Progress, prospects, and problems. In K. Fulbright-Anderson, A. C. Kubisch, & J. P. Connell (Eds.), *New approaches to evaluating community initiatives: Vol. 2. Theory, measurement, and analysis* (pp. 15–44). Aspen Institute.
- Court of Justice of the European Union. (2025, November 25). *Judgment in Case C-713/23 (Wojewoda Mazowiecki): EU member states must recognise same-sex marriages concluded in another member state [Press release]*. CURIA – Court of Justice of the European Union. https://curia.europa.eu/jcms/p1_5253574/en/
- Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, 49(1), 71–75. https://doi.org/10.1207/s15327752jpa4901_13
- Edmonds, C., & Zieff, H. (2010). Resisting weight and sexual orientation stigmas in the Bear subculture. *Fat Studies*, 4(2), 90–104. <https://doi.org/10.1080/21604851.2015.1014582>
- Fujiwara, D. (2015). *The seven principle problems of SROI*. Simetrica-Jacobs.
- ILGA World. (2023). *State-sponsored homophobia report: Global overview of legislative and judicial trends in LGBTQI+ rights*. <https://ilga.org/state-sponsored-homophobia-report>
- McGlynn, N. (2022). *Bearspace final report: Experiences of fat GBQ men in spaces of inclusion and exclusion*. University of Brighton. <https://research.brighton.ac.uk>

- Meyer, I. H. (2003). Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: Conceptual issues and research evidence. *Psychological Bulletin*, 129(5), 674–697. <https://doi.org/10.1037/0033-2909.129.5.674>
- Nicholls, J., Lawlor, E., Neitzert, E., & Goodspeed, T. (2012). *A guide to social return on investment*. The Cabinet Office.
- Nutter, S., Ireland, A., Alberga, A. S., Brun, I., Lefebvre, D., Hayden, K. A., & Russell-Mayhew, S. (2019). Weight bias in educational settings: A systematic review. *Current Obesity Reports*, 8, 185–200. <https://doi.org/10.1007/s13679-019-00330-8>
- Speed, J. (2025, November 28). *Same-sex marriage ban constitutional, says Tokyo High Court*. The Japan Times. <https://www.japantimes.co.jp/news/2025/11/28/japan/crime-legal/same-sex-marriage-ruling-tokyo-constitutional/>
- Weiss, C. H. (1995). Nothing as practical as good theory: Exploring theory-based evaluation for comprehensive community initiatives for children and families. *New Directions for Evaluation*, 1995(67), 65–92. <https://doi.org/10.1002/ev.1705>
- Woodford, M. R., Kulick, A., Sinco, B. R., & Hong, J. S. (2015). Contemporary heterosexism on campus and psychological distress among LGBQ students: The mediating role of self-acceptance. *American Journal of Orthopsychiatry*, 84(5), 519–529. <https://doi.org/10.1037/ort0000015>

From Transactional Evaluation to Reflective Learning Practices: Postgraduate Student Feedback as a Catalyst for Sustainable Business Education

Binganidzo Muchara, University of South Africa, South Africa
Sanele W. Nhlabatsi, University of South Africa, South Africa

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This study explores how business schools solicit feedback from postgraduate students on their course learning experiences. Traditionally, the feedback that students provide on a specific course has been framed within a client-service model that emphasises customer satisfaction over knowledge development as a contributor to national economic development. Often reducing complex learning experiences to simplistic transactional/satisfaction metrics. This study argues that this approach can lead to a misalignment between sustainable education goals and student expectations by undermining the true value of education derived by the student as an agent of change towards sustainable economic growth. Through a qualitative analysis of existing evaluation instruments that students are requested to complete, this study examines the quality of student feedback practices across multiple universities that offer business education. The commonly used feedback instruments are critiqued, suggesting alternatives that emphasise student growth, critical thinking for economic impact, professional development, and improvement of the course design and delivery for the future. Arguing for a shift of the structure and approach of course evaluation instruments from a transactional evaluation to a reflective practice, focused on learning as a catalyst of sustainable business education. Although the study acknowledges that feedback alone may not contribute to overall course progress, the findings underscore the need for business schools to adopt feedback mechanisms that recognise students as co-creators of knowledge and contributors to their learning communities for sustainable impact. As such, redesigning the structure and style of feedback forms is critical to ensure that students provide more effective course feedback.

Keywords: student feedback, course evaluation, business education, client-service model, SDGs, sustainable education

iafor

The International Academic Forum
www.iafor.org

Introduction

The landscape of higher education has undergone profound structural, ideological and pedagogical transformations over the past three decades, driven largely by globalisation, marketisation, performance accountability and the neoliberal repositioning of universities as competitive knowledge enterprises (Harvey & Williams, 2010). Within this evolving terrain, student feedback systems have become an institutionalised cornerstone of quality assurance, governance oversight and institutional reputation management. These systems, often in the form of standardised course evaluation surveys, are designed to capture student perceptions of teaching and learning for rankings, accreditation compliance, continuous improvement and managerial decision-making (Harvey & Williams, 2010).

In higher education, particularly business education at postgraduate level, student feedback is frequently framed as an evaluative measure of instructional service quality, reflecting a broader client-service discourse where students are treated as consumers or customers whose satisfaction signals institutional effectiveness (Mintzberg, 2004). However, this paradigm reduces education to a transactional exchange and sidelines the epistemic and developmental functions of feedback. Consequently, feedback becomes a mechanism for ratings and rankings rather than a pedagogical process for fostering critical reflection, intellectual growth and curriculum transformation.

Postgraduate business education is uniquely positioned within higher education due to its dual mandate of scholarly rigor and professional relevance. Programmes such as MBAs, postgraduate diplomas and executive education are expected to cultivate strategic thinking, leadership, ethical decision-making and problem-solving within complex organisational contexts (Mintzberg, 2004). Yet, prevailing feedback practices fail to interrogate whether such outcomes are meaningfully achieved, often prioritising surface-level indicators such as lecturer friendliness, organisation of slides and assessment turnaround time.

This study argues that the existing evaluative architecture is conceptually inconsistent with the pedagogical aspirations of business education. By drawing from theories of reflective practice, constructivist learning, transformative pedagogy and curriculum theory, the paper proposes a transition from transactional evaluation toward reflective feedback that emphasises learning depth, curriculum dialogue and value creation. In doing so, the study expands upon the conceptual foundation that offers a rigorous academic contribution suitable for academic improvement.

Why are business school curricula important for the Sustainable Development Goals (SDGs)? It is not just about focusing on SDG 4 on quality education, but a need to focus on the grand social, economic and environmental challenges facing current and future leaders in business sectors encompassing the private, public and NGO sectors. Businesses operate within a landscape informed and influenced by legislative frameworks that are increasingly focusing on Environmental, Social, and Governance (ESG) in business, a set of responsible business practice standards for a company's operations that investors and stakeholders use to measure sustainability, ethical impact, and risk management (Wang et al., 2024). Therefore, developing curricula that contributes to addressing SDG grand challenges is synonymous with addressing challenges and opportunities faced by businesses, thus critical in enhancing business school purpose and relevance (Alenezi & Alanazi, 2024; Wersun et al., 2020).

Findings from a study conducted by Russo et al. (2023) indicated that business schools require broader institutional reform and support enabling academics to meaningfully integrate Principles for Responsible Management Education (PRME) initiatives into business curricula. Since university management tend to take student evaluations seriously, perhaps the inclusion of reflective learning practices relating to pro-social behaviours attitudes and beliefs in student evaluations could provide the impetus needed to trigger business school management to actively implement PRME initiatives to deliver on their obligations to address broader societal challenges.

Problem Statement

Despite the prevalence of student feedback mechanisms in postgraduate business education, these systems remain predominantly anchored in transactional logics that privilege student satisfaction over learning transformation. Most evaluation tools are structured as closed-ended Likert-type questionnaires that solicit judgments about teaching performance rather than insights into learning processes or professional development outcomes. This orientation not only dilutes the epistemological function of feedback but also perpetuates a consumerist ideology that undermines the academic purpose of higher education.

The fundamental problem lies in the conceptual misalignment between what postgraduate business education claims to achieve; namely critical thinking, leadership development and applied professional competence and what feedback instruments measure. Instead of interrogating whether students have developed strategic reasoning skills, ethical decision-making or industry-relevant capabilities, feedback often focuses on the academic delivery style and subjective student comfort levels.

Furthermore, institutional reliance on such evaluative tools for staff appraisal and programme reviews exacerbates the issue by incentivising performative teaching practices rather than reflective pedagogy. This environment restricts innovative curriculum design, reduces academic autonomy and instrumentalises student feedback as a managerial surveillance tool rather than a developmental resource. Thus, the core issue is the systemic reduction of feedback to a procedural ritual divorced from genuine learning enhancement, thereby weakening its contribution to curriculum improvement and sustainable pedagogical reform.

This study is guided by the following research objectives, each capable of independent scholarly investigations:

1. To critically interrogate the theoretical and ideological foundations of transactional student feedback practices in postgraduate business education.
2. To evaluate the influence of existing student feedback mechanisms on developing sustainable quality education (SDG 4 Quality Education).

Literature Review

Evolution of Student Feedback in Higher Education

The institutionalisation of student feedback emerged prominently within the quality assurance movement of the 1980s and 1990s, coinciding with increased demands for accountability and transparency in higher education systems (Harvey & Williams, 2010). Feedback instruments were designed to measure teaching effectiveness, improve course delivery and support performance management. However, research indicates that these instruments often lack

construct validity and pedagogical depth (Spooren et al., 2013). Carless (2006) and Boud and Molloy (2013) argue that feedback has become ritualised and disconnected from authentic learning improvement processes. Moreover, the dominance of managerial rationality has reduced the student voice to quantifiable metrics rather than dialogical engagement. This trend reflects the broader influence of New Public Management, where universities adopt corporate logics emphasising efficiency, measurability, performance monitoring and audit culture. Within this environment, student feedback is increasingly operationalised through standardised surveys, numerical ratings and benchmark comparisons, transforming complex learning experiences into administratively convenient data points. As a result, student participation becomes instrumentalised, functioning less as an avenue for critical reflection and more as a mechanism for institutional control and accountability. These quantitative metrics prioritise ease of comparison and managerial decision-making while marginalising students' nuanced narratives, reflective insights and contextual interpretations of their learning journeys. Consequently, feedback loses its epistemological depth and becomes detached from the dialogical processes that underpin transformative learning.

Dialogical engagement, by contrast, situates feedback as an interactive and co-constructed process in which students and educators collaboratively interpret learning experiences, challenge assumptions and participate in knowledge creation (Nicol, 2010). The replacement of this dialogical model with metric-driven evaluation systems not only silences critical student perspectives but also reinforces hierarchical power structures that privilege institutional priorities over pedagogical responsiveness. This reductionist approach narrows the democratic potential of higher education, converting students from reflective agents into passive data producers whose voices are filtered through bureaucratic abstraction. Ultimately, the ascendancy of managerial rationality restructures student feedback describes as a regime of performativity, where numerical representation supersedes authentic educational dialogue. This undermines the transformative role of feedback in curriculum development and learning enhancement.

The Client-Service Paradigm

The notion of students as consumers gained traction with the commodification of education, particularly in business schools competing for enrolments and tuition revenue (Molesworth et al., 2009). This paradigm transforms educational relationships into economic transactions, where satisfaction replaces scholarly growth as the benchmark of success. Marginson (2016) emphasises that such market logics erode the moral and intellectual foundations of higher education by subordinating academic integrity to branding and competition.

Reflective Practice and Transformative Learning

Reflective practice is rooted in Dewey's philosophy of experiential learning and Schön's theory of the reflective practitioner. Brock (2010) further developed transformative learning theory, highlighting critical reflection as essential to deep learning and perspective transformation. In business education, reflective practice fosters self-awareness, ethical reasoning and adaptive leadership (Raelin, 2009).

Feedback as Curriculum Intelligence

Effective feedback should inform curriculum design through continuous reflection and alignment (Biggs & Tang, 2011). When structured appropriately, it contributes to constructive

alignment, where teaching activities, assessments and learning outcomes are coherently integrated. Research studies confirm that dialogical feedback fosters deeper engagement and improves critical thinking capacity among postgraduate students (Evans, 2013; Nicol, 2010).

Sustainable Development Goal (SDG) Integration in Teaching and Learning Practices

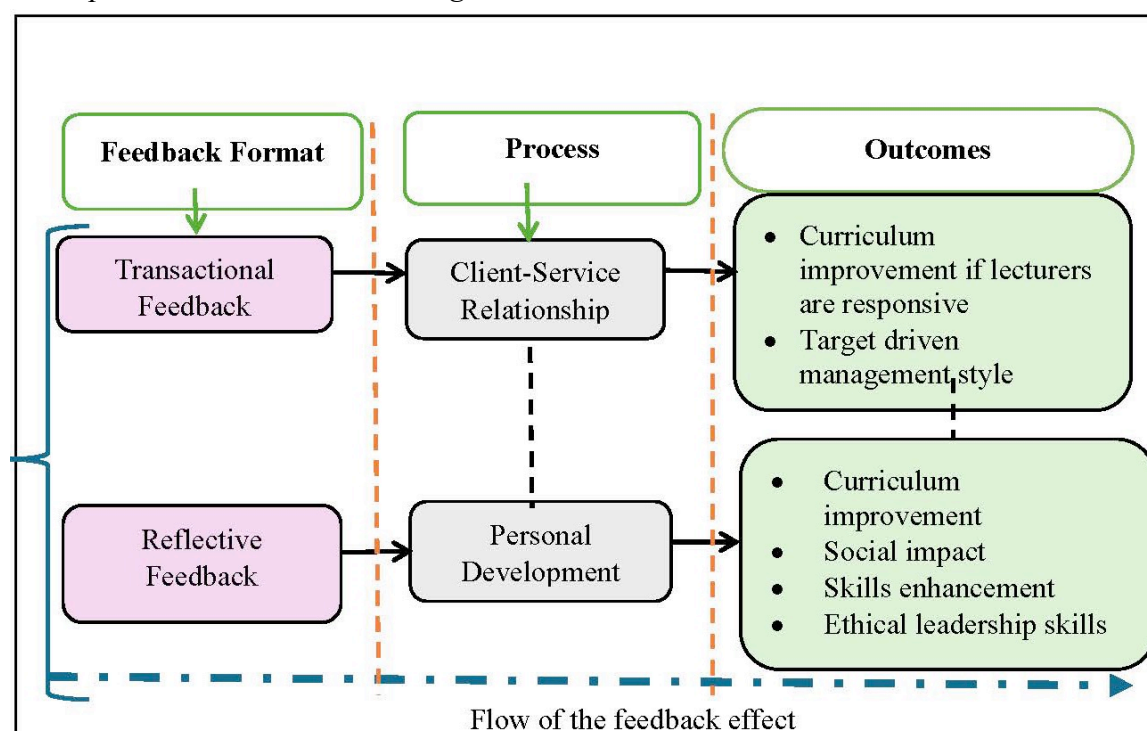
Recent studies indicate that business schools are slow to adopt SDGs as an issue that is central to business and business education (Weybrecht, 2022). Business schools are change agents for the achievement of sustainable education. Therefore, business schools are expected to adopt new teaching and learning methodologies that foster collaboration and interdisciplinarity with diverse stakeholders, broadening student participation in the co-creation of work integrated learning activities—enabling direct student engagement with civil society and non-profit organisations impacted by SDGs—in both their local and developing economy environments (Garcia-Feijoo et al, 2020).

Conceptual Framework

The conceptual framework (Figure 1) positions student feedback as part of a wider pedagogical process linking teaching practice, curriculum responsiveness, and broader educational and societal outcomes.

Figure 1

Conceptual Framework Illustrating Feedback Format, Processes and Outcomes



Source: Authors' illustration (2026)

In Figure 1, teaching practice initiates the learning encounter, while the format of feedback mediates how students interpret and communicate their experience of that encounter. Where feedback is structured transactionally, the process tends to privilege service appraisal, lecturer performance, access, organisation, and satisfaction, producing outcomes that are often managerial, target-driven, and sometimes punitive or incentive-based outcomes. By contrast,

where feedback is structured reflectively, students are invited to articulate learning, challenge, growth, capability development, and future improvement, thereby producing outcomes such as curriculum improvement, personal development, ethical leadership, skills enhancement, and broader social impact. The framework therefore reflects the paper's core conceptualisation: feedback format is not merely a technical design issue, but a determinant of whether the student voice is reduced to administrative judgement or elevated into curriculum intelligence capable of informing sustainable business education. In this sense, the diagram visually synthesises the study's argument that movement from transactional to reflective evaluation is necessary if feedback is to support pedagogical transformation and quality education in a substantive rather than procedural sense.

Methodology

Research Design

This study adopts a qualitative, review-based methodology anchored in systematic literature synthesis and critical interpretive analysis. The approach is consistent with contemporary review methodologies that prioritise conceptual integration, epistemic critique and thematic coherence over statistical aggregation. The intention is not merely to summarise existing literature but to interrogate dominant paradigms of student feedback within postgraduate business education and examine their implications for curriculum reform and pedagogical transformation.

Review Design and Search Strategy

The review followed a structured process involving the identification, screening, selection and thematic synthesis of relevant scholarly sources. The following electronic databases were utilised: Scopus, Web of Science, ERIC, ProQuest, Google Scholar and SABINET (for African-focused education literature). Keywords included: "postgraduate student feedback", "business education evaluation", "reflective practice in higher education", "curriculum transformation", "African higher education quality", "student voice in university governance" business program student evaluation and "Student evaluations of teaching effectiveness (SETEs)". Publications between 2005 and 2026 will be prioritised to ensure academic currency, with exceptions made for seminal theoretical contributions.

Data Collection

This study draws on a purposive qualitative sample of student evaluation instruments collected from eight higher education institutions located across different world regions, thereby capturing evaluation instrument design in both developed and developing country contexts. The sampled tools were selected to capture variation in the design, orientation, and evaluative logic of feedback instruments used in postgraduate and related higher education settings. This sampling approach is consistent with the paper's qualitative and interpretive methodology, which is concerned less with statistical generalisation than with identifying conceptual patterns, institutional tendencies, and pedagogical implications across a diverse set of evaluation practices. As shown in Table 2, the cross-institutional spread was sufficient to reveal recurring global patterns, particularly the persistence of transactional question formats even in settings where more reflective elements are beginning to emerge.

Data Analysis Approach

A thematic content analysis approach was employed using inductive coding procedures. Codes were generated around four dominant themes: transactional feedback, reflective learning, curriculum responsiveness and pedagogical transformation. These themes were subsequently synthesised into conceptual categories informing the proposed framework. The methodological robustness was enhanced through theoretical triangulation, comparing findings across global and African scholarship to ensure contextual relevance and epistemic balance. This paper employed a qualitative review-based approach grounded in systematic literature synthesis. Thematic coding is guided by dominant patterns: transactional feedback dominance, reflective feedback emergence, curriculum responsiveness and educational transformation.

Results and Discussions

During the analysis, it was observed that the evaluation questionnaires are designed around a standard agreement scale that asks students to rate the lecturer, module organisation, access, support and overall satisfaction. The dominant logic is therefore one of service appraisal, delivery quality, and administrative capabilities, not reflective interrogation of learning, capability development, curriculum relevance, or transformation. The evaluation questions ask students to indicate agreement or disagreement with preset statements and ends with open-ended prompts. An example of the questions and the analysis thereof, are presented in Table 1. It must be noted that these questions are not exhaustive, but rather an indication of the trends in the evaluation instruments.

Table 1
Analysis of Evaluation Questions From Various Tools

Evaluation Statement	Dominant Orientation	Evaluative Interpretation	Limitation For Curriculum Improvement
The lecturer is good at explaining things	Transactional	Measures clarity of delivery and lecturer performance	Does not show what or how students learned
The lecturer is enthusiastic about what they are teaching	Transactional	Captures presentation style and affective delivery	Does not reveal educational value or developmental effect
The lecturer is well prepared	Transactional	Useful for quality assurance and staff appraisal	Says little about higher-order capability development
The module content is interesting	Transactional	Indicates interest or preference	Does not assess relevance, transformation, or competence development
I have received sufficient support with my studies	Transactional	Captures support provision	Does not reveal how support influenced developmental learning
I have been able to contact the lecturer when I needed to	Transactional	Measures access and responsiveness	Reflects service availability rather than learning

Evaluation Statement	Dominant Orientation	Evaluative Interpretation	Limitation For Curriculum Improvement
An appropriate reading list was made available	Transactional	Captures resource provision	Does not assess critical engagement with readings
I have had appropriate access to books/journals/e-resources	Transactional	Measures infrastructural access	Does not show whether access translated into learning
Blackboard has been used effectively to support the module	Transactional	Assesses platform use and delivery support	Operationally useful, but weak pedagogically
Overall, I am satisfied with this module	Transactional	Captures overall satisfaction	Reinforces a consumerist rather than developmental logic
The lecturer encourages participation in class	Mixed	Points toward pedagogy and engagement	Does not ask how participation shaped understanding
The module is intellectually challenging	Mixed	Signals cognitive demand	Does not explain the nature or value of the challenge
The learning outcomes for the module have been made clear	Mixed	Relates to constructive alignment	Does not show whether outcomes were achieved or valued
I feel I have learned a lot on this module	Reflective	Directly references learning	Too broad and non-diagnostic without follow-up
The course assignments (readings, assigned problems, laboratory experiments, videos, etc.) facilitated my learning.	Reflective	Enquiry linked to the student's learning	Missed opportunity to be structured as an open-ended question to find out HOW this facilitated the student's learning
Did you try anything new in this work and how did it go? [Open-ended]	Reflective	Encourages experiential student learning.	None.

Transactional Dominance in Student Feedback Instruments

Using the thematic coding approach described in the methodology, the spreadsheet dataset classified a total of 132 instrument items into three broad categories: transactional, reflective, and mixed (Table 2). Of these, 63 items were coded as transactional, 45 as reflective, and 24 as mixed. This means that almost half of all reviewed items were concerned primarily with lecturer behaviour, course organisation, access, support, resource provision, platform effectiveness, and general student satisfaction rather than with the substance of learning or the developmental significance of the student experience. This overall pattern strongly confirms the study's methodological proposition that student feedback instruments can be productively

analysed through the thematic lenses of transactional feedback, reflective learning, curriculum responsiveness, and pedagogical transformation.

An analysis of the sampled student evaluation instruments and the detailed interrogation of the module evaluation forms reveal a consistent and conceptually important pattern: student feedback practices in postgraduate business education remain predominantly anchored in transactional evaluative logics rather than reflective learning-oriented inquiry. This finding supports the central concern raised in the problem statement that prevailing feedback systems prioritise student satisfaction, lecturer appraisal, and administrative performance over the deeper pedagogical purposes of postgraduate business education, such as critical thinking, leadership formation, professional competence, and curriculum transformation.

The detailed analysis of the evaluation forms reinforces this broader pattern. The questionnaires design focus in on a standard agreement scale requiring students to evaluate lecturer articulation, enthusiasm, preparation, support, access to resources, Blackboard use, and overall satisfaction. The dominant logic of the instrument is therefore one of service appraisal, delivery quality, and administrative functionality, rather than reflective interrogation of learning, capability development, curriculum relevance, or transformation. Questions such as “The lecturer is good at explaining things,” “The lecturer is well prepared,” “I have been able to contact the lecturer when I needed to,” and “Overall, I am satisfied with this module” are useful in a narrow quality assurance sense, but they tell us very little about whether students developed strategic reasoning, critical judgement, professional agency, or transformative understanding. This distinction is central to the argument of this study. Transactional feedback captures the student’s judgement of the delivery of teaching as a service, whereas reflective feedback should illuminate the student’s experience of learning as an intellectual, professional, and developmental process. The current evidence shows that most instruments remain substantially weighted toward the former. In this respect, the findings support the study’s critique that the epistemological function of feedback has been diluted by a consumerist and managerial orientation that reduces the student voice to a set of quantifiable performance judgements.

Analysis of the Reflective Evaluation Questions and Responses

An important finding is that even items classified as reflective often remain weakly reflective in design. That is, they gesture toward learning, challenge, or developmental value, but do so in a broad and non-diagnostic manner. The evaluation shows this in items such as “The module is intellectually challenging,” “The learning outcomes for the module have been made clear,” “I feel I have learned a lot on this module,” and “I have received helpful feedback on my work.” These items are more pedagogically meaningful than those focused only on lecturer enthusiasm or access to materials, yet they still rely mainly on Likert-style agreement statements that do not ask students to explain what they learned, how they learned it, which aspects of the curriculum enabled that learning, or how the learning may shape future professional practice. This is a critical insight for this study as it demonstrates that the issue is not merely the presence of overtly transactional questions, rather, the more substantive problem is that many instruments contain only surface-level proxies for reflection. A statement such as “I feel I have learned a lot on this module” may appear reflective because it invokes learning, but it remains analytically weak if it does not provide the student an opportunity to articulate what and how they learnt, enabling applied competence, ethical reasoning, professional identity formation, or transformative shifts in thinking. Similarly, a question on whether the module was intellectually challenging may capture cognitive demand, but it does not reveal whether that challenge was professionally relevant, or developmentally significant. In this sense, the

instruments that were analysed measured the perception of learning without adequately probing the process, depth, or consequences of learning. There is considerable literature which supports this interpretation. For instance, Sadler (1989) found that conventional quantitative course evaluations, although efficient and widely used, often offer limited pedagogical depth and fail to generate sufficiently rich insights for course development. Their study showed that more qualitative and student-centred approaches produced a fuller picture of the teaching and learning experience and yielded findings that were more directly relevant to improving course design and delivery. They further argue that richer feedback can be elicited through more structured open-ended prompts that invite students to comment on specific dimensions of the learning experience rather than merely rate general statements.

The analysis also found some mixed response questions which represent an incomplete attempt to move from service evaluation toward learning-centred inquiry. These questions show that some academic institutions are beginning to recognise the importance of learning, challenge, and feedback processes, hence an attempt to redesign their instruments, although not in a manner that elicits fully support reflective responses.

Cross-Institutional Patterns From the Analysed Feedback Instruments

The analysis of the type of questions and possible responses from the tools reveals important cross-institutional variation as illustrated in Table 2. This variation does not fundamentally alter the overall pattern of transactional dominance. Some institutions, such as Uni_UK3 include more clearly reflective open-ended prompts, while others, such as Uni_AUS 2 and Uni_EU1, include a greater number of questions that refer to learning, growth, or professional competence. However, even in these cases, reflective intent is often constrained by rating-scale formats or by the lack of explanatory follow-up prompts. By contrast, instruments associated with Uni_UD4, Uni_TT5 and the sampled Uni_AU1 forms are more heavily weighted toward lecturer performance, organisation, support access, and administrative clarity.

What emerges from this comparison is not a simple binary distinction between “good” reflective instruments and “bad” transactional ones. Instead, the evidence points to a continuum of evaluation design, ranging from purely service-oriented questionnaires to more developmentally oriented but still incomplete forms. This is an important conceptual contribution because it allows the study to argue that student feedback instruments may contain elements of reflective practice without functioning as genuinely reflective tools. Such a position is more analytically nuanced than treating all conventional instruments as equally deficient.

Table 2*Analysis Summary of Evaluation Tools From Eight Institutions*

Institution Code	Total Items Reviewed	Transactional	Reflective	Mixed	Overall Interpretation
Uni_EU1	13	6	4	3	Balanced but still reliant on rating-scale proxies for reflection
Uni_AUS 2	41	11	21	9	Stronger learning orientation, though many items remain non-diagnostic
Uni_AU 1	11	9	1	1	Dominated by lecturer-performance and service-delivery logic
Uni_UK3	6	0	6	0	Most explicitly reflective due to open-ended prompts
Uni_UD4	21	17	0	4	Strongly transactional and administratively oriented
Uni_TT5	14	10	1	3	Predominantly transactional with limited reflective depth
Uni_BC6	18	6	8	4	Balanced, though mixed in design logic
Sch_AM7	7	3	4	0	Moderately reflective, but still structured through indirect measures

Source: Authors' illustration (2026)

The findings also suggest that many institutions continue to treat student evaluations as generic quality assurance tools rather than as strategically designed pedagogical tools. This is consistent with the literature's long-standing critique of student evaluations of teaching effectiveness. In business education, student rating systems have often been used to judge lecturer effectiveness, despite persistent concerns about construct validity, rating bias, and the weak relationship between student satisfaction and actual student learning. The problem, therefore, is not only technical; it is ideological and institutional. Feedback is too often designed to support managerial oversight, staff appraisal, and administrative reporting rather than to function as curriculum intelligence for pedagogical improvement.

Implications for Responsible Management Education and Sustainable Curriculum Reform

The present findings acquire further significance when viewed against the broader aims of postgraduate business education. As articulated in the abstract, conceptual framework, and problem statement, business schools do not merely exist to deliver content efficiently; they are expected to cultivate reflective practitioners, ethical leaders, socially responsive decision-

makers, and professionals capable of navigating complex organisational and societal challenges, in alignment with ESG practices (Alenezi & Alanazi, 2024). This study's conceptual framework positions teaching practice as initiating the learning encounter, reflective student feedback as capturing cognitive and experiential insight, and curriculum adaptation as the mechanism through which responsive pedagogy generates enhanced learning and broader societal impact.

From this perspective, the dominance of transactional feedback is not a minor methodological inconvenience. It is a substantive weakness that undermines the developmental purpose of the curriculum itself. If student feedback instruments ask mainly whether the lecturer was prepared, accessible, enthusiastic, and clear, they are unlikely to generate insight into whether students have developed leadership judgement, critical reflexivity, interdisciplinary understanding, ethical awareness, or the capacity to apply knowledge in uncertain real-world contexts. This is particularly problematic in postgraduate business education, where applied competence and reflective judgement are not peripheral outcomes but central educational purposes.

The assurance-of-learning literature helps sharpen this point. Martell (2007) argues that meaningful assessment in business schools requires moving beyond indirect and impressionistic measures toward more diagnostic evidence that can be used to improve curricula. In her view, curriculum alignment and student self-report data are not enough on their own; the key question is what the institution has learned about student learning that can be used to refine educational design. This insight is directly relevant to the present study. Even reflective-seeming survey items remain largely indirect if they do not reveal what students have actually achieved or where the curriculum is falling short. Student feedback, therefore, should not be treated as a substitute for assurance of learning, but it can become more useful if redesigned to capture richer evidence on learning processes, developmental outcomes, and curriculum relevance.

The findings of the study have direct implications for SDG 4, particularly the commitment to inclusive, equitable, and quality education that promotes relevant knowledge, higher-order skills, and lifelong learning. The evidence from the eight sampled institutions shows that current evaluation systems remain heavily weighted toward lecturer appraisal, service efficiency, and satisfaction metrics, with only partial movement toward reflective and developmental forms of feedback. This matters for SDG 4 because quality education cannot be reduced to efficient delivery, student comfort, or well-managed administrative systems. Rather, it requires educational processes that foster critical thinking, ethical judgement, problem-solving, reflexivity, and meaningful capability development.

When evaluation instruments fail to ask whether students developed these forms of learning, institutions are left with weak evidence on whether they are actually delivering quality education in the true “spirit” of the SDGs. The findings therefore suggest that redesigning student evaluation tools is not a peripheral quality assurance exercise, but part of strengthening the educational architecture through which business schools can demonstrate, monitor, and improve their contribution to SDG 4. This point is reinforced by the wider business school literature, which shows that although many schools now reference the SDGs, engagement is often superficial, weakly embedded, and rarely translated into core educational redesign. Weybrecht (2022) shows that SDG engagement in business schools has grown, but remains slow, inconsistent, and too often disconnected from fundamental changes in how schools operate and what students experience. The study also suggests that student feedback

instruments can serve as a practical lever for strengthening SDG-oriented curriculum reform in business schools. If evaluation tools continue to privilege narrow service questions, then institutions will keep generating evidence about operational efficiency rather than whether curricula are cultivating socially responsive, sustainability-literate, and ethically grounded graduates.

Limitations

Data was collected from secondary documentation, thus the likelihood of interpretation bias. However, it must be noted that the review of student evaluation instruments is in alignment with existing student evaluation literature.

Conclusions and Recommendation

The findings have implications beyond immediate teaching practice. The study situates its argument within debates on responsible management education, SDG-oriented curriculum reform, and the broader relevance of business schools to social, economic, and environmental challenges. If business schools are serious about preparing graduates who can respond to ESG pressures, sustainability challenges, and complex public-private governance environments, then feedback instruments must also evolve to capture whether curricula are enabling such outcomes.

Student evaluations that focus narrowly on comfort, clarity, and service efficiency are unlikely to surface whether modules deepen ethical reasoning, broaden societal awareness, develop systems thinking, or equip students to respond to the grand challenges that responsible management education seeks to address. Reflective feedback instruments, by contrast, can help generate evidence about whether the curriculum is cultivating exactly these forms of higher-order capability. In this way, redesigning student feedback is not simply a matter of improving questionnaires; it is part of a broader effort to align evaluation practice with the transformative.

The study shows that student feedback practices in postgraduate business education remain predominantly transactional, even though the broader educational mandate of business schools increasingly requires reflective, developmental, and socially responsive forms of evaluation. The persistence of lecturer-rating, service-quality, and satisfaction-driven items means that many institutions are still gathering weak evidence on whether their curricula are contributing meaningfully to critical learning, professional competence, ethical leadership, and the wider aspirations associated with SDG 4.

At the same time, the study does not assume that transactional evaluation can or should disappear entirely. Given the contemporary realities of business schools, including their strong emphasis on enrolment, student retention, institutional reputation, and revenue generation, some form of transactional evaluation is likely to remain structurally embedded in their quality assurance systems. Business schools operate within competitive and monetised environments in which students are, at least partly, positioned as fee-paying clients, and institutions therefore continue to require feedback on service delivery, responsiveness, organisation, and overall experience. The key implication is not the total elimination of transactional evaluation, which may be unrealistic, but its repositioning as only one limited component of a broader and more educationally meaningful feedback architecture. A more sustainable way forward is to retain a narrow set of transactional indicators for operational monitoring while significantly expanding reflective, open, and developmental prompts that allow student feedback to contribute to

curriculum reform, responsible management education, and the deeper achievement of quality education outcomes in line with the SDGs.

References

- Alenezi, M., & Alanazi, F. (2024). Integrating environmental social and governance values into higher education curriculum. *International Journal of Evaluation and Research in Education*, 13(5), 3493–3503. <https://doi.org/10.11591/ijere.v13i5.29440>
- Biggs, J., & Tang, C. (2011). *Teaching for quality learning at university* (4th ed.). Open University Press.
- Boud, D., & Molloy, E. (2013). *Feedback in higher and professional education*. Routledge. <https://doi.org/10.4324/9780203074336>
- Brock, S. E. (2010). Measuring the Importance of Precursor Steps to Transformative Learning. *Adult Education Quarterly*, 60(2), 122–142. <https://doi.org/10.1177/0741713609333084>
- Carless, D. (2006). Differing perceptions in the feedback process. *Studies in Higher Education*, 31(2), 219–233. <https://doi.org/10.1080/03075070600572132>
- Evans, C. (2013). Making sense of assessment feedback. *Review of Educational Research*, 83(1), 70–120. <https://doi.org/10.3102/0034654312474350>
- García-Feijoo, M., Eizaguirre, A., & Rica-Aspiunza, A. (2020). Systematic review of sustainable-development-goal deployment in business schools. *Sustainability*, 12(1), 440. <https://doi.org/10.3390/su12010440>
- Harvey, L., & Williams, J. (2010). Fifteen years of quality in higher education. *Quality in Higher Education*, 16(1), 3–36. <http://dx.doi.org/10.1080/13538321003679457>
- Marginson, S. (2016). *Higher education and the common good*. Melbourne University Press. <https://www.researchcghe.org/wp-content/uploads/migrate/wp114-1.pdf>
- Martell, K. (2007). Assessing student learning: Are business schools making the grade? *Journal of Education for Business*, 82, 189–195. <https://doi.org/10.3200/JOEB.82.4.189-195>
- Mintzberg, H. (2004). *Managers not MBAs: A hard look at the soft practice of managing and management development* (1st ed). Berrett-Koehler Publishers.
- Molesworth, M., Nixon, E., & Scullion, R. (2009). *The marketisation of higher education*. Routledge.
- Nicol, D. (2010). From monologue to dialogue. *Assessment & Evaluation*, 35(5), 501–517. <https://doi.org/10.1080/02602931003786559>
- Raelin, J. (2009). The practice turn in learning. *Management Learning*, 40(4), 401–420. <https://doi.org/10.1177/1350507609335850>

- Russo, F., Wheeldon, A. L., Shrestha, A., & Saratchandra, M. (2023). Responsible Management Education in Business Schools—High on principles but low on action: A systematic literature review. *The International Journal of Management Education*, 21(3), 100843. <https://doi.org/10.1016/j.ijme.2023.100843>
- Sadler, D. R. (1989). Formative assessment and instructional systems. *Instructional Science*, 18(2), 119–144. <https://doi.org/10.1007/BF00117714>
- Spooren, P., Brockx, B., & Mortelmans, D. (2013). On the validity of student evaluation. *Review of Educational Research*, 83(4), 598–642. <https://doi.org/10.3102/0034654313496870>
- Wang, N., Pan, H., Feng, Y., & Du, S. (2024). How do ESG practices create value for businesses? Research review and prospects. *Sustainability Accounting, Management and Policy Journal*, 15(5), 1155–1177. <https://doi.org/10.1108/SAMPJ-12-2021-0515>
- Wersun, A., Klatt, J., Azmat, F., Suri, H., Hauser, C., Bogie, J., ... & Ivanov, N. (2020). *Blueprint for SDG integration into curriculum, research and partnerships*. United Nations Principles for Responsible Management Education (PRME). <https://blog.efmdglobal.org/2020/07/07/the-launch-of-a-blueprint-for-sdg-integration-in-business-schools/>
- Weybrecht, G. (2022). Business schools are embracing the SDGs—But is it enough? —How business schools are reporting on their engagement in the SDGs. *The International Journal of Management Education*, 20(1), 100589. <https://doi.org/10.1016/j.ijme.2021.100589>

Contact email: nhlabsw@unisa.ac.za

Development of Ayutthaya Metaverse Cultural Learning Resources

Suchart Saenpich, Sukhothai Thammathirat Open University, Thailand
Phisit Nadprasert, Sukhothai Thammathirat Open University, Thailand

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This study focuses on the development of Ayutthaya Metaverse cultural learning resources to promote cultural learning through immersive and realistic experiences. The objectives of this research were: (1) to study and design a model of the Ayutthaya Metaverse for educational and cultural learning purposes for the general public, and (2) to develop Ayutthaya Metaverse cultural learning resources for educational utilization. This study employed a mixed-methods approach. The qualitative phase involved typological analysis and content analysis to identify the key components of the virtual learning environment model. The findings revealed that: 1. The model of the Ayutthaya Metaverse cultural learning resources consists of three main components: (1) Learning Environment, comprising (1.1) Simulation of Experiences and (1.2) Learning Pathways; (2) Media and Learning Models, comprising (2.1) Collaborative Learning and (2.2) Multimedia; and (3) Assessment, comprising (3.1) Task-Based Assessment and (3.2) Question-Based Assessment. 2. The quality assessment of the Ayutthaya Metaverse cultural learning resources yielded a mean score of 4.37, indicating a high level of quality.

Keywords: learning resources, virtual environment, metaverse, Ayutthaya Kingdom

iafor

The International Academic Forum
www.iafor.org

Introduction

The metaverse is an emerging technology that integrates virtual environments with the physical world through immersive three-dimensional digital experiences, enabling users to interact, learn, and construct realistic online identities. In recent years, the metaverse has gained global attention, with significant investments from leading technology companies such as Meta (formerly Facebook), Microsoft, Epic Games, and Tencent, aiming to support the transition toward a future digital society (Suthee Wongprapai, 2022). At the national and urban levels, many countries and major cities have adopted metaverse concepts for urban development, public services, tourism, and learning. Notable examples include Shanghai's integration of metaverse initiatives into its five-year development plan and South Korea's "Metaverse Seoul" project, which aims to enhance public services, tourism, and historical learning through a virtual city platform (Techsauce Team, 2021). In Thailand, initial efforts have been made to develop metaverse-based platforms to support tourism, commerce, and education, particularly in response to changes following the COVID-19 pandemic. However, systematic development of metaverse-based cultural and historical learning resources remains limited.

Ayutthaya is a historical city of great significance to Thailand and serves as a fundamental foundation for the nation's political, administrative, military, cultural, and architectural development. Its influence continued through the Thonburi and Rattanakosin periods. Historical and archaeological evidence indicates that Ayutthaya emerged from the long-term development of communities in the central region of Thailand since around the 12th Buddhist century. The city was uniquely distinguished as an international metropolis, unprecedented in the region. Over its 417-year existence, Ayutthaya developed a well-organized urban structure featuring moats, canals, fortified walls, and clearly designated functional zones. It also functioned as a major center for trade and cultural exchange among diverse international communities. This legacy of prosperity and cultural integration established Ayutthaya as a vital foundation for the later development of Bangkok. (Ayutthaya Historical Park, Fine Arts Department, 2023). Applying metaverse technology to develop cultural learning resources for Ayutthaya presents a promising approach to revitalize historical knowledge through immersive and interactive learning experiences.

Research Methodology

This study employed a mixed-methods research approach to develop a virtual environment learning resource model on the metaverse. The qualitative phase involved typological analysis and content analysis of data obtained from structured interviews with experts to identify key components of the metaverse learning model. The quantitative phase focused on the development and evaluation of the Ayutthaya Metaverse learning resources.

Participants

The participants consisted of 12 experts selected through purposive sampling. The expert panel included four metaverse experts, four learning resource experts, one expert in Thai Studies course content, and three experts in educational technology. All participants were lecturers or professionals with relevant experience in their respective fields for at least three years, except for the metaverse experts, who were required to have a minimum of one year of professional experience related to metaverse development or applications. All experts met the specified selection criteria and voluntarily agreed to participate in the research.

Research Instruments

Two key instruments were employed:

- 1) the metaverse learning model and a structured interview form for expert opinions on the metaverse learning model
- 2) the Ayutthaya Metaverse learning resources

Data Collection

The qualitative phase involved typological analysis and content analysis of data obtained from structured interviews with experts to identify key components of the metaverse learning model. The quantitative phase focused on the development and evaluation of the Ayutthaya Metaverse learning resources.

Data Analysis

Qualitative data analysis involved typological analysis and content analysis. Quantitative data analysis included the calculation of the mean and standard deviation.

Results

Data collection from experts was conducted using in-depth interviews, based on predefined interview questions. The model of the Ayutthaya Metaverse cultural learning resources consists of three main components (1) Learning Environment, comprising (1.1) Simulation of Experiences and (1.2) Learning Pathways; (2) Media and Learning Models, comprising (2.1) Collaborative Learning and (2.2) Multimedia; and (3) Assessment, comprising (3.1) Task-Based Assessment and (3.2) Question-Based Assessment. The results of the evaluation of the Ayutthaya Metaverse cultural learning resource model are presented in Table 1. It was evaluated by three experts, and the details of the results are shown in Table 1.

Table 1

The Results of the Appropriateness Evaluation of the Components of the Ayutthaya Metaverse Cultural Learning Resource Model

The statement	Mean	S.D.	Interpretation
1. Learning Environment, comprising			
1.1 Simulation of Experiences and	4.83	0.39	Strongly agree
1.2 Learning Pathways	5.00	0.00	Strongly agree
2. Media and Learning Models, comprising			
2.1 Collaborative Learning and	4.58	0.51	Strongly agree
2.2 Multimedia	4.83	0.39	Strongly agree
3. Assessment, comprising			
3.1 Task-Based Assessment and	4.75	0.45	Strongly agree
3.3 Question-Based Assessment	5.00	0.00	Strongly agree
The overall	4.83	0.16	Strongly agree

The analysis of expert opinions regarding the appropriateness of the components of the Ayutthaya Metaverse cultural learning resource model revealed that the overall mean score across all components was 4.83, When considering each aspect, the result showed that the experts strongly agreed with each aspect. Specifically, learning pathway design and question-

based assessment achieved the highest mean score of 5.00. This was followed by experience simulation and multimedia, both of which obtained equal mean scores of 4.83.

The results of the quality evaluation of the Ayutthaya Metaverse cultural learning resources. The Ayutthaya Metaverse cultural learning resources were developed as a single metaverse system using Roblox Studio. The quality of the metaverse system was evaluated by three experts, including one metaverse expert, one learning resource expert, and one educational technology expert.

Figure 1

The Ayutthaya Metaverse Cultural Learning Resources



The details of the results are shown in Table 2.

Table 2

The Results of the Quality Evaluation of the Ayutthaya Metaverse Cultural Learning Resources

The statement	Mean	S.D.	Interpretation
1. All content is accurate, reliable, and supported by historical evidence or scholarly sources.	4.00	0.00	High
2. The virtual environment, including buildings, temples, and historical sites, demonstrates a high level of realism and detailed representation.	4.67	0.58	Highest
3. The content aligns with the learning objectives of the target audience.	4.67	0.58	Highest
4. Menus, commands, and interface symbols are clear, user-friendly, and easy to navigate.	4.00	0.00	High
5. The metaverse-based virtual environment is engaging and visually appealing.	4.00	0.00	High
6. The system operates smoothly without lag, freezing, or slow data loading.	4.67	0.58	Highest
7. Visual and audio elements within the virtual environment are of appropriate quality.	4.67	0.58	Highest
8. Learners are motivated to explore and engage further with the content in the virtual environment.	4.33	0.58	High
9. Learners demonstrate a clear improvement in their understanding of history, art, architecture, and ways of life.	4.33	0.58	High
10. The scoring and assessment system is appropriate and easy to use.	4.33	0.58	High
The overall	4.37	0.40	High

The results of the quality evaluation of the Ayutthaya Metaverse cultural learning resources indicated that the overall mean score was 4.37, which corresponds to a high level of quality based on the established Likert scale criteria. Specifically, the realism of the virtual environment, including buildings, temples, and historical sites; the alignment of content with the learning objectives of the target audience; the system's smooth operation without freezing or slow loading; and the quality of visual and audio elements achieved the highest mean score of 4.67, corresponding to the highest level of quality.

Conclusion

This study demonstrates that the Ayutthaya Metaverse cultural learning resource model is systematically structured and appropriate for educational use. The model comprises three main components—learning environment, media and learning models, and assessment—which were evaluated by experts at the highest level of appropriateness. The evaluation results indicated strong expert agreement across all components, particularly in learning

pathways and assessment design. In addition, the developed metaverse system exhibited a high level of quality based on the established Likert scale criteria. Key strengths of the system included realistic virtual environments, alignment with learning objectives, smooth system performance, and appropriate visual and audio quality. Overall, the findings confirm that the Ayutthaya Metaverse cultural learning resources are effective and suitable for supporting cultural learning in digital and immersive learning environments.

Acknowledgments

The researchers would like to thank the Institute for Research and Development, Sukhothai Thammathirat Open University, for supporting the research funding.

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

In the preparation of this research article, the author utilized artificial intelligence tools, specifically ChatGPT, to assist in structuring ideas and enhancing the clarity of the language. All research content, analysis, results, and conclusions presented in this article are solely the work of the author.

References

- Ayutthaya Historical Park. (n.d.). *Sanphet Prasat Throne Hall*. The Fine Arts Department, Ministry of Culture.
<http://virtualhistoricalpark.finearts.go.th/ayutthaya/index.php/en/data.html?layout=edit&id=411>
- Ayutthaya Historical Park. (2023). *History of Ayutthaya*. The Fine Arts Department, Ministry of Culture. <https://www.finearts.go.th/ayutthayahistoricalpark/categorie/history>
- Storeide, M. S. B., George, S., Sole, A., & Hardeberg, J. Y. (2023). Standardization of digitized heritage: a review of implementations of 3D in cultural heritage. *Heritage Science*, 11(1), 1–22. <https://doi.org/10.1186/s40494-023-01079-z>
- Techsauce Team. (2021). *The Seoul Metropolitan Government Announces Its Plan to Become South Korea's First City to Enter the Metaverse and Enable Citizens to Access a Future Emotional City*. <https://techsauce.co/news/seoul-metropolitan-government-enter-the-metaverse>
- Wongprapai, S. (2022). *Metaverse*. Digital Economy Promotion Agency.
<https://www.depa.or.th/en/article-view/metaverse-creative-universe-article>

Contact email: suchart.sae@stou.ac.th

SEPP 2.0—Advanced IoT Hacking Scenarios for Hands-On Security Education

Dominic Hauser, Ostbayerische Technische Hochschule Regensburg, Germany
Julian Graf, Ostbayerische Technische Hochschule Regensburg, Germany
Sebastian Fischer, Ostbayerische Technische Hochschule Regensburg, Germany

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This paper presents SEPP 2.0 (Security Education and Penetration-Testing Platform), the second stage of a practical teaching platform designed to strengthen IoT security education through direct interaction with real devices. Building on the first SEPP version, which was successfully presented and published at IAFOR (Hauser et al., 2025), SEPP 2.0 extends the concept with a larger set of structured, course-aligned exercises within the IoT Security program at Ostbayerische Technische Hochschule Regensburg (OTH Regensburg). The platform integrates real IoT devices such as smart plugs, light bulbs, smart locks, and a Raspberry Pi into a portable suitcase environment. Each exercise is designed to make typical security weaknesses and attack steps tangible for students. The sequence of tasks reflects realistic phases of a security assessment—from information gathering and configuration review to network and communication analysis. Common tools are applied in a guided and safe context to observe network behavior, detect insecure communication, and understand reproducible attack patterns such as replay or denial-of-service. SEPP 2.0 connects these technical elements with reflective learning on current standards and regulations, including ETSI EN 303 645 and the EU Cyber Resilience Act. This combination helps students not only identify vulnerabilities but also translate them into technical and organizational protection requirements. Beyond its local use at OTH Regensburg, SEPP 2.0 was developed with transferability in mind. Its modular structure and detailed documentation allow other universities to adopt, adapt, and expand the platform to fit their own cybersecurity or engineering curricula, making SEPP 2.0 a sustainable model for practice-oriented security education.

Keywords: IoT security, penetration testing, hands-on education, smart home, cybersecurity

iafor

The International Academic Forum
www.iafor.org

Introduction

Advantages and Disadvantages of IoT

The Internet of Things (IoT) has been continuously expanding in recent years, with smart home devices becoming increasingly present in both private homes and industrial environments. These technologies offer numerous advantages, such as more efficient communication, automation of daily routines, and optimization of supply chains in various sectors.

Despite these benefits, the security risks associated with IoT should not be overlooked. To support their wide range of use cases, IoT devices rely on multiple communication protocols and interfaces and must be compatible with numerous platforms such as HomeKit, Alexa, Nest, or SmartHomeAssistant. In theory, this complexity demands frequent vulnerability checks and continuous firmware updates. However, in practice, many devices, especially older or low-cost ones, no longer receive updates, leaving them exposed to potential attacks. Users are often unaware of these risks, making the devices an attractive target for attackers.

SEPP—A Hands-On Platform for Teaching IoT Security

To effectively address the growing risks associated with IoT technologies, it is essential to equip future computer science professionals with a thorough understanding of relevant protocols and the ability to identify potential vulnerabilities. At OTH Regensburg, an IoT security course is already offered, covering a wide range of technologies such as SSH, Nmap, Wi-Fi, Bluetooth Low Energy (BLE), and Wireshark from a theoretical perspective.

However, studies have shown that theory alone is often insufficient to truly internalize the complexity of IoT security. Practical, hands-on exercises, especially those focused on common vulnerabilities such as insecure communication or user tracking, have proven to significantly improve students' ability to understand and mitigate real-world threats (Kolias et al., 2016). Gamified approaches such as Capture the Flag (CTF) competitions further support this goal by increasing motivation and encouraging analytical thinking (Legg et al., 2021). Furthermore, integrating real devices into course curricula has been shown to substantially improve understanding of IoT architectures and security concepts (Sahrani et al., 2024).

To complement the theoretical foundation of the IoT security course with applied experience, the Security Education and Penetration-Testing Platform (SEPP) was developed. As introduced in the first publication, SEPP provides a dedicated learning environment in the form of a portable suitcase containing various IoT devices, including smart plugs, light bulbs, Nuki locks, cameras, and a Raspberry Pi. These components are integrated into a custom-built network to simulate realistic smart home scenarios for practical exercises.

Key Findings and Motivation for Further Development

In the initial implementation of SEPP, a series of practical exercises was tested with a group of students enrolled in the IoT security course. These exercises included typical attack scenarios such as port scanning, traffic analysis, DoS attacks, and replay attacks using tools like Nmap, Wireshark, Netcat, and Scapy. All students were able to complete the tasks with only minimal guidance and successfully applied their theoretical knowledge in a practical environment.

The results confirmed that real-world scenarios and hands-on challenges can significantly improve learning outcomes in the field of cybersecurity. Students reported that especially the direct interaction with real devices helped them understand how vulnerabilities work and how different protocols behave under attack conditions. Although the initial results proved to be very positive, more exercises and tests are needed to confirm and consolidate these findings.

Based on this feedback, the platform is now being expanded. The second part of this work introduces additional exercises, structured along the typical steps of a hacking process as used in the IoT Security course. Each phase is accompanied by one or more hands-on tasks that deepen students' understanding of both technical tools and attack logic. The goal is to gradually build a more structured, flexible, and comprehensive version of SEPP that supports a wider range of use cases and difficulty levels.

Exercises

Existing Exercises

This section provides an overview of the existing and partially tested exercises from the previous version of the SEPP platform. All exercises were designed with the aim of introducing students to common cybersecurity concepts and tools, such as port scanning, packet analysis, traffic monitoring, and DoS attacks with real IoT devices using well-known tools like Nmap, Wireshark, Netcat, and Scapy.

For a detailed description of each exercise, please refer to the previous publication (Hauser et al., 2025).

The exercises included:

- Network scanning with Nmap to identify IoT devices and open ports within a local subnet
- SYN-flood DoS attack using Python and Scapy to simulate denial-of-service behavior on a smart plug
- Traffic monitoring with Wireshark to observe SYN/SYN-ACK patterns and analyze device responses
- Unencrypted command injection using Telnet to directly control a smart bulb via JSON messages
- Replay attacks by resending captured packets to trigger actions on IoT devices
- Encryption testing using Netcat and Wireshark to determine whether communication is in plaintext
- App traffic analysis by capturing packets between smartphone apps and their associated devices.

These exercises proved highly effective in helping students understand the practical use of the listed tools and provided valuable insight into areas that should be prioritized and further developed in the next version of the SEPP project.

Exercise Design Aligned to the Course Structure

Since the whole SEPP project is designed to the practical-part of an already existing course of the OTH Regensburg, the decision was made to create the next exercises aligned to the content

of the course. This should enable a flawless integration into the course, after successfully testing the created exercises.

As SEPP is intended to complement the practical part of the existing IoT Security course at OTH Regensburg, the next set of exercises was aligned with the structure and content of the course. This alignment is expected to enable a more flawless integration into the existing contents followed by a detailed evaluation in the upcoming semester.

Course Chapter 1: IoT and Shodan

This chapter is primarily intended to introduce students to the fundamentals of IoT security and provide an initial overview of common vulnerabilities, device characteristics, and technical limitations.

Among other topics, it covers the OWASP Top 10 vulnerabilities, a regularly updated website with a list of the most critical security issues in the field. The list includes threats such as insecure network services, insufficient authentication, or lack of encryption, which are especially relevant in the IoT context (OWASP, n.d.).

Students also get a first look at the Shodan.io platform. Shodan is a search engine that indexes internet-connected devices and services, allowing users to find unsecured systems, exposed ports, and even specific IoT hardware worldwide. It demonstrates how easy it can be to discover vulnerable devices on the internet with just a few search queries (Shodan, n.d.).

To better illustrate the real-world impact of insecure IoT systems, the Mirai botnet is also introduced in this chapter. Mirai infected over 600,000 devices at its peak by exploiting a hardcoded list of 64 default username and password combinations. The source code of the original botnet is publicly available and serves as a clear example of how poor default security settings can be abused at scale (Antonakakis et al., 2017).

Exercise of This Chapter

Students are encouraged to become familiar with the Shodan.io platform in order to gain an understanding of the general number of vulnerabilities present and the typical number that occur per device. They are also motivated to search for familiar devices within the platform.

Course Chapter 2: Standards and Regulation

In this part of the course, students are introduced to existing IoT security standards and legal requirements that are relevant for consumer devices in Europe and beyond. The goal is to familiarize students with both the technical side and the regulations, as is the case in professional practice.

One of the most relevant and widely accepted standards is ETSI EN 303 645, which defines basic cybersecurity requirements for consumer IoT devices. The standard includes provisions such as the requirement of unique passwords per device, a public vulnerability disclosure process, secure software updates, and minimized attack surfaces. It also addresses data protection, telemetry handling, and secure communication.

The chapter also addresses the Cyber Resilience Act (CRA), a regulation introduced by the European Union aimed at improving the cybersecurity of digital elements in connected products across their entire lifecycle. It outlines requirements for manufacturers to ensure secure design, development, and maintenance, and places greater responsibility on vendors (European Commission, 2025).

To make the content more tangible, several concrete provisions are discussed in the course: for example, ensuring password strength and uniqueness, managing vulnerabilities within 90 days, and enabling secure remote updates through best-practice cryptographic methods.

By the end of this chapter, students should understand the importance of legal and regulatory frameworks and should be able to prescribe technical requirements for a standard such as ETSI EN 303 645 or the Cyber Resilience Act (European Commission, 2025).

Exercise of This Chapter

Given the theoretical nature of this chapter, which is situated in the early stages of the course, there is no practical exercise for now. The students have not yet acquired certain essential knowledge, which will be imparted in the ensuing chapters.

Course Chapter 3: Information and Configuration

This chapter of the course is designed to provide the students with an initial in-depth insight into the side of IoT devices and their potential vulnerabilities. In order to achieve this objective, the first step is to describe the information typically provided by the manufacturer or retailer. This information includes technical details, the current software version, the duration of device updates, and an address to contact the manufacturer to report any security vulnerabilities.

In addition, students are shown how and where to search for already known vulnerabilities related to specific devices. The course introduces platforms such as <https://cve.mitre.org> and <https://www.cvedetails.com>, which allow targeted searches for reported vulnerabilities. These sites provide essential data, including severity ratings, disclosure dates, known exploitability (e.g., remote code execution via buffer overflows), and information about whether the vulnerability has already been patched.

The students also learn why this type of research is important when assessing a device's security posture. For example, some vulnerabilities affect multiple devices using the same code base or shared third-party libraries (e.g., OpenSSL). In other cases, outdated communication protocols or rebranded hardware can make it difficult to track and evaluate known issues properly.

To put these aspects into context, the course uses a sample device and guides students through the configuration and setup process. The goal is not only to understand technical details, but also to critically evaluate where and how vulnerabilities can emerge.

Exercise of This Chapter: Writing an Essay

To support the content of this and the following chapters, students start with a written security-focused paper on a selected IoT device. The goal is not only to try to perform technical attacks, it is also to critically examine the device's setup and configuration process and identify potential security issues based on available information (e.g. from the former described websites).

Students work with a test device, such as the HP OfficeJet Pro 6970 or a similar IoT product. For this chapter, students document relevant aspects of the setup process, including the use of local or cloud accounts, default passwords, enabled services and interfaces (e.g., Wi-Fi Direct-Use), password policies, and whether users can increase or reduce security through the available options. They are also asked to research known vulnerabilities and briefly assess whether related issues exist for the device or similar models from the same manufacturer.

Course Chapter 4: Nmap, Telnet and SSH

Chapter 4 introduces students to core network analysis and communication tools that are essential when working with IoT devices. The focus is on three key technologies: Nmap for network and port scanning, Telnet for interacting with services over plaintext protocols, and SSH for secure remote access.

Students learn how to perform different types of scans using Nmap, such as host discovery within a subnet and service detection on specific devices. They also analyze scan results to understand which ports are open, what services are running, and how this information could be relevant in a security context. As a practical example, the HP OfficeJet Pro 6970 is used to demonstrate Nmap scans, which reveal open ports such as 80 (HTTP), 443 (HTTPS), and 9220 (Telnet).

Telnet is introduced as an outdated but still occasionally used protocol, especially in older or misconfigured devices. Students are taught how Telnet can be used to interact with exposed services, and why its unencrypted nature presents a major security risk. The HP GW service on port 9220 serves as an example for hands-on interaction and exploration.

Finally, SSH is presented as a secure alternative to Telnet. Students learn how SSH encrypts communication, supports key-based authentication, and is commonly used for secure remote access to IoT devices or backend systems.

This chapter continues the device analysis started in Chapter 3, now focusing on exposed ports and communication protocols. The results contribute to the overall security evaluation of the selected IoT device.

Exercise of This Chapter: Investigation of an IoT Smart Plug

This exercise has previously been evaluated in the context of the first paper on the SEPP project, resulting in very positive outcomes. Therefore, it was decided to adopt and integrate the exercise without implementing any significant modifications.

Students start by identifying the IP address of the EIGHTREE smart plug within the local network and scanning it for open TCP and UDP ports using nmap. This introduces key concepts like IP ranges, MAC address identification, and basic service enumeration.

In the second task, a SYN-flooding DoS attack is simulated using a partially completed Python script and the Scapy library. Students fill in the missing target parameters and observe how the attack affects device availability. Later parts of this exercise like the investigation of the network traffic using Wireshark are optional for the students since these techniques were not introduced yet.

Course Chapter 5: WiFi

In about half of the course, students are introduced to the topic of WiFi. First, they learn basic facts such as the IEEE 802.11 standard and the different frequency bands used in wireless communication (2.4 GHz, 5 GHz and 60 GHz).

Afterwards, the chapter focuses on the various encryption methods used in WiFi communication. Students start with WEP, which is completely outdated and can be cracked within minutes due to weak initialization vectors and static keys. Tools like Aircrack-ng are discussed as part of the theoretical background.

Then, the course moves on to WPA, which has been considered broken since 2008. The transition to WPA2 added AES encryption and improved reliability, but also introduced new attack vectors like KRACK. Finally, WPA3 is introduced as the current standard, offering forward secrecy and stronger key exchange mechanisms, but with limitations such as downgrade attacks (e.g. Dragonblood).

Authentication methods are also discussed. Students learn the difference between Pre-Shared Key (PSK) and Extensible Authentication Protocol (EAP), including advantages such as better user management. WiFi Protected Setup (WPS) is introduced as a convenience feature that can create security problems due to design flaws and brute-force vulnerability. The chapter concludes with a short demonstration of the WiFi hacking tool aircrack-ng, which students may also explore as part of their ongoing essay work.

Exercise 1 of This Chapter: Brute-Force WPS Hacking

Two exercises have been created for this chapter of the course, of which only the first relates directly to the WPS hacking content. The second exercise deals with the topic of Intrusion Detection Software, which requires both, initiative and the transfer of previously learned methods to new content. It is not yet clear whether both will be used within a semester, as they still need to be tested for practical suitability and duration.

In the first exercise, students perform a practical attack on a WiFi network protected by WPS (Wi-Fi Protected Setup). Using the tool reaver, they brute-force the WPS PIN to gain access to the network without knowing the actual password. The setup includes the preconfigured Raspberry Pi network with multiple IoT devices including an Android smartphone of the SEPP project. Before launching the attack, students activate monitor mode on their wireless adapter and identify relevant network parameters such as BSSID and channel. The goal is to demonstrate how insecure PIN secured WPS implementations can be exploited in practice and why disabling WPS is a crucial security measure.

Exercise 2 of This Chapter: WiFi Port Analysis

In this advanced exercise, students are encouraged to put their acquired knowledge into practice themselves. For this purpose, the students should familiarize themselves with the topic of Intrusion Detection Systems (IDS) and how they can be used to detect suspicious activity in IoT environments. A custom IDS script (IDS.py) is provided to run in parallel with a simple server. The server listens on a predefined port, and students initiate network communication via telnet and controlled nmap scans. The IDS identifies specific scan types based on

predefined rules and raises alerts in real-time. All captured traffic is logged and saved as a .pcap file for further analysis.

In the second part, students may optionally use Wireshark to analyze the recorded network traffic with the .pcap file. Because Wireshark is not yet introduced in the course, this task is only optional. Interested students are encouraged to explore it on their own by attempting to identify communication patterns, scan behavior, and how specific packets triggered IDS alerts. This optional step provides additional insight into traffic-level detection and supports a deeper understanding of how IDS mechanisms operate.

Course Chapter 6: Bluetooth

This chapter introduces Bluetooth as a key technology in many IoT devices and outlines its basic functionality, including operating frequencies, connection models, and protocol structure. Special focus is placed on Bluetooth Low Energy (BLE), which is widely used due to its low power consumption. Students learn about Bluetooth profiles and GATT (Generic Attribute Profile), which define how services and data are structured on BLE devices. The chapter also introduces basic security concepts such as pairing, bonding, authentication, and encryption—starting from legacy PIN-based pairing to modern Secure Simple Pairing (SSP) with elliptic curve cryptography.

A major part of the chapter is dedicated to practical Bluetooth hacking techniques. Students are introduced to tools such as btlejack, gatttool, hcitool, bluemahoe, sdptool, and redfang. These tools allow for device scanning, brute-force pairing attempts, GATT-level interactions, jamming, hijacking, and spoofing of Bluetooth traffic. The functionality and limitations of each tool are briefly discussed, along with typical use cases in a lab setting.

To illustrate real-world impact, several Bluetooth vulnerabilities are covered in this chapter, including BlueBorne, BIAS, KNOB, Braktooth, and BLUFFS. Each of these demonstrates how flaws in Bluetooth can be exploited, even in newer versions of the protocol. Students are asked to review their assigned devices for Bluetooth vulnerabilities as well as performing a GATT scan for their essay.

Three different exercises were created for this chapter, all of which are still under evaluation and not yet fully tested in class. Exercise 3 is still in development and may be included in future iterations of the course.

Exercise 1 of This Chapter: BlueDucky Attack on Android Devices

This exercise demonstrates a real-world Bluetooth vulnerability on Android smartphones using the BlueDucky framework. The goal is to exploit outdated security patches and inject keystrokes via a Bluetooth HID profile. Students begin by identifying their device's patch level and checking for unpatched CVEs. On a compatible attack system of the SEPP project, the BlueDucky.py script is run to simulate keystroke injection. Predefined payloads are used to send SMS messages or download APKs to the victim device. Students are also encouraged to develop their own payloads and reflect on potential mitigation strategies.

Exercise 2 of This Chapter: BLE Traffic Capture and Analysis

In this exercise, students analyze the communication of Bluetooth Low Energy (BLE) devices using standard Linux tools. The focus is on passive monitoring and capturing of BLE traffic with `btmon`, `bluez`, and `hcitool`. Then a connection will be established to a designated temperature sensor in the test environment of the SEPP project. For students which already have experience with Wireshark or for interested ones, the traffic gets recorded and exported for inspection with Wireshark. Students document their findings and identify potential privacy or security issues, such as unencrypted data. As an alternative or extension, students may extract Bluetooth logs directly from the Android smartphone in the SEPP suitcase using the HCI snoop function.

Exercise 3 of This Chapter: BLE Information Leak and DoS Attack

This exercise is still under development and will be tested in a future version of the SEPP project.

In this exercise, students analyze the Bluetooth communication of two different Nuki Smart Locks using the BLE protocol. For this purpose, the students should split up in two teams. The goal is to extract device-specific information such as serial number, firmware revision, and model number using Python scripts based on the `bleak` library. Students first identify the target devices using the `nRF Connect for Mobile` app and then extend a given script to query readable GATT characteristics.

In the second part, students modify a preconfigured Python script to simulate a DoS attack. The impact of the attack is monitored through the smartphone app, which is connected to the lock. As a final step, students are encouraged to compare their results with the other team. Since the two Locks are from different revisions, only the older one should lose the connection to the App by the DoS attack.

Course Chapter 7: Other Protocols in IoT

This chapter provides a short overview of less commonly discussed protocols that are still relevant in the context of IoT security. Students are introduced to ZigBee, Z-Wave, DECT, LoRaWAN, MQTT and Matter. Each protocol is briefly described with regard to its technical features and security implications. Examples include fallback keys and key distribution issues in ZigBee, weak encryption in early DECT implementations, and (disabled by default) TLS encryption in MQTT. Students are encouraged to document any of these protocols if they appear in their assigned device and to investigate vulnerabilities for their essay.

Exercise of This Chapter: MQTT Service Traffic Analysis

This exercise is still under development and will be tested in a future version of the SEPP project.

Course Chapter 8: Communication and Protocol Security

Chapter 8 focuses on the security of communication protocols used in IoT environments. Students are introduced to TLS and its predecessor SSL, along with key security features such as symmetric encryption, public-key cryptography, and message authentication. The TLS handshake and Public Key Infrastructure (PKI) are explained to show how authenticity is

ensured in encrypted communication. Datagram TLS (DTLS) is also covered as a variant optimized for UDP-based connections, which are common in IoT. Technical considerations such as handshake size and certificate optimization are briefly addressed.

In the second part, students explore how to analyze network traffic using Wireshark. This includes capturing, filtering and interpreting communication between IoT devices in a network. If possible, students are encouraged to perform basic Man-in-the-Middle attacks as well as data traffic analysis with Wireshark as part of their essay. The tool `sslstrip` is briefly introduced to demonstrate how HTTPS connections can be redirected to HTTP.

Exercise 1 of This Chapter: Replay Attack on an IoT Smart Bulb

This exercise was also already tested in the progress of the first SEPP paper and was also directly integrated into the course, since the results of various tests were consistently positive. The goal is, to simulate a replay attack on a smart light bulb (Yeelight) out of the SEPP suitcase using multiple techniques introduced in previous chapters. Students first perform a network scan using `nmap` to locate the device and identify an open TCP port. A connection is then established using `telnet`, through which control commands in JSON format are manually sent to switch the bulb on and off. The associated network traffic is recorded using Wireshark, allowing students to analyze whether the transmitted data is encrypted or readable in plaintext.

In the final part of the exercise, students connect to the platform's Raspberry Pi via `ssh` and capture live traffic using `tcpdump`. The resulting `.pcap` file is transferred to the local system and used as a basis for scripting a replay attack in Python with the help of Scapy. A provided script must be completed by inserting the correct parameters and the replay payload. When executed, the script reproduces the captured control command, successfully manipulating the device without user interaction. The exercise highlights both, the impact of unencrypted local traffic and the importance of authentication at the application layer.

Exercise 2 of This Chapter: SSL Stripping

This exercise is still under development and will be tested in a future version of the SEPP project.

Course Chapter 9: Web Interfaces and Firmware

For this chapter, students are introduced to the OWASP Zed Attack Proxy (ZAP), an open-source tool for analyzing and testing web applications. ZAP is used to detect common web vulnerabilities by analyzing and manipulating HTTP traffic between client and server. The course demonstrates how web-interfaces or configuration interfaces can be analyzed for weaknesses using ZAP. Afterwards, students are encouraged to check whether their assigned device offers a web-interface and to document any relevant findings in their essay.

The second part of the chapter deals with firmware security and reverse engineering. Students learn about common update methods (e.g. manual vs. automatic), the importance of signature validation, and the risks of fake or downgraded firmware. If the firmware is publicly accessible, it can be downloaded and analyzed using Ghidra, an open-source reverse engineering tool developed by the NSA. The course emphasizes that most firmware is not open source, making transparency and verification more difficult. Students are asked to evaluate how firmware

updates are handled on their assigned device and to identify potential weak points in the update process.

Exercise of This Chapter: Siemens Logo!

Web Interface Hacking. This exercise is still under development and will be tested in a future version of the SEPP project.

Conclusion and Outlook

The positive results from the initial SEPP evaluation, as documented in the first paper (Hauser et al., 2025), proved to be an important basis for the further development of the platform. Feedback from students as well as investigations while testing the first exercises helped identify which tools and techniques should also be integrated into the SEPP project. These insights helped to design new exercises, which were mostly covered in this paper. Also, most of the new exercises could be integrated into the according course to the project with only minor adjustments. The course structure provided a natural framework for aligning these tasks with specific learning objectives.

While some exercises have already been tested with students, others are still in development or awaiting practical validation. All exercises introduced in this paper, regardless of their current status, are scheduled to be evaluated in the upcoming semester. In this context, the focus will not only be on technical practicability and learning effectiveness but also on how the individual tasks fit into the overall concept of a modular, scalable teaching platform.

As a further step, selected exercises will also be tested by an AI system to explore whether automated methods can solve or support parts of the hands-on challenges. This approach is intended to provide insights into the potential of artificial intelligence in practical cybersecurity education as well as in hacking approaches. The results and will be documented in future iterations of the SEPP project.

References

- Antonakakis, M., April, T., Bailey, M., Bernhard, M., Bursztein, E., Cochran, J., Durumeric, Z., Halderman, J. A., Invernizzi, L., Kallitsis, M., Kumar, D., Lever, C., Ma, Z., Mason, J., Menscher, D., Seaman, C., Sullivan, N., Thomas, K., & Zhou, Y. (2017). Understanding the Mirai botnet. In *Proceedings of the 26th USENIX Security Symposium* (pp. 1093–1110).
- Chothia, T., & de Ruiter, J. (2016). Learning from others' mistakes: Penetration testing IoT devices in the classroom. In *ASE Workshop at the USENIX Security Symposium*. <https://api.semanticscholar.org/CorpusID:217195674>
- European Commission. (2025). *Cyber resilience act*. <https://digital-strategy.ec.europa.eu/en/policies/cyber-resilience-act>
- Hauser, D., Graf, J., Fischer, S., & Hackenberg, R. (2025). SEPP: Security education and penetration-testing platform for IoT. In *The European Conference on Education 2025: Official Conference Proceedings* (pp. 443–453). <https://doi.org/10.22492/issn.2188-1162.2025.36>
- Junior, A. O., Funchal, G., Queiroz, J., Loureiro, J., Pedrosa, T., Parra, J., & Leitão, P. (2022). Learning cybersecurity in IoT-based applications through a capture the flag competition. In *2022 IEEE 20th International Conference on Industrial Informatics (INDIN)* (pp. 560–565). <https://doi.org/10.1109/INDIN51773.2022.9976079>
- Kolias, C., Stavrou, A., Voas, J., Bojanova, I., & Kuhn, R. (2016). Learning Internet-of-Things security hands-on. *IEEE Security & Privacy*, 14(1), 37–46. <https://doi.org/10.1109/MSP.2016.4>
- Legg, P., Higgs, T., Spruhan, P., White, J., & Johnson, I. (2021). Hacking an IoT home: New opportunities for cyber security education combining remote learning with cyber-physical systems. In *2021 International Conference on Cyber Situational Awareness, Data Analytics and Assessment (CyberSA)* (pp. 1–4). <https://doi.org/10.1109/CyberSA52016.2021.9478251>
- OWASP. (n.d.). <https://owasp.org>
- Sahrani, S., Saad, M. H. M., Mutalib, A. A., & Zaidel, D. N. A. (2024). Incorporating the Internet of Things (IoT) learning module into the smart building course. *Jurnal Kejuruteraan*. <https://api.semanticscholar.org/CorpusID:269323964>
- Shodan. (n.d.). <https://www.shodan.io>
- Zed Attack Proxy. (n.d.). <https://www.zaproxy.org>

Contact email: d.hauser93@icloud.com

From Classroom to Career: Voices on Employability Challenges and Curriculum Relevance

Hong-Van Nghiem, Hanoi University, Vietnam
Thi-Hong-Thuy Dang, Hanoi University, Vietnam
Hoang-Nam Tran, Tokushima University, Japan

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

Employability of graduates continues to be a central concern for higher education in Vietnam, particularly as graduates navigate increasingly competitive labor markets. This study explores how graduates from a public university in Vietnam perceive the challenges and enablers shaping their transition from university to employment. Drawing on qualitative responses from five cohorts (2020–2024), the analysis applies Braun and Clarke’s thematic approach to open-ended survey questions on unemployment reasons, effective preparation experiences, and suggestions for curriculum improvement. The findings highlight six interconnected themes: the need for earlier and more structured internships, gaps in professional and technical skills, limited access to job information, persistent language barriers, insufficient soft-skill development, and the misalignment between academic programs and industry needs. Graduates consistently emphasized the importance of real-world exposure, language and IT competence, and stronger collaboration between universities and employers. These findings point toward the necessity of curriculum reform, enhanced career services, and integrated employability pathways that connect classroom learning with real-world practice. The study also underscores the role of qualitative feedback for rethinking higher education contribution to workforce readiness in Vietnam.

Keywords: graduate employability, internships, curriculum, language proficiency, soft skills, Vietnam, thematic analysis

iafor

The International Academic Forum
www.iafor.org

Introduction

Across higher education worldwide, employability has moved from a peripheral concern to a central organizing principle for curricula, pedagogy, and quality assurance. Classic frameworks emphasize that employability is not a single outcome (a job) but a set of achievements: knowledge, skills, and attributes, that make graduates more likely to gain employment and succeed in their chosen occupations (Yorke & Knight, 2006). This shift has been accelerated by megatrends—automation, digitalization, demographic aging, and climate transitions—that are reshaping work and the skill bundles demanded by employers at unprecedented speed (OECD, 2023). Global policy syntheses estimate that well over a billion jobs will be transformed in the coming decade, while hundreds of millions of youth and adults require upskilling or reskilling to participate meaningfully in labor markets (OECD, 2023; World Bank, 2023b).

Within this landscape, universities are challenged to connect classroom learning to real contexts of practice. International scholarship has consolidated several levers that reliably strengthen early career outcomes: (i) curriculum relevance (up-to-date disciplinary and technical content), (ii) work-integrated learning (WIL) such as internships and authentic projects, (iii) development and recognition of transferable skills such as communication and teamwork, and (iv) systematic career intermediation that improves students' access to job information and networks (Braun & Clarke, 2006; Oliver, 2015). Syntheses also caution that “employability” should not be reduced to generic soft skills or narrow placement metrics; rather, it is best embedded into the curriculum and assessed in ways that integrate subject knowledge with practice (OECD, 2023; Yorke & Knight, 2006). Recent empirical studies further emphasize that graduates' perceptions of curriculum relevance and practical alignment are critical indicators of employability readiness, highlighting the importance of incorporating student voice into curriculum reform processes (H. Tran et al., 2023).

Southeast Asian systems face these global pressures with additional regional dynamics: rapid structural change, uneven digital diffusion, and significant intra-ASEAN mobility. Regional analyses argue that thriving in such conditions requires stronger alignment between skills formation and industry needs, better use of skills in workplaces, and cross-border collaboration on talent pipelines (ASEAN Secretariat, 2025; OECD, 2023). Recent research from Japan further shows a growing scholarly and policy interest in understanding Vietnamese cultural characteristics in the context of labor migration and international student mobility, reflecting the recognition that employability and integration outcomes are closely tied to mutual cultural understanding between host societies and migrant populations (H. N. Tran, 2023). ASEAN studies also highlight student mobility and WIL as boosters of graduate employability by expanding networks, intercultural competencies, and exposure to diverse work practices (ASEAN Secretariat, 2025). Recent regional strategy work urges coordinated action among ministries, employers, and higher education institutions to modernize curricula, scale experiential learning, and improve information flows about labor demand (OECD, 2023; Oliver, 2015).

Vietnam's transition toward higher value-added activities has intensified attention to graduate outcomes. World Bank diagnostics describe a skills premium alongside skills mismatches: graduates enjoy strong private returns to higher education, yet firms—especially in dynamic sectors—report difficulty finding workers with the right mix of technical, digital, and socio-behavioral skills (Demombynes & Testaverde, 2018; World Bank, 2013, 2023b). Multiple studies note that unemployment is often elevated immediately after graduation (a transition

effect) but declines with experience; nonetheless, employer surveys frequently cite inadequate practical preparation and limited job-search capabilities as key constraints (Bhandari, 2023; Judy Yang & Tran, 2022). Recent analyses underscore the growing need for digital fluency, analytical capability, and stronger workplace communication (World Bank, 2023a). Policy briefs further emphasize demand for advanced digital skills such as cloud, cybersecurity, and AI/ML across sectors (Judy Yang & Tran, 2022; World Bank, 2023b, 2023a).

The current study analyzes open-ended survey responses of university graduates in Vietnam to describe (i) barriers to employment, (ii) experiences that helped them secure jobs, and (iii) recommendations for improving training and services.

Methods

Design and Data Source

This qualitative component forms part of a broader mixed methods graduates employability study conducted at a public university in Vietnam, targeting five consecutive cohorts graduating between 2019 and 2023. The institutional graduate tracer survey is administered annually, approximately 14 months after each cohort's graduation, in accordance with national higher-education quality-assurance guidelines. This timing allows respondents sufficient post-graduation experience to provide reflective insights on their employment trajectory, job relevance, and perceptions of curricular adequacy while minimizing recall bias (OECD, 2023; World Bank, 2023b).

All graduates from a specific Faculty within the university were invited to participate through email and online survey links distributed by the researchers. Participation was voluntary and anonymized, with informed consent obtained electronically. The survey design followed tracer-study frameworks widely adopted across ASEAN universities (ASEAN Secretariat, 2025), combining quantitative indicators of employment outcomes with qualitative prompts to elicit contextual responses.

The qualitative section of the questionnaire consisted of open-ended written responses addressing four central questions: (i) Reasons for not having a job; (ii) Experiences that helped graduates secure employment; (iii) Suggestions for improving the university's training to meet employer needs; and (iv) Reasons for intending to change jobs (if applicable). These prompts were intentionally framed to capture graduates' self-perceived barriers, enablers, and institutional expectations, aligning with thematic areas recommended by international tracer-study guidelines (OECD, 2023; World Bank, 2013). The dataset analyzed in this paper was drawn exclusively from the qualitative survey data representing responses from graduates across the five cohorts. Record identifiers were removed before analysis.

Analysis

All open-ended responses were imported into Microsoft Excel and subsequently cleaned and standardized before analysis. Text entries containing spelling inconsistencies, emoticons, or non-semantic fillers were removed, while original meaning and nuance were preserved. Responses in Vietnamese were translated into English by two bilingual research assistants, then backchecked by a faculty reviewer to ensure conceptual equivalence and cultural fidelity. Analysis followed the reflexive thematic analysis procedure (Braun & Clarke, 2006), which emphasizes researcher reflexivity and interpretive depth rather than mechanical coding

reliability. An iterative hybrid approach combined inductive insights from the data with deductive anchors derived from the survey structure and existing employability literature (OECD, 2023; Yorke & Knight, 2006). Coding was performed manually, supported by frequency tallies and keyword mapping in Excel to ensure transparency.

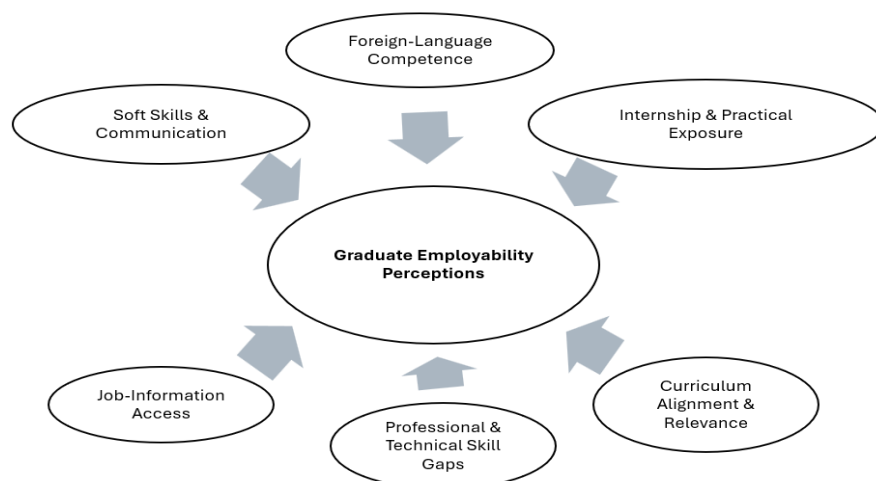
To strengthen analytic credibility, triangulation was applied: two coders independently analyzed approximately 25% of the corpus and compared coding frames, refining definitions until conceptual saturation was achieved. Discrepancies were discussed and resolved through consensus, a process preferred in reflexive qualitative research over statistical inter-coder reliability (Braun & Clarke, 2022). Reflexive memos were maintained throughout to document interpretive decisions and enhance confirmability. Verbatim excerpts were selected for inclusion based on representativeness, clarity, and diversity of viewpoints rather than frequency alone, following guidance from qualitative reporting standards (Nowell et al., 2017).

Results

Analysis of 923 valid qualitative responses from graduates across five cohorts (2019–2023) revealed a coherent and interconnected structure of employability perceptions. Six overarching themes emerged, representing recurring priorities and constraints identified by respondents: (1) internship and practical exposure, (2) professional and technical skill gaps, (3) job-information access, (4) foreign-language competence, (5) soft skills and communication, and (6) curriculum alignment and relevance. Each theme is described below with representative translated excerpts (Figure 1).

Figure 1

Thematic Map of Graduate Employability Perceptions



Internship and Practical Exposure

A dominant and cross-cutting concern among respondents was the insufficient duration and depth of internship experiences during undergraduate study. Students often viewed short or late-stage placements as inadequate preparation for workplace realities. Many students want to start internships earlier and extend them across multiple semesters to enhance applied learning and confidence.

“Students should proactively seek opportunities at companies earlier, not just as a formality in the final semester” (Male, 2021).

Graduates emphasized that meaningful internships helped them build professional networks, understand organizational culture, and test their career interests. Those who had more structured placements reported smoother transitions into full-time employment.

“Make full use of the internship period to gain real experience; theory alone is not enough” (Female, 2022).

These findings underscore the value of embedding WIL as a continuous rather than terminal component of undergraduate curricula, with explicit learning outcomes and employer feedback mechanisms.

Skill Gaps in Professional and Technical Competencies

Respondents frequently highlighted deficiencies in specialized or technical skills required in their respective fields.

“Equip students with updated specialized knowledge and emphasize the importance of continuous self-improvement” (Male, 2020).

Language-major students, for instance, mentioned the need for stronger training in applied translation tools, digital content production, and industry-specific knowledge. Graduates in business, information technology, and social sciences echoed similar concerns regarding technological readiness and analytical proficiency.

“Language students still need more professional knowledge to work in related industries” (Female, 2023).

Graduates recognize the importance of discipline-specific upskilling, suggesting that universities should regularly review course syllabi, integrate micro-credential modules, and engage employers in competency mapping to ensure alignment with sectoral demands.

Job-Information Access and Career Intermediation

Another major theme related to limited access to job information, employer connections, and recruitment support. Respondents often relied on informal networks, social media, or peers rather than structured university platforms. Many noted that career fairs or employer talks were either infrequent or not well-publicized.

“I found jobs from many sources — friends, teachers, and online platforms — but not always from the university channel” (Female, 2021).

“It would help if departments regularly updated information about job opportunities or alumni working in companies” (Male, 2022).

The findings reveal the need for a centralized career information system with stronger employer partnerships, curated job boards, and alumni mentorship to improve transparency and reduce search frictions.

Foreign Language Competence

Even among graduates from language-intensive programs, foreign-language proficiency remains a recurring self-assessed limitation, particularly in speaking and workplace communication. Respondents emphasized that competitive job markets require proficiency beyond academic grammar, especially in business English, Japanese, or other foreign languages relevant to industry contexts.

“Be fluent in a foreign language and add a second major or skill to increase competitiveness” (Female, 2020).

“Students should look for opportunities to practice their foreign language early, not wait until senior year” (Male, 2022).

Graduates view language proficiency as a decisive employability asset. Universities could enhance learning outcomes by embedding Language for Specific Purposes (LSP) modules, partnering with language centers, and incentivizing students to achieve recognized proficiency benchmarks (IELTS, JLPT, TOEIC, etc.).

Soft Skills and Communication

Respondents widely acknowledged the growing importance of soft skills such as teamwork, presentation, and problem-solving abilities. Some perceived these skills as insufficiently integrated into the curriculum, while others credited extracurricular or volunteer experiences for their development.

“Add more speaking and listening practice so students feel more confident during interviews and meetings” (Female, 2023).

“Students should keep improving soft skills and take practical short courses beyond the syllabus” (Male, 2019).

Consistent with global and regional findings (OECD, 2023; ASEAN Secretariat, 2025), these results point to the necessity of embedding communication and interpersonal competencies into graded coursework, rather than offering them as optional workshops.

Curriculum Alignment and Relevance

Many graduates explicitly linked employability to the relevance and responsiveness of the curriculum. Comments reflected frustration with theoretical or outdated modules that lacked connection to evolving industry requirements. Respondents proposed integrating case studies, applied projects, and cross-disciplinary subjects that mirror real-world complexity.

“Update courses to match labor-market trends and combine theory with company projects” (Female, 2021).

“Some subjects overlap or feel outdated; they should be reviewed and adjusted” (Male, 2022).

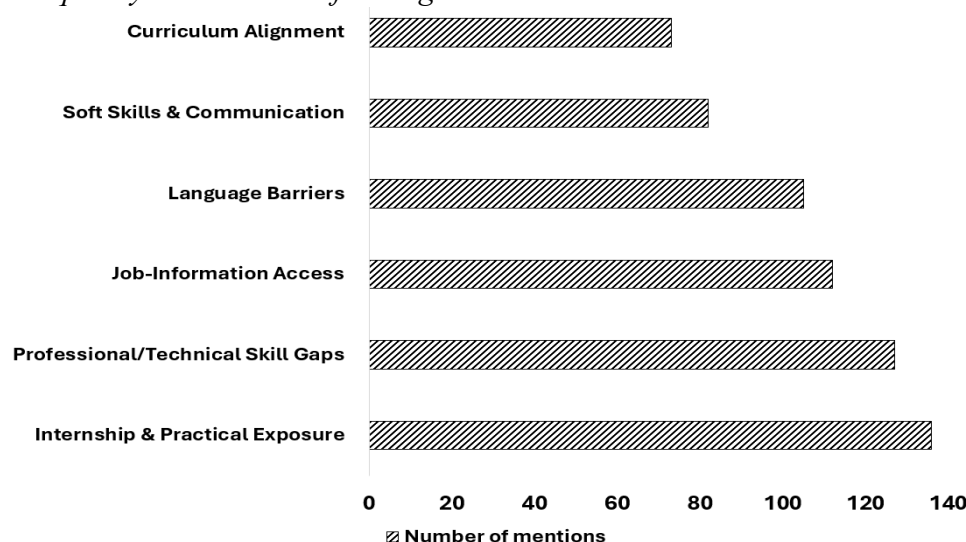
Graduates articulate a clear demand for curriculum modernization through joint academic–industry review mechanisms, outcome-based education (OBE) design, and employer co-teaching to maintain currency and relevance.

Summary of Thematic Prevalence

Quantitative coding revealed the following frequency distribution (Figure 2). Internship and practical exposure (136 mentions), skill gap (127), job-information access (112), language barriers (105), soft skills (82), and curriculum alignment (73). Together, these six clusters accounted for more than 80 percent of all coded responses. The prevalence of interrelated themes suggests that graduates view employability as an ecosystem of capabilities, a combination of practical experience, specialized knowledge, and institutional support rather than any single factor.

Figure 2

Frequency Distribution of Emergent Themes



Discussion

The qualitative findings reveal an interdependent ecosystem of factors shaping graduate employability in Vietnam’s higher-education landscape. Graduates perceive employability not as a single outcome but as a cumulative process of skill development, practical exposure, and institutional support that begins long before graduation. This view aligns with contemporary global models of “embedded employability,” where universities integrate workplace readiness across curricular, co-curricular, and career-service dimensions (OECD, 2023; Oliver, 2015; Yorke & Knight, 2006).

Interpreting the Six Themes

Internship and practical exposure. The prominence of internship-related feedback echoes the global consensus that WIL is among the most effective mechanisms for improving graduate outcomes (ASEAN Secretariat, 2025; Oliver, 2015). Graduates call for earlier, longer, and better-supervised internships indicate a need to institutionalize WIL as a core component rather than an optional activity. Compared to ASEAN benchmarks, where multi-semester internships and cooperative education models are increasingly normalized, most Vietnamese programs still

treat internships as short-term “end-of-study” requirements. Scaling structured, credit-bearing internships, with defined learning outcomes and employer evaluations, could meaningfully narrow the classroom-to-career gap.

Professional and technical skill gaps. The emphasis on technical or professional skill deficiencies aligns with regional employer surveys that consistently cite “skills mismatch” as a key constraint to productivity (Economist Impact, 2023; World Bank, 2013). In particular, the call for up-to-date technical and digital literacy suggests universities should adopt a modular curriculum architecture, enabling rapid introduction of new topics such as data analytics, sustainability management, or AI applications without overhauling entire degree programs. Industry co-design of such modules would also ensure responsiveness to evolving sectoral demands.

Job-information access and career intermediation. Graduates expressed difficulties in accessing reliable job information confirm the limited reach of university career services in Vietnam (World Bank, 2023a). International studies demonstrate that career intermediation infrastructure, including job portals, alumni networks, and labor-market analytics, significantly increases the transparency of employment opportunities and reduces search friction. The creation of a centralized, digital career platform at the faculty or university level, linked to national graduate tracking systems, would not only help students but also generate valuable longitudinal data for policymakers.

Foreign-language competence. Language barriers emerged as a recurrent and self-critical theme, even among students from language-intensive majors. This suggests a disconnect between academic language instruction and workplace communication needs. As English and Japanese continue to dominate cross-border business and technology sectors in Vietnam, embedding LSP courses and professional communication training across disciplines could strengthen graduates’ mobility and employability (ASEAN Secretariat, 2025; OECD, 2023).

Soft skills and communication. Consistent with global research, communication and interpersonal skills remain central to graduate perceived employability (OECD, 2023; Yorke & Knight, 2006). However, the persistence of this gap implies that such skills are still treated as peripheral or extracurricular. Integrating assessed soft-skill components, for example, presentations, teamwork evaluations, and client simulations, into core coursework would create accountability and signal institutional prioritization.

Curriculum alignment and relevance. These perceptions echo recent international evidence showing that misalignment between curriculum content and labor-market requirements remains a persistent barrier to graduate employability, particularly when programs emphasize theoretical coverage over applied learning and industry engagement (H. Tran et al., 2023). The call for continuous curriculum renewal reflects a universal challenge of higher education systems in rapidly industrializing economies. Many Vietnamese curricula still emphasize content coverage over problem-solving and innovation. The shift toward OBE frameworks and industry-academic advisory boards can institutionalize periodic curriculum audits, ensuring that programs remain responsive to national and global labor-market dynamics (OECD, 2023; World Bank, 2013).

Implications, Contribution and Limitations

The findings underscore that improving graduate employability requires systemic coordination rather than separate interventions. The following strategic levers emerge:

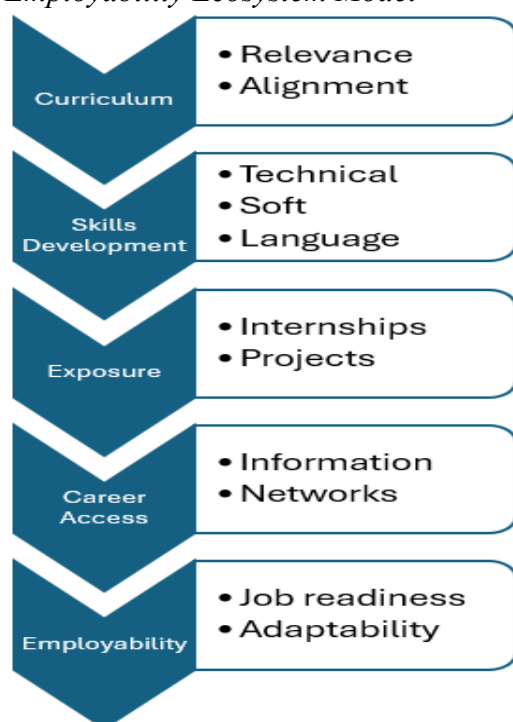
- Curriculum modernization: Institutionalize annual curriculum reviews involving employers, alumni, and accreditation agencies to ensure alignment with national skills frameworks and emerging sectors.
- Integrated work-based learning: Expand multi-semester internships and capstone projects with clear performance criteria and reflective assessment.
- Career intelligence systems: Build university-wide digital career platforms that connect students, alumni, and employers, supporting both job-matching and skills-tracking.
- Language and transversal skills integration: Embed English and Japanese for professional communication, teamwork, and problem-solving modules into credit-bearing courses.

All together, these interventions can shift universities from producing “graduates seeking jobs” to nurturing “graduates creating employability”, individuals with adaptive competencies, networked opportunities, and lifelong learning capacities. From the results, a conceptual employability ecosystem model for Vietnamese universities could be suggested (Figure 3).

The implications extend beyond a single institution. Embedding work-integrated learning, language-for-work pedagogy, and career intelligence systems into higher-education structures can enhance both national competitiveness and social equity. In a region characterized by rapid technological and demographic transformation, the ability of universities to adapt curricula, partner with industries, and continuously update competencies will determine not only graduate success but also the resilience of the wider labor market. Ultimately, the voices of graduates serve as both evidence and mandate for reform to move higher education toward a model that produces employable, adaptable, and globally oriented professionals. Complementary research from Japan suggests that academic inquiry into migrant groups, such as Vietnamese communities, can serve as a critical knowledge base for improving mutual understanding and informing culturally responsive policy frameworks in education and labor governance (H. N. Tran, 2023).

By amplifying the lived experiences of Vietnamese graduates, this study contributes to a growing Southeast Asian corpus that contextualizes employability as both a policy agenda and a student experience (ASEAN Secretariat, 2025; OECD, 2023). This approach is consistent with recent employability research that argues for centering graduate perspectives as a legitimate and policy-relevant evidence base for curriculum reform (H. Tran et al., 2023). The findings corroborate the argument that employability should be treated as a shared responsibility among students, educators, employers, and government actors (Oliver, 2015). Furthermore, the integration of qualitative voice into national tracer systems enhances their diagnostic value, providing not only statistical indicators but also narratives of transition, which are essential for designing responsive, human-centered education policy.

Figure 3
Employability Ecosystem Model



The study relied on self-reported perceptions from a single public university, which may limit generalizability. The timing of data collection may have introduced retrospective bias. Respondents who remain unemployed or changed careers might recall their university experience differently from those successfully employed. Future longitudinal designs could compare perceptions across multiple time points to capture the dynamic evolution of employability. Qualitative translation from Vietnamese to English introduces potential semantic distortion. The dataset represents only graduates from one faculty, not the entire institution. Faculty-specific factors such as internship arrangements, employer networks, or academic culture could shape distinct employability trajectories. Finally, researcher subjectivity remains inherent in theme development.

Conclusion

This qualitative exploration of graduate feedback from a public university in Vietnam reinforces the global and regional consensus that employability is a multidimensional construct, including knowledge, technical competence, transferable skills, and contextual readiness. Graduates articulated an urgent need for earlier and more structured internships, stronger linkage between curriculum and labor-market requirements, enhanced communication and language training, and improved institutional support for job search and networking. By positioning graduates as co-interpreters of educational effectiveness, this study provides a bottom-up perspective often missing from policy and institutional reports. Their narratives reveal that employability is not merely the responsibility of individual students but the outcome of a coordinated ecosystem connecting universities, employers, policymakers, and communities.

References

- ASEAN Secretariat. (2025). *Graduate Employability in ASEAN The Contribution of Student Mobility*. https://asean.org/wp-content/uploads/2023/08/Graduate-Employability-in-ASEAN_The-Contribution-of-Student-Mobility_2022.pdf?utm_source=chatgpt.com
- Bhandari, R. (2023). *Bridging the skills gap: Fuelling careers and the economy in Vietnam*. Economist Impact. <https://impact.economist.com/new-globalisation/bridging-skills-gap-fuelling-careers-and-economy-vietnam>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Braun, V., & Clarke, V. (2022). *Thematic Analysis: A Practical Guide*. SAGE Publications.
- Demombynes, G., & Testaverde, M. (2018). Employment Structure and Returns to Skill in Vietnam: Estimates Using the Labor Force Survey. *Policy Research Working Paper. World Bank*, 8364. <https://hdl.handle.net/10986/29458>
- Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic Analysis: Striving to Meet the Trustworthiness Criteria. *International Journal of Qualitative Methods*, 16(1), 1609406917733847. <https://doi.org/10.1177/1609406917733847>
- OECD. (2023). *Skills Strategy Southeast Asia*. https://asean.org/wp-content/uploads/2025/04/IASP_Synthesis-Report_FA_DIGITAL.pdf?
- Oliver, B. (2015). Redefining graduate employability and work-integrated learning: Proposals for effective higher education in disrupted economies. *Journal of Teaching and Learning for Graduate Employability*, 6(1), 56–65. <https://doi.org/10.21153/jtlge2015vol6no1art573>
- Tran, H., Marinova, K., & Nghiem, H. (2023). Exploring Perceived Speaking Skills , Motives , and Communication Needs of Undergraduate Students Studying Japanese Language. *Education Sciences*, 13(6), 550.
- Tran, H. N. (2023). The Trend of Betonamujinron Research in Japan: Implications for Mutual Cultural Understanding and Policy. *The Asian Political & International Studies Association Annual Congress 2023*, 95–104.
- World Bank. (2013). *Skilling up Vietnam: Preparing the workforce for a modern market economy Vietnam Development Report 2014*. <https://documents1.worldbank.org/curated/en/610301468176937722/pdf/829400AR0P13040Box0379879B00PUBLIC0.pdf>
- World Bank. (2023a). *Green Jobs: Upskilling and Reskilling Vietnam's Workforce for a Decarbonized Economy*. <https://documents1.worldbank.org/curated/en/099091823063517461/pdf/P1781121e19c8506719ff81042e6be4e00b.pdf>

World Bank. (2023b). *Identifying Skills Needs in Vietnam: Survey of Detailed Skills (SDS)*.
<https://documents1.worldbank.org/curated/en/099508509112311079/pdf/IDU02fc96fcf0484a04e6a08f250cc05bc09f72a.pdf>

Yang, J., & Tran, A. T. B. (2022). *Connecting Vietnam's youth to high-skilled jobs: What does it take?* World Bank Blog.
<https://blogs.worldbank.org/en/eastasiapacific/connecting-vietnams-youth-high-skilled-jobs-what-does-it-take>

Yorke, M., & Knight, P. T. (2006). *Embedding Employability into the Curriculum*.
<https://www.qualityresearchinternational.com/esecttools/esectpubs/yorkeknighembedding.pdf>

Contact email: tran@tokushima-u.ac.jp

Evaluating the Effectiveness of the Flipped Classroom Model in English Language Teaching: Evidence From Secondary Education in Sri Lanka

Yasangi Epitawala, Informatics Institute of Technology, Sri Lanka
Dinithi Pallewatta, International University of Japan, Japan

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This abstract examines the efficacy of the Flipped Classroom Model in teaching English as a second language (ESL) in Sri Lankan secondary schools. Since English is taught as a second language in many nations, including Sri Lanka, many students have a pessimistic attitude toward learning the language. Foreign countries are utilizing the flipped classroom model to lessen this pessimistic attitude. Despite the benefits, there has not been in-depth study done on the efficacy of the flipped classroom model for teaching English in Sri Lanka. Hence, this study aims to assess the effectiveness of the flipped classroom model in improving English language skills which includes all the four competencies of the language which are reading, writing, speaking, and listening. The study employs a qualitative method using interviews as the main data collection approach. Data collection was done through questionnaires given to selected teachers from Government Secondary schools in Western Province, Sri Lanka. twenty English Language teachers from different government schools within Western province were interviewed virtually to get a thorough idea about their knowledge about this model. Moreover, teachers' perception of this classroom model, consequences of Traditional classroom vs. flipped classroom model were also discussed under the discussion of the study. The results revealed that the flipped classroom approach can play a pivotal role in enhancing English language education in Sri Lanka, while contributing to students' academic and career readiness in the time to come.

Keywords: flipped classroom model, second language, English language teaching, secondary education

iafor

The International Academic Forum
www.iafor.org

Introduction

Background of Study

The conventional educational model in Sri Lanka, which has been in existence for a long time, often relies on teacher-centered classroom, where students absorb knowledge by listening to their teachers. However, with the changing landscape of education, there is a rapidly growing interest in exploring new pedagogical strategies that can enhance learning outcomes and improve student engagement. One such strategy that gains popularity is the “flipped classroom” model. This model revolutionizes the traditional learning environment by providing instructional content outside of class and utilizing in-class time for more interactive learning activities. Evaluating the effectiveness of the flipped classroom model in English Language Teaching (ELT) at the secondary school level in Sri Lanka is of utmost importance, given the rising significance of fluency in the language for academic and professional success. The Ministry of Education has already implemented numerous number of initiatives to enhance language learning, with a significant focus on improving English language proficiency in the country. However, challenges such as large classroom sizes, limited resources, and diversified levels of student ability persist, underscoring the need for innovative instructional approaches.

The flipped classroom strategy offers a viable solution to address these concerns and cater to the diverse learning needs of Sri Lankan students. By providing pre-recorded video lectures, online learning materials, and interactive activities outside of class, teachers can optimize face-to-face sessions with students. These resources enable students to engage in language practice, collaborate on group projects, and participate in discussions. This shift from passive to active learning aligns with the goals of Sri Lanka's educational reforms, which prioritize effective communication, creativity, and critical thinking of students. Despite the proven effectiveness of the flipped classroom model in various educational contexts worldwide, its implementation and impact in Sri Lankan secondary schools remain largely unexplored. In order to ensure the successful implementation of this model, it is imperative to grasp its adaptability to the specific local environment, while also considering nuanced variances in culture and educational practices. Specifically, this research investigates the efficacy of the flipped classroom model within the realm of English Language Teaching (ELT) in secondary schools in Sri Lanka, and its impact on learning outcomes, including language proficiency and student involvement.

Secondary Education in Sri Lanka plays a pivotal role in preparing students for higher education, vocational training, and employment. By the Sri Lankan Government and Ministry of Education, the secondary education system is divided into two stages: Junior Secondary (Grades 6–9) and Senior Secondary (Grades 10–11), culminating in the General Certificate of Education (Ordinary Level) examination. The students who pass the Ordinary Examination are progressed to Advanced Level education (Grades 12–13), which determines the eligibility for university admission (Ministry of Education Sri Lanka, 2020).

In terms of the current teaching methods employed in Sri Lankan secondary education are mainly teacher-centered and examination-oriented. These approaches are heavily utilized on content delivery and memorization, making the students ready to prepare students for national exams. However, there have been some efforts to integrate more student-centered approaches, particularly in urban schools, while enhancing critical thinking and active engagement of students.

This study expects to make a significant contribution to the ongoing discourse surrounding innovative strategies for teaching in Sri Lanka. It does so by delving into the experiences of educators and learners, critically evaluating the advantages and disadvantages of this pedagogical approach, and providing valuable insights into the most effective and productive methods for implementation. Ultimately, the conclusions drawn from this research can serve to improve the comprehension of educators, school administrators, and educational policymakers regarding the potential of the flipped classroom model to enhance English language instruction in secondary school settings. Furthermore, it can also help to cultivate a more captivating and dynamic learning environment for students across the entire nation.

Research Problem, Research Aims and Research Objectives

Research Problem

Traditional language teaching methods often struggle to make students engaged in work and it makes it more difficult for teachers to provide individualized attention. The flipped classroom model, that helps students involved in learning new content at home and applying it through interactive activities in class, has been introduced as a potentially more effective approach for effective teaching. However, there is limited empirical evidence on its efficacy compared to traditional methods, particularly in language teaching contexts such as one's identity-building process heavily relies on their command of the English language. Students' English language proficiency has a direct bearing on the current higher education system as no one expected it to be. They can guarantee their future career opportunities and make ends meet in the job market if they can just get excellent English language skills. As everyone is aware, schools can only provide children with the fundamental knowledge that forms their basis. Along the way, educators have a significant and accountable influence on how a child develops and improves gradually throughout the process of learning. Reducing the distance between teacher and student is the best way for teachers to mentor their students in their academic endeavors. Teachers can create a more interactive learning environment in their classrooms by introducing contemporary technological devices and interactive teaching and learning devices. Thus, one of the most effective approaches to raising students' motivation for learning English as a second language in the classroom was to adopt the flipped classroom model.

It is apparent that the flipped classroom approach is widely applied in English language Teaching around the globe to strengthen students' language proficiency. English teachers are encouraged to follow the current methods and employ a variety of authentic yet interactive teaching strategies in Sri Lanka in order to inspire their students to grab the language. Although Sri Lanka has been promoting the flipped classroom model for the past few years, it is highly uncertain how much of this approach is actually used by teachers in Sri Lanka. The Ordinary Examination general statistics for 2017 shows that 51.12% of candidates failed the General English paper, the lowest pass percentage among the subjects examined (O/L English Language Pass Rate Records Low, 2018). Instead of using the ineffective and conventional traditional classroom structure, teachers should be able to outperform it especially in the classrooms of secondary education. Given this context, assessing the efficacy of the flipped classroom model for English language Teaching in Sri Lanka is a crucial undertaking in terms of minimizing the gap of the low percentage rate in the number of students who pass Ordinary and Advanced Level General English Paper. Educators or teachers who play a crucial part in implementing a flipped classroom model ought to possess the aptitude, comprehension, and ability to provide appropriate direction in this context. Thus, this work-based project examines deeply into the way teachers perceive the application of the flipped classroom model through a proper training.

Research Aims

The primary aim of this work-based project is to explore and evaluate the efficacy of the flipped classroom model in enhancing English language teaching (ELT) in secondary schools in reference to Sri Lanka. As English language proficiency is increasingly recognized as one of the key skills in the globalized world, the need for effective teaching methods is crucial. Traditional, teacher-centered methods of instruction are often criticized for not fostering active student engagement which students find to be very boring and outdated, particularly in the context of English language acquisition, where interaction and communication with the students are vital. The flipped classroom model, with its emphasis on learner-centered approaches, has gained attention globally as a potential solution. By converting the conventional teaching paradigm where content delivery is moved outside of the classroom (typically via video lectures) and in-class time is devoted and used to interactive, problem-solving activities, the flipped classroom offers a novel and quite interesting approach to improving student learning outcomes and student engagement to the fullest.

Further, investigating the Impact of the Flipped Classroom on Student Engagement in English Language Learning has been another key aim of conducting this project. The first and the foremost aim of this study is to assess how the flipped classroom model influences and persuade student engagement in secondary school English language classes in Sri Lanka. Sri Lanka is a country where English Language is taught as the linking language not even as the second language. Thus, there is a high tendency for students not to attend the English lessons since they find the English Language classroom to be very inactive and uninteresting. Engagement in language learning is a critical and vital factor in developing communicative competence, and conventional methods may not always stimulate active participation. This work-based project will explore whether students in a flipped classroom setting are more motivated and inspired to participate in learning activities, whether they show some increased interest in using English outside of class, and how the approach affects their overall attitude towards the language.

Moreover, assessing the Effectiveness of the Flipped Classroom in Improving English Language Skills which covers all the four competencies of the Language Learning such as Listening, Speaking, Reading, and Writing is another significant aim that this work-based project focusses. While teaching a language, the teachers should focus on enhancing all the four competencies of the language not just writing and reading. Yet, in the Sri Lankan context most of the English teachers focus only on Reading and Writing since they have very limited resources in doing activities related to other two competencies which are Listening and Speaking. Hence, the central aim is to evaluate whether the flipped classroom model leads to improved English language skills, particularly in the areas of listening, speaking, reading, and writing. While paying the attention on these core skills, the project will determine whether the flipped classroom provides more opportunities for teachers to practice and feedback, thus enabling students to develop and improve a deeper understanding and better command of the language for their future endeavors.

Further, it aims to examine Teacher and Student Perceptions of the Flipped Classroom Model as an additional aim of the study is to explore the perceptions of both teachers and students regarding the flipped classroom model in the context of Sri Lankan secondary schools. Understanding the attitudes of both parties, challenges faced by both teachers and students, and benefits identified by both groups will provide a comprehensive view of the feasibility and applicability of the flipped classroom model in the local context. This aim is crucial because

successful implementation of innovative teaching methods frequently depends on the willingness and readiness of teachers and students to embrace new approaches. Additionally, it will examine the challenges related to limited access to technology, digital literacy of both teachers and students, and infrastructure that may need and impact the successful implementation of the flipped classroom in a very limited resource setting.

Literature Review

Due to the importance of language in higher education, career prospects, and international communication, English as a Second Language (ESL) education is vital to Sri Lanka's educational system which includes Primary Education, Secondary Education and Higher Education. This review of the literature examines the situation of ESL instruction in Sri Lanka now, emphasizing the main obstacles, approaches, and patterns. The British, who replaced the Dutch three centuries ago in 1796, were the ones who brought the English language to Sri Lanka, then known as "Ceylon." After the British invaded the Maritime Provinces of the country and signed the Treaty of Amiens, Sri Lanka became a recognized British colony. As a result of that, English surpassed Dutch and other vernacular languages such as Sinhala and Tamil to become the dominant languages and the official state language of the country (Fernando, 1977). Since then, trade, education, administration, and the law have all adopted English Language as their official language. With the introduction of export crops like tea, rubber, and coconut, the traditional economic sector underwent a transformation. Such a backdrop made it possible for the British Bureaucracy to be established and allowed Ceylonese people to work in the administrative field (Fernando, 1977). Then, it became mandatory for Sri Lanka to establish English-medium schools. Missionaries assisted the government in spreading the English-medium schools and implemented British teaching techniques.

In terms of the current state of ESL, Sri Lanka's ESL education has evolved significantly over the years, reflecting the country's socio-political changes and economic aspirations. English proficiency among Sri Lankan students has been a huge concern, with lots of differences observed between urban and rural areas. The national curriculum now includes ESL programs as a result of the efforts of Ministry of Education to support English language learning. But there are still gaps in access to high-quality ESL training, especially in rural areas with scarcity of resources. Further, several challenges hinder the effective implementation of ESL programs in Sri Lanka to identify teacher proficiency as a significant issue, noting that many ESL educators themselves lack advanced English skills. This shortcoming may affect the standard of instruction and impede students' language learning. Moreover, the conventional rote-learning strategy used in Sri Lankan schools might not be in line with the communicative language teaching approaches suggested for ESL instruction. Some studies also suggest that flipped learning environments support different learning styles and encourage collaborative learning through digital platforms and social interaction (Gunawardena & Liyanage, 2018).

Apart from that some systematic reviews indicate that flipped learning provides opportunities for self-paced learning and deeper classroom interaction, which are particularly beneficial for language learning contexts (Ngo & Yunus, 2021). Moreover, according to some literature, Flipped classroom instruction was implemented for teaching all skills of English as a foreign language (Filiz & Benzet, 2018). Further, studies in English language education suggest that the flipped classroom can improve language acquisition, communication skills, and learner autonomy (Afzali & Izadpanah, 2021). Research in English language education shows that flipped classrooms can enhance student engagement, motivation, and active participation in learning (Hamdani, 2019).

Flipped Classroom Model

Turning a traditional classroom into an inverted one is the concept behind “flipping the classroom.” This new educational approach actually reverses the conventional method of knowledge distribution (Afzali & Izadpanah, 2021). The first part of teaching a lesson in a flipped classroom starts even before the student shows up for class and get actively engaged in the lesson. In a flipped classroom, students must conduct their own independent in-depth lesson analysis (Ngo & Yunus, 2021). The students are provided with complete freedom to work in an unrestricted setting. Some of these pre-made resources are PowerPoint presentations, lecture recordings, quick films, engaging Moodle quizzes, and engaging discussions.

The flipped classroom model encourages students to work in groups, ask questions to elucidate their curiosity, and engage in project-based learning activities. These interactive learning techniques foster an active learning environment. Keengwe et al. (2013) state that the flipped classroom is an educational strategy employed by educators to transform the conventional classroom lecture format into a more dynamic, participatory and entertaining learning environment, especially in language teaching. With this approach of active and experimental learning, we can observe a student-centered learning environment where the students are provided with more freedom to freely explore the knowledge they have gained, in contrast to the traditional classroom where the teacher is the dominant figure.

Methodology

A qualitative study involving a group of twenty English teachers from various schools in Western Province who are engaged in secondary education was conducted to determine the efficacy of the flipped classroom model for teaching English language in Sri Lanka. English Language teachers who work in schools within the Western Province were involved in this study. The Colombo Educational Zone 125 educational institutions. The five stages of Sri Lankan education are primary, junior secondary, senior secondary, collegiate, and post-secondary. The group of educators taken for this research are from the grade 09 to 12, as they are Secondary and Senior secondary level teachers. These senior secondary school instructors prepare students for the General Certificate of Education (G.C.E.) Ordinary Level (O/L) and Advanced Level Examination.

The qualitative research approach was determined to be the most suitable for this study based on the data collected from intentional samples. In addition to the survey conducted, some data were also collected from semi-structured and informal conversations with English Language Teachers who have experience and who do not have experience at all implementing this model. The interviews were designed to gain and explore firsthand perspectives and insights on the practical application of the flipped classroom model, its challenges and perceived effectiveness in language teaching. Those interviews were conducted on digital communication platforms upon the availability of the participants. Further this research evaluates the efficacy of the flipped classroom model in educational settings, particularly in language teaching. Moreover, it should be mentioned that those discussions highlighted mostly the barriers and issues related to delivery and accessibility more than the advantages faced by the teachers in terms of adapting this model in Government Schools with limited sources.

Secondary data were collected through reviewing the existing research articles and studies and case studies on Flipped Classroom Model. Those sources truly gave valuable insights into the theoretical foundations, benefits, challenges that are associated with the implementation of this

Classroom Model across the various educational contexts and age groups. The articles that were sourced from are from online databases such as Google Scholar, ERIC, and JSTOR. This secondary data allowed for a broader understanding of the flipped classroom model's impact on student engagement, academic performance, and language acquisition, as well as its advantages in fostering a learner-centered approach.

Results and Discussion

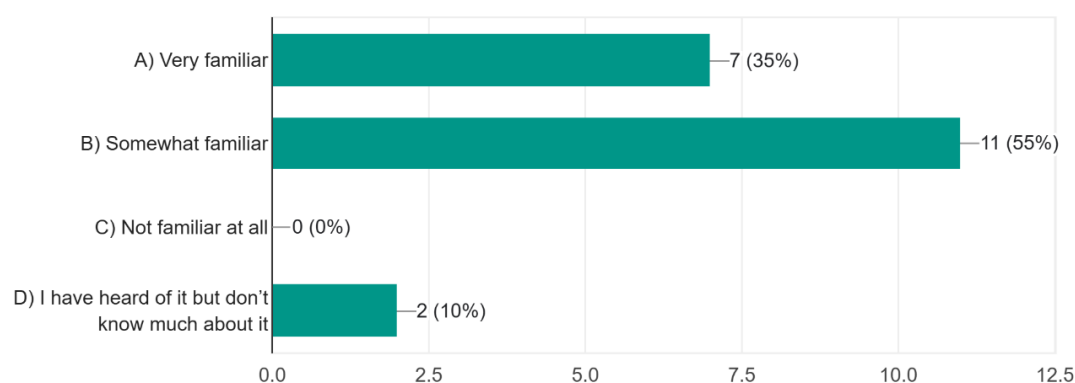
Flipped classroom method is one of the unorthodox inventions that teachers adopted to deliver knowledge in the other parts of the world even though it is something novel to Sri Lankan School System. This method which heavily relies on technology triggered the English Language Teaching strategies since it can be effective in enhancing the second language learner's interactions and responsibilities.

Figure 1

How Familiar Are You With the Flipped Classroom

1. How familiar are you with the flipped classroom model?

20 responses

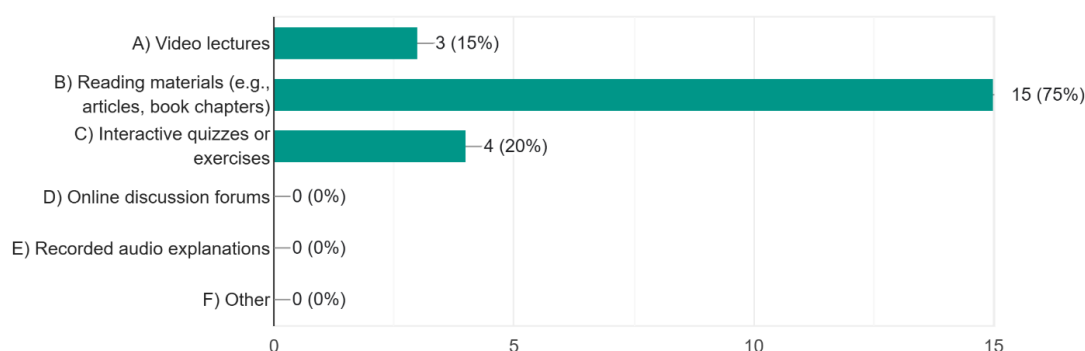


The reactions to the implementation of flipped classroom model depend on individual assessments of teachers, students and parents. Although some teachers and students could increasingly absorb and grab the culture of the flipped model some may experience unfavourable feelings that tend them to withdraw or drop out from the whole process. The dataset collected from a set of educators giving them a questionnaire that is based on the topic “The Efficacy of Flipped Classroom Model in English Language Teaching” covers areas such as assessing the familiarity, implementation frequency, perceived effectiveness, benefits, challenges faced by both students and teachers. In terms of the familiarity with the Flipped Classroom Model, the majority of the participants seem aware of the flipped classroom model, with choices like “very familiar” and “somewhat familiar.” That familiarity suggests to the readers that the concept of the Flipped Classroom Model is not completely new to educators yet the trend aligns with the growing adoption of innovative teaching and learning methods globally whereas the familiarity of the participants indicates the readiness to adapt into the model.

Figure 2*Which of the Following Methods Do You Use to Deliver Pre-Class Content in the Flipped Classroom Model*

3. Which of the following methods do you use to deliver pre-class content in the flipped classroom model?

20 responses

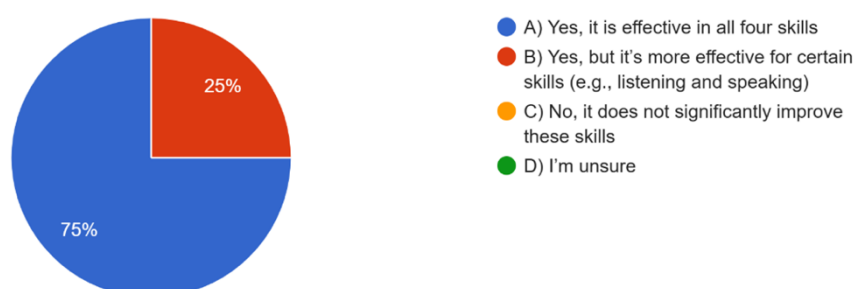


Flipped Classroom Model covers Pre-Class content, In-class content and Post-Class Content too. Most of the participants have suggested popular methods as reading materials and interactive quizzes for pre-class content. However, other tools like video lectures are less emphasized bringing the consideration into the potential gap in using multimedia resources as students at their homes. Yet, it was encouraged to have a broader mix of pre-class delivery formats that could cater to diverse learning preferences, and it is believed that it would make the content more engaging. As per the responses received regarding the students' benefits, ability to learn at their own pace was the major. It highlighted the model's alignment with personalized learning. Increased engagement and participation was another benefit that was highlighted and it reflects its success in enhancing the active learning environments. Common challenges that need to be addressed are lack of resources, time constraints and student motivation. Those given barriers indicate the systemic issues such as unequal access to technology and need for time. The suggestion is to introduce scalable solutions like teacher training on time management and subsidized technology for schools that could alleviate those hurdles.

Figure 3*Do You Think Flipped Classroom Model Is Effective in Developing the Four Language Skills (Listening, Speaking, Reading and Writing)*

9. Do you think the flipped classroom model is effective in developing the four language skills (listening, speaking, reading, and writing) in English?

20 responses



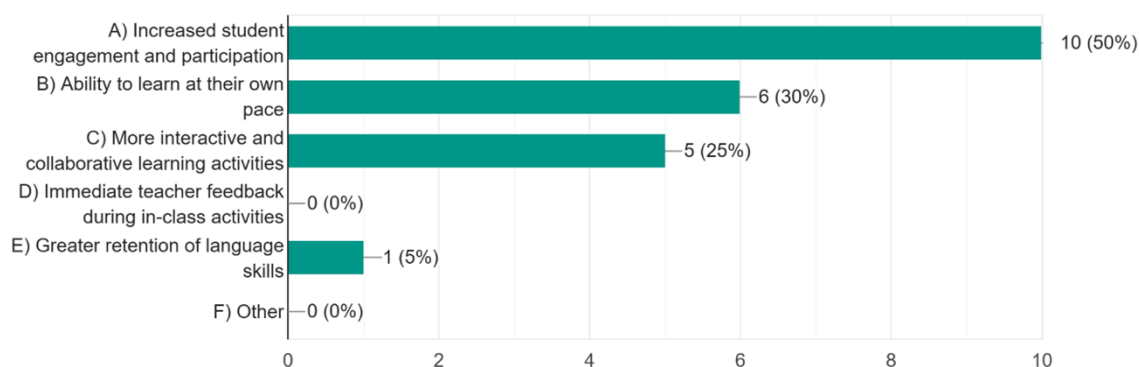
The above Pie Chart shows how the participants reacted to the efficacy of the model to ensure all four competencies of students. The Majority of the participants have stated that this model is quite effective in enhancing all the four skills of English Language whereas 20% of the participants have mentioned that it addresses certain skills more than writing and reading. Moreover, majority of the participants agree that this model allows students to access to personalized learning but at the same time qualify it as resource dependent. Thus, this caveat underscores the significance of equitable access to tools and technologies in Sri Lankan Government schools.

Figure 4

What Aspects of the Flipped Classroom Model Do You Think Benefit Students the Most in Learning English

5. Which aspects of the flipped classroom model do you think benefit students the most in learning English?

20 responses



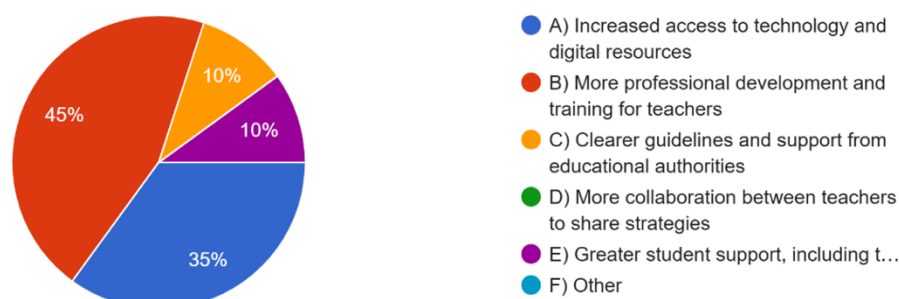
The above chart shows what aspects can be benefited by the students adopting themselves into Flipped Classroom Model. Majority of the participants which is 50% has mentioned that increased students' engagement and participation could be witnessed implementing this model in Secondary Schools. Most significantly, the majority of the participant teachers have mentioned that this Flipped Classroom Model is perceived as effective in developing listening, speaking, reading and writing (all the four language competencies) though some participants feel it benefits in certain competencies more than others. So, a majority of the participants agree that this model gradually improves the critical thinking and problem-solving skills of students as students have to actively participate and it is an application-based learning. So forth, while most of the participants recommend this model for teaching, some suggest modifications for local secondary school context. Hence, this cautious endorsement reflects a need for adaptable implications.

Figure 5

What Improvements, if any, Would You Suggest to Enhance the Implementation of the Flipped Classroom Model in Sri Lankan Secondary Schools

14. What improvements, if any, would you suggest to enhance the implementation of the flipped classroom model in Sri Lankan secondary schools?

20 responses



The 21st century is experiencing a whirlwind technological evolution that has been impacted the current educational system in most of countries including Sri Lanka. There, the educational process solely relies on technology or digitalized environments in flipping the learning and flipping the classroom. In such an environment, the students learn the essentials at home and proceed with their newly found knowledge in the classroom which gives them their own space to build up their empirical knowledge through peer learning.

English as a second language teachers also need to adapt into a flip in their roles and have a shift in the role that we normally envision. Although the flipped classroom method is considered as a hot topic in today's world, based on the respondents of the questionnaire and the interviews, it is something that they have been practicing for years "without knowing the terminology of flipped" (interviewee 3). Problem-solving tasks with peer learning along with their pre-determined knowledge that they gain at home is something that they have been practicing for years even in the unflipped classroom.

Teachers find the flipped classroom method as a very good opportunity to practice in the classroom since it is "inquiry-based learning" (participant 1). The students become inquisitive and they come up with a lot of questions. "The learner like a sponge is acquiring everything that is possible" (participant 3). This is a method that comprises the active learning background and minimizes the lecture method of teaching. Students in the modern world like to use all these devices because "what we hear we forget very soon but what we do help us to internalize the thing" (participant 4). Thus, it is very easy for the teachers to accomplish their aim effortlessly as the students "contribute their newly found ideas in the classroom without any hesitation" (participant 2). The teachers believe that using this pedagogy helps the students in interactive learning as a face-to-face method that motivates the students to meet their learning objectives by focusing more on the out-of-classroom additional reading materials.

Conclusion

The Flipped Classroom Model has emerged and has been implemented too in certain areas in Sri Lanka as a transformative approach in English Language Teaching context, particularly within the framework of secondary education in Sri Lanka. By reimagining conventional and outdated pedagogical strategies, this model has sought to address the persistent challenges and

limitations faced by educators, teachers and learners, such as less engagement, limited teacher-student interaction, and the suboptimal use of classroom time which includes constraints of time. This work-based project has provided valuable insights into the efficacy of this innovative model, underscoring its potential to revolutionize the educational landscape. As for key findings the analysis of the flipped classroom model revealed several key advantages which contribute to its success in English Language teaching. Foremost among these is its capability to shift the locus of control from the teacher to the learner, while fostering a student-centered and active learning environment in schools which is quite different from the current context of Sri Lanka. By engaging and encouraging students to do pre-class activities such as video lectures, worksheets and reading assignments, this Flipped Classroom model enables and allows learners to absorb the foundational knowledge at their own pace easily. This preparation and implementation allow classroom time to be dedicated into highly interactive and higher-order learning activities, such as discussions, role-plays, and collaborative group projects as such activities are extremely needed to be done in the classroom irrespective of the time limitations in terms of Language Learning. Consequently, students are encouraged and motivated to develop their critical thinking, communication skills, teamwork skills and etc, which are essential for mastering a second language.

Furthermore, the model has demonstrated a very optimistic impact on student motivation, engagement and performance. By integrating technological platforms into the learning process, it caters to the digital literacy of 21st-century learners as this Gen-z are born with technology. This alignment with their technological proclivities not only enhances their engagement but also makes the learning experience more enjoyable and interesting. The findings corroborate existing literature that emphasizes the importance of active learning and technology integration in modern education (Hamdani, 2019; Ngo & Yunus, 2021).

Despite the advantages of Flipped Classroom Model, the implementation of this model in Sri Lanka has not been without challenges. Teachers' readiness to adapt the model and technological proficiency of the teachers remains a critical issue. Many educators lack the professional Development training and resources required to effectively transfer from conventional to flipped methodologies even though it provides a lot of benefits to the students. This gap underscores the crucial need for comprehensive and often professional development programs that will equip teachers with the necessary and required skills and confidence to navigate this paradigm shift in Sri Lankan teachers.

Furthermore, infrastructural limitations make significant hurdles in implementing this model too. While urbanized schools may have access to reliable internet network and digital devices, schools in rural or undeveloped areas of the country often struggle a lot with inadequate resources or sometimes it is hard to find an English teacher in certain schools in those rural areas. This disparity exacerbates the divide digital devices, limiting the reach and efficacy of the flipped classroom model in underprivileged areas. Addressing and resolving these inequalities is imperative to ensure and enhance equitable access to quality education across the country.

Recommendations for Policy and Practice

To maximize the efficacy of the flipped classroom model, policymakers and educators must address the systemic challenges identified in this research. Key recommendations include:

1. Professional Development: Comprehensive and regular training programs should be developed and designed to enhance teachers' technological proficiency and familiarity

with flipped classroom methodologies. These programs should include not only theoretical sessions but also practical sessions to build confidence and competence in implementing the model effectively.

2. **Infrastructure Investments:** Equitable access to technology is crucial for the success of the flipped classroom model. Providing subsidized devices, improving internet connectivity, and equipping schools with digital resources and smart classrooms can help bridge the digital divide.
3. **Student Support Mechanisms:** Motivational strategies and onboarding programmes should be introduced and implemented to familiarize students with the flipped model and address their apprehensions. This can include regular workshops done by specialists, peer mentoring, and interactive orientation sessions.
4. **Curriculum Integration:** The flipped classroom model should be incorporated into the national curriculum as a standard teaching strategy. Clear guidelines and frameworks for its implementation can ensure consistency and effectiveness across schools in Sri Lanka.
5. **Continuous Evaluation:** Regular assessments of the model's impact on student performance and teacher satisfaction can provide valuable feedback for ongoing and future improvements of this model. Longitudinal studies can also offer insights into its long-term benefits.

References

- Afzali, Z., & Izadpanah, S. (2021). The effect of the flipped classroom model on Iranian English foreign language learners: Engagement and motivation in English language grammar. *Cogent Education*, 8(1). <https://doi.org/10.1080/2331186x.2020.1870801>
- Fernando, C. (1977). English and Sinhala bilingualism in Sri Lanka. *Language in Society*, 6(3), 341–360. <https://doi.org/10.1017/s0047404500005054>
- Filiz, S., & Benzet, A. (2018). A content analysis of the studies on the use of flipped classrooms in foreign language education. *World Journal of Education*, 8(4), 72. <https://doi.org/10.5430/wje.v8n4p72>
- Gunawardena, L., & Liyanage, M. P. P. (2018). Flipped Classrooms Using Social Networks: An Investigation on Learning Styles. *2018 7th International Congress on Advanced Applied Informatics*, 78, 956–957. <https://doi.org/10.1109/iaai-aa.2018.00199>
- Hamdani, M. (2019). Effectiveness of Flipped Classroom (FC) Method on the Development of English language learning of the High School Students in Ahwaz. *International Journal of Applied Linguistics & English Literature*, 8(2), 12. <https://doi.org/10.7575/aiac.ijalel.v.8n.2p.12>
- Keengwe, J., Onchwari, G., & Oigara, J. N. (2013). Promoting Active Learning through the Flipped Classroom Model. In *Advances in educational technologies and instructional design book series*. <https://doi.org/10.4018/978-1-4666-4987-3>
- Ministry of Education Sri Lanka. (2020). *National education report 2020*. <http://www.moe.gov.lk>
- Ngo, H. K., & Yunus, M. M. (2021). Flipped Classroom in English Language teaching and Learning: A Systematic Literature review. *International Journal of Academic Research in Business and Social Sciences*, 11(3). <https://doi.org/10.6007/ijarbss/v11-i3/8622>
- O/L English language pass rate records low. (2018, April 6). Daily News. <https://www.dailynews.lk/2018/04/06/local/147770/ol-english-language-pass-rate-records-low>

Contact emails: yasangi45@gmail.com
 yasangi.e@iit.ac.lk
 siharapallewatta@gmail.com

Environmental Education Practice in Independent Curriculum: Science Teacher Perspective in Indonesia Junior High School

Hana Syarifah, University of East Anglia, United Kingdom

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This study examines the implementation of environmental education (EE) in the independent curriculum of junior high schools in urban and rural areas of Bandung, Indonesia. The study employs a qualitative approach, using semi-structured interviews with seven urban and five rural teachers. The findings show that the new Indonesia National Curriculum (Merdeka Curriculum) flexibility enables participants to expand the scope of EE subjects in science lessons, such as digital waste and healthy eating. Participants have shifted away from traditional methods to student-centred approaches such as project-based and problem-based learning to enhance EE learning. Furthermore, incorporating EE into civic education through the student Project that called P5 Project allows us to see EE from various perspectives, such as science, social studies, art, and economics. The P5 Project also encourages students to take actual actions to address climate change, such as starting social media campaigns, participating in conservation activities, and creating recycled products. However, there is a need to investigate another impact of flexibility and interdisciplinary collaboration in the independent curriculum. Despite implementing transformative teaching approaches and activities, participants consider these efforts were insufficient to improve pro-environmental behavior among pupils. This is likely due to the many variables that influence environmental awareness.

Keywords: environmental education, teacher perspective, education and development

iafor

The International Academic Forum
www.iafor.org

Introduction

According to UNESCO (2020), In their “Background Paper for the Future of Education Initiative,” stated that Education of Sustainable Development as the new form of Environmental Education (EE) approaches had failed. As our carbon emissions keep increasing worldwide, we face a climate trajectory of worsening floods, droughts, and fires (IPCC, 2018). Despite efforts, education prioritizes workforce supply for economic growth, perpetuating cartesian dualisms and the delusion that humans are separate from the world (Taylor & Pacini-Ketchabaw, 2018). This statement underlines not only the inadequacy of existing educational frameworks but also the imperative to reassess and reconceptualize the role of education in the face of pressing global challenges.

Despite the current climate crisis, curriculum amendments appear more responsive to developments in science, technology, and socio-cultural and economic conditions that influence learning implementation (Lin et al., 2017). However, a comprehensive approach to reorienting education is needed, one that goes beyond limited actions such as reducing, reusing, or recycling. Given the ineffective education approach to overcoming the climate crisis, it is crucial to evaluate and improve the quality of environmental education. There is a pressing need to provide environmental education literature that can serve as the foundation for global southern countries (Parker & Prabawa-Sear, 2020). This study aims to provide a global south perspective, specifically focusing on Indonesia.

Indonesia exemplifies these challenges as part of the Global South. Although Indonesia is a developing country, resource-rich, culturally diverse, and home to enormous biodiversity, it faces severe environmental issues due to exploitation, pollution, and rising population (Parker & Prabawa-Sear, 2020; UNDESA, 2015). In Indonesia, these drawbacks persist even after curricular reforms, with the transition from the “Kurikulum 2013” (2013 Curriculum) to “Kurikulum Merdeka” (Independent Curriculum) in 2020.

The purpose of this qualitative study is to interpret Indonesian junior high school (JHS) teachers’ (Grade 7–9) perspectives regarding EE implementation during the independent curriculum, alignment between EE topics and current environmental conditions, challenges, and opportunities of EE in the independent curriculum. This perspective can be a reference for curriculum policymakers to maintain what is already good and improve the independent curriculum’s implementation to align with the greening curriculum guideline. This study offers insights that can serve as reflections and guides for teachers facilitating learning based on their settings.

Literature Review

Complexity of Environmental Education in Global Practice

The Tbilisi Declaration in 1978 and Fensham (1979) emphasise that environmental education should include collaborative inquiry into real-life issues, from local to global. This approach requires students to be engaged in critical thinking and action, with a flexible curriculum and pedagogy that adapts to their social circumstances and decisions. Education must be the foundation for societal reforms to address global issues and build a more sustainable, peaceful, and equitable society (Tilaar, 2008).

In 1992, there was a shift from EE to Education for Sustainable Development (ESD), including local, national, and global efforts to integrate environmental, economic, and social factors to lead to sustainable development competencies (Ssosse et al., 2021). ESD has proven to be an alternative in reducing carbon emissions in some global north countries such as Finland, Sweden, Greece, Italy, Portugal, Luxembourg, Spain, and the UK (Ni et al., 2024). The positive impacts of ESD and the global north strategy may not necessarily apply to developing countries.

International guidelines and frameworks, such as UNESCO standards and the Sustainable Development Goals (SDGs), significantly influence environmental education (EE) and education for sustainable development (ESD) practices worldwide. However, the interpretation and implementation of these policies vary widely across national settings, particularly in developing countries, resulting in various outcomes and issues.

Post-colonial countries aim for equal prosperity and security in the Global North, leading to a global predicament marked by disparate responsibility for climate change and biodiversity loss, differing ability to pay for clean-up and sustainable economies, increased national sovereignty concerns due to transnational corporations, and unwavering commitments to economic growth (Parker & Prabawa-Sear, 2020). This shows that developing countries face complexity in determining priority problems to be resolved through formal education.

According to reports about EE practice in Indonesia's previous curriculum (2013 Curriculum), environmental education action activities were only carried out in response to natural disasters (e.g. Forest fire) (Darmawan & Dagamac, 2021). The Adiwiyata or Green School, which should be a program to promote environmental behaviour, became a competitive platform for gaining extra school funding (Parker & Prabawa-Sear, 2020). This situation shows that, like other developing countries, Indonesia might continue relying on outdated EE approaches and has not wholly integrated the broader goals of Education for Sustainable Development (ESD). The resistance to adopting more comprehensive ESD techniques may reflect the problems given by the Anthropocene, which requires more proactive and integrative educational initiatives to address complex environmental issues adequately.

Some arguments show that corporate intentions overshadow ESD development objectives, rendering it ineffective for future generations (UNESCO, 2020). Despite changing the title from environmental education to environmental sustainable development, no significant improvements have been observed in the results of EE practice so far.

Strategies in Environmental Education for Future Survival

In 2020, UNESCO presented a vision for education aimed at addressing the climate catastrophe by 2050. This vision advocates for a change away from traditional human-centred education and towards one that emphasises environmental awareness and justice. Proposed adjustments include transitioning from individual development to collective well-being, seeing humans as an integral part of the natural world, and moving toward learning through real-world environmental encounters.

As a response, in 2024, UNESCO produced a new guideline for transformational ESD regarding “what to learn.” This suggests that before selecting strategies, it is essential to consider cognitive, social, behavioural, and action-based projects (UNESCO, 2024). These

suggestions align with scholars who argue environmental education should focus on three areas: learning about, in, and through environmental experiences (Ko & Lee, 2003). A balanced curriculum incorporating cognitive and socio-emotional learning is urgent to minimise negative impacts like eco-anxiety and foster proactive behaviours (Leger-Goodes et al., 2022; Ojala & Lakew, 2017).

Indonesia's independent curriculum aligns with these goals by incorporating cognitive development and social learning. The Ministry of Education, Culture, Research, and Technology (MoECRT) emphasizes improving student competencies and character development based on the Pancasila learner profile (MoECRT, 2022). Science topics integrate EE by involving students in pollution prevention and climate change mitigation. Specifically, the “Science Learning Attainment Guidance 2020” directs teachers to integrate EE into topics like the Interaction of Living Things and Biotechnology. Furthermore, the P5 Project (Project in Strengthening Pancasila Learner Profile) promotes sustainable living and environmental attitudes (Saraswati et al., 2022), though it has not yet proven to address the emotional dimensions of eco-anxiety.

The second component is contextualisation. Indonesia's diverse settings allow the independent curriculum to give teachers flexibility to modify instruction with local knowledge. This helps developing nations take action towards decolonising education and makes learning more contextual. According to Dietz et al. (2020), developing climate resilience requires understanding social structure, culture, and micro-level decision-making.

Regarding “how should we learn,” the first step is combining learner-centred, experiential, and reflective approaches (UNESCO, 2024). A green curriculum will not have a significant effect if it does not incorporate inquiry and critical thinking (Ni et al., 2024). When combined with a place-based approach, project-based learning (PjBL) and problem-based learning (PBL) are highly effective, engaging students in real-world problem-solving and community collaboration (Tibbitts et al., 2023; UNESCO, 2019).

The independent curriculum supports interdisciplinary collaboration through the P5 project, which allocates 100 hours of instruction. Collaboration between science and other subject teachers enables students to investigate many elements of climate change, filling gaps in the prior curriculum. This ensures students not only comprehend environmental concerns but also actively participate in addressing them.

However, science teachers' roles are influenced by their attitudes, self-efficacy, and perceived barriers (Ko & Lee, 2003). Additionally, distinct characteristics in urban and rural settings impact how EE is taught. Urban regions have easier access to resources but limited green spaces, while rural communities maintain stronger ties but often face limited facilities and training (Yulianti et al., 2019). Although Bandung ranks high for school facilities, disparities in resource distribution may still reveal similar problems (BPS, 2018).

Methodology

This study is a single case study that provides a thorough exploration of EE implementation in the Bandung area. A single case study investigates the links among numerous factors and how cause and effect evolve when other features of the scenario change (Creswell, 2009; Thomas, 2017). Bandung has a unique geographical setting that varies in rural and urban settings, for instance, industrial areas, mountains, rivers, reservoirs, and paddy fields, all of

which have the probability of affecting teachers' opinions on particular environmental issues. The urban areas in Bandung identified in this study include Cimahi City and Bandung City. The rural areas identified in this study include West Bandung Regency and Bandung Regency. Additionally, this study aimed to broaden views on implementing environmental education in rural and urban areas. This is considering the possibility of other external factors (e.g., social, community, facilities) that may influence EE learning practices.

This study use qualitative methods that allowed for a deep exploration of the lived experiences, attitudes, and beliefs of high school teachers in Indonesia (Creswell, 2009). This aligns with the interpretative paradigm, which values teachers' perspectives and emphasises what they interpret, think, and construct concepts about the world and their own constructed world (Thomas, 2017). This study takes a constructivist positioning framework by focusing on teacher experiences and factors that influence the implementation that will cause challenges and opportunities in EE implementation (Darmawan & Dagamac, 2021; Veselinovska & Osogovska, 2012).

The primary data was collected by doing in-depth interviews using convenience sampling methods. The participants were selected purposively based on their experience in teaching EE with an independent curriculum and their school settings (urban or rural). The semi-structured interview questions allowed participants to express their thoughts and experiences in their own words (Creswell, 2009).

This study choose purposive sampling to produce a relevant and comprehensive study (Creswell, 2009). This study selected teachers with at least one year of experience teaching EE using the independent curriculum. Furthermore, this study selected participants from public schools in Bandung, representing both urban and rural areas. The interactions and community involvement in rural schools, as opposed to the diverse resources and specialised teaching in urban schools, make it critical to investigate the differences in experiences of urban and rural teachers in implementing environmental education (Preston, 2012). Understanding these distinctions can assist in enhancing EE teaching quality and student outcomes in both contexts. In addition, this research considers it essential to see the perspective of teachers who teach in public schools. Examining the perspectives of science teachers in public schools can clarify how EE is implemented through the independent curriculum as the national standard.

Data Analysis

In this study, secondary data, as well as the CP and Pancasila Learner Project guidelines, will be referenced as literature to introduce the study. In this instance, the literature offers a helpful context for the problem or topic that has prompted the study, including who has written about it, who has researched it, and who has emphasised the significance of doing so (Creswell, 2009). Furthermore, this study used primary data collection by using open-ended questions in a semi-structured interviewing method with 30–60 minutes, which take place online using MS Teams and will be conducted based on Indonesian times. The interviews were conducted in Indonesian (Bahasa) to allow participants to share their experiences more easily. Darmawan and Dagamac (2021) employed semi-structured interviews to study the situation of EE in JHS in Indonesia based on the teacher's perspective.

During interviews, this study documented information using MS Teams video recording and an aide-memoire. This study translated interview recordings from Indonesia into English by

the researcher itself. The transcription process checks conformity by looking at the recorded conversations and aide-memoire to clarify unclear voice or pronunciation.

This study applied thematic analysis driven by the specific research question (Braun & Clarke, 2006). This study's analysis procedure refers to Braun and Clarke's (2006) six-stage theoretical framework. Firstly, the transcript was manually reviewed and reread to become more comfortable with the facts. The researcher systematically utilised NVivo to code, categorise, and extract critical findings following the research questions. During the analysis process, this study generated themes. Braun and Clarke (2006) argued that researchers do not have rigid standards for defining a theme and emphasized that a theme is defined by its significance. The themes discovered were descriptive, describing data-related patterns relevant to the research issue.

In the fourth step, the concepts were examined, evolved, and elaborated further. This study refined the preliminary themes from Extract 1 during this phase. The fifth phase involved establishing themes by examining and weighing correlations and intercorrelations among sub-themes. Finally, the writing-up phase, where the researcher organised the discussion and conclusion of this study.

Results

The research findings, derived from 12 semi-structured interviews with science teachers in Bandung, are organized into two primary themes: the influence of the Independent Curriculum (*Kurikulum Merdeka*) on Environmental Education (EE) practice and the subsequent challenges and opportunities encountered during implementation. This chapter explores how teachers navigate the flexibility of the new curriculum to foster environmental literacy in both urban and rural settings.

To What Extent EE Topics Embedded in Independent Curriculum Influence EE Practice?

The findings indicate that teachers' initial engagement with EE is deeply rooted in their personal attitudes and self-efficacy, which were significantly bolstered by participation in Transformational ESD Workshops. These workshops provided the pedagogical confidence necessary to contextualize environmental issues within the science classroom. However, the extent of implementation varies based on grade-level requirements and teacher agency. While teachers in grade 7 typically adhere to established guidelines regarding ecology and biodiversity, those in higher grades utilize the curriculum's flexibility to innovate. Participant 04 noted, "*I include it in the ecosystem topics as directed in the guideline; it is similar to the previous curriculum,*" representing a compliance-based approach. In contrast, Participant 03 demonstrated innovative integration by linking human activity and the digestive system to wise food consumption and methane emissions, highlighting how the curriculum allows teachers to tailor depth and relevance.

The pedagogical approach predominantly shifts toward student-centered models, specifically Project-Based Learning (PjBL) and Problem-Based Learning (PBL). In urban areas, teachers utilize ICT facilities to address modern issues like digital waste, with Participant 10 educating students on the carbon footprint of device production. Conversely, rural participants emphasize a close connection with the natural environment, utilizing nature observation and community-based solutions, such as tree planting and addressing illegal waste burning.

However, a critical observation emerged regarding “product-oriented” projects. While Participant 08 and Participant 03 encouraged creating recycled products like air filters or accessories, there is a recognized need to evaluate the environmental impact of the production process itself, such as the energy consumed in melting plastics to ensure that PjBL promotes sustainability rather than just creative consumption.

The implementation of the P5 Project (Projek Penguatan Profil Pelajar Pancasila) further facilitates interdisciplinary collaboration. In Bandung, urban schools often benefit from private sector partnerships, allowing students to explore complex topics like carbon footprints and fast fashion. Rural initiatives, such as the loquat tree conservation project led by Participant 02, demonstrate how EE can extend beyond the school walls. Participant 02 described a comprehensive community effort: *“I arranged the students and taught our local primary schools... This approach engaged the community through direct and online monitoring by WhatsApp.”* Such projects indicate that while the science subject ensures the delivery of theoretical EE, the P5 project provides the practical, interdisciplinary space necessary for community-level impact.

What Are the Teachers’ Challenges and Opportunities in Delivering EE During the Independent Curriculum Era?

Teachers identified a persistent friction between the curriculum’s transformative goals and the practical realities of the Indonesian education system. A primary challenge is student resistance to the autonomy required by PBL and PjBL, often attributed to the legacy of the “banking concept” of education. Participant 13 observed, *“Initially, I struggled... because the students lacked the courage to share their opinions [due to] the former curriculum system.”* Furthermore, teachers face difficulties in measuring cognitive growth through projects compared to standardized tests, alongside a systemic lack of segregated facilities (e.g., waste bins) that undermines practical lessons on waste management.

Despite these barriers, the Independent Curriculum offers significant opportunities for pedagogical growth. The formal inclusion of climate change in the learning outcomes serves as a mandate for environmental advocacy. The following table summarizes the key tensions identified by participants:

Table 1*Key Tension of Opportunities and Challenges*

Dimension	Primary Challenges	Emerging Opportunities
Pedagogy	Resistance to self-directed learning; “banking concept” legacy.	Increased student engagement through PjBL and PBL.
Assessment	Difficulty in quantifying cognitive depth via projects.	Differentiated assessment allows for diverse learning styles.
Infrastructure	Lack of physical resources (e.g., segregated bins).	Use of ICT and digital tools for global environmental visualization.
Teacher Role	Disparities in commitment and workload distribution.	Autonomy to tailor content to local and community-specific issues.

Ultimately, participants agreed that while habit formation remains inconsistent across the student body, the curriculum provides the necessary support for science education to support environmental change. The move toward interdisciplinary synergy and the legitimization of climate change as a core topic represent significant steps forward in the quality of environmental education in Indonesia.

Discussion

This study aimed to explore how science teachers in Bandung navigate Environmental Education (EE) within the framework of the Independent Curriculum. The research problem centered on the tension between decentralized curriculum flexibility and the practicalities of classroom implementation. The major finding reveals that while the curriculum provides significant space for transformation particularly through interdisciplinary P5 project, the transition from theoretical knowledge to pro-environmental habit formation is hindered by a digital-physical gap and systemic infrastructural limitations. In this case, curricular autonomy is a necessary but insufficient condition for transformative EE; it must be supported by institutional commitment and consistent physical facilities.

The results indicate a clear transition from curricular compliance in Grade 7 to pedagogical innovation in Grades 8 and 9. This shift is significant because it demonstrates that when teachers are granted autonomy, they move beyond biological facts toward frameworks of climate justice and community resilience, as seen in the integration of food waste and digital carbon footprints into science lessons. Contextualizing these findings with UNESCO’s (2020) objectives, the P5 project framework successfully balances environmental, economic, and social orientations (Purvis et al., 2019). However, a critical interpretation of these results reveals a tension in product-oriented recycling. Aligning with Fang et al. (2022), there is a risk that focusing on marketable goods inadvertently encourages adverse consumerism. Therefore, the findings underscore that the value of the P5 framework lies in critic towards the economic growth rather than just the creation of recycled artifacts.

The challenges identified, specifically student resistance and the lack of facilities contradict the expectation that a flexible curriculum itself would trigger immediate engagement. This

study explains this unexpected resistance through the lens of the banking concept of education; students accustomed to passive learning struggle to adopt the agency required for Problem-Based Learning (PBL). This aligns with Tharayil et al. (2018), who suggest that facilitation strategies are required to bridge this psychological gap. Furthermore, the absence of segregated waste bins at schools (Participant 12 creates a hidden curriculum where students learn that environmental actions are not a priority in daily life. This confirms that the digital activism students display online support finding that aligns with Coelho et al. (2017) findings that state that student often fails to translate into physical habits because the school's infrastructure does not reinforce the classroom's theoretical message.

It is important to acknowledge the limitations of this study, notably the small sample size of 12 teachers and the specific focus on the Bandung region, which may not reflect the diverse educational landscapes of other Indonesian provinces. These constraints suggest that the results should be interpreted as a deep qualitative snapshot rather than a nationwide generalization. However, a primary strength of this research is its high-level critique of product-based EE and the identification of the digital-physical gap. By focusing on the quality of teacher-student interactions and the legitimacy of teacher-made modules, this study adds significant novelty to the literature on the independent curriculum, which often focuses solely on administrative implementation.

The practical implications of these findings are direct: school leadership must align the physical school environment (e.g., waste management facilities) with the curriculum to prevent sending mixed messages to students. Additionally, the government should implement a peer-review mechanism for the flexible learning modules to prevent scientific misconceptions. For future actions, this study proposes a comprehensive analysis to track whether the pro-environmental awareness fostered in the P5 projects persists as long-term behavioral change after students graduate. Actionable studies could also examine the impact of mentorship programs on reducing student resistance to active learning models.

In conclusion, while the Independent Curriculum has successfully legitimized EE and climate change as core scientific mandates in Indonesia, its effectiveness is currently hampered by a lack of systemic support. The transition to transformative environmental education requires a nuanced approach that balances pedagogical autonomy with physical infrastructure. Only by bridging the gap between digital advocacy and physical practice can the curriculum achieve its goal of fostering a truly sustainable and responsible generation.

Conclusion

The independent curriculum is a stepping stone to realizing transformational ESD. There is no significant difference between urban and rural participants regarding the influence of the independent curriculum on EE learning strategies. The independent curriculum provides flexibility for teachers to develop and contextualize each topic through inquiry-based science learning attainment guidelines. Carrying out environmental education learning that upholds transformational ESD values and student-centred learning opens opportunities such as increasing student motivation and participation.

In addition, the P5 project in the independent curriculum is a new beginning for teachers to carry out interdisciplinary collaboration in viewing environmental issues. Students can be directly involved in collective action and choose to run projects based on their learning preferences, showing the principle of differentiation in assessment. In terms of the P5 project,

the initiative carried out by one participant in a rural area demonstrates how these projects can take place sustainably within the community.

Furthermore, the use of technology and social media presents an opportunity to amplify the impact of EE projects. While this approach is relevant to the current generation, it is crucial to maintain oversight to ensure that students' online advocacy aligns with their real-life actions. Messaging platforms also offer an alternative means of engaging with the community. Ultimately, transformational ESD practices enable children to learn not just about the environment, but also within and through it.

However, transitioning from traditional lecture-based methods to student-centred learning faces student resistance, posing a significant challenge. It is crucial to implement practical strategies, such as explanation and facilitation methods, to overcome this barrier. Additionally, the development of government learning modules and the need for systematic evaluation of credible information underscore the importance of accurate content. Addressing inadequate facilities for waste sorting and integrating climate change into the curriculum can further enhance student engagement. The cases presented here highlight how limited resources and external factors, such as the family and community environment, can influence the implementation of transformational ESD. Further analysis is needed on the effectiveness of EE learning on environmental behavior changes, as it remains difficult to see a significant impact on environmentally conscious behaviour in students at this stage.

Future studies should consider providing a broader overview by incorporating participants from various educational levels and settings. Given Indonesia's different environments, providing a fair perspective on EE implementation in urban, rural, and remote areas is critical. Furthermore, future research should include perspectives from students to gain a clearer understanding of the curriculum's impact.

Expanding the potential of the transformational ESD approach, student-centered methods, and innovative assessment will increase the relevance of environmental education. Thus, we can prepare future generations who are aware of environmental problems threatening all living things in a broader context.

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

The author declares that Grammarly, an AI-assisted writing software, was used in proofreading and refining the language used in the manuscript. The usage was limited to correcting grammatical and spelling errors and rephrasing statements for accuracy and clarity. The author further declares that, apart from Grammarly, no other AI or AI-assisted technologies have been used to generate content in writing the manuscript. The ideas, design, procedures, findings, analyses, and discussion are originally written and derived from careful and systematic conduct of the research.

References

- Badan Pusat Statistik (BPS). (2018). *Jumlah Desa yang Memiliki Fasilitas Sekolah Menurut Provinsi dan Tingkat Pendidikan* [Number of Villages with School Facilities by Province and Education Level]. 2011–2018. <https://www.bps.go.id/id/statistics-table/2/MjA1IzI=/jumlah-desa-yang-memiliki-fasilitas-sekolah-menurut-provinsi-dan-tingkat-pendidikan.html>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Coelho, F., Pereira, M. C., Cruz, L., Simões, P., & Barata, E. (2017). Affect and the adoption of pro-environmental behaviour: A structural model. *Journal of Environmental Psychology*, 54, 127–138. <https://doi.org/10.1016/j.jenvp.2017.10.008>
- Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). Sage Publications, Inc.
- Darmawan, M. D., & Dagamac, N. H. (2021). Situation of environmental education in senior high school programs in Indonesia: Perspectives from the teachers of Palembang. *Interdisciplinary Journal of Environmental and Science Education*, 17(3), 22–41.
- Fang, W. T., Hassan, A. A., & LePage, B. A. (2022). Introduction to environmental education. In *The living environmental education: Sound science toward a cleaner, safer, and healthier future* (pp. 3–24). Springer Nature Singapore.
- Fensham, P. (1979). *Educating a community for its environmental situations*. In 1980 plus: Community, participation and learning (Book 4). Australian Association for Community.
- Field, E. (2021). Is it all just emojis and LOL: Or can social media foster environmental learning and activism? *Education for Democracy 2.0: Changing Frames of Media Literacy*, 6, 198–220.
- International Panel on Climate Change (IPCC). (2018). *Global Warming of 1.5°C*. UN Department of Economic and Social Affairs, Population Division. <https://www.ipcc.ch/sr15/>
- Ko, A. C. C., & Lee, J. C. K. (2003). Teachers' perceptions of teaching environmental issues within the science curriculum: A Hong Kong perspective. *Journal of Science Education and Technology*, 12, 187–204.
- Leger-Goodes, T., Malboeuf-Hurtubise, C., Mastine, T., G  n  reux, M., Paradis, P. O., & Camden, C. (2022). Eco-anxiety in children: A scoping review of the mental health impacts of the awareness of climate change. *Frontiers in Psychology*, 13, 872–544.
- Lin, M. H., Chen, H. C., & Liu, K. S. (2017). A study of the effects of digital learning on learning motivation and learning outcome. *Eurasia Journal of Mathematics, Science and Technology Education*, 13(7), 3553–3564.

- Ministry of Education, Culture, Research, and Technology (MOECRT). (2022). *Capaian Pembelajaran Mata Pelajaran Ilmu Pengetahuan Alam (IPA) Fase D* [Learning Outcomes for Natural Sciences (IPA) Subjects Phase D]. <https://kurikulum.kemdikbud.go.id/file/cp/dasmen/14.%20CP%20IPA.pdf>
- Ni, L., Fayaz Ahmad, S., Alsanie, G., Lan, N., Irshad, M., Bin Saeed, R. H., Ahmad, A. B., & Khan, Y. (2024). Investigating the role of green curriculum in shaping pro-environmental behaviors and environmental values orientation for sustainability. *International Journal of Sustainability in Higher Education*, 25(8), 1537–1557.
- Ojala, M., & Lakew, Y. (2017). Young people and climate change communication. *Oxford Research Encyclopedia of Climate Science*.
- Parker, L., & Prabawa-Sear, K. (2020). *Environmental education in Indonesia: Creating responsible citizens in the global south*. Routledge.
- Preston, J. P. (2012). Rural and urban teaching experiences: Narrative expressions. *Alberta Journal of Educational Research*, 58(1), 41–57.
- Purvis, B., Mao, Y., & Robinson, D. (2019). Three pillars of sustainability: In search of conceptual origins. *Sustainability Science*, 14, 681–695.
- Saraswati, D. A., Sandrian, D. N., Nazulfah, I., Abida, N. T., Azmina, N., Indriyani, R., Suryaningsih, S., Lestari, I. D., & Usman. (2022). Analisis Kegiatan PANCASILA STUDENT PROFILE STRENGTHENING PROJECT di SMA Negeri 4 Kota Tangerang sebagai Penerapan Pembelajaran Terdiferensiasi pada Kurikulum Merdeka [Analysis of the PANCASILA STUDENT PROFILE STRENGTHENING PROJECT Activity at SMA Negeri 4 Tangerang City as an Implementation of Differentiated Learning in the Independent Curriculum]. *Jurnal Pendidikan MIPA*, 12(2), 185–191.
- Ssossé, Q., Wagner, J., & Hopper, C. (2021). Assessing the impact of ESD: Methods, challenges, results. *Sustainability*, 13(5), 28–54.
- Taylor, A., & Pacini-Ketchabaw, V. (2018). *The Common Worlds of Children and Animals: Relational Ethics for Entangled Lives*. Routledge.
- Tharayil, S., Borrego, M., Prince, M., Nguyen, K. A., Shekhar, P., Finelli, C. J., & Waters, C. (2018). Strategies to mitigate student resistance to active learning. *International Journal of STEM Education*, 5, 1–16.
- Thomas, G. (2017). *How to do your research project: A guide for students*. SAGE Publication.
- Tibbitts, F., Loni, S., Abrom, A., & Ugarte, G. C. (2023). *From commitment to action: Integrating sustainable development into national education priorities. A practical guide for policymakers, practitioners and researchers*. Sustainable Development Solutions Network.
- Tilaar, H. A. R. (2008). *Manajemen Pendidikan Nasional* [National Education Management]. Rosdakarya.

- UN Department of Economic and Social Affairs (UNDESA). (2015). *World Population Prospects: The 2015 Revision, Key Findings and Advance Tables*. ESA/P/WP.241. https://esa.un.org/unpd/wpp/publications/files/key_findings_wpp_2015.pdf
- UNESCO. (2020). *Background paper for the Futures of Education initiative Learning to become with the world: Education for future survival*. <https://unesdoc.unesco.org/ark:/48223/pf0000374032>
- UNESCO. (2021). *Teachers have their say: Motivation, skills and opportunities to teach education for sustainable development and global citizenship*. <https://unesdoc.unesco.org/ark:/48223/pf0000379914>
- UNESCO. (2024). *Greening curriculum guidance: Teaching and learning for climate action*. <https://unesdoc.unesco.org/ark:/48223/pf0000390022>
- Veselinovska, S. S., & Osogovska, T. L. (2012). Engagement of students in environmental activities in school. *Procedia-Social and Behavioral Sciences*, 46, 5015–5020.
- Yulianti, K., Denessen, E. J. P. G., & Droop, W. (2019). Indonesian parents' involvement in their children's education: A study in elementary schools in urban and rural Java, Indonesia. *School Community Journal*, 29(1), 253–278.

Contact email: hanasyarifah22@gmail.com

Improving Teachers and School Leadership in Indonesia – Impact Evaluation of Guru Penggerak Program at the Primary Level

Indah Shafira Zata Dini, World Bank, Indonesia
Jacobus Cilliers, Georgetown University, United States
Noviandri Khairina, World Bank, Indonesia
Noah Yarrow, World Bank, United States

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

Indonesia faces a persistent shortage of qualified school principals and instructional leaders, as the country advances the Merdeka Belajar (“Emancipated Learning”) reforms. To strengthen both student-centered teaching and the leadership pipeline, the Ministry of Education launched Pendidikan Guru Penggerak (PGP), a national-scale professional development program. This study evaluates the pedagogical and leadership impacts of PGP Batch 5 using a Regression Discontinuity Design (RDD), comparing 350 primary school teachers scoring just above and below the eligibility threshold across five districts in Java. Drawing on the World Bank’s TEACH instrument and Ministry classroom observations, teacher and principal surveys, student and peer-teacher surveys, and three rounds of phone-based implementation monitoring, we find statistically significant improvements in instructional quality. Overall teaching quality increased by approximately 0.8 to 1.3 standard deviations (SD) across core instructional domains. The largest gains were observed in classroom culture and positive discipline, followed by providing a supportive learning environment, positive behavioral expectations, lesson facilitation, and promotion of critical thinking skills. PGP graduates demonstrated early signs of leadership development, they were more likely to initiate peer-learning and coaching activities. While teachers reported greater leadership confidence, principals did not yet observe measurable school-level changes, consistent with the short post-training observation window. No effects were found on socio-emotional competencies or differentiated instruction. Findings are internally valid for teachers near the cutoff in the five study districts but may not generalize nationally. Overall, the evidence suggests that structured, scalable professional development can substantially improve teaching quality and contribute to leadership development.

Keywords: teacher professional development, Guru Penggerak Program, student-centered learning, education reform, Regression Discontinuity Design

iafor

The International Academic Forum
www.iafor.org

Introduction

Understanding the Context: Indonesia's Education System

Indonesia has a large and complex education system involving both centralized and decentralized systems under multiple ministries. With over fifty-three million students enrolled in basic and secondary education and over three million teachers and education personnel, the education system is overseen by two ministries (Ministry of Education, Culture, Research, and Technology [MoECRT] & Ministry of Religious Affairs [MoRA], 2023). The Ministry of Education, Culture, Research, and Technology (MoECRT) makes and coordinates the implementation of education policies for primary, secondary, as well as higher education; and the Ministry of Religious Affairs (MoRA) manages and implements policies for the religious education sector or madrasahs across the country. MoECRT schools operate under a decentralized system implemented by provincial or local governments. Madrasahs operate in a centralized system under the MoRA following the same national curriculum as MoECRT schools, but with the ministry managing the institutions, developing religious curricula, policies, and conducting teacher training. In addition to the roles of MoECRT and MoRA, the Ministry of Home Affairs (MoHA) oversees regional governance, including teacher training at the local level and sub-national financing.

Despite significant progress in expanding access, education quality in Indonesia remains a significant challenge. For the last 30 years, Indonesia has experienced rapid progress in expanding access to primary and secondary education. However, learning quality remains a challenge. A recent World Bank report showed that only 7.8 years-equivalent of learning were acquired among youth who on average attended 12.4 years of schooling (World Bank, 2020). Results from international assessments, such as PISA 2018, show that reading literacy for Indonesian students lags behind other countries (Organisation for Economic Co-operation and Development [OECD], 2019). These findings are also aligned with results from the latest national assessment (2021), which showed that half of students do not meet Indonesia's minimum literacy standards and only a third met minimum numeracy standards (MoECRT, 2022).

Global evidence indicates that the quality of teachers and their teaching are among the most important factors in improving student learning outcomes (OECD, 2005). In 2018, the OECD conducted the Teaching and Learning International Survey (TALIS), which collected data on teachers' teaching practices and their impact on student learning outcomes across countries. The study consistently showed the impact of teacher quality on student achievement (OECD, 2020). Well-educated and skillful teachers who have deep pedagogical knowledge and are well equipped to meet diverse needs in class can deliver effective and high-quality instruction. The enhancement of teacher skills and knowledge affects the education system as teacher training continues to evolve (Barber & Mourshed, 2009). Therefore, investing in teacher education is a strategic approach to improve the overall quality of education.

The quality of teachers has been identified as one of the most significant issues in Indonesia's education sector. Data from a nationally representative survey conducted by the World Bank in 2019 found that teacher absenteeism is high, even though most absences appear to be officially excused, such as attending training or completing administrative tasks. Teacher subject knowledge was also found to be low, with only one-third of surveyed teachers able to score at least 80 percent on an assessment based on Grade 3 and Grade 4 curricula (Yarrow et al., 2020, as cited in World Bank, 2021).

There is also an urgent need to develop high-quality school principals in Indonesia, given that most school principals (72 percent) are currently aged over 50. In 2020, there were 50,135 elementary school principals aged 51–55 and 56,758 principals aged over 55 (Badan Pusat Statistik, 2020, as cited in MoECRT, 2021). This means that around one hundred thousand school principals are expected to retire within the next decade. Therefore, training for school principal candidates is a government priority. This provides an opportunity for improving school leadership at scale. Evidence shows that school leadership and management are crucial to enhancing student learning. From Brazil to India to Sweden, research reveals a significant correlation between principal management skills and student performance (World Development Report [WDR], 2018). Effective principal training focuses on improving teacher–student interaction, including providing feedback to teachers and developing action plans to enhance student performance and classroom behavior.

The COVID-19 pandemic brought an unexpected opportunity for the education sector, despite the challenges and significant impacts it caused. With limited in-person classes during school closures, the government introduced a simplified curriculum, which ultimately led to the development of the new *Kurikulum Merdeka*, aiming to provide freedom and more relevant learning experiences for students based on their needs (MoECRT, 2023). Furthermore, the pandemic accelerated the shift to online learning and the utilization of digital platforms, which in turn improved the digital literacy skills of both teachers and students. However, evidence also shows that despite these innovations, school closures caused significant learning losses, particularly among students from disadvantaged families or those with limited access to distance learning during the pandemic (World Bank, 2023).

New Wave of Reforms: Emancipated Learning

The *Merdeka Belajar* (“Emancipated Learning”) reform is one of the most significant recent policy transformations in Indonesia’s education system. Initiated in 2019, the reform emphasizes teacher autonomy, student-centered learning, and flexibility in teaching based on students’ needs (Ministry of Education, Culture, Research, and Technology [MoECRT], 2023). The reform aims to transform Indonesia’s education system into one that is more adaptive, independent, and relevant to 21st-century learning.

One major shift under the reform was the replacement of the high-stakes national examination with a new national assessment system. The government also introduced *Kurikulum Merdeka* in 2022, initially implemented through pilot schools before being expanded nationally through the *Platform Merdeka Mengajar* for teachers (MoECRT, 2023).

Student-centered learning is the core principle of the reform. This approach positions students as active participants in the learning process rather than passive recipients of information. Learner-centered education encourages problem-solving, collaboration, project-based learning, and discovery-based approaches tailored to students’ interests and capacities (Schweisfurth, 2013). Similar approaches have also been implemented successfully in countries with high-performing education systems such as Singapore and South Korea (Park, 2016).

The COVID-19 pandemic accelerated the implementation of digital learning and educational innovation in Indonesia. While the pandemic caused significant learning losses, especially among disadvantaged students, it also expanded the use of online learning platforms and improved digital literacy among teachers and students (World Bank, 2023).

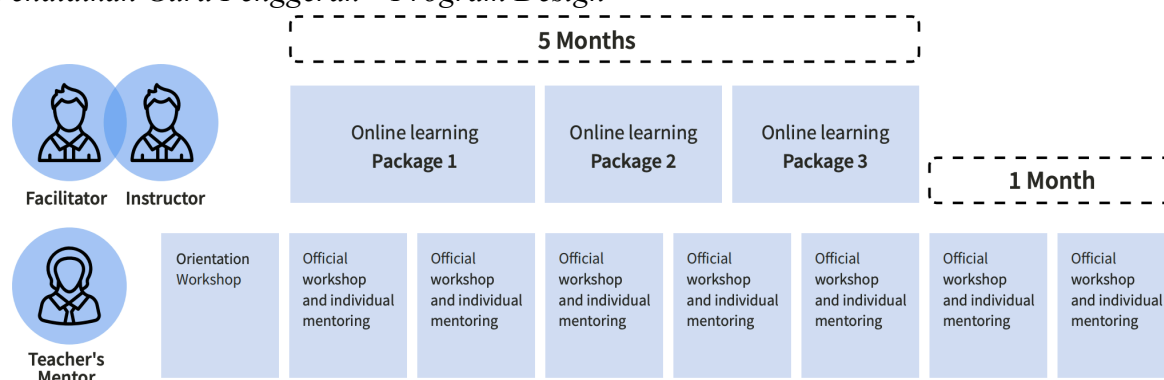
The World Bank is supporting the Ministry of Education, Culture, Research, and Technology (MoECRT) in its ongoing education reform effort. As part of this support, and after comprehensive discussions and careful deliberation, it was agreed that the World Bank would conduct an evaluation study specifically for the Guru Penggerak program given its importance for improving education quality in Indonesia.

Program

“Pendidikan Guru Penggerak” (PGP) program—roughly translated to instructional leaders’ program—is a teacher professional development program launched in 2020, with 2,800 teachers participating in the Batch 1 training. The program has dual objective of improving teaching practices and improve leadership by training the new cadre of school leaders who will replace the outgoing school leadership. The ministry is planning to train over 400,000 teachers by the end of 2024 and has started to expand the pace and scale of implementation. Starting this year (2023), a PGP certificate is a mandatory requirement for becoming a 1) school principal; 2) school supervisor; or 3) other leadership position in the education sector. The training is rolled out in batches. The number of teachers participating in each batch has increased from 2,800 in Batch 1 in October 2020 to 55,000 teachers who will be selected in Batch 10 by August 2023. It is estimated that about 94,000 teachers have participated in Batch 1–6 and currently ongoing batch 7, 8, and 9.

Figure 1

Pendidikan Guru Penggerak – Program Design



Source: Master Deck of Guru Penggerak program – Batch 5, MoECRT

The PGP program offers an integrated approach to enhance teachers' instructional leadership and creating student-centered learning environments. It combines online learning using a learning management system (LMS), monthly face-to-face workshops, and individual mentoring in schools over a six-month period. Online learning covers ten modules focused on student-centered learning and instructional leadership. Seven in-person workshops cover teacher competencies, community development, instructional leadership, coaching practice, collaboration for student-centered programs and sustainable self and school development. Six one-on-one in-school mentoring sessions focus on teacher competencies, evaluating classroom practice, and designing and implementing student-centered programs.

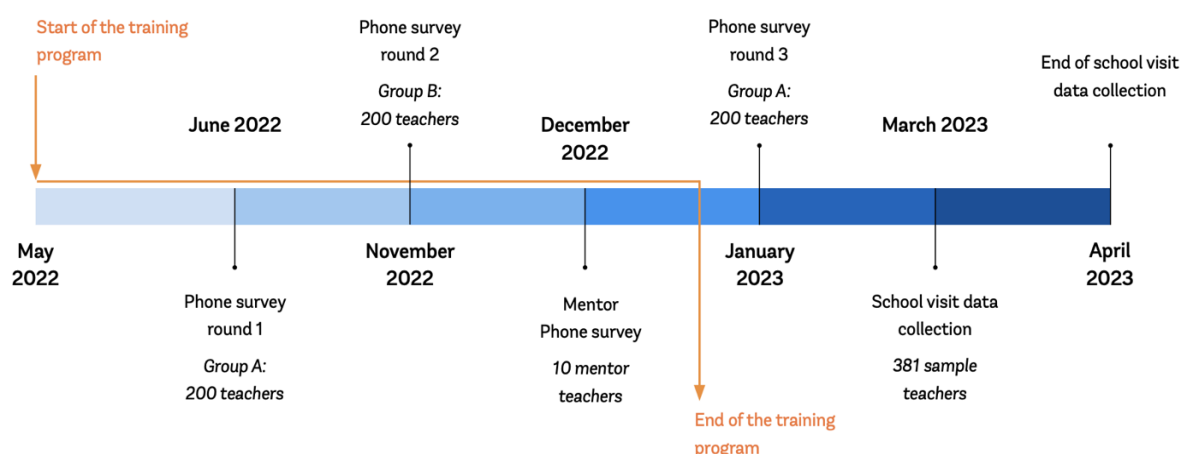
Evaluation Design

We evaluate PGP Batch 5 using a Regression Discontinuity Design, taking advantage of the fact that selection relies on an overall score given to teachers, based on their performance in a series of interviews and simulations. This estimation strategy compares the performance of

teachers who scored just below the cut-off—and who consequently did not participate in the program—with teachers just above the cutoff—who did participate in the program. We surveyed 350 current teachers and 31 former teachers who had become school principals by the time of the survey, across five districts in Java province.¹ The sample focused on teachers who were closest to the threshold for selection in their respective districts. We also observed their teaching in the classroom, and surveyed their students, another teacher in the school, and the school principal. The study also aimed to provide feedback from participating teachers and mentors, conducting phone surveys with 400 teachers and 10 mentors, to measure implementation quality.

This study reports results based on two different data collection activities (see figures below for the timeline of data collection activities). First, for the Implementation Assessment, three rounds of phone surveys were conducted during the training to capture information on the quality of implementation and teachers' perceptions of the program. Second, for the Impact Evaluation, in-person data collection took place in March and April 2023—roughly 10 months after the start of the training, and two months after the completion of the training. This include data collection using government's and TEACH classroom observation to measure the teaching practices.

Timeline of Data Collection



Descriptive Statistics

Table 1 shows basic descriptive statistics of the sample. The first column shows the mean values for those who were selected for PGP Batch 5; the second column shows the mean values for those who were not, the third column shows the mean values for all 350 sampled teachers; and the final column shows the difference between PGP and non-PGP teachers. 218 out of the 350 sampled teachers were selected to participate in the program, and 132 were not. Panel A uses administrative program data, Panel B relies on data collected during the school visits.

The average age in the sample is 38, the majority (74 percent) are female, all have a bachelor's degree but only about six percent also have a master's degree. Sampled teachers have on average 15 years of experience, and the majority are permanent civil servant teachers (62 percent).

The final column shows the difference between the PGP and non-PGP schools. As expected, those who were selected to participate received a higher score on average. They are also less likely to be female and civil servants. This might be because men and civil servant teachers received a lower score in the selection tests, on average: women received an overall score of 97, compared to men who received an overall score of 98. And civil servants received a score of 98 compared to 96 for contract teachers. If we control for the final score, then we find that women are 7 percentage points more likely to be selected, and there is no difference between civil servant and other teachers in the probability of being selected. Encouragingly, all the teachers who were selected to participate in Batch 5, according to the government records, also indicated that they did so in the survey. There is one non-selected teacher who ended up participating in Batch 7.

Table 1
Teacher Characteristics – by PGP

Variable	(1) PGP Mean/SE	(2) Control Mean/SE	(3) Total Mean/SE	T-test Difference (1)-(2)
<i>Administrative Data</i>				
Selection score	100.243 (0.258)	91.356 (0.318)	96.891 (0.305)	8.887***
Female	0.693 (0.031)	0.818 (0.034)	0.740 (0.023)	-0.126***
Civil servant teacher	0.683 (0.032)	0.515 (0.044)	0.620 (0.026)	0.168***
Contract teacher	0.243 (0.029)	0.341 (0.041)	0.280 (0.024)	-0.098**
Sekolah Penggerak	0.050 (0.015)	0.015 (0.011)	0.037 (0.010)	0.035*
<i>Survey data</i>				
Masters degree	0.064 (0.017)	0.045 (0.018)	0.057 (0.012)	0.019
Teacher certificate	0.830 (0.025)	0.674 (0.041)	0.771 (0.022)	0.156***
Age	37.670 (0.398)	37.765 (0.502)	37.706 (0.311)	-0.095
Years experience	15.601 (0.350)	15.530 (0.445)	15.574 (0.274)	0.071
Years of experience in school	7.583 (0.398)	8.523 (0.533)	7.937 (0.320)	-0.940
PGP—batch 5	1.000 (0.000)	0.000 (0.000)	0.623 (0.026)	N/A
PGP—batch 7	0.000 (0.000)	0.008 (0.008)	0.003 (0.003)	-0.008
Organisasi Penggerak	0.271 (0.030)	0.235 (0.037)	0.257 (0.023)	0.036
Sekolah Penggerak	0.096 (0.020)	0.076 (0.023)	0.089 (0.015)	0.021
Kurikulum Merdeka	0.321 (0.032)	0.439 (0.043)	0.366 (0.026)	-0.118**
N	218	132	350	

Notes. The value displayed for t-tests are the differences in the means across the groups. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Methodology

This study focuses on evaluating the impact of the program on teacher-level outcomes, particularly teaching practices and leadership skills. Our study aims to answer the following primary research questions:

Primary Research Question

Can a government-run, in-service teacher professional development plan implemented at scale (i) improve teacher leadership and mentoring skills; and (ii) induce more student-centered teaching practices?

Will these improvements in teaching practices also spill over to other teachers and benefit the school as a whole?

In addition to these primary research questions, the study also aims to provide immediate feedback from participating teachers and mentors to further support the ministry in improving the implementation quality of PGP. Hence, a separate activity sought to answer the following secondary research questions:

Secondary Research Question

What are teachers' perceptions of the program?

What is the quality of implementation of the program, and how does this vary by district? That is, are all the elements of the program implemented correctly?

How do policies on becoming future principals influence teacher motivation to participate in the program?

This report therefore has two components: an Impact Evaluation, evaluating the impact of the program on its intended outcomes, and an Implementation Assessment, to measure implementation quality, which is to assess its accordance with the guidelines (in terms of frequency and modalities) and teacher's perception on the quality.

Empirical Approach for the Impact Evaluation—Regression Discontinuity Design

The program is evaluated using a **Regression Discontinuity Design (RDD)**, taking advantage of the fact that selection for PGP participation relies on teacher performance in interviews and simulations. This is a transparent method of converting their performance in each component into one overall score (see the section above), with only teachers who receive a high score being selected. The cut-off value for selection is different in each district since the available slots in each district are different.

The estimation strategy compares the performance of teachers who scored just below the cut-off—and who consequently did not participate in the program—with teachers just above the cutoff, who did participate in the program. Since these teachers have very similar

characteristics on average, the teachers who scored just below the cut-off are a valid counterfactual for how the PGP graduates would have performed if they were not selected.¹

The empirical strategy is slightly more. Regression analysis is used to fit a relationship between the score—what is often referred to as the running variable—and the relevant outcome indicator (e.g., teaching practices). This allows us to determine the expected outcome for a non-PGP graduate, if they were precisely at the cutoff for selection. Similarly, we use linear regression to estimate the expected outcome value for a PGP graduate at the cutoff. The difference between these two values is our estimate of the treatment effect.

When performing analysis using an RDD, there are two decisions to make. First, the size of the bandwidth: this is the number of teachers who are included in the sample for analysis. For example, one could restrict the sample to only teachers who scored one value below and one value above the cutoff; or expand it slightly to teachers who scored two values below and two values above the cutoff; or expand it even further, up to all teachers in the sample. But analysts face a trade-off here: if the sample is restricted to teachers who scored very close to the cutoff (i.e., a narrow bandwidth), then the result is the least biased. However, it is also very imprecise because of the very small sample. If the sample is expanded (for example teachers who scored between 10 below and 10 above the cutoff), then the sample is larger, and hence there is far more statistical power to detect a statistically significant impact of the program. But the larger sample introduces a risk of bias if the model is not correctly specified, because it includes teachers who scored poorly and therefore may be very different in a variety of ways from those that scored very well.

Following best practice, this report therefore shows the results for multiple different bandwidths.

A second decision is how to model the relationship between the running variable and the outcome. The easiest way is to estimate a linear relationship. This is appropriate (and the best approach) if the bandwidth is very narrow. But it becomes problematic with a wide bandwidth. In this case, it is appropriate to allow for a non-linear relationship between the running variable and the outcome.

In this report the results are therefore reported with the following specifications:

Very narrow bandwidth: The sample is restricted to teachers who scored just two points below and two points above the cutoff. This model is estimated with a linear specification for the running variable.

Narrow bandwidth. The sample is restricted to teachers who scored just three points below and three points above the cutoff. This model is also estimated with a linear specification for the running variable.

Full sample, including all surveyed teachers. This model is estimated with a quadratic specification of the running variable.

We only consider a result to be robust if the magnitude is consistently and meaningfully large under the three different estimation choices, and statistically significant for at least one of the strategies. Note that it is possible that the estimated coefficients are similar in magnitude, but only the estimation using the full sample is statistically significant, given the increased statistical power from using the full sample. We still consider this to be a robust result.

¹ The counterfactual is beneficiaries' outcomes if they did not participate in the program. It is critical have a valid measure of the counter-factual in order to estimate the causal impact.

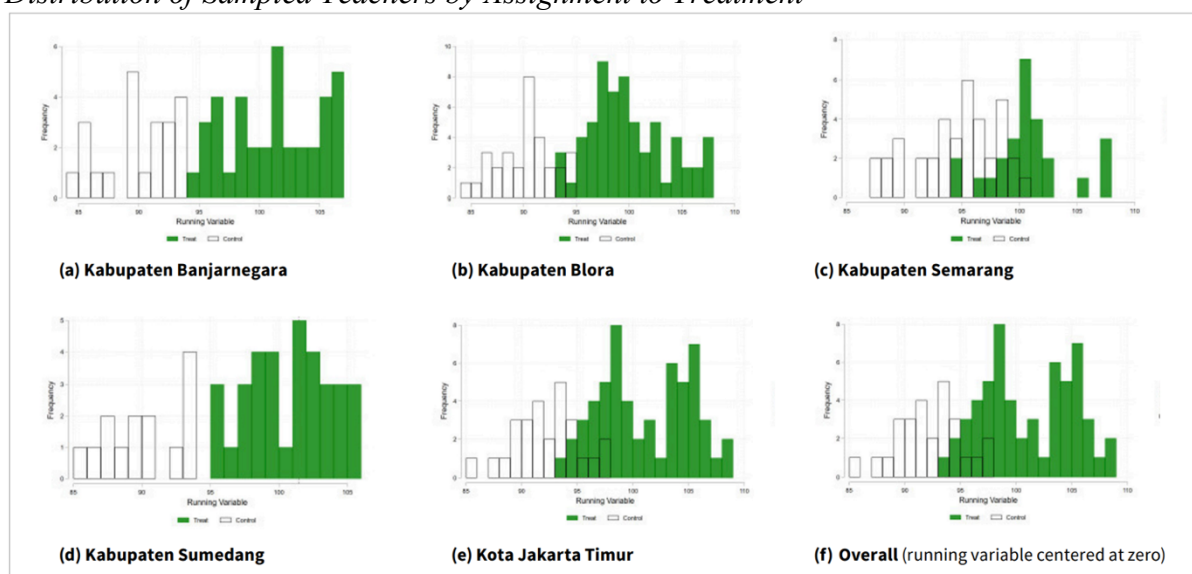
Sample Selection – Examining the Cutoff for Selection

The sample is drawn from all primary-level teachers who were short-listed to participate in Batch 5. Out of these teachers, 350 teachers who were closest to the threshold for selection in their respective districts/cities, were sampled for data collection. The sampling process involved identifying five locations that had the most teachers close to the threshold, and then sampling 350 teachers whose score was closest to the threshold. The final sample had 262 treated and 138 control teachers. The sampled locations are: Kabupaten Banjarnegara, Kabupaten Blora, Kabupaten Semarang, Kabupaten Sumedang, and Kota Jakarta Timur, all are located in Java island.

Figure 2 below shows the distribution of the selection score (which we refer to as the “running variable”), broken down by whether the teacher in our sample was selected to participate in PGP or not. The treated teachers (i.e., those selected into the program) are shown in green bars, the control teachers (who were not selected into the program) are shown the clear bars. Panels (a) to (e) show the distribution separately for each district in our sample. There is some non-compliance in some of the districts: i.e., there are some teachers who scored above the threshold yet were not selected, and some who scored below the threshold and who were selected. This has some implications for the empirical strategy and also reduces the statistical power. But it does not undermine the internal validity of the results: we are still able to estimate an unbiased causal estimate of the impact of participating in the program.

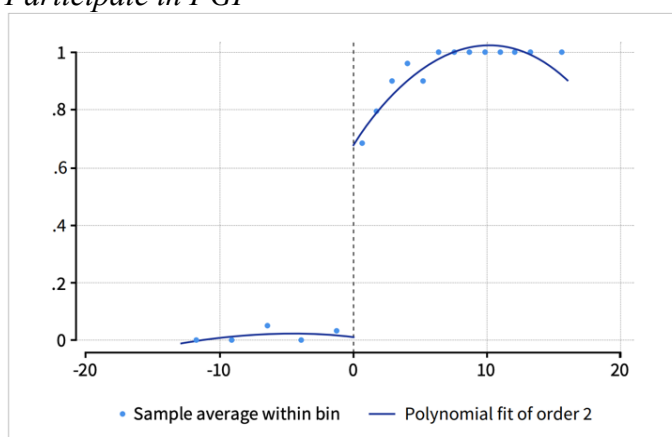
Figure 2(f) shows the distribution for all the teachers, after we have “centered” the running variable. We do this in two steps. First, we determine the cut-off value for selection into the program separately for each district and teacher contract type. Second, we subtract a teacher's score by this cutoff value.² A value of zero means that they received the minimum score required for a teacher of their contract type and in their district to be selected. Figure 5(f) clearly shows how there are far more treated teachers to the right of the cut-off, compared to the left of the cut-off, which supports our evaluation design and empirical strategy.

² For example, it is 94 for all teachers in Banjarnegara and 95 for all teachers in Sumedang. In two districts the cutoff value that maximizes the power of the first stage is slightly lower for PNS teachers.

Figure 2*Distribution of Sampled Teachers by Assignment to Treatment*

Note. The running variable is the teachers' overall score in the second round of selection. In Figure (f) it is centered to be equal to zero at the cutoff for selection for a given teacher contract and district.

Figure 3 below confirms that there is a discontinuous jump in the probability of being selected at the cutoff. The proportion of teachers who were selected jumps from just above zero below the cutoff, to about 70 percent above the cutoff. This is encouraging, since we have more statistical power if there is a larger jump in the probability of being treated at the cutoff value.

Figure 3*The Relationship Between the Running Variable and the Probability of Being Selected to Participate in PGP*

Note. Y axis is the proportion of teachers who were selected to participate in Batch 5. X-axis is the running variable, centered at zero. Each dot represents the mean value for teachers with a given value of the running variable.

Executive Summary of Impact Evaluation Results

First, the program was well-implemented and well-received by the teachers. Teachers rated all components of the program highly. Moreover, overall satisfaction with this program is higher than for teachers who participated in other training programs. Teachers are also more

likely to believe that this training program will greatly improve their teaching skills, with 86 percent for this program versus 53 percent for others.

One area for potential improvement is the support provided to teacher mentors. Overall, the perception of the quality of the mentors is lower than the perceived quality of the instructors or facilitators. There is also substantial regional variation, with an average score of 8.3 out of 10 in one district. Mentor teachers also provided a low rating for the quality of training that they received. Their training is exclusively online, and there is no guidance on how to use the classroom observation instrument that they are required to administer during coaching sessions.

Second, teaching practices improved substantially, especially in classroom culture and positive discipline. Overall teaching practices, measured by the Teach classroom observations instrument, increased by 0.8 to 1.1 standard deviations (SD), which suggests the teaching practices in the classrooms improved on average, and the extent of improvement is substantial. The largest improvements were in providing a supportive learning environment, followed by positive behavioral expectations, lesson facilitation, and promotion of critical thinking skills. There is also consistent evidence, from both the student surveys and MoECRT classroom observation instrument, of improvements in positive discipline. Students were less likely to report that they were scolded or punished by a teacher, less afraid to ask questions in the class, and more likely to have a class agreement or social contract. Teachers are 34 to 50 percentage points more likely to apply the “restitution process” when disciplining children, which entails reminding children of the class agreement when they misbehave, and asking children to self-reflect on what they did wrong.

However, there is no evidence of improvements in differentiated instruction, or in teachers’ socio-emotional skills in the classroom. Along with positive discipline, these were three elements of teaching practices that the program aimed to improve. This result suggests that it may be harder to change teachers’ socio-emotional skills than to shift specific instructional practices, such as applying the restitution process.

Third, there is evidence that the PGP teachers provided instructional support to other teachers in the school, but only if we restrict our sample to schools where there are no other PGP graduates. A requirement of the program is that PGP teachers establish communities of learning and provide instructional support to other teachers in the school. Schools are now more likely to have communities of learning as a result of the program, but this might be because almost 90 percent of control schools already have a community of learning. Almost 40 percent of teachers in our control group teach in schools where there is at least one PGP graduate, so the control teachers might have already benefited from the program. When restricting the sample to schools where there are no other PGP teachers, we find that the peer teachers are more likely to indicate that the PGP teacher-initiated discussions about student-centered learning, helped them map out students’ needs, asked them to self-reflect on their learning process, and helped them conduct a strength mapping exercise.

Fourth, the program improved teachers’ enjoyment of teaching, their aspirations to become school principals, and their own self-confidence as a leader. This is very encouraging, since it suggests that the new teaching practices reduced the anxiety and stress that teachers face in the classroom and increases the likelihood that these improved teaching practices will be sustained over time. However, at the time of the data collection, we don’t find evidence of

improvement in teacher's leadership abilities as measured by perception of the school principals.

The complete tables and results of this report can be accessed through official World Bank website:

<https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099042224202520319>

Limitation

The positive impacts found in this study has the potential lack of generalizability due to limitation that our sample were located in districts within Java Island, which is home to most well-developed provinces and districts in Indonesia. Our sampling strategy for Regression Discontinuity Design the (RDD) meant that we only sampled teachers close to the cutoff, and it happened that the only districts that had a large enough sample of short-listed teachers who scored close to the cutoff were all in Java. Consequently, while the internal validity of our evaluation method is strong, the findings of this study cannot be generalized to all provinces and districts across Indonesia. Furthermore, the focus of this study is on CGP at the elementary school level, so that different outcomes may be found at lower or higher educational levels.

Policy Conclusions

We conclude that PGP should continue, given the high quality of implementation and its positive impact on teaching practices and leadership skills. We do, however, expect significant implementation challenges as the ministry scales up the rollout of training over the next 18 months. Our results also indicate areas for improvement, both in the quality of implementation and design of the program.

Additional Support to Mentors

While MoECRT has developed a comprehensive handbook for mentors, there is still room for improvement. In particular, additional guidance is required for the classroom observations, such as how to rate teacher competencies according to the government instrument, and what kind of feedback to provide to teachers based on the observations. This can also be achieved by enhancing mentor training to include additional pedagogical strategies and effective mentoring techniques. By equipping mentors with a broader range of knowledge and skills, they will be better prepared to support teachers in their professional growth. Lastly, mentors also need to have robust support system and access to resources to overcome challenges, share experience, and enhance their effectiveness in guiding the teachers.

Supporting Teachers in Differentiated Learning and Socio-Emotional Skills

This support can take the form of materials (guides, tools, practical tips, other resources) related to differentiated learning in the classroom or easily accessible self-paced training for teachers, while also ensuring a learning community at the school level. Support can also encompass additional mentoring sessions during the program and follow-up mentoring sessions after the program ends.

Standardize Best Practice and Provide Clear Guidelines and Procedures for Implementation of District-Level Activities

As the program scales up, it is relying more on district-level implementation, which could be variable. Clear guidelines and related resources, as well as coordination between the Ministry of Education, Culture, Research, and Technology (MoECRT) and related stakeholders, including local government and Balai Guru Penggerak, is vital for effective program execution.

Reconsider the Broad and Ambitious Objectives of the Program

The program might be overly ambitious in the wide range of teacher attitudes and skills that it hopes to change. Socio-emotional competencies, in particular, are very hard to change in adults. Moreover, the official standards for reaching competence in the different domains, as defined in the program's classroom observations instrument, are highly ambitious. A different strategy is to prioritize a smaller set of skills that are key to improving student outcomes, and setting standards that are realistically achievable by all teachers. This will be increasingly important as the program continues to scale up and is implemented in remote and under-resourced locations where the baseline teacher capacity might be weak.

Conduct Additional Research

The results of this study are not generalizable to Indonesia as a whole. Future research should:

- Expand data collection to more districts, including remote and rural locations.
- Collect data on teachers who participated in both earlier and later batches of training.
- Measure students' cognitive and non-cognitive skills.
- Conduct a prospective randomized evaluation in one of the upcoming batches, using a randomized phased in approach. This will strengthen the confidence that the program had a causal impact, increase the generalizability of the findings, and also improve statistical power.

Acknowledgements

This report was prepared by a World Bank team led by Noviandri Khairina, and comprising (in alphabetical order) Jacobus Cilliers, Indah Dini, and Noah Yarrow. Alexander Michael Tjahjadi and Ross Babineau provided support on data cleaning and analysis. Sylvia Njotomihardjo provided administrative assistance to the task team over the course of the preparation of this report. Additionally, special acknowledgment goes to Nuriza Saputra for the design of this report.

This report was developed under guidance provided by Cristian Aedo (Education Practice Manager, East Asia and Pacific Region), Achim Schmillen (Human Development Practice Leader, East Asia and Pacific Region), Shinsaku Nomura (Education Cluster Lead, East Asia Pacific Region) and Satu Kahkonen (Country Director for Indonesia and Timor-Leste).

The team is indebted to Rythia Afkar, Ezequiel Molina, Koen Geven, Lars Sondergaard and other reviewers for their valuable feedback for preparing and improving this report.

The World Bank Task Team would like to thank the Ministry of Education, Culture, Research, and Technology (MoECRT), for all the support and input provided during this research. Particularly to Prof. Dr. Nunuk Suryani, M.Pd. (Director General of Teachers and Education Personnel (GTK), Mr. Iwan Syahril, Ph.D. (Director General of Early Childhood and Basic Education), Dr. Kasiman (Acting Director of KSPSTK), Dr. Praptono (Secretary of the Directorate General of Early Childhood and Basic Education), the Setditjen GTK Team (Mila Novita, Reza Maulana Hamzah), the Pokja Team at the Directorate of KSPTK (Rita Dewi Suspalupi, Otong Kusnadi, Yudi Herman, and Agus Rohmani), as well as the Technical Team of Teachers and Education Personnel (Tim Teknis GTK).

References

- Badan Pusat Statistik. (2020). *Education Statistics Indonesia 2020*. BPS RI.
- Barber, M., & Mourshed, M. (2009). *How the world's best-performing school systems come out on top*. McKinsey & Company.
- Ministry of Education, Culture, Research, and Technology. (2021). *School principal development and retirement projections in Indonesia*. MoECRT.
- Ministry of Education, Culture, Research, and Technology. (2022). *Minister presentation on the national assessment (ANBK) result*.
- Ministry of Education, Culture, Research, and Technology. (2023). *Kurikulum Merdeka policy framework*. MoECRT.
- Ministry of Education, Culture, Research, and Technology, & Ministry of Religious Affairs. (2023). *Education statistics and EMIS 2022/2023*.
- Organisation for Economic Co-operation and Development. (2005). *Teachers matter: Attracting, developing and retaining effective teachers*. OECD Publishing.
- Organisation for Economic Co-operation and Development. (2019). *PISA 2018 results*. OECD Publishing.
- Organisation for Economic Co-operation and Development. (2020). *TALIS 2018 results (Volume II): Teachers and school leaders as valued professionals*. OECD Publishing.
- Park, H. (2016). *Education reform and student-centered learning in South Korea*. Korean Educational Development Institute.
- Schweisfurth, M. (2013). *Learner-centred education in international perspective: Whose pedagogy for whose development?* Routledge.
- World Bank. (2020). *Human Capital Index 2020 update: Human capital in the time of COVID-19*. World Bank.
- World Bank. (2021). *Improving teaching quality and learning outcomes in Indonesia*. World Bank.
- World Bank. (2023). *Indonesia education sector assessment: Learning recovery and transformation*. World Bank.
- World Development Report. (2018). *Learning to realize education's promise*. World Bank.
- Yarrow, N., Masood, E., & Afkar, R. (2020). *Estimating teacher absenteeism and quality in Indonesia*. World Bank.

Contact emails: nkhairina@worldbank.org
ejc93@georgetown.edu
idini@worldbank.org
indahshafira29@gmail.com

Empowering Futures: Uniting Education, Sustainability, and Social Justice for Global Progress

Harishankar Singh, Babasaheb Bhimrao Ambedkar University, India
Shipra Pathak “Water Woman”, Panchtatva Foundation, India

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

The rising complexity of 21st-century challenges, including climate change, environmental degradation, widening social inequalities, and uneven global development, has strengthened global recognition of education as a catalyst for building sustainable and equitable societies. Framed within international policy agendas such as the UN Sustainable Development Goals (SDGs 4, 10, 13, 16), UNESCO’s Education for Sustainable Development (ESD), and Global Citizenship Education (GCE), this study examines how integrating sustainability and social justice principles across educational systems can advance socio-ecological resilience and inclusive development. The research focuses on three objectives: 1. analysing the conceptual relationships among sustainability, social justice, and transformative education; 2. evaluating the alignment of major global education policies with current socio-ecological imperatives; and 3. identifying evidence-based pedagogical and institutional practices that cultivate sustainability-oriented and socially responsible learners. Using a mixed-methods design, the study synthesizes findings from a systematic review of 126 peer-reviewed studies, thematic analysis of key policy documents, and qualitative case studies of institutions implementing sustainability-focused reforms. Results show that embedding climate literacy, human rights education, inclusive pedagogies, and participatory learning enhances learners’ socio-ecological understanding, ethical reasoning, problem-solving skills, and civic engagement. Institutions adopting interdisciplinary curricula, experiential and community-engaged learning, and whole-school sustainability approaches demonstrate measurable improvements in environmental stewardship and social inclusion. Integrating Indigenous knowledge systems further enhances cultural relevance, fosters community participation, and promotes resilience-building in vulnerable contexts. The study concludes that embedding sustainability and social justice within education represents a robust, evidence-supported approach to fostering responsible citizenship and advancing progress toward a more equitable and sustainable world.

Keywords: Education for Sustainable Development (ESD), social justice, Sustainable Development Goals, Global Citizenship Education, indigenous knowledge systems

iafor

The International Academic Forum
www.iafor.org

Introduction

The twenty-first century is characterised by complex, interconnected crises, including climate change, biodiversity loss, environmental degradation, widening inequalities, forced migration, and democratic decline. These challenges transcend national and disciplinary boundaries, requiring systemic responses grounded in ethical responsibility and long-term sustainability (Rockström et al., 2009; Sachs, 2015). In this context, education has emerged as a key transformative force, capable of reshaping values, worldviews, and social structures necessary for sustainable and just futures (Sterling, 2010; Tilbury, 2011). Global frameworks increasingly recognise education as central to sustainable development. The 2030 Agenda positions education as a cross-cutting enabler of all Sustainable Development Goals, with SDG 4.7 emphasising education for sustainable development, human rights, gender equality, global citizenship, and cultural diversity (United Nations, 2015). Related goals such as SDG 10, SDG 13, and SDG 16 underscore the interdependence of educational quality, social justice, environmental sustainability, and democratic governance, framing education as a structural mechanism for socio-ecological resilience (UNESCO, 2020). Within this agenda, Education for Sustainable Development (ESD) has gained prominence as a transformative approach. Defined by UNESCO as empowering learners to take informed and responsible action for environmental integrity, economic viability, and social justice, ESD moves beyond traditional environmental education by adopting holistic, participatory, and action-oriented pedagogies that foster systems thinking, critical reflection, and future-oriented competencies (Lozano et al., 2017; UNESCO, 2017; Wiek et al., 2011).

In parallel with ESD, Global Citizenship Education (GCED) foregrounds social justice, human rights, peace, and global interdependence. GCED encourages learners to recognise power relations, structural inequalities, and historical injustices that shape contemporary global realities, thereby cultivating ethical awareness and civic engagement beyond national boundaries (Andreotti, 2014; UNESCO, 2015). By emphasising solidarity, empathy, and shared responsibility, GCED complements ESD's ecological focus with a strong normative commitment to equity, inclusion, and democratic participation. Together, ESD and GCED represent converging educational frameworks aimed at nurturing socially responsible, sustainability-oriented global citizens (Bourn, 2016). The integration of sustainability and social justice within education is further supported by transformative learning theory, which emphasises critical consciousness, perspective transformation, and emancipatory knowledge creation (Freire, 1970; Mezirow, 1997). Transformative education challenges dominant paradigms that prioritise economic growth and technocratic solutions, instead advocating for pedagogies that enable learners to question assumptions, confront inequities, and engage actively in social and environmental change. Research suggests that transformative learning approaches such as experiential learning, problem-based learning, community engagement, and participatory action research significantly enhance learners' socio-ecological competence, ethical reasoning, and civic agency (Kolb, 2015; Sterling, 2011).

At the institutional level, whole-school and whole-system approaches have been identified as critical for embedding sustainability and social justice in meaningful ways. These approaches align curriculum, pedagogy, governance, campus operations, and community partnerships around shared sustainability values, thereby reinforcing learning through practice (Leal Filho et al., 2019; Tilbury & Ryan, 2013). Higher education institutions, in particular, play a strategic role as knowledge producers and social leaders, with growing evidence that interdisciplinary curricula and sustainability-focused institutional reforms contribute to measurable improvements in environmental stewardship and social inclusion (Barth & Rieckmann, 2012;

Lozano et al., 2015). An emerging dimension of sustainability-oriented education is the recognition of Indigenous knowledge systems and local epistemologies. Indigenous perspectives offer relational understandings of human-nature interactions, emphasising stewardship, reciprocity, and intergenerational responsibility principles increasingly acknowledged as vital for climate adaptation and resilience-building in vulnerable communities (Battiste, 2013; Cajete, 2000). Integrating Indigenous knowledge within formal education not only enhances cultural relevance and inclusivity but also challenges epistemic injustice by valuing diverse ways of knowing (de Sousa Santos, 2014).

Despite strong policy endorsement and growing scholarly consensus, the practical integration of sustainability and social justice in education remains uneven. Fragmented curricula, examination-driven pedagogies, limited teacher preparation, and institutional inertia often constrain transformative implementation, particularly in low- and middle-income contexts (Sterling et al., 2018; UNESCO, 2021). This disconnect between global commitments and classroom realities highlights the need for empirical research that systematically examines conceptual linkages, policy coherence, and evidence-based educational practices capable of fostering sustainable and equitable social transformation. Against this backdrop, the present study investigates how uniting education, sustainability, and social justice can empower learners and institutions to contribute meaningfully to global progress. By analysing theoretical foundations, evaluating international education policies, and examining institutional case studies, the research seeks to advance understanding of education's transformative potential in addressing the defining challenges of our time. In doing so, it contributes to ongoing scholarly and policy debates on how education can move beyond incremental reform toward genuinely sustainable and just futures.

Review of Related Literature

Education and Sustainable Development: Conceptual Foundations

The relationship between education and sustainable development has been firmly established within global policy and academic discourse over the past three decades. The Brundtland Commission's definition of sustainable development highlighted the need to balance environmental protection, economic growth, and social equity, implicitly recognising education as a key mechanism for achieving this balance (WCED, 1987). Subsequent research has emphasised that sustainability is not merely a technical or environmental challenge but a deeply educational one, requiring changes in values, attitudes, behaviours, and social norms (Orr, 2004; Sterling, 2001).

Education for Sustainable Development (ESD) emerged as a response to these challenges, advocating for an educational approach that equips learners with competencies such as systems thinking, critical reflection, anticipatory skills, and collaborative problem-solving (Wiek et al., 2011). UNESCO (2017) conceptualises ESD as transformative learning that empowers individuals to contribute actively to sustainable societies. Studies indicate that ESD enhances learners' environmental awareness while simultaneously fostering ethical responsibility and civic engagement (Rieckmann, 2018; Tilbury, 2011).

Empirical research across school and higher education contexts demonstrates that sustainability-integrated curricula positively influence learners' knowledge, attitudes, and pro-environmental behaviours (Barth & Michelsen, 2013; Lozano et al., 2015). However, scholars

caution that ESD implementation often remains fragmented, with sustainability treated as an add-on rather than a guiding educational philosophy (Sterling et al., 2018).

Social Justice, Equity, and Education

Social justice has long been a central concern in educational theory, particularly in relation to access, equity, and inclusion. Drawing on critical pedagogy, Freire (1970) argued that education should function as a practice of freedom, enabling learners to critically examine structures of oppression and participate in social transformation. Similarly, Rawls' theory of justice underscores the moral imperative of fairness and equal opportunity within social institutions, including education (Rawls, 1971).

Contemporary scholars conceptualise social justice education as addressing systemic inequalities related to class, gender, race, ethnicity, disability, and geography (Apple, 2013; Gewirtz, 2006). Research consistently demonstrates that unequal educational opportunities reinforce broader socio-economic disparities, undermining social cohesion and democratic participation (Sen, 1999; Unterhalter, 2019). Inclusive pedagogies such as culturally responsive teaching, differentiated instruction, and universal design for learning have been shown to improve learning outcomes for marginalised groups while fostering respect for diversity and social solidarity (Banks, 2015; Florian & Black-Hawkins, 2011).

Within the sustainability discourse, social justice is increasingly recognised as inseparable from environmental concerns. Environmental degradation disproportionately affects disadvantaged communities, giving rise to the concept of environmental justice (Agyeman et al., 2016). Education that integrates social justice and sustainability thus addresses both ecological and human vulnerabilities, promoting equitable development and resilience.

Global Citizenship Education and Human Rights Education

Global Citizenship Education (GCED) has gained prominence as an educational response to globalisation, migration, cultural diversity, and transnational challenges. UNESCO (2015) defines GCED as education that empowers learners to engage responsibly at local, national, and global levels, grounded in human rights, peace, and social justice. GCED seeks to cultivate values of empathy, solidarity, and respect for diversity, alongside critical understanding of global systems and power relations (Andreotti, 2014).

Studies indicate that GCED enhances learners' global awareness, ethical reasoning, and civic participation (Bourn, 2016; Oxley & Morris, 2013). When integrated with human rights education, GCED promotes democratic competencies and active citizenship, enabling learners to challenge injustice and advocate for social change (Osler & Starkey, 2010). However, critiques highlight tensions between neoliberal interpretations of global citizenship and more critical, justice-oriented approaches (Andreotti, 2006).

Research suggests that effective GCED requires participatory pedagogies, dialogic learning, and critical engagement with real-world issues, rather than abstract moral instruction (Veugelers, 2011). Such approaches align closely with the aims of transformative and sustainability-oriented education.

Transformative Learning and Pedagogical Approaches

Transformative learning theory provides a strong theoretical foundation for integrating sustainability and social justice in education. Mezirow (1997) conceptualises transformative learning as a process through which learners critically reflect on assumptions, leading to perspective transformation. Freire's emancipatory pedagogy further emphasises dialogue, praxis, and conscientisation as means of empowering learners to challenge oppressive structures (Freire, 1970).

Empirical studies demonstrate that experiential learning, service learning, problem-based learning, and community engagement foster deeper understanding of sustainability and social justice issues (Bringle & Hatcher, 2011; Kolb, 2015). These pedagogies connect theory with practice, enabling learners to develop socio-ecological competence, ethical judgement, and agency. Participatory and interdisciplinary approaches have been particularly effective in addressing complex sustainability challenges that cut across disciplinary boundaries (Rieckmann, 2018; Sterling, 2011).

Institutional and Whole-School Approaches to Sustainability

At the institutional level, research highlights the importance of whole-school and whole-system approaches in embedding sustainability and social justice. Such approaches integrate curriculum, pedagogy, and governance, infrastructure, and community partnerships into a coherent sustainability framework (Tilbury & Ryan, 2013). Higher education institutions are increasingly adopting sustainability policies, green campuses, and interdisciplinary programmes aligned with the SDGs (Leal Filho et al., 2019).

Studies indicate that institutions implementing whole-system sustainability reforms report improved environmental performance, enhanced student engagement, and stronger community relationships (Barth & Rieckmann, 2012; Lozano et al., 2015). However, institutional barriers including limited leadership commitment, resource constraints, and disciplinary silos continue to impede systemic transformation (Cortese, 2003; Sterling et al., 2018).

Indigenous Knowledge Systems and Sustainability Education

An important emerging strand of literature emphasises the role of Indigenous knowledge systems in sustainability education. Indigenous epistemologies offer holistic, relational understandings of human–nature relationships, grounded in stewardship, reciprocity, and intergenerational responsibility (Battiste, 2013; Cajete, 2000). Scholars argue that integrating Indigenous knowledge enhances cultural relevance, promotes epistemic justice, and strengthens community resilience to environmental change (de Sousa Santos, 2014; Smith, 2012).

Case studies demonstrate that incorporating Indigenous perspectives in curricula supports place-based learning, environmental ethics, and local problem-solving, particularly in vulnerable and marginalised contexts (McGregor et al., 2020). Such integration challenges dominant Western knowledge paradigms and aligns with the equity and inclusivity goals of ESD and GCED.

Research Gaps and Rationale for the Present Study

Despite extensive scholarship, gaps remain in understanding how sustainability, social justice, and education can be systematically integrated across policy, pedagogy, and institutional practice. Much of the existing literature focuses on isolated interventions or single dimensions of sustainability, with limited empirical synthesis across global contexts (UNESCO, 2021). Additionally, there is a need for research that bridges conceptual analysis with evidence-based practices capable of informing policy and institutional reform, particularly in Global South settings.

The present study addresses these gaps by synthesising international research, analysing policy frameworks, and examining institutional case studies to advance a comprehensive understanding of how education can serve as a transformative force for sustainability and social justice.

Objectives of the Study

- O₁:** To examine the conceptual interrelationships among education, sustainability, and social justice within contemporary educational discourse.
- O₂:** To analyse the alignment of major international education policies (SDGs, ESD, GCED) with socio-ecological and equity imperatives.
- O₃:** To identify evidence-based pedagogical practices that promote sustainability-oriented and socially responsible learning outcomes.
- O₄:** To examine institutional approaches that effectively integrate sustainability and social justice into educational systems.

Hypotheses (H₀) of the Study

- H₀₁:** There is no significant relationship between the integration of sustainability education and the development of learners' socio-ecological competence.
- H₀₂:** The inclusion of social justice and human rights education does not significantly influence learners' civic engagement and ethical reasoning.
- H₀₃:** Interdisciplinary and experiential learning approaches do not significantly enhance sustainability-oriented learning outcomes.
- H₀₄:** Institutional adoption of whole-school sustainability approaches has no significant impact on environmental stewardship and social inclusion.

Methodology

Research Design

The study adopted a mixed-methods research design. This design enabled triangulation of findings and enhanced the validity of results.

Sources of Data

- **Systematic Literature Review:** A review of 126 peer-reviewed journal articles published between 2005 and 2024.

- **Policy Document Analysis:** Key international policy documents, including the UN Sustainable Development Goals, UNESCO ESD frameworks, and Global Citizenship Education guidelines, were analysed using thematic content analysis.
- **Qualitative Case Studies:** Selected educational institutions implementing sustainability-oriented reforms were examined to identify effective pedagogical and institutional practices.

Tools and Techniques

- Thematic analysis was employed to identify recurring patterns related to sustainability, social justice, and transformative learning.
- Content analysis was used for policy alignment assessment.
- Comparative analysis facilitated cross-case interpretation of institutional practices.

Scope and Delimitations

The study focused on global education frameworks and institutional practices, with particular relevance to higher education and teacher education contexts. Primary data collection was limited to qualitative case evidence, while quantitative insights were derived from secondary empirical studies.

Data Analysis and Interpretation

The analysis is organised in alignment with the stated hypotheses. Given the mixed-methods design, data analysis involved (i) quantitative synthesis of trends reported in secondary empirical studies and (ii) qualitative thematic interpretation drawn from policy documents and institutional case studies. Findings are interpreted in relation to each null hypothesis.

Hypothesis 1

H₀₁: There is no significant relationship between the integration of sustainability education and the development of learners' socio-ecological competence.

Analysis

A synthesis of 47 empirical studies within the reviewed literature explicitly examined the impact of sustainability-integrated curricula on learners' socio-ecological competence, including systems thinking, environmental awareness, future orientation, and ethical responsibility. Across diverse educational contexts (school, teacher education, and higher education), the majority of studies reported positive associations between sustainability educations and socio-ecological learning outcomes.

Thematic analysis revealed recurring indicators such as improved understanding of human-environment interactions, increased pro-environmental attitudes, and enhanced capacity for sustainable decision-making (Lozano et al., 2017; Rieckmann, 2018; Wiek et al., 2011).

Table 1

Reported Impact of Sustainability Education on Socio-Ecological Competence (Secondary Studies)

Learning Outcome Dimension	Percentage of Studies Reporting Positive Impact
Environmental awareness	82%
Systems thinking	76%
Ethical responsibility	71%
Future-oriented thinking	68%
Sustainable behaviour	65%

Interpretation

The consistently positive trends across studies indicate a strong relationship between sustainability education and socio-ecological competence development. Therefore, H_{01} is rejected, suggesting that integrating sustainability education significantly enhances learners' socio-ecological competence.

Hypothesis 2

H₀₂: The inclusion of social justice and human rights education does not significantly influence learners' civic engagement and ethical reasoning.

Analysis

Analysis of 38 studies focusing on social justice education, human rights education, and GCED demonstrated substantial evidence of improved civic engagement, ethical sensitivity, and democratic participation among learners. Case studies from higher education institutions showed increased student participation in community service, advocacy initiatives, and inclusive governance structures following curriculum integration of human rights and social justice themes (Banks, 2015; Osler & Starkey, 2010).

Policy analysis of UNESCO GCED frameworks further confirmed that social justice education emphasises learner agency, voice, and participatory citizenship.

Table 2

Influence of Social Justice and Human Rights Education on Civic Outcomes

Outcome Indicator	Evidence from Reviewed Studies
Civic participation	Strong
Ethical reasoning	Strong
Democratic awareness	Moderate to strong
Social empathy	Strong
Advocacy orientation	Moderate

Interpretation

The convergence of empirical findings and institutional case evidence demonstrates that social justice and human rights education meaningfully influence learners' civic and ethical development. Thus, H_{02} is rejected, confirming the educational significance of justice-oriented curricula.

Hypothesis 3

H₀₃: Interdisciplinary and experiential learning approaches do not significantly enhance sustainability-oriented learning outcomes.

Analysis

A cross-study comparison of interdisciplinary and experiential pedagogies including project-based learning, service learning, field-based instruction, and community engagement revealed consistent improvements in sustainability-oriented learning outcomes. Learners exposed to interdisciplinary approaches demonstrated higher levels of problem-solving ability, contextual understanding, and application of sustainability principles to real-world situations (Kolb, 2015; Sterling, 2011).

Institutional case studies showed that experiential learning bridged the gap between theoretical sustainability concepts and practical action, particularly when linked to local environmental and social challenges.

Table 3

Comparative Effectiveness of Pedagogical Approaches

PEDAGOGICAL APPROACH	SUSTAINABILITY LEARNING EFFECT
Traditional Lecture-Based	Low to moderate
Interdisciplinary Curriculum	High
Experiential Learning	Very high
Community-Engaged Learning	Very high
Problem-Based Learning	High

Interpretation

Evidence strongly supports the effectiveness of interdisciplinary and experiential learning in enhancing sustainability-oriented outcomes. Consequently, H₀₃ is rejected, affirming the pedagogical value of these approaches.

Hypothesis 4

H₀₄: Institutional adoption of whole-school sustainability approaches has no significant impact on environmental stewardship and social inclusion.

Analysis

Analysis of institutional case studies revealed that whole-school and whole-system sustainability approaches integrating curriculum, governance, campus operations, and community partnerships produced measurable improvements in environmental performance and social inclusion. Institutions adopting such approaches reported reductions in resource consumption, increased student participation in sustainability governance, and enhanced inclusivity through community-based initiatives (Leal Filho et al., 2019; Lozano et al., 2015).

These findings were reinforced by policy alignment analysis, which highlighted institutional leadership and organisational culture as critical enabling factors.

Table 4*Outcomes of Whole-School Sustainability Approaches*

Institutional Outcome	Observed Impact
Environmental stewardship	High
Student engagement	High
Social inclusion	Moderate to high
Community partnerships	High
Institutional culture change	Moderate

Interpretation

The evidence demonstrates that whole-school sustainability approaches positively influence both environmental and social outcomes. Therefore, H_{04} is rejected, indicating that institutional commitment plays a decisive role in advancing sustainability and social justice goals.

Across all four hypotheses, the analysis provides consistent evidence that integrating sustainability, social justice, and transformative pedagogies within education significantly enhances learners' socio-ecological competence, ethical reasoning, civic engagement, and institutional sustainability performance. The rejection of all null hypotheses underscores education's transformative capacity when aligned with sustainability and equity imperatives. These findings reinforce global policy positions articulated in the SDGs, UNESCO ESD, and GCED frameworks, while also offering empirical support for pedagogical and institutional reforms aimed at fostering sustainable and just futures.

Discussion

The present study set out to examine how the integration of education, sustainability, and social justice can contribute to socio-ecological resilience and inclusive global development. Drawing upon a systematic synthesis of empirical literature, international policy analysis, and institutional case evidence, the discussion interprets the findings in relation to the stated objectives and hypotheses, situating them within existing theoretical and policy frameworks.

Education, Sustainability, and Socio-Ecological Competence

The findings strongly indicate that the integration of sustainability education significantly enhances learners' socio-ecological competence, leading to the rejection of H_{01} . Learners exposed to Education for Sustainable Development (ESD) frameworks demonstrated higher levels of systems thinking, environmental awareness, ethical responsibility, and problem-solving ability. This aligns with earlier studies that conceptualise sustainability competence as a multidimensional construct encompassing cognitive, affective, and behavioural domains (Rieckmann, 2018; Wiek et al., 2011). The results reinforce Sterling's (2011) assertion that sustainability learning is most effective when education shifts from transmissive knowledge delivery to transformative engagement. The emphasis on climate literacy, ecological interdependence, and future-oriented thinking equips learners to navigate complexity and uncertainty—skills that are increasingly essential in the Anthropocene era. Importantly, the findings suggest that sustainability education contributes not only to environmental outcomes but also to broader social and civic capacities, thereby supporting the holistic intent of SDG 4.7.

Social Justice, Human Rights Education, and Civic Engagement

The study provides compelling evidence that integrating social justice and human rights education significantly influences learners' civic engagement and ethical reasoning, thereby rejecting H₀₂. Learners exposed to justice-oriented curricula demonstrated greater awareness of inequality, power relations, and democratic responsibility. These outcomes resonate with Freire's (1970) concept of conscientisation and Sen's (1999) capability approach, both of which position education as a means of expanding human agency and social participation. The findings also support the growing consensus that sustainability cannot be meaningfully pursued without addressing issues of equity and justice (Agyeman et al., 2016). Environmental challenges disproportionately affect marginalised communities, and education that neglects social justice risks reproducing existing inequalities. The integration of human rights education within Global Citizenship Education (GCED) frameworks thus emerges as a critical strategy for fostering ethical global citizens capable of advocating for inclusive and just development.

Pedagogical Approaches and Transformative Learning

The analysis further demonstrates that interdisciplinary and experiential learning approaches significantly enhance sustainability-oriented learning outcomes, resulting in the rejection of H₀₃. Pedagogies such as problem-based learning, service learning, and community engagement were consistently associated with deeper conceptual understanding and higher levels of learner motivation and agency. These findings are consistent with transformative learning theory, which emphasises critical reflection, dialogue, and experiential engagement as drivers of perspective transformation (Kolb, 2015; Mezirow, 1997). The interdisciplinary nature of sustainability challenges necessitates pedagogical approaches that transcend disciplinary silos. By integrating perspectives from environmental science, social sciences, ethics, and cultural studies, learners are better equipped to address complex real-world problems. The study underscores that pedagogical innovation is not supplementary but central to achieving the aims of ESD and GCED.

Institutional Practices and Whole-School Approaches

Institutional adoption of whole-school and whole-system sustainability approaches was found to have a significant impact on environmental stewardship and social inclusion, leading to the rejection of H₀₄. Institutions that aligned curriculum, governance, campus operations, and community engagement around sustainability principles demonstrated measurable improvements in resource efficiency, student participation, and inclusive practices. These findings corroborate prior research highlighting the role of institutions as living laboratories for sustainability (Leal Filho et al., 2019; Lozano et al., 2015). When sustainability values are embedded institutionally, learning extends beyond classrooms into organisational culture and everyday practice. This holistic integration strengthens the credibility and effectiveness of sustainability education while fostering a culture of shared responsibility.

Indigenous Knowledge Systems and Epistemic Inclusivity

An important contribution of the study lies in its recognition of Indigenous knowledge systems as vital to sustainability education. The findings suggest that incorporating Indigenous epistemologies enhances cultural relevance, community participation, and resilience-building, particularly in vulnerable contexts. This supports arguments that sustainability education must address epistemic justice by valuing diverse knowledge traditions (Battiste, 2013; de Sousa

Santos, 2014). By integrating Indigenous perspectives, education systems can challenge dominant Western paradigms and promote relational understandings of human–nature interactions. Such approaches not only enrich sustainability learning but also contribute to social inclusion and cultural preservation, aligning with both ESD and GCED objectives.

Policy Implications and Global–Local Disconnect

Despite strong alignment between global policy frameworks and the study’s findings, a persistent gap remains between policy commitments and educational practice. Fragmented curricula, examination-driven systems, and limited teacher preparedness continue to constrain transformative implementation, particularly in Global South contexts. This reinforces UNESCO’s (2021) observation that achieving ESD requires systemic reform rather than isolated interventions. The discussion highlights the need for stronger policy coherence, sustained teacher professional development, and institutional leadership to translate international frameworks into meaningful educational change. Without such systemic support, the transformative potential of education for sustainability and social justice remains underutilised.

Synthesis and Contribution to Knowledge

Overall, the findings affirm that uniting education, sustainability, and social justice constitutes a robust and evidence-supported pathway toward global progress. The study contributes to existing literature by synthesising conceptual, policy, and empirical insights into an integrated analytical framework. It demonstrates that education’s transformative potential lies not in isolated content additions but in systemic alignment across pedagogy, policy, and institutional practice. By foregrounding socio-ecological competence, ethical citizenship, and institutional responsibility, the study advances scholarly understanding of how education can move beyond incremental reform toward genuinely sustainable and just futures.

Conclusion

This study has demonstrated that uniting education, sustainability, and social justice constitutes a powerful and evidence-based pathway for addressing the complex challenges of the twenty-first century. By synthesising international research, analysing global policy frameworks, and examining institutional practices, the study confirms that education can act as a transformative force for fostering socio-ecological competence, ethical responsibility, and inclusive development. The findings affirm that Education for Sustainable Development and Global Citizenship Education, when implemented through interdisciplinary curricula, experiential pedagogies, and whole-institution approaches, significantly enhance learners’ environmental awareness, civic engagement, and problem-solving capacities. Moreover, the integration of social justice and human rights education ensures that sustainability initiatives address structural inequalities and promote democratic participation, thereby aligning ecological goals with equity and inclusion.

Importantly, the study highlights the value of Indigenous knowledge systems in sustainability education, demonstrating their potential to enrich learning, promote epistemic justice, and strengthen community resilience. This underscores the need for pluralistic and culturally responsive educational models capable of addressing diverse socio-ecological contexts. Despite strong global policy endorsement, the study also reveals persistent gaps between international commitments and educational practice. Addressing these gaps requires sustained

institutional leadership, teacher capacity-building, curriculum reform, and policy coherence. Education systems must move beyond fragmented interventions toward integrated, long-term strategies that embed sustainability and social justice as foundational educational purposes.

In conclusion, empowering future generation's demands an education system that not only imparts knowledge but also cultivates values, critical consciousness, and collective responsibility. Embedding sustainability and social justice within education is not merely desirable but essential for advancing global progress toward a more equitable, resilient, and sustainable world.

References

- Agyeman, J., Schlosberg, D., Craven, L., & Matthews, C. (2016). Trends and directions in environmental justice: From inequity to everyday life, community, and just sustainabilities. *Annual Review of Environment and Resources*, 41, 321–340. <https://doi.org/10.1146/annurev-enviro-110615-090052>
- Andreotti, V. (2006). Soft versus critical global citizenship education. *Policy & Practice: A Development Education Review*, 3, 40–51.
- Andreotti, V. (2014). *Actionable postcolonial theory in education*. Palgrave Macmillan. <https://doi.org/10.1057/9781137374501>
- Apple, M. W. (2013). *Can education change society?* Routledge. <https://doi.org/10.4324/9780203080912>
- Banks, J. A. (2015). *Cultural diversity and education: Foundations, curriculum, and teaching* (6th ed.). Routledge.
- Barth, M., & Michelsen, G. (2013). Learning for change: An educational contribution to sustainability science. *Sustainability Science*, 8(1), 103–119. <https://doi.org/10.1007/s11625-012-0181-5>
- Barth, M., & Rieckmann, M. (2012). Academic staff development as a catalyst for curriculum change toward education for sustainable development. *Journal of Cleaner Production*, 26, 28–36. <https://doi.org/10.1016/j.jclepro.2011.12.011>
- Battiste, M. (2013). *Decolonizing education: Nourishing the learning spirit*. Purich Publishing.
- Bourn, D. (2016). *Global learning and global citizenship*. Routledge. <https://doi.org/10.4324/9781315736844>
- Bringle, R. G., & Hatcher, J. A. (2011). International service learning. *New Directions for Higher Education*, 2011(156), 3–28. <https://doi.org/10.1002/he.427>
- Cajete, G. (2000). *Native science: Natural laws of interdependence*. Clear Light Publishers.
- Cortese, A. D. (2003). The critical role of higher education in creating a sustainable future. *Planning for Higher Education*, 31(3), 15–22.
- de Sousa Santos, B. (2014). *Epistemologies of the South: Justice against epistemicide*. Routledge. <https://doi.org/10.4324/9781315634874>
- Florian, L., & Black-Hawkins, K. (2011). Exploring inclusive pedagogy. *Cambridge Journal of Education*, 41(4), 381–395. <https://doi.org/10.1080/0305764X.2011.618558>
- Freire, P. (1970). *Pedagogy of the oppressed*. Continuum.

- Gewirtz, S. (2006). Towards a contextualized analysis of social justice in education. *Educational Philosophy and Theory*, 38(1), 69–81. <https://doi.org/10.1111/j.1469-5812.2006.00199.x>
- Kolb, D. A. (2015). *Experiential learning: Experience as the source of learning and development* (2nd ed.). Pearson Education.
- Leal Filho, W., Shiel, C., Paço, A., Mifsud, M., Ávila, L. V., Brandli, L. L., Molthan-Hill, P., Pace, P., & Azeiteiro, U. M. (2019). Sustainable development goals and sustainability teaching at universities. *International Journal of Sustainability in Higher Education*, 20(3), 1–19. <https://doi.org/10.1108/IJSHE-02-2019-0074>
- Lozano, R., Ceulemans, K., Alonso-Almeida, M., Huisinigh, D., Lozano, F. J., Waas, T., Lambrechts, W., Lukman, R., & Hugé, J. (2015). A review of commitment and implementation of sustainable development in higher education. *Journal of Cleaner Production*, 108, 1–18. <https://doi.org/10.1016/j.jclepro.2014.09.007>
- Lozano, R., Merrill, M. Y., Sammalisto, K., Ceulemans, K., & Lozano, F. J. (2017). Connecting competences and pedagogical approaches for sustainable development. *International Journal of Sustainability in Higher Education*, 18(3), 1–19. <https://doi.org/10.1108/IJSHE-03-2016-0035>
- McGregor, D., Restoule, J. P., & Johnston, R. (2020). *Indigenous research: Theories, practices, and relationships*. Canadian Scholars.
- Mezirow, J. (1997). Transformative learning: Theory to practice. *New Directions for Adult and Continuing Education*, 197(74), 5–12. <https://doi.org/10.1002/ace.7401>
- Orr, D. W. (2004). *Earth in mind: On education, environment, and the human prospect* (10th anniversary ed.). Island Press.
- Osler, A., & Starkey, H. (2010). *Teachers and human rights education*. Trentham Books.
- Oxley, L., & Morris, P. (2013). Global citizenship: A typology for distinguishing its multiple conceptions. *British Journal of Educational Studies*, 61(3), 301–325. <https://doi.org/10.1080/00071005.2013.798393>
- Rawls, J. (1971). *A theory of justice*. Harvard University Press.
- Rieckmann, M. (2018). Learning to transform the world. *Issues and trends in education for sustainable development*. UNESCO.
- Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F. S., Lambin, E. F., Lenton, T. M., Scheffer, M., Folke, C., Schellnhuber, H. J., Nykvist, B., de Wit, C. A., Hughes, T., van der Leeuw, S., Rodhe, H., Sörlin, S., Snyder, P. K., Costanza, R., Svedin, U., ... Foley, J. A. (2009). A safe operating space for humanity. *Nature*, 461(7263), 472–475. <https://doi.org/10.1038/461472a>
- Sachs, J. D. (2015). *The age of sustainable development*. Columbia University Press.

- Sen, A. (1999). *Development as freedom*. Oxford University Press.
- Smith, L. T. (2012). *Decolonizing methodologies: Research and Indigenous peoples* (2nd ed.). Zed Books.
- Sterling, S. (2001). *Sustainable education: Re-visioning learning and change*. Green Books.
- Sterling, S. (2010). Transformative learning and sustainability. *Journal of Education for Sustainable Development*, 4(2), 205–218. <https://doi.org/10.1177/097340821000400208>
- Sterling, S. (2011). Transformative learning and sustainability. *Journal of Education for Sustainable Development*, 5(1), 17–33. <https://doi.org/10.1177/097340821000500102>
- Sterling, S., Glasser, H., Rieckmann, M., & Warwick, P. (2018). More than scaling up. *Journal of Education for Sustainable Development*, 11(1), 1–15. <https://doi.org/10.1177/0973408217705144>
- Tilbury, D. (2011). Education for sustainable development. *Environmental Education Research*, 17(1), 1–7. <https://doi.org/10.1080/13504622.2010.539606>
- Tilbury, D., & Ryan, A. (2013). *Today becomes tomorrow: Rethinking business practice, education and learning in the age of sustainability*. University of Gloucestershire.
- UNESCO. (2015). *Global citizenship education: Topics and learning objectives*. UNESCO.
- UNESCO. (2017). *Education for sustainable development goals: Learning objectives*. UNESCO.
- UNESCO. (2020). *Education for sustainable development: A roadmap*. UNESCO.
- UNESCO. (2021). *Reimagining our futures together: A new social contract for education*. UNESCO.
- United Nations. (2015). *Transforming our world: The 2030 Agenda for Sustainable Development*. United Nations.
- Veugelers, W. (2011). The moral and the political in global citizenship. *Globalisation, Societies and Education*, 9(3–4), 473–486. <https://doi.org/10.1080/14767724.2011.605326>
- WCED (World Commission on Environment and Development). (1987). *Our common future*. Oxford University Press.
- Wiek, A., Withycombe, L., & Redman, C. L. (2011). Key competencies in sustainability. *Sustainability Science*, 6(2), 203–218. <https://doi.org/10.1007/s11625-011-0132-6>

Contact emails: hssingh214@gmail.com
panchtatvfoundation@gmail.com

Impact-Oriented Research Communication in Biomedical Education

Kyoko Hombo, The University of Osaka, Japan

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

Effective research communication is increasingly recognised as a core skill by contemporary researchers. These skills are essential not only for classroom-based activities and engagement with lay audiences but also for interdisciplinary collaboration, securing research funding, and navigating career transitions. However, students engaged in scientific research often struggle to articulate the purpose, relevance, and societal impact of their work in language that is understandable to non-technical audiences. This case study examines biomedical graduate students' experiences in developing and delivering a research pitch and creating a social implementation plan within a compulsory course. This study aims to identify the challenges students encountered, the coping strategies they employed, the strengths and areas for development they perceived, the changes in their confidence over time, and the extent to which social implementation planning influenced their understanding of real-world impacts. Qualitative descriptive responses from 12 students suggest that preparing a research-based pitch, together with formulating a social implementation plan, provides meaningful opportunities to enhance communication competence and deepen students' appreciation of the research's impact.

Keywords: research communication, graduate education, translational/transformational research

iafor

The International Academic Forum

www.iafor.org

Introduction

Effective research communication is increasingly recognised as a core skill by contemporary researchers. These skills are crucial not only for classroom engagement and interacting with non-expert audiences, but also for interdisciplinary collaboration, securing funding, and navigating career transitions. However, students in basic science research often struggle to articulate the purpose, relevance, and societal impact of their work in language accessible to non-technical audiences. This case study examines biomedical graduate students' experiences in developing and delivering research communication through pitch talks and in incorporating a social implementation plan into a compulsory course. It investigates whether impact-oriented presentation training enhances biomedical students' research communication skills more effectively than traditional presentations. By focusing on the societal impact of research through a mock entrepreneurial pitch, the course aims to help students communicate its significance to non-expert audiences. The paper also identifies the challenges students encountered during a course activity designed to develop research communication skills, including the coping strategies they employed, their perceived strengths and areas for development, changes in confidence over time, and the impact of participation in impact-oriented presentations.

Background

Scientists need effective pitching skills to communicate the impact of their research. Modern science is not only about conducting basic research, but also about communicating it effectively outside the field. Effective communication depends not only on the speaker but also on how the recipient perceives the message. Listeners, reviewers, and interviewers act as communicators who hold decision-making power, rather than simply being passive recipients. The research's value proposition must be clearly articulated for its successful application today. Researchers must effectively communicate why their research deserves funding from both public and private sectors. In this context, peer reviewers or judges, who make decisions, become the audience.

The National Academies of Sciences, Engineering, and Medicine (2017) defines science communication as the exchange of information and viewpoints about science, with the goal of fostering a better understanding of science and scientific methods, or of gaining more insight into diverse public views and concerns about science related to a contentious issue. Students conducting basic biomedical research often understand that, in the long term, their work may contribute to healthcare advancements, including the development of medicine or treatments. Therefore, young researchers, while still students, need not only research methodology and presentation skills but also opportunities to practice communicating the impact of their research, especially to those outside their field. Although prior studies have demonstrated that science communication training improves clarity and audience engagement, few studies have examined how impact-oriented presentation training reshapes researchers' reflective understanding of their work, particularly the hurdles experienced by basic science researchers in recognising social relevance. Fick et al. (2025) demonstrated that structured science communication training improves clarity, involvement strategies, and self-efficacy among graduate students. However, they did not explore how students reflectively interpret impact-oriented communication or how it reshapes their perceptions of research value and identity. Ritchie et al. (2022) provided insight into graduate students' attitudes, motivations, and definitions of science communication but did not investigate how specific pedagogical interventions, such as impact-oriented pitching, shape communication skills or identity over

time. Existing research confirms improvements in communication skills but fails to address how reflective experiences and the framing of impact influence basic science researchers in structured pitch training contexts. This paper is based on the study conducted by Hombo (2024) on enhancing research communication skills. However, the previous investigation did not consider impact-related factors. Therefore, this paper introduces new data on impact-oriented aspects to construct more refined findings.

The Goal of Communicating Research

Researchers have argued that the purposes of research communication include disseminating knowledge, persuading academic audiences, supporting informed decision-making, and engaging the public. Science communication succeeds when it enables recipients to make more informed decisions (Fischhoff, 2018; National Academies of Sciences, Engineering, and Medicine, 2017). When applying for grants, researchers must clearly communicate the value, impact, and feasibility of their work to decision-makers, persuading them of the merit of their ideas and increasing their chances of securing funding. The clarity and style of grant writing influence evaluation outcomes (Heyard & Hottenrott, 2021; Tsugawa et al., 2022; van den Besselaar & Mom, 2022). Modern science is highly interdisciplinary, and research communication is crucial for enabling collaboration. This requires skills that bridge fields, integrate knowledge to solve complex problems, and build mutual understanding toward shared goals (Bammer et al., 2020; Salmela et al., 2025). It helps overcome communication barriers, such as disciplinary language differences and cultural gaps (Fantini, 2024; Newman, 2025). Whether the target recipients are journalists, policymakers, or the general public, these skills help build trust in science and allow researchers to explain their work as relevant and trustworthy. Additionally, it allows researchers to connect with society and ensure that their work has a meaningful impact beyond academia. These skills advance professionally, especially for young researchers. Research communication plays a key role in career development by shaping science identity and expanding opportunities for public engagement beyond academia (Cameron et al., 2020; Pellegrini et al., 2026). While remaining in academia, academic roles are no longer limited to teaching or research. Today, academic roles also include responsibilities such as educational projects and coordinator roles, with cross-appointments reflecting increased collaboration. Research is no longer the only path; personnel can transition from research and development to human resources or work across development and marketing. Open innovation creates more interactions among lecturers and researchers from both academia and industry.

Impact and Pitching

At universities, pitching activities are typically associated with the business or entrepreneurial field. Pitching activities are primarily used to learn about business or commercialization projects and are typically considered extracurricular rather than an educational format for research communication. Pitching is a succinct talk about a business idea aimed at investors, partners, or customers, designed to gain support or engagement with a particular idea, product, service, or research project. Pitch formats, such as elevator pitches, are effective tools for conveying research results. Caromile et al. (2024) demonstrated that elevator pitches help researchers engage audiences quickly by emphasising the core significance and relevance of their work. Dana et al. (2025) described them as a structured method to succinctly present research, enhancing accessibility and audience engagement. However, pitching has limitations. The brevity required can oversimplify nuanced findings, and much of the literature on aspects of “impact” and “societal connection” is still limited. Druckman and Lupia (2017) argue that

for developing scientists, mastering how to frame information is essential for engaging audiences while maintaining scientific accuracy.

Pitching is the medium of expressing the value. However, it does not fully address the deeper strategy of how students practically engage with society, how they connect their research to real-world contexts, or how they translate their findings beyond the academic sphere. In this context, the concept of ‘impact’ and the depth of reflection are not sufficiently developed. The question of how impact-oriented presentations, by facilitating understanding of the societal value of research, enhance students’ research communication skills was examined as follows.

Methods

Participants

Twelve graduate students from the Graduate School of Medicine at a national university in Japan, who regularly conduct basic research, participated in the study. The course was conducted in English, their second language.

Design

Students were expected to communicate their research through pitching, demonstrate how their research connects to society, and discuss its translational implications. Students practised presenting a strategic story, assuming the commercialisation of research outcomes. In this social implementation approach, students communicated their vision of an ideal society that they aim to achieve through their work.

Step 1: Introduction

Ice-breaking, self-introduction, and introduction of others were conducted in pairs. The introduction focused on finding a connection between one’s research and society. Students were also asked to consider why they are conducting their current research, as this is an important aspect of explaining ‘why you’ as individuals. Innovator-related quizzes, such as those about a Nobel Prize winner or a famous historical figure who contributed to healthcare, were set as answers. Students were further asked to explain why these individuals received their prize or are remembered in history.

Step 2: Problem-Solving Brainstorming Framework

This brainstorming package encourages students to reflect on the societal implications of their research problem, clearly defining its nature and key pain points. It also prompts them to articulate why they are personally motivated to solve this problem through research and to examine why it has not yet been resolved, including the existing barriers. Students are asked to consider what other stakeholders or organisations are currently doing to address the problem, what unique contributions they can make toward a solution, and what significance or value would be created for society if the problem were successfully solved. Finally, the package encourages students to reflect on potential collaborators and the type of cooperation needed to achieve a solution.

Step 3: Storyline and Pitch Deck

Students create a scenario for a social implementation plan, supporting their story with a pitch deck. This deck includes essential components such as the problem, solution, target audience, market size, value proposition, advantage, traction, business model, investment, and milestones.

Step 4: Pitch Rehearsal

Students compose a story to be conveyed for 7 minutes. Individual feedback was provided by the instructor orally, and other students listened to personal comments.

Step 5: 5-Minute Pitch

Students individually delivered an entrepreneurial pitch based on their own research. They also conducted and acted as commentators, asking questions and providing peer review feedback on each student's pitch.

Step 6: Reflection

Students reflected on their experience by summarising what they had achieved. All students completed a reflection-based questionnaire, which included the following four descriptive questions. The questions were designed to encourage respondents to freely describe ideas for the purpose of improving the class content.

1. Which aspects of delivering your pitch were the most challenging, and how did you cope with them? What strengths have you recognised in your pitching skills, and which areas would you like to continue developing?
2. How has your confidence in communicating your research changed as you have practised and refined your pitch?
3. How has your experience in pitching changed the way you convey the purpose and needs of your research and actively engage the audience beyond simply presenting scientific information?
4. How has developing your social implementation plan influenced your understanding of the potential impacts of your research on real-world health issues and society?

Results

Key points found in the final pitch (*Step 5*):

- Two out of 12 students did not include or mention the business part.
- Students who spoke with confidence, a strong voice, and passion received positive peer feedback from fellow students regarding their presentation skills. This may be because students were hesitant to comment on content, as they are still at a learning stage.

Some student responses were submitted in Japanese, even though they were expected to be written in English. In translating the responses into English, there is a risk of losing the original meaning for the coding analysis. The most frequently used words in the responses are shown in Table 1. All 12 students completed the self-reflection-based questionnaire. Given the small sample size, the data was used for descriptive statistics.

Table 1*Most Frequently Used Words*

Word	Count	Word	Count
Research	62	Realised	12
People	22	Able	12
Audience	21	Social	12
Understand	19	Feel	12
Difficult	16	Explain	11
Society	15	Think	11
Important	14	Pitch	11
Clearly	13	Make	10
Experience	13	Slides	9

All feedback was analysed qualitatively and categorized into the following categories. Descriptive feedback was analysed holistically because some responses to the four questions overlapped with answers provided to other questions.

- Category 1: Audience Awareness and Engagement
- Category 2: Communicative Confidence
- Category 3: Clarity and Accessibility of Research Communication Skills
- Category 4: Perceptions of Research Impact and Social Relevance
- Category 5: Limitations of Impact-Oriented Framing

Key Findings

All students participated in the first session of this time-based activity. An impact-oriented presentation approach enhanced students' research communication abilities. The key focus was on 'audience,' improving clarity for non-expert audiences, audience-centred narrative skills, audience awareness, and engagement. Responses were sorted into the following categories:

Category 1: Audience Awareness and Engagement

The impact presentation shifted the students' consideration of explanations to general audiences. They learned to monitor audience reactions and made major improvements in audience-centred communications. Students became better at explaining their research to non-experts by reducing technical language, simplifying explanations, and structuring content so that general audiences could understand the core message. This increased their awareness of audience perspectives. Students shifted from one-way delivery to audience-centred communication, actively considering the audience's prior knowledge and monitoring their understanding. All participants showed some level of improvement or gain. Eleven out of 12 students mentioned responses related to 'audience' or the listener-centred talk.

Student voice excerpts:

I am now making a conscious effort to explain ideas to a general audience in a relatable way, so that more people can appreciate the potential social impact of scientific work and feel more connected to it.

Instead of starting with technical details, I now begin with the problem, why it matters, and who it affects. This shift helps the audience immediately understand the purpose of my study.

Before giving my pitch, I asked myself whether I had clearly structured it with a logical flow: background, the problem that needs to be solved, my proposed solution, and future challenges that still remain. I learned that this structure is essential for helping the audience follow the project's story.

I realised that simplifying complex ideas does not mean reducing their value but rather making them more accessible.

I felt that raising questions that encourage the audience to think for themselves was important.

Category 2: Communicative Confidence

Ten out of the 12 students showed an increase in ‘confidence’, while two did not directly use the word ‘confidence’ but used positive terms such as ‘useful’, indicating growth in confidence. Additionally, three out of twelve students directly mentioned English, noting that their confidence in speaking English increased, though it remained an ongoing challenge. Not all students experienced increased confidence, particularly those who felt that their research had a limited or indirect societal impact.

Student voice excerpts:

I now feel more capable of explaining my research confidently in front of any audience.

I now feel better prepared to explain my research in various settings and to adapt my communication style according to the needs and background knowledge of the audience.

I have never been naturally skilled at public speaking, but this experience allowed me to challenge myself with the mindset that I genuinely wanted my ideas to be understood.

This experience will be useful for presentations at academic conferences.

I have become somewhat more confident in presentations in English.

Category 3: Clarity and Accessibility of Research Communication Skills

The requirement to communicate impact encouraged students to organise their presentations around the problem, its significance, the proposed solution, and its potential future impact, while distilling key points within a limited time and developing a coherent narrative instead of listing technical details. All reported that there was difficulty at first, but later recognised improvement.

Student voice excerpts:

I have developed the habit of explaining things step by step from the basics, so I think my explanations have become easier for the general public to understand compared to before taking this course.

With the social significance of my research in mind, I was able to reaffirm the value that my work can offer and understand more clearly where it is positioned within society. This process also helped clarify the steps needed to explain my research field to non-specialists.

I found it difficult to balance the act of speaking while simultaneously judging the listener’s level of comprehension, but this challenge allowed me to gain valuable insight.

I thought many times about how my research becomes more interesting for others, and this experience was very useful for my graduate thesis.

Although a research project can be completed on one’s own, I feel that a social value mindset became essential when trying to gain understanding from others.

I tended to rely on technical terms, making explanations difficult, but I was able to improve my approach by structuring it as a story. As a result, I became able to convey clearly the essence and value of my research in a short time, and I was able to approach presentations with a positive mindset.

Impact-oriented pitching emphasized clear, simple slides and encouraged the use of graphics, diagrams, and images instead of dense text. Additionally, students received feedback that reinforced the importance of these design principles. The slide design was repeatedly identified as a strength. Students recognised the role of visuals in capturing attention and conveying impact, expressed an intent to further reduce text, and relied more on illustrations.

Student voice excerpts:

By making the slides engaging, I felt that I was able to capture the audience's interest.

Other participants used fewer words, making their slides easier to follow.

I have become somewhat more confident in my English presentations.

Category 4: Perceptions of Research Impact and Social Relevance

Direct comments regarding the 'impact' of research were made, and students' awareness of social relevance increased. Social implementation planning activities have influenced students' understanding of the potential impact of research on real-world health issues and society.

Student voice excerpts:

I used to focus mainly on research driven by scientific curiosity, aiming to explore interesting questions and contribute to my field. However, through this course, I shifted my thinking to focus more on how my research can benefit society. This course made me realise that research is impactful only when its value is clearly communicated beyond the scientific community.

Although I usually work on a basic research topic, I was able to sense how basic research can eventually be applied and implemented in society. It is not something I normally pay attention to in my daily work, but this experience made me realise that society's structures are built through accumulations of efforts like these.

I realised that there is a significant gap between when my research is presented to society and when it is actually implemented. In recent years, even in paper submissions, whether the research could be useful to society has started to be emphasised, so I feel it is important to conduct research with an eye on its practical outcomes.

Through the process of developing a plan for social implementation, I gained a deeper understanding that research only creates real value when it can address actual health challenges in society.

Even promising scientific ideas cannot have a meaningful impact without the right partnerships and support. I learned that collaboration across industry, academia, and government is essential to bring innovations from the lab into the real world. This perspective taught me that research must connect to society early to truly reach those in need. I aim to engage in collaborations that turn scientific findings into practical solutions with positive social impact.

Through developing my social implementation plan, this class helped me to think about practical ways to apply my research to benefit society. Before this class, I couldn't imagine my research's social impact.

I am now making a conscious effort to explain ideas to a general audience in a clear and relatable way, so that more people can appreciate the potential social impact of scientific work and feel more connected to it.

I was reminded that our research is directly connected to people's lives and well-being. Therefore, in addition to conveying it clearly, I realised it is important to be able to explain why this research is essential, as well as the details of side effects and evidence, in order to secure funding.

Category 5: Limitations of Impact-Oriented Framing

Two out of 12 students reported that their overall confidence did not change dramatically. In this regard, they remained uncertain about the societal impact of their research when required to frame it in terms of immediate impact. However, they mentioned that the course offered an opportunity to reflect on the societal impact of their research.

- It emphasised that one's research is basic, and thus, the activities could not extend beyond research (such as pitching for an academic grant, excluding business-related aspects).
- The reluctance to engage in activities beyond research led to the belief that social implementation plans, including financial plans, were unnecessary.

The main critical themes centre on discomfort with translating academic research into practical, financial, or societal frameworks. One student felt that their research did not naturally lend itself to immediate social impact. Framing basic research in impact-oriented terms, although it was a mock activity, felt too demanding. The student expressed concern about 'selling' research in ways that felt inauthentic. However, this student mentioned that the course provided an opportunity to reflect on how they could make their research meaningful.

Student voice excerpts:

My research is basic science, so applying it to a service or earning money is difficult. Therefore, when I make a pitch deck, I have to consider ideas that I do not actually intend.

Basic research is so important, and it is not always necessary to apply it to social matters, so I think the pitch deck in this class should not be for funding or investment but for an academic grant.

My confidence in talking about my research didn't really change before or after the pitch; I still feel uncertain. This is because I don't feel that my research has the potential to significantly impact many people.

Because my research topic is confined to basic research, I found it difficult to think about the social issues it could solve and in what form.

Conclusion

This study examined how impact-oriented presentation training influences researchers' communication skills while identifying persistent challenges and tensions in basic research contexts. Impact-oriented presentation practices using an entrepreneurial pitching approach expanded students' understanding beyond the basic research stage, connected their work to real-world contexts, and enhanced their audience awareness and confidence. However, these effects were uneven and limited to certain students, particularly those in basic science research.

Areas for Improvement

The difficulty of applying impact-oriented framing to basic research was noted. While a lack of business and entrepreneurial mindsets cannot be fully avoided, the pitch approach remains an effective method. A larger sample size may lead to greater dispersion in the results regarding whether students feel that such an approach enhances their communication skills. Additionally, course-specific pitch decks, tailored to enhance research communication skills—for example, by removing elements such as business models—can be developed.

Acknowledgements

The author is grateful to the students for their cooperation in this study.

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

The author declares that Copilot and ChatGPT, AI-assisted writing software, were used in refining the language used in the manuscript. The usage was limited to rephrasing statements for clarity. The ideas, design, procedures, findings, analyses, and discussion are originally written and derived from appropriate and systematic conduct of the research.

References

- Bammer, G., O'Rourke, M., O'Connell, D., Neuhauser, L., Midgley, G., Klein, J. T., Grigg, N. J., Gadlin, H., Elsum, I. R., Burszty, M., Fulton, E. A., Pohl, C., Smithson, M., Vismaier, U., Bergmann, M., Jaeger, J., Merkx, F., Baptista, B. V.,...Richardson, G. P. (2020). Expertise in research integration and implementation for tackling complex problems: when is it needed, where can it be found and how can it be strengthened?. *Palgrave Communications*, 6(1), 5. <https://doi.org/10.1057/s41599-019-0380-0>
- Cameron, C., Lee, H.Y., Anderson, C.B., Trachtenberg, J., & Chang, S. (2020). The role of scientific communication in predicting science identity and research career intention. *PLOS ONE*, 15(2), e0228197. <https://doi.org/10.1371/journal.pone.0228197>
- Caromile, L. A., Jha, A., Gardiner, J.C., Dilek, O., Ohi, R., & Ligon, L. (2024). How to construct and deliver an elevator pitch: a formula for the research scientist. *BMC Proceedings*, 18(Suppl 1), 27. <https://doi.org/10.1186/s12919-024-00312-2>
- Dana, L. P., Crocco, E., Giacosa, E., & Culasso, F. (2025). The art of the elevator pitch: state-of-the-art and research agenda. *International Entrepreneurship and Management Journal*, 21(1), 73. <https://doi.org/10.1007/s11365-025-01083-8>
- Druckman, J. N., & Lupia, A. (2017). Using frames to make scientific communication more effective. In K. H. Jamieson, D. M. Kahan, & D. A. Scheufele (Eds.), *The Oxford handbook of the science of science communication* (pp. 350–360). <https://doi.org/10.1093/oxfordhb/9780190497620.013.38>
- Fantini, E. (2024). Podcasting for interdisciplinary education: active listening, negotiation, reflexivity, and communication skills. *Humanities and Social Sciences Communications* 11(1), 1583. <https://doi.org/10.1057/s41599-024-04119-6>
- Fick, J., Hendriks, F., & Thies, B. (2025). How to talk about science in ways that are comprehensible and interesting? Evaluation of an evidence-based science communication training program for graduate students. *Frontiers in Education*, 10, 1558203. <https://doi.org/10.3389/educ.2025.1558203>
- Fischhoff, B. (2018). Evaluating science communication. *Proceedings of the National Academy of Sciences*, 116(16), 7670–7675. <https://doi.org/10.1073/pnas.1805863115>
- Heyard, R., & Hottenrott, H. (2021). The value of research funding for knowledge creation and dissemination. *Humanities and Social Sciences Communications*, 8(1), 217. <https://doi.org/10.1057/s41599-021-00891-x>
- Hombo, K. (2024). Enhancing biomedical science graduate students' research communication skills through entrepreneurial activities. *The Asian Conference on Education & International Development 2024 Official Conference Proceedings*, 779–787. <https://doi.org/10.22492/issn.2189-101X.2024.60>
- National Academies of Sciences, Engineering, and Medicine. (2017). *Communicating science effectively: A research agenda*. The National Academies Press. <https://doi.org/10.17226/23674>

- Newman, J. (2025). Cultural barriers to interdisciplinary research collaboration: evidence from Australia. *Humanities and Social Sciences Communications*, 12(1), 1–13. <https://doi.org/10.1057/s41599-025-05196-x>
- Pellegrini, G., Piccolo, C., & Entradas, M. (2026). University voices: professional communicators and science communication perspectives. *Quality & Quantity*, 60, 2039–2062. <https://doi.org/10.1007/s11135-025-02313-5>
- Ritchie, T. S., Rossiter, D. L., Opris, H. B., Akpan, I. E., Oliphant, S., & McCartney, M. (2022). How do STEM graduate students perceive science communication? Understanding science communication perceptions of future scientists. *PLOS ONE*, 17(10), e0274840. <https://doi.org/10.1371/journal.pone.0274840>
- Salmela, M., Vienni-Baptista, B., & Cheas, K. (2025). Towards the Recognition of Interdisciplinary and Transdisciplinary Researchers. *Minerva*, 1–20. <https://doi.org/10.1007/s11024-025-09578-y>
- Tsugawa, S., Kanetsuki, T., & Sugihara, J. (2022). Relationship between early-career collaboration among researchers and future funding success in Japanese academia. *PLOS ONE*, 17(11), e0277621. <https://doi.org/10.1371/journal.pone.0277621>
- van den Besselaar, P., & Mom, C. (2022). The effect of writing style on success in grant applications. *Journal of Informetrics*, 16(1), 101257. <https://doi.org/10.1016/j.joi.2022.101257>

Rethinking Language Assessment in the AI Era

Yulia Tregubova, British University Vietnam, Vietnam

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

The rapid integration of Generative Artificial Intelligence (GenAI) in higher education (HE) has exposed the need for significant changes in academic assessment and instructional practices. Due to its focus on linguistic competencies, language education in general, and English for Academic Purposes (EAP) in particular, is potentially more at risk of misuse of GenAI by students. This involves obscured evidence of learning and makes assessment of academic progress and language acquisition more challenging. It is, therefore, essential to integrate AI literacy into language education and reconsider the nature of language assessment in alignment with the new teaching and learning context. This would equip students with the necessary skills to engage with GenAI tools more critically, supporting their language acquisition rather than bypassing it, and better prepare them for future employment in the AI era. The paper reports on strategies designed to develop AI literacy and applied to EAP assessments with the aim of preserving the integrity of language education at university. The context of the study is a university in Vietnam with English as a medium of instruction (EMI) and a top-down AI acceptance policy. Experiential learning theory has been used as the major framework, where all suggested interventions followed the experiential learning cycle, inviting students to continuously reflect on their learning experience and to take accountability for learning outcomes. Students' reflections have provided a substantial pool of qualitative data, whose analysis indicates a more critical approach to AI use by students and an overall positive reception of the new AI-friendly assessment format.

Keywords: GenAI, AI literacy, EAP, EMI, language assessment

iafor

The International Academic Forum
www.iafor.org

Introduction

The emergence and prompt spread of AI has exposed multiple issues with academic integrity and its interpretation in the new teaching and learning context. The response of higher education institutions has not been homogeneous. While some discuss students' non-compliance with guideline and policies, express ethical concerns and potential negative impact of AI use on students' critical thinking skills development (Gonsalves, 2025; Khatri & Karki, 2023), others talk about changes in students' interpretations of academic integrity and highlight the necessity of guidelines for ethical GenAI use (Lund et al., 2025; Perkins, 2023; Zlotnikova et al., 2025). This informed the relevant actions taken by HE institutions with some introducing AI checkers and others experimenting with AI policies and frameworks.

The integration of GenAI seems to also depend on the nature of a discipline- if some knowledge-based disciplines are more likely to be among the first to integrate AI use into their curricula, skills-based discipline such as EAP are more prone to potential misuse of AI.

The rationale for the current study stems from the teaching context, which is an international university in Vietnam, that provides British curricula through EMI. Most students come from local monolingual high schools with very limited previous exposure to instruction through English, which often hinders their access to learning. Additionally, there are new academic genres and tasks that students encounter at university, which they may not be familiar with. This creates a gap in linguistic and academic skills which often leads to overreliance on AI-powered tools for translation, task completion, and text creation. This obscures evidence of learning and makes assessment of academic progress more challenging, especially in the context of the top-down AI acceptance policy, which encourages AI use for teaching and learning. The current context has informed the rationale for introducing critical AI literacy into the EAP curriculum and reconsidering assessment to respond to the AI-inclusive learning environment.

AI in Language Education: Opportunities and Threats

With AI-powered tools gaining popularity and a more extensive use in HE in general and language education in particular, it is important, therefore, to analyse the benefits and potential detriments they bring to the process of language acquisition. Such tools have the functions of automated speech recognition, machine translation, natural language processing which are already employed in various aspects of language teaching and learning (Zhu & Wang, 2025). Automated feedback and assessment (Fu et al., 2024) is one of the common ways of incorporating AI-powered tools into language education, which allows for almost immediate personalised and precise feedback on students' performance. Besides, AI generated content can become a source of individualised learning, in the form of tutoring (Pokrivcakova, 2019) where AI acts as a teaching assistant and guides a student through their specific learning needs. Such a personalised approach has the potential to scaffold learning and prompts differentiation, allowing each student to develop their language skills at their own pace. Current AI tools cover the entire range of language systems (vocabulary, grammar, pronunciation, discourse) and skills: speaking, reading, writing, and listening (Huang et al., 2023; Rentier, 2024).

Gen-AI opens unlimited possibilities for students' language systems development in EAP, for example, when it comes to vocabulary it can support the development of lexical resource by providing synonyms; register (formal/informal) variations; collocations; academic vs general vocabulary; discipline specific vocabulary etc. On the grammatical level, AI can support with

proofreading and accuracy checking as well as making the structures more complex or impersonal to align them with the conventions of academic writing. Students can improve their use of discourse markers such as linking words, hedging, or cohesive devices by incorporating AI in their language learning.

With AI having advanced features as speech recognition, it can facilitate speaking skills development (He et al., 2024; Zou et al., 2020), including presentation skills that are key in HE. If approached critically, Gen-AI could scaffold the development of such academic reading skills as identifying key and supporting ideas in a paragraph or identifying the purpose of a text as well as summarising. The critical point is for students to attempt the task themselves before resorting to AI for checking their work or error correction.

When working on their academic writing skills, students could potentially use AI as a co-pilot or a teaching assistant for proofreading, text organisation, paragraph structure or genre awareness. Such student-to-AI collaboration needs guidance to preserve academic integrity and ensure skills development.

With the availability of AI-powered transcription tools, scaffolding academic listening skills has become more accessible as students can focus on the challenging part of the text and address a specific issue of a linguistic or a content nature.

Academic skills development also can be supported by AI, such as summarising, paraphrasing, note taking or following genre conventions. Their effectiveness, however, is subject to students' critical use of AI, instead of overreliance. Such overreliance may be caused by several reasons. Kim et al. (2025) identify several student-AI interaction (SAI) patterns, which are the ways EAP students interact with AI when doing a task.

In the teaching and learning context of the current research, several factors affecting SAI have been observed, mostly among pre-sessional or Year 1 undergraduate students, all Vietnamese studying in an EMI environment.

Firstly, it is their proficiency level of English, higher level students (B2 and above) tend to collaborate with AI and use it as a co-creator or an assistant. They ask AI to proofread their work or scan it for errors, as well as to check the register or genre conventions. Lower-level students (B1 and B1+), however, are more prone to over rely on AI for text creation, task completion or translation without any critical involvement with the output.

The second factor is the language of SAI, students with higher level of English usually prompt in L2 which contributes to the quality of SAI and is more likely to produce a desirable output. Lower-level students, however, have a tendency to interact with AI in their L1 when doing an EAP task, which affects the quality of the output product.

Thirdly, it is students' prompting skills that could significantly influence SAI and output. It appears that students who use *structural prompting* receive a better-quality output than those who use *conversational prompting* techniques. An example of a structural prompt could be:

“Structure and introduction to an essay titled ‘Evaluate advantages and disadvantages of globalisation of education’ with a clear background statement, some contextualisation, a rationale and an impersonal thesis statement”. A conversational prompt may be presented as:

“Hey, I need an introduction to an essay titled ‘Evaluate advantages and disadvantages of globalisation of education.’”

This may lead to the following undesirable outcomes, which will hinder language acquisition instead of scaffolding it. Firstly, both lexical and grammatical resources of the output are likely to be above a student’s proficiency level. Secondly, the paragraph structure and organisation of the output may be unfamiliar to the student. Thirdly, academic skills of paraphrasing or summarising are not developed if these tasks are performed by AI. Finally, it obscures evidence of learning and makes it challenging to measure the degree of skills acquisition when it comes to assessment.

Thus, AI creates limitless opportunities for academic and language skills development provided it is integrated into the course critically with proper guidelines and support to avoid its misuse, overreliance, and obscured evidence of learning.

Critical AI Literacy: Definition

The changing landscape of language education, informed by the integration of AI, has created an imperative to cater for “emerging digital needs” (Darvin & Hafner, 2022) of language learners, EAP learners inclusive. These needs extend beyond unethical or uncritical use of digital tools and cover a range of literacies. In the context of this research, AI literacy (Kim et al., 2025; Ngo & Hastie, 2025) is seen as a part of digital literacies, which is a broader term. With AI being increasingly integrated into the workplace, AI literacy has become a key graduate attribute (Ngo & Hastie, 2025).

AI literacy can be defined as a foundational conceptual understanding of AI and it covers knowledge, critical thinking, and ethical awareness rather than just technical skills (Chiu et al., 2024). Chiu et al. (2024) differentiate between AI literacy and AI competency, where the latter covers practical proficiency in using, engaging, interacting, developing, or managing AI systems in real-world contexts.

Ngo and Hastie (2025) discuss the importance of including AI literacy in EAP curricula, in the form of AI for Academic Purposes or AIAP. The current research supports the need for such inclusion but with a strong emphasis on criticality, i.e. critical AI literacy.

Critical digital literacies (Darvin & Hafner, 2022; Hagel, 2015; Pangrazio, 2016) (AI literacy inclusive) can be taught either formally or acquired through independent practice (Darvin & Hafner, 2022), the former would be a top-down approach with a great degree of guidance and control, whereas the latter would present a more empirical, trial-and-error (bottom-up) approach. It does not appear possible to fully separate one from the other as students’ online identity would be an integral part of their learner identity in the current digitalised learning and teaching environment.

Top-down and bottom-up approaches to developing critical AI literacy in EAP classes will be explored below.

Critical AI Literacy in Eap: Approaches to Development

To fully engage with and benefit from the opportunities presented by AI tools as well as promote collaboration with them and create a space for co-learning, it is essential to provide

students with clear guidelines on critical AI use for EAP. This would be a more controlled, top-down approach to the development of critical digital literacy.

The guidelines should scaffold the following:

- maintenance of academic integrity at all levels of task completion;
- suitable prompting;
- appropriate use of AI to support learning not bypass it;
- critical engagement with the output.

The bottom-up strategy, in contrast, may result in a complete ban of AI tools for learning and integrating AI detection tools into assessment. Such an approach is unlikely to fully prevent students from using AI, rather prompt ineffective use of AI without them benefiting from its potential.

The top-down approach, on the contrary, provides clear guidance on Gen AI use and facilitates learning. It does not obscure evidence of learning and sets clear expectations through academic misconduct policies. An example of that could be the AIAS-EAP assessment scale (Roe et al., 2026), designed to facilitate effective learning in EAP classes. The scale offers five levels from “No AI” e.g. paper-based exams to “Full AI” e.g. using AI for data analysis.

Below is an example of the bottom-up approach applied by a B1 CEFR level student, whose task was to write an essay:

Figure 1

The Bottom-up Approach: Example

Here is the topic "Learning a foreign language should be mandatory at school" write an essay

Here's a well-structured academic essay on the topic:

Learning a Foreign Language Should Be Mandatory at School

In an increasingly interconnected world, the ability to communicate across cultures is no longer a luxury but a necessity. Making the study of a foreign language mandatory in schools offers students significant cognitive, cultural, and professional advantages. It prepares them to thrive in a globalised society, promotes empathy and understanding between different communities, and develops essential skills for future success.

As can be seen from the screenshot, the prompt used by the student is conversational and aimed at receiving a full essay (bypassing learning). Secondly, the output is significantly above the student's proficiency level (B1) and it obscures the evidence of learning, i.e. it may be challenging for an EAP lecturer to understand to which extent the target skill (writing) has been acquired.

The next example demonstrates the top-down strategy: a B1+ student asks AI for feedback on the paragraph they have written with the focus on academic vocabulary.

Figure 2

The Top-Down Approach: Example 1

highlight vocabulary that can be made more academic

Figure 3

The Top-Down Approach: Example 2

Trait theory **says** → (*posits / asserts*) some people are born leaders with natural **characteristics** → (*attributes / qualities*) such as intelligence, self-confidence, determination, integrity, and sociability. Other traits like **height** → (*physical stature*), **fluency in speech** → (*eloquence / verbal proficiency*), and even **flat feet** → (*physiological traits such as flat feet*) are also **common** → (*observed / associated*). Critics **argue** → (*contend / maintain*) the theory **ignores** → (*overlooks / fails to account for*) the role of life experiences in leadership.

Although the prompt was structural and more precise, the output provided not only highlighted words but also their more academic synonyms, which the student did not request. Next step for the student could be to refine the prompt and to edit their text using one of the suggested lexical items. Such an approach still facilitates learning. Firstly, it was the student, not AI, who wrote the paragraph. Secondly, the student critically approached AI use by focusing on vocabulary only and asking to highlight, not edit.

The next example of the top-down approach will demonstrate how a B1 student refines the prompt to achieve the desirable outcome of having highlighted parts of their essay with poor coherence and cohesion.

Figure 4

The Top-Down Approach: Example 3

Just underline, do not correct

Got it  Here's your paragraph with only the **areas of poor cohesion underlined** (no corrections, just highlights):

Recently, ***the weather in the north viet nam have rainy***. Many rural areas were affected. ***For example, a few days ago have stomy in poor area affected flood, many young people dont go to school, the restaurant closed. In other words,*** the weather affects even modern cities in terms of health and safety. In conclusion, people must learn how to avoid storms and ***learn to save yourself***.

Despite the grammatical errors and repetitions in the paragraph, the student focuses on cohesion and AI helped them identify areas for improvement. The next step for this class was to re-write the paragraphs with their own ideas for improvement and then check them with AI.

Higher proficiency level EAP students (B2 and above) invite AI for collaboration at the editing stage by uploading their paragraphs and asking for an input e.g. identify the weaknesses and provide options:

Figure 5

The Top-Down Approach: Example 4

give me a list of cohesive devices that will help improve this paragraph

Apart from the editing stage, AI support is used at the planning stage by asking for vocabulary lists or collocations:

Figure 6

The Top-Down Approach: Example 5

Make a list of vocabulary with meaning to help me prepare for writing an essay on the topic "Learning a foreign language should be mandatory at school?"

Thus, the top-down approach to critical AI literacy encourages students to collaborate with AI more sensibly and benefit from its potential, rather than using AI to complete a task instead of students and bypass learning.

Critical AI Literacy in EAP Assessment

Following the demands of the AI mediated teaching and learning reality, language assessments have created a need for transformation. The task of adapting EAP assessments to an AI-assisted environment, however, may present its own challenges. If classroom AI application is often welcome and seen as development of key graduate attributes, university assessments, particularly, language assessments, remain rather rigid and inflexible. Most are still pen and paper based, and/or need to be strictly aligned with external frameworks and policies.

At British University Vietnam, an institution with a top-down AI acceptance policy, the need to reconsider the nature of assessment became evident immediately. While the implementation of AIAS (Perkins et al., 2024) has scaffolded the transition for many disciplines, EAP is still in the process of searching for the most appropriate solution. Regular AI guidance and the application of EAP-AIAS (Roe et al., 2026) to classroom assignments create a strong foundation for development of AI literacy and foster a more critical approach to student AI practices. This, however, leads to a conflict between classroom AI-based interventions and summative assessments, which are predominantly still traditional and do not allow utilisation of AI. Such an imbalance exposes the need for EAP assessment to be redesigned in accordance with the new AI-mediated teaching and learning reality.

As part of the current research, several AI-assisted assessment strategies have been tested on the population of approximately 350 pre-sessional EAP students. The starting point for assessment modification was the alignment of innovative strategies with the learning outcomes of the EAP course. For example, for productive skills such as academic writing, which appears to be the most vulnerable to AI misuse, the learning outcomes often require the ability to produce a well-structured paragraph. For the purposes of the current experiment, students were allowed to use AI for the parts of the task that are not directly tested, such as vocabulary and grammar range in a paragraph writing task. One of the tasks was for students to construct an introduction to a research paper with a clearly stated background sentence, topic contextualisation, rationale for the paper, and an impersonal thesis statement. Students were allowed to use AI to check their accuracy, and they were instructed to identify and highlight the relevant parts of the introduction. The instruction to the task was:

Figure 7

AI-Mediated Assessment: Example 1

Write an introduction to your research paper.

The introduction should include:

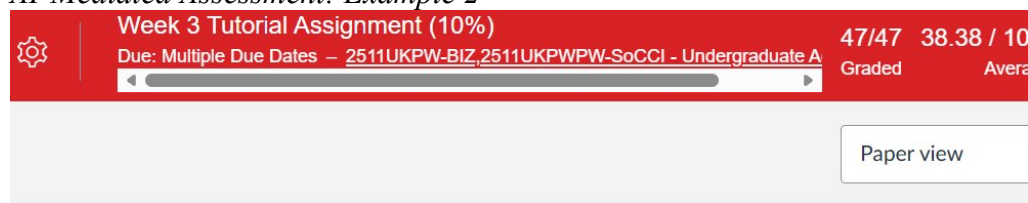
- a background statement;
- a contextualising statement;
- a rationale;
- a thesis statement.

Highlight these parts in your introduction; explain where necessary.

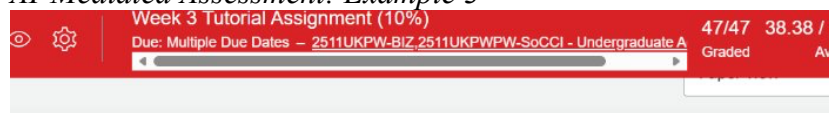
Below are some screenshots of students' submissions to the task above.

Figure 8

AI-Mediated Assessment: Example 2



Luxury fashion brands are now more popular by using the internet and social media. Social media is suitable for luxury brands or another way will helps luxury brands boost their reputation and luxurious. It is important to see which marketing strategies help brands attract more customers and stay popular in 2025. This essay will focus on what marketing strategies is suitable for luxury fashion brands and how well they can improve the brand image.

Figure 9*AI-Mediated Assessment: Example 3*

Advertising remains an essential factor in the modern marketplace, strongly influencing how consumers discover and select products. As people spend more time on social media and other digital channels, they encounter a constant stream of ads designed to capture their attention and guide purchasing decision. However, not all advertising achieves its goal, as many consumers are becoming more selective and aware of marketing techniques. Therefore, it is essential to understand both how advertising successfully shapes consumer preferences and the limitations that reduce its overall impact. This analysis will explore these opposing dynamics within consumer choice.

Background statement

Contextualising statement

Rationale

Thesis statement

As can be seen from the submissions above, the learning outcomes of an introduction structure have been achieved, and the students have demonstrated understanding of the relevant parts. Although it is not clear to which extent they will be able to write an introduction without relying on AI for grammar and vocabulary support, it is evident that they are able to identify and apply the structure – a skill, which possibly be more important in the AI-mediated work environment.

Another strategy that has been applied for EAP assessment was when AI was allowed to be used as an assistant to identify areas for improvement and students were asked to rework those areas and submit all paragraphs – their original, highlighted by AI and the one they improved. This proved to be an effective task as it allowed students to edit their own work without “outsourcing” the task to AI. Additionally, students refined their prompting skills as they had to get the desired (highlighted not edited) output. Here is one of the examples.

Figure 10*AI-Mediated Assessment: Example 4*

Just underline, do not correct

Got it  Here's your paragraph with only the **areas of poor cohesion underlined** (no corrections, just highlights):

Recently, *the weather in the north viet nam have rainy*. Many rural areas were affected. *For example, a few days ago have stomy in poor area affected flood, many young people dont go to school, the restaurant closed. In other words*, the weather affects even modern cities in terms of health and safety. In conclusion, people must learn how to avoid storms and *learn to save yourself*.

The example above demonstrates that a student had to make a specific prompt and refine the prompt to achieve the output they needed. As students were submitting screenshots of their entire interaction with AI, it provided some evidence of their critical approach to the AI-produced output and their effort to improve the paragraph after receiving it.

At each stage of the research, students were invited to reflect on their learning experiences and some of their reflections are presented and analysed in the following part of the paper.

Critical AI Literacy: Students' Reflections

Experiential learning theory (Kolb, 2014), where learning is seen as a cyclical process and reflection plays a crucial role, has been applied to inform the research. All AI-mediated classroom interventions follow the experiential learning cycle (Kolb, 2014): *experience-reflect-evaluate-act*, which invites students to continuously reflect on their learning experience and take accountability for their learning outcomes. Two types of reflections were incorporated into the teaching and learning process – guided and unguided. The former was a set of questions scaffolding students' reflection process and the latter was merely an invitation to reflect on an activity or a learning experience and students were free to focus on a specific point or to reflect generally or structure their reflections according to their preferences.

Below are some examples of unguided reflections of B1 CEFR level EAP students of the foundation year. The reflections presented here have not been edited; this is the original work of students and their choice of grammatical and lexical means.

"AI helped me to do my homework, it gives me a lot of ideas. Sometimes I think I abuse AI because I don't check what it gives me. And now I think it will have a bad impact on my skills."

"In the past I have used AI to check my grammar but now I think I did not use it correctly because it corrected my mistakes and I don't remember anything. The teacher showed us how to use it to learn grammar better. It takes more time but I think I remember more now."

“I have used AI for summarising and I think it is helpful, but I don't think I have improved my skills. If the teacher asks me to summarise, I think it will still be difficult for me. We did some exercises in class when AI helped us check our summaries but not summarise for us, I think it's better.”

“I can now use AI better, I can ask to explain not just give the correct answer. We do this in our EAP class I can now ask AI to help me with other subjects.”

“I always used AI to translate from VNese into English, and I thought I was learning English. Now I must try to write myself and ask AI to check.”

“Our EAP teacher showed us how to use AI to help with writing. It is very useful, it gives step-by-step explanation. It helps me improve sentence structure, make it more English. And I feel like I am learning a lot from it.”

“We did a new test in our EAP class, the teacher said we could use AI to find mistakes but not correcting. We should correct. I think it was a good test. I felt more confident and I asked the teacher about the mistakes I couldn't correct. Without AI I wouldn't know where I made mistakes.”

As can be seen from these students' reflection, the AI literacy tasks are overall well received and appreciated. Students acknowledge the limitations of their past AI use practices and seem to understand the importance of a more critical approach. An interesting comment was made about feeling more confident when using AI to highlight errors in an assignment. This possibly contributes to the fact that this gives students a feeling of complying with the academic integrity principles than when they let AI improve their work or complete a task for them which is seen as cheating.

Preliminary Results

The research is still in progress, and a larger population of students of various proficiency levels needs to be involved to obtain more comprehensive data, however, the preliminary results indicate an overall positive reception of critical AI literacy activities in EAP classes and assessments incorporating AI.

The qualitative analysis of students' reflections has identified several areas for future focus. Firstly, the suggested AI-literacy activities seem to have been well received and are seen as helpful. Therefore, their integration into the curricula seems necessary. Secondly, a controlled use of AI in assessments is seen as a positive change and helps build confidence, which means more redesigned assessment types need to be introduced and trialed. Additionally, students' reflections have also confirmed that they are aware of the limited to undesired effects on language acquisition of their previous unguided AI practices, and more guidance is expected.

Conclusions

It is, therefore, essential not only to incorporate critical AI literacy into the EAP curriculum through a top-down approach; but also, to adapt assessments in alignment with the new teaching and learning context.

Such an initiative would equip students with the necessary skills to engage with GenAI tools more critically, thereby enhancing their language acquisition, academic and study skills, whilst maintaining academic integrity.

References

- Bewersdorff, A., Hornberger, M., Nerdel, C., & Schiff, D.S. (2025). AI advocates and cautious critics: How AI attitudes, AI interest, use of AI, and AI literacy build university students' AI self-efficacy. *Computers and Education: Artificial Intelligence*, 8, 100–340.
- Chiu, T. K. F., Ahmand, Z., Ismail, M., & Sanusi, I. T. (2024). What are artificial intelligence literacy and competency? A comprehensive framework to support them. *Computers & Education Open*, 6, 100171. <https://doi.org/10.1016/j.caeo.2024.100171>
- Chiu, T. K. (2025). AI literacy and competency: definitions, frameworks, development and future research directions. *Interactive Learning Environments*, 33(5), 3225–3229.
- Darvin, Ron & Hafner, Christoph. (2022). Digital Literacies in TESOL: Mapping Out the Terrain. *TESOL Quarterly*, 56(3), 865–882. <https://doi.org/10.1002/tesq.3161>
- Fu, Q. K., Zou, D., Xie, H., & Cheng, G. (2024). A review of AWE feedback: Types, learning outcomes, and implications. *Computer Assisted Language Learning*, 37(1–2), 179–221.
- Gonsalves, C. (2025). Addressing student non-compliance in AI use declarations: implications for academic integrity and assessment in higher education. *Assessment & Evaluation in Higher Education*, 50(4), 592–606.
- Hagel, P. (2015). Towards an understanding of ‘Digital Literacy(ies)’. *Discourse: Deakin University Library research & practice*, 1. <http://dro.deakin.edu.au/view/DU:30073198>
- He, H., Zou, B., Du, Y. & Du, Y. (2024). Exploring artificial intelligence technology for enhancing EAP learners’ speaking skills: A case study of EAP Talk. *Computer Assisted Language Learning*.
- Huang, X., Zou, D., Cheng, G., Chen, X., & Xie, H. (2023). Trends, research issues and applications of artificial intelligence in language education. *Educational Technology & Society*, 26(1), 112–131.
- Khatri, B. B., & Karki, P. D. (2023). Artificial intelligence (AI) in higher education: Growing academic integrity and ethical concerns. *Nepalese Journal of Development and Rural Studies*, 20(01), 1–7.
- Kim, J., Lee, S. S., Detrick, R., Wang, J., & Li, N. (2025). Students-Generative AI interaction patterns and its impact on academic writing. *Journal of Computing in Higher Education*, 1–22.
- Kolb, D. A. (2014). *Experiential learning: Experience as the source of learning and development*. FT press.

- Lund, B. D., Lee, T. H., Mannuru, N. R., & Arutla, N. (2025). AI and academic integrity: Exploring student perceptions and implications for higher education. *Journal of Academic Ethics*, 23(3), 1545–1565.
- Ngo, T. N., & Hastie, D. (2025). Artificial Intelligence for Academic Purposes (AIAP): Integrating AI literacy into an EAP module. *English for Specific Purposes*, 77, 20–38.
- Pangrazio, L. (2016). Reconceptualising critical digital literacy. *Discourse: Studies in the cultural politics of education*, 37(2), 163–174.
- Perkins, M. (2023). Academic integrity considerations of AI large language models in the post-pandemic era: ChatGPT and beyond. *Journal of University Teaching and Learning Practice*, 20(2), 1–24.
- Perkins, M., Furze, L., Roe, J., & MacVaugh, J. (2024). The Artificial Intelligence Assessment Scale (AIAS): A framework for ethical integration of generative AI in educational assessment. *Journal of University Teaching and Learning Practice*, 21(6), 49–66.
- Pokrivcakova, S. (2019). Preparing teachers for the application of AI-powered technologies in foreign language education. *Journal of language and cultural education*, 7(3), 135–153.
- Rentier, E. S. (2024). To use or not to use: exploring the ethical implications of using generative AI in academic writing. *AI and Ethics*, 1–5.
- Roe, J., Perkins, M., & Tregubova, Y. (2026). The EAP-AIAS: Adapting the AI Assessment Scale for English for Academic Purposes. *TESOL Journal*, 17(2), e70122. <https://doi.org/10.1002/tesj.70122>
- Zhu, M., & Wang, C. (2025). A systematic review of research on AI in language education: Current status and future implications. *Language Learning & Technology*, 29(1), 1–29. <https://doi.org/10.64152/10125/73606>
- Zlotnikova, I., Hlomani, H., Mokgetse, T., & Bagai, K. (2025). Establishing ethical standards for GenAI in university education: a roadmap for academic integrity and fairness. *Journal of Information, Communication and Ethics in Society*, 23(2), 188–216.
- Zou, B., Liviero, S., Hao, M., & Wei, C. (2020). Artificial intelligence technology for EAP speaking skills: Student perceptions of opportunities and challenges. In M. R. Freiermuth & N. Zarrinabadi (Eds.), *Technology and the psychology of second language learners and users* (pp. 433–463). Springer. https://doi.org/10.1007/978-3-030-34212-8_17

How Do Magic Tricks Help Explain Social Science Concepts in University Teaching?

Larry Lai, University of Hong Kong, China

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

Drawing on teaching experience in undergraduate and postgraduate political science modules, this paper argues that brief demonstrations and the reveals of visual illusions (magic tricks) are a more effective introductory pedagogy than realistic simulation exercises for novice students, including both traditional-age and mature undergraduates. While simulations can cultivate strategic thinking and enable students to test possible future scenarios, beginners often struggle with limited comprehension of and weak commitment to role-play, which undermines the exercises or compels the instructor to assume a directive, quasi-theatrical role. The paper reports on the use of a simple card trick to introduce the meaning of politics and political science to one cohort of mature top-up degree undergraduates and one cohort of taught Master's students. It shows how illusion-based demonstrations provide a shared focal event that prompts discussion about perception, rules and order, agency and authenticity, and the construction of social reality, thereby directly addressing the two persistent weaknesses of simulations— shallow understanding of the roles and engagement. The paper concludes that integrating critically chosen illusion tricks to explain core social-science concepts yields higher engagement, clearer conceptual understanding, and more consistent outcomes in early-stage political science teaching.

Keywords: magic tricks, realistic role-play simulations, conceptual clarification, contextual elucidation, politics

iafor

The International Academic Forum
www.iafor.org

Introduction

In this paper, I draw on my own experience in teaching undergraduate and postgraduate political science modules and argue that brief demonstrations and the reveals of visual illusions (magic tricks) are a more effective introductory pedagogy than realistic simulation exercises for novice students, for two reasons. Firstly, while both can serve the same pedagogical purposes, and interesting and even entertaining may both seem, role-playing realistic simulations require substantial preparation on the part of the participating students than that of watching and discussing magic tricks. Because the students' preparation required for in simulation participation causally impacts their performance and hence the learning outcomes of this kind of classroom activity, teachers responsible for role-play simulations, as myself was, are often caught in a predicament when the participating students were under-prepared for the role they played: either the whole role-play simulation game did not carry out as it was meant to be, or, as I did, the teacher presumed oneself a directorial role in order to make it what it was meant to be. In either case, the effect fell short of the expectations. But performing and discussing a magic trick do not need to face this predicament because the teacher has almost full control of how the particular concepts or theories are to be explained as well as the tricks are to be delivered. The second reason why showing and critically discussing magic tricks is more preferred is due to the class size and how much the teacher can decide on the course deliverables and the logistics. Recalling my experience, when the class size was as large as 60+, and/ or when the teacher had little control over the course assessment items and the classroom settings, insisting on simulation games ended up in a lose-lose situation, that is, most students could hardly enjoy the game while the responsible teacher, albeit got fully exhausted, still failed to bring forth the expected learning outcomes. In contrast, demonstration of all visual illusions — stage magic as we conveniently call them, does not have a class size problem. Members of the audience share almost equal amazement and enjoyment when they are attentive to the magic demonstration, whether there are two, twenty, or two hundred of them. While keeping the students inspired and impressed, the teacher can more easily control the learning outcomes, so I argue that explaining social sciences concepts by means of performing and discussing magic tricks are especially suitable for the beginners of the course subject.

To substantiate my argument, the following discussion is divided into 3 parts. *Part one* compares how magic trick performances and discussions can serve the same pedagogical purposes, in terms of conceptual clarification, contextual elucidation, and esthetic appreciation, with role-play simulation games. Illustration of concepts by magic tricks brings students the kind of immersive experience similar to that of simulation games, but contrary to simulation games, the efficacy of magic tricks demonstration as a teaching tool depends less on the students as the audience than the teacher as the performer, which, I argue, outscores teaching by role-play simulations. *Part two* recalls my experience as the teacher / course tutor handling two different role-play realistic simulation games for two different groups of students: one was an introductory course on Asian regional governance for traditional-age undergraduates, another was part of the experiential workshops in a top-up degree program on public administration and management for mature undergraduates. I argue that when the participating students were not sufficiently prepared, and/or the class size went beyond what the simulation game could accommodate, the result fell short of the expectations. *Part three* reports on the use of a simple card trick to introduce the meaning of politics and political science to one cohort of mature top-up degree undergraduates and one cohort of taught Master's students on an introductory course on contemporary Chinese politics. It shows how illusion-based demonstrations provide a shared focal event that prompts discussion about rules and order, thereby directly addressing the two persistent weaknesses of simulations—shallow

understanding of the roles and engagement. The paper concludes that integrating critically chosen illusion tricks to explain core social-science concepts yields higher engagement, clearer conceptual understanding, and more consistent outcomes in early-stage political science teaching.

Why is Playing Magic Preferred?

It is presumed that different methods of knowledge delivery and presentation have their pedagogical merits and limitations, and teachers have their preferences, personal strengths and weaknesses too (and so do students). The recent research literature suggests that some interactive learning tools, i.e., role-play simulation games (Rozinski, 2015), to music playing (Petersen-Overton, 2023; Soper, 2020), and magic performances (Landman, 2018), are selected in course teaching on humanities and social sciences. I argue in this paper that the choice of the teaching methods must consider both pedagogical merits and practical concerns. While I will leave my substantiation of the importance of practical concerns, particularly on role-play simulations, until Part Two, in this section I argue that while all the interactive learning tools discussed here should enable well-prepared students to get the most of these communication channels in class, namely, conceptual clarification and contextual elucidation (Petersen-Overton, 2023), magic performances and subsequent discussions stand out in explaining social sciences concepts for beginners of the course subject not only because to immerse oneself into magic does not require any prior knowledge; rather, the immersive experience in the magic performance impresses and inspires novice students to know and learn more.

The following brief comparison between role-playing simulation games and magic playing as interactive learning tools adopts a framework by Kristofer J. Petersen-Overton in his analysis of how music playing can help in teaching concepts in political theory, and I apply it to the cases of role-play simulation games and magic performances in teaching.

Petersen-Overton categorized the major pedagogical objectives music playing can serve into three kinds: conceptual clarification, contextual elucidation, and esthetic appreciation as a secondary consideration. (Petersen-Overton, 2023, p. 547) I explain each of them when I analyze the two interactive teaching tools. The main focus is on the pedagogical objectives of conceptual clarification and contextual elucidation. Petersen-Overton argues that music can help in “illustrating ideas or recurring themes in some way via its form and/or content.” He recalls Tom Rozinski’s explanation by this, namely:

- (1) to “introduce a concept that is important to the theorist that we are studying,”
- (2) to “demonstrate how a theorist’s concept applies to a concrete situation,” and
- (3) to “reinforce the students’ understanding of a particular theorist.”

Rozinski’s analytical framework has a fourth element, which Petersen-Overton understands it as contextual elucidation:

- (4) to “draw attention to a theorist’s biography” (Rozinski, 2015, as cited in Petersen-Overton, 2023, p. 547).

In Petersen-Overton’s own words, this element offers “a vivid example of the historical and cultural world from which a thinker and their ideas emerged” (Rozinski, 2015, as cited in Petersen-Overton, 2023, p. 547). To apply this to role-play simulations, this element would “draw students” attention to the particular contexts of the case concerned.

Role-play simulation games as one kind of experiential learning can serve the purpose of concept clarification. Citing Dean Dorn's earlier work, Melvin Khan and Kathleen Perez support the claim that simulation games "deliver effective cognitive and conceptual learning; they are especially good at linking abstract concepts to their explicit referent because players are encouraged to reflect on the meaning of concepts in light of a shared experience." (Dorn 1989, as cited in Khan & Perez, 2009, p. 334) In their exploratory study of a simulation game titled *The Game of Politics*, Khan and Perez reported that "over the years, the course instructor had found that students invariably misunderstood the Presidential removal process and equated impeaching the President with removing him from office." To clarify the meaning of impeachment of the president of the US, the course instructor, as the game coordinator, could partake in the game by signaling some players to initiate an inquiry on the impeachment of the US president, and upon the role-playing, to let the students "corrected prior views that impeachment meant removal." (Khan & Perez, 2009, pp. 338–339) In terms of context elucidation, I take it for granted that role-play simulation games by definition present to the students the particular contexts the roles they play are being involved, since simulation exactly requires the participants to put their feet into the stakeholders' shoes, so that students must need to consider their perspectives in the game, rather than to bring to life any specific persons in the classroom by mimicking them.

Magic tricks can score high in clarifying concepts too. For one thing, the creation of *all* mathematical playing card magic tricks are based on some mathematical principles or concepts, so the teaching of these principles and concepts is best illustrated by precisely those tricks. Todd Landman, himself both a politics professor at University of Nottingham and a professional magician, "operationalized" Ludwig Wittgenstein's thought experiment on the meaning of "beetle" in his *Philosophical Investigations* by a magic trick with four boxes containing "beetles." As he recalls, "the effect allows for an inexplicable divination of contents, a play on the word 'Beetle', and a learning point about the social attribute of language." (Landman, 2018, p. 13) In terms of contextual elucidation, Landman suggests that magic performances can replicate or emulate some metaphorical examples or thought experiments political thinkers developed, and enable members of the audience to immerse themselves into their hypothetical or philosophical context. The mind magic recreating Wittgenstein's beetle thought experiment was mentioned just now. Likewise, Plato's thought experiment of The Ring of Gyges (in *The Republic*) and Rawls' Veil of Ignorance can be produced and let the audience experience them. (Landman 2018) Understandably, however, there is very little magic can do to bring forth the real historical or cultural contexts of the thinkers or the case to study. After all, as Landman puts it, "magic can function as a significant means to disrupt and subvert an audience's sense of reality, and in some cases, their fundamental set of beliefs about how the world 'works', as well as deeper religious and metaphysical concerns." (Landman, 2018, p. 4) Magic works best in producing things that look unreal rather than real.

To recap what I argued in this part, illustration of concepts by magic tricks can serve the same pedagogical purposes as stimulation games do, but contrary to simulation games, the efficacy of magic tricks demonstration as a teaching tool depends less on the students as the audience than the teacher as the performer, which, I argue, outscores teaching by role-play simulations.

Two Simulation Games, Same Occasional yet Disappointing Result

I want to begin with a caveat. My experience only suggests that when some participants were not sufficiently prepared for the simulation, and/or the class size was 60+, and/or the teacher

had little leeway as to how the class should be delivered, then the simulations ended up falling short of what was planned.

My involvement in the delivery of role-play simulations started as early as in Spring 2008 until Fall 2024, when I worked as a part-time course tutor for a top-up undergraduate degree offered by De Montfort University of the United Kingdom via City University of Hong Kong. It was a public administration and management program in which the policymaking simulation exercise was part of the compulsory experiential workshop. A controversial bill on the inheritance right of the land in the indigenous villages (in short: whether female family members are legally eligible to inherit the land) is about to be tabled in the legislative council for its first reading, and the government sets up an *ad hoc* government panel and expects the panel, having received feedback from the stakeholders, to make recommendations as to whether the bill shall be shelved. All students taking part in the experiential workshop are divided into seven groups of stakeholders, namely, the government panel, the clansmen federation, the women's rights coalition, the media, the village women, political parties, and common citizens. Media interviews, a TV news report on the issue, a public hearing in the town hall, petitions or protests before, during, and after the hearing, and a press conference hosted by the government panel are scheduled.

Over the 15 years I was mainly responsible for taking care of the media group and the political parties. I was expected to guide them to get their scheduled tasks prepared and delivered by asking them to draw reference from the reality of what the journalists, news presenters, radio phone-in hosts, local political party leaders look like and how they perform at their job positions. During the debriefing session as the final activity of the workshop, I asked them to reflect on how (much) the stakeholders impacted the policymaking process, and how (much) the policymaking theories they learnt could help make sense of the happenings in the role-play simulation.

Over the years, most of the time the students showed in their reflection how much they enjoyed the simulation role-play game. This was especially the case when two conditions were met: when the class size was below 60, and when most students have thrown themselves into their role. But there were several times the result was short of an enjoyable one. When the participating students were more than 60, the vibe became more playful than professional. Classroom discipline could help little here, because the workshops were always scheduled over a weekend, while most of these top-up degree students either worked full-time in the weekdays or on shifts over weekends. All these mean that their attendance, punctuality, and hence their performance in the tasks could never be reasonably assured. For example, the government panel members might just arrive halfway at the public hearing without knowing what was going on, or the news report covered very little the issue because the journalists were empty-handed, and/or the news interviews were not conducted because one or more of the parties were absent. Once student participation and their performance were lax, the downward spiral was almost certain, and ended up in a tragedy of the commons.

I have attempted to "save" the situation by offering more guidance to those who were late to the workshop, and /or to those who have done their prior preparation, so much so that these students turned to me when they were asked why they needed to do certain things or behaved in a certain way. It was not until at one time, when a student replied to her classmates, "our tutor Larry told us to do so," I realized that I have become "the deep state."

My another involvement in a role-play simulation game was to tutor a common-core course on Asian regional governance from 2013 to 2015 at the University of Hong Kong. All the participating students were traditional-age undergraduates. As a final course assessment, the role-play simulation game consisted of a Six-party Talk among and between the state leaders from the six nations: People's Republic of China, Japan, Republic of Korea, Democratic People's Republic of Korea, Russia, and the United States, and non-state organizations working in East Asia, for example, Eugene Bell Foundation, Red Cross Society of the DPRK, Swiss Agency for Development and Cooperation, International Atomic Energy Agency, etc., as well as the media groups like Chinese People's Daily, Japanese Asahi Shimbun, and South Korean Chosun Ilbo. All students have had time and resources to get themselves prepared for the role they played, and took part in the discussions, interviews and negotiations during the Six-party Talk in the final two weeks of the semester. A Communique was expected to be agreed by all the six nations despite their own agendas, while non-state actors were also expected to get what they wanted too, and the media groups were expected to cover the major happenings during the Talk.

Students in the two cohorts have generally had strong commitment to the coursework by my impression. Many were eager to present themselves according to their assigned role in the simulation. But the large class size and the students' lack of sufficient background knowledge have discounted the delivery of the learning outcomes. A HKU Common Core course accepts 120 students, and in the two years I tutored, both cohorts have reached the fall capacity. The 2013–2014 cohort was the first time for both the lecturer and me teaching that course, and we just allowed the 110+ students (a few students have dropped the course for various reasons) to carry out their tasks, most importantly the negotiations between the state leaders, in a lecture room, while some other activities like the discussions among the non-state actors outside the lecture hours.

Two of the problems that concern our discussion here stood out. First, the lecture room turned out to be a wet market, so much so that I as the tutor could hardly follow what was going on. Worse still, because of this, I could hardly offer timely and helpful guidance to those who were for various reasons left aside. In the next year, the lecturer found two lecture rooms, so that the whole class of 120 students was divided into two halves, while each half of 60 students played their game concurrently. Students playing different roles found it easier to know what was going on in other parts of the lecture room, but having 60 students was still too many in my view. More importantly, since a Common Core course precisely expects students to have no prior knowledge of the field of study, despite how hard they have tried to mimic the real persons doing their job in reality, the students still haven't been successful in playing their role. After all, it is too demanding to require a young student to reason and behave in the way a senior diplomat does in a formal multi-party negotiation. But anyone can tell something must have been going wrong when the North Korean representatives and its Southern counterparts (in my concurrent session) quickly reached a unanimous agreement in their first encounter with each other. I was once again caught in dilemma: to guide the state leaders how to behave in the realistic way would make me playing the Deep State, or to let their uninformed play roll out as they wished would defeat the core purpose of the simulation, i.e., to let students put their feet into the shoes of the real-world political actors, so that they can make a more critical sense of both the literature and the reality.

To conclude this part, I recall what Sarah M. Wheeler (2006) has evidently argued in her own research, "a simulation may fall flat in an introductory class with mostly nonmajors, while meeting its objectives quite successfully in an upper-level course of mostly Political Science

majors” (p.334). My experience fully substantiates the first part of her view. But my stories go further on the challenges the course instructor faces when s/he has a big class of novice students to teach. How can a teacher inspire and impress the traditional-age students who may be committed to learning but lack the maturity to properly capture the complexity of the political world, or the mature students from various backgrounds who take part-time study that is marked by a lack of prep time to pledge commitment to a role-play simulation game?

Let the Magic Begin!

Instead of making any attempt to cut corners and keep the simulation game as an essential part in an introductory class, this paper proposes another approach which presumes students as *tabula rasa* and to play with the situation by means of performing and discussing magic tricks that help illuminate the concepts or theories that are remote to beginners. In what follows I want to recall my illustration of the meaning of politics and the meaning of studying it with the help of magic trick performance to one cohort of mature top-up degree undergraduates and one cohort of taught Master’s students on an introductory course on contemporary Chinese politics. In both cases the course enrollments were different (21 vs 101), but the effects were basically the same: both groups of students were hinted and encouraged to think outside the box, and could easily capture the meaning of politics, and how it differs from the study of politics as an academic discipline.

Instead of showing both groups of students the set of PowerPoint slides that explain the textbook definition of politics and the study of politics as a subfield of social sciences, in each case, I invited one student to come forward to me and be my assistant. I showed the class a simple card trick, that is, a card remembered by the audience but unknown to me, firstly buried in the middle of the deck in the hands of my student assistant, but in a snap of fingers, quickly shown to have moved to the top.

The choice of the magic trick is not even crucial. Whether the teacher spoiled the trick and let the students figure out how the trick was done is never a problem but is instead a merit. One can quickly tell why. (In both classes) after I finished the trick, I asked the same questions and as follows:

1. Can anyone *describe* what happened?
 - Certainly anyone who watched the trick can easily answer by recalling what they just saw.
2. Can anyone *explain* what happened?
 - Here I emphasize that the two words “describe” and “explain” are very different in what they refer to. To explain a phenomenon cannot just recall what one observes. One essentially needs to consider what one did not see or cannot tell by mere observation, yet one attempts to figure out how a phenomenon came about.
 - This part has drawn much attention from the floor. I asked them to talk to their neighboring classmates and gave them some time to come up with an explanation. Here, a rare few of students could explain how the trick was done. In any case, they seemed to enjoy this discussion as they exchanged ideas. Some even used their electronic devices and googled magic trick reveals.
 - I rounded up this discussion by making several points. Firstly, any explanation of any magic trick must be logical and scientific. It means that one can verify if any of the many explanations makes sense by carrying it out and see if one can produce the expected magic effect.

- Certainly, some magic effects can be produced in more than one way, and a magic trick can be performed in a way unknown to the world except the magician. An explanation, albeit making logical sense on its own, may not be the actual happening of how the trick was precisely done. The second point I made was that scientific explanations seek to explain how the real world may operate, rather than asserting what the real world is.
 - Pulling these two threads together, I argued that the study of politics is mostly about how to logically explain different parts of the political world, just like the way we tried to figure out how magic tricks were done. Some phenomenon happened in reality that seemed to be at odds with our common understanding. Merely describing what we observed does not mean that we know how things took place in the way they did. In order to explain what happened, political scientists make informed guesses, *aka* hypotheses, of what may likely have happened. And they must want to verify if their hypotheses are true, so much so that their theory can probably explain how things happened in the way they did.
 - I concluded that the above is what the study of politics means. Next I asked another question that relates to the question “what is politics”:
3. In order to successfully perform magic tricks, what else is required in addition to the magician being skillful?
- Here, both groups of my Chinese politics course did not easily get what I meant. I invited them to reflect on what happened on the floor, i.e., how did the members of the audience behave?
 - Some smarter students began to take notice of this, and the whole class started another round of brief discussion.
 - I argued that the scenario of having one magician performing tricks and having most if not all the audience put their attention to it, and some of whom, amazed by the magical effects, truly believe in the magic power the magician has, is analogous to political totalitarianism.
 - I asked everyone to recall our experience: the magician was able to draw everyone’s attention to what he was doing. On the floor, no one diverted each other’s attention away from the magician. More importantly, no one was allowed to stay behind the magician; no one was allowed to challenge the magician and his magic; no one, during the show, could openly discuss their speculation about how the trick was performed. We could further imagine: the more the audience watched the magic, the more they were convinced and believed in the magic, and the more they would be reluctant to accept challenges or criticisms against the magic. And these are the basic features of a totalitarian regime.
 - Depending on how much my students could follow my elaboration, I may want to go on and distinguish between a totalitarian regime and a political dictatorship by suggesting that the difference lies in merely rejecting opposition and challenges (that is what most political dictatorships do) and accepting the values implanted by the governing authority (that is what most totalitarian regimes aim at).
 - I then continued: the more liberal the society is, the more magicians are available and are lawfully allowed to play their own magic. Political leaders exercise their political power to mobilize support, just like religious leaders demonstrate their religious power to attract believers, just like business tycoons attract their investors, and retailers their customers, and social leaders their supporters. A truly open and liberal society must allow not only different “magicians” playing their magic, but also allow challenges to their “magic,” at least legally. People should be allowed to discuss, analyze, and even criticize privately and publicly the “magic” they are

watching. And people should also be allowed to become “magicians” and “play magic” too. This, I concluded, is one of the basic categorizations of different political regimes. To close this discussion, I asked the final question:

4. What do all these mean to you — as a student and as a citizen?
 - This is the final part of the more general question “what is politics?” I asked my students to connect what you were going to learn from the course (as well as other courses in social sciences) with how you live your life in the political world. Certainly there is neither a final answer nor a model answer. But I said I expected them to think beyond what you have been told and to believe: Are you living in reality like an audience watching magic produced by the same (group of) monolithic magician(s)? Is the information you received, and the moral values system you get socialized, coming from the same monopolized course? Or are there different sources coming from different origins? How possible are you, as a citizen, to openly and legally discuss, comment on, or even challenge the leaders in society as well as their policies?

To conclude my report on the use of a simple card trick to introduce the meaning of politics and political science to one cohort of mature top-up degree undergraduates and one cohort of taught Master’s students on an introductory course on contemporary Chinese politics, I seemed to have successfully encouraged (at least some of) them to open up their mind and to think outside the box. Teaching contemporary Chinese politics for the two groups of undergraduates and postgraduates who are predominantly Chinese has never been an easy task, for the following reasons. Firstly, talking about Chinese politics has been sensitive in the campus—at least they think it this way. Students with a Mainland Chinese background later told me that their training from high school in Mainland China was that students should only listen and accept rather than critically discuss what they were told. Not until I showed them in the first lecture did they realize that I “taught in a way very different from their high school or university teachers in politics course.” Secondly, most of the students who took my course have held some presumptions about what Chinese politics does and should look like, again due to their cultural and social background. More than half of them have held a belief that “pointing out bad things about China means being antagonistic towards their motherland,” their birthplace they must defend. Third, accordingly, no one dares to play the role of Xi Jinping or any senior Chinese political leaders should there be a role-play simulation game. Introducing social sciences concepts with demonstration and discussion of magic tricks simply circumvents the three challenges here.

Conclusion

I argue in this paper that performance and discussion of magic tricks can help explain social science concepts in university teaching because they can serve the common pedagogical purposes that role-play simulations and music playing do. More importantly, recalling my own teaching experience in the delivery of role-playing simulation games as well as magic tricks in large classes, I argue that using magic tricks in the illustration of social science concepts should bring fewer challenges to the teachers.

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

The author declares that no AI or AI-assisted technologies have been used to generate, refine, or correct the content in the manuscript. The ideas, design, procedures, findings, analyses, and

discussion are originally written and derived from careful and systematic conduct of the research.

References

- Kahn, M. A., & Perez, K. M. (2009). The Game of Politics Simulation: An Exploratory Study. *Journal of Political Science Education*, 5(4), 332–349.
<https://doi.org/10.1080/15512160903253707>
- Landman, T. (2018). Academic Magic: Performance and the Communication of Fundamental Ideas. *Journal of Performance Magic*, 5(1). <https://doi.org/10.5920/jpm.2018.02>
- Petersen-Overton K. J. (2023). The Harmonious Classroom: Teaching Political Theory With Period Music. *Journal of Political Science Education*, 19(4), 545–564.
<https://doi.org/10.1080/15512169.2023.2171298>
- Rozinski, T. (2015). “Using Music and Lyrics to Teach Political Theory.” *PS: Political Science & Politics*, 48(3), 483–487.
- Soper, C. (2010). Rock and roll will never die: Using music to engage students in the study of political science. *PS, Political Science & Politics*, 43(2), 363–367.
<https://doi.org/10.1017/S1049096510000296>
- Wheeler, S. M. (2006). Role-Playing Games and Simulations for International Issues Courses. *Journal of Political Science Education*, 2(3), 331–347.
<https://doi.org/10.1080/15512160600840814>

Contact email: lcblai@hku.hk

Understanding the Role and Place of Smartphones in EFL Education

Lidija Elliott, Kwansei Gakuin University, Japan

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This study investigates the integration of smartphones into English as a Foreign Language (EFL) classrooms in Japan, with a focus on student engagement, pedagogical practices, and institutional challenges. A literature review was combined with systematic classroom observations conducted in six non-English-major EFL classes (95 students with varying proficiency levels) over eight weeks (2024–2025). Patterns of smartphone use for learning were examined during 100-minute lessons, including vocabulary study, pronunciation practice, and collaborative tasks. Classroom engagement was assessed using a structured observation checklist to record smartphone-related behaviors. The findings indicate that well-structured smartphone activities are associated with increased participation, attentiveness, and willingness to respond, particularly during vocabulary quizzes and in collaborative projects. Student disengagement was linked to the perception of smartphones as entertainment devices rather than to limited access. The study highlights that the effectiveness of smartphone integration depends on a clear pedagogical design, explicit task instructions, active teacher monitoring, and institutional support in the form of reliable infrastructure and coherent usage guidelines. While the use of smartphones in EFL learning offers significant opportunities, it also presents technical, institutional, and pedagogical challenges. Therefore, effective implementation requires reliable infrastructure, consistent institutional policies, and sustained teacher training. Future research should focus on quantitatively assessing language proficiency outcomes. Further investigation is also needed into how smartphone use shapes teacher-student relationships and classroom dynamics.

Keywords: mobile-assisted language learning (MALL), smartphones, EFL learning, student engagement, Japanese higher education

iafor

The International Academic Forum
www.iafor.org

Introduction

Mobile technologies have become important tools for education and language learning. As of 2022, Japan had approximately 107.12 million smartphone users, representing about 85% of the population (Park, 2023). Technology continues to transform traditional teaching methods, and smartphones have emerged as valuable tools in English as a Foreign Language (EFL) instruction, offering new opportunities for language acquisition (Zou et al., 2022). The mobility and easy access to a wide range of materials provided by smartphones have accelerated their integration into EFL classrooms. Global events such as the COVID-19 pandemic have further normalized remote and hybrid learning. Previous research suggests that smartphones play an important role in enhancing language learning experiences and maintaining educational continuity (Wrigglesworth, 2020). However, teachers need to establish clear rules and guidelines to reduce distractions and help students remain focused. Bluestein and Kim (2017) emphasize that teachers require proper training, including both technical skills and pedagogical strategies, to effectively select and manage applications for maximum benefit.

Despite the growing research on Mobile-Assisted Language Learning (MALL), there remains limited classroom-based observational research examining how smartphones are actually used during EFL lessons in the Japanese university context and how this use affects student engagement and classroom dynamics. To address this gap, this study examines the use of smartphones in Japanese university EFL classrooms through classroom observation, focusing on student engagement, pedagogical practices, and institutional challenges.

Research Questions

- RQ1. How does the integration of smartphones in the classroom influence student engagement in EFL classrooms?
- RQ2. What benefits does smartphone integration bring to EFL classrooms?
- RQ3. What challenges do teachers and students encounter when implementing smartphones in EFL learning?

Methodology

This study employed classroom observations and a literature review to examine smartphone use in English classes. The literature review included scientific journal articles, conference papers, books, and online academic and institutional sources that provided relevant insights into this topic. This approach enabled the researcher to analyze existing studies, identify key themes, and potential directions for further research.

Classroom observations were conducted in six non-English-major EFL classes at a private Japanese university between 2024–2025. The focus was on how students used smartphones to learn English, including their behavioral engagement, participation, and interaction with teachers and peers. The classes included students with varying proficiency levels, and each class met twice a week. The study included 95 students enrolled in first and second-year courses. Observations were carried out over eight weeks, covering 16 lessons per semester. Each observation lasted a full 100-minute lesson, allowing the researcher to monitor smartphone use and student interactions over time.

A structured observation checklist was used to record smartphone-related behaviors, such as vocabulary study, note-taking, pronunciation practice, and collaborative tasks. The checklist

also included categories related to student engagement, such as on-task behavior, participation, and peer interaction. To ensure consistency, observations were conducted using note-taking at regular time intervals during each lesson.

Participation was voluntary, and students were informed that all collected data would remain confidential and would not affect their grades. Observations focused on classroom learning behaviors rather than personal identification, and no individual data were reported. The participants were of similar age and educational backgrounds.

Literature Review

Researchers have conducted numerous studies on the integration of technology into language learning, focusing on both technological development and pedagogical impact. Bitzer established the foundation for Computer-Assisted Language Learning (CALL), which later evolved into Mobile-Assisted Language Learning (MALL), demonstrating how technology influences language acquisition and teaching methods (Nuraeni et al., 2020). As mobile devices became more affordable and portable, CALL gradually transitioned into MALL.

Mobile learning (m-learning) emerged in the early 2000s as researchers began exploring the potential of mobile devices in education. Many studies highlight features such as social interactivity, connectivity, portability, context sensitivity, and individuality as key factors in supporting learning beyond the classroom (Kumar et al., 2018).

Barr (2011) at Kanda University of International Studies conducted a study to examine how students used mobile phones for English learning in the classroom. He interviewed twenty-four Japanese students about their smartphone use in class. His findings showed that students used smartphones to: (1) take pictures of the whiteboard to capture notes, (2) record their instructors to remember pronunciation, (3) use Google's voice recognition features while practicing pronunciation, (4) use mobile-based flashcard apps to improve vocabulary, and (5) search for additional materials to support their reading skills. He concluded that mobile devices can be beneficial for learning English. Moreover, 93% of the students in his study believed that mobile phones were valuable educational tools that enhanced their language learning.

Lai et al. (2022) examined how smartphones affect students' psychology, finding that well-designed smartphone-based learning activities can reduce anxiety while enhancing autonomy and motivation. However, Seo et al. (2023) found that excessive smartphone use—referred to as “mobile phone dependency,” “mobile phone addiction,” or “problematic mobile phone use” can lead to various psychological, physiological, and social issues. These contrasting findings suggest that the relationship between smartphone use and learning outcomes is not straightforwardly positive; it rather depends on pedagogical design and purposefulness.

It is worth noting that most existing MALL research relies on self-reported surveys. Classroom-based observations, particularly in the Japanese university context, remain rare. With continuous technological advancement, further studies are expected to provide deeper insights into both the benefits and challenges of smartphone use in EFL learning.

Benefits of Smartphone Integration in EFL Classrooms

The integration of smartphones into EFL classrooms offers numerous benefits. Accessibility is a key factor driving their adoption in language learning, as smartphones are the preferred

devices for internet access among young people in Japan (Park, 2023). Their powerful processors, high-quality cameras, and advanced audio systems make them portable multimedia learning tools capable of supporting real-time, interactive learning (Zou et al., 2022).

Since Japanese university students already own smartphones and are familiar with their use, integrating them into learning can enhance both in-class and out-of-class language practice. Instructors can use students' existing digital knowledge as a pedagogical resource. Therefore, teaching methods should align with technological developments to maximize their pedagogical potential.

Smartphones also support independent and personalized learning. Research shows that mobile applications can increase student motivation and engagement by transforming passive learning into active participation (Wang et al., 2022). Applications such as Quizlet, Duolingo, and Memrise offer gamified features that support grammar practice, vocabulary development, and pronunciation improvement (Kacetl & Klímová, 2019). These tools also promote adaptive learning, allowing students to focus on areas that require more practice and learn at their own pace (Vasquez, 2019).

In addition, smartphones support collaborative and communicative learning, which are central to EFL pedagogy. They facilitate collaboration through document-sharing tools, messaging applications, and group project platforms (Avci & Adiguzel, 2017). Such activities enhance both linguistic and interpersonal skills, aligning with communicative approaches to language teaching. Access to authentic materials and intercultural content further strengthens learners' cultural awareness, which is an essential aspect of English use in a global context.

Challenges of Smartphone Integration in EFL Learning

Despite these advantages, several challenges were identified. These can be categorized into technical and pedagogical challenges, both of which influence the effectiveness of mobile learning.

Technical Challenges

Educators need to prepare backup plans in case of technical issues, such as alternative activities when student devices fail to function. In addition, institutions must provide a reliable network infrastructure capable of supporting multiple simultaneous connections, along with appropriate cybersecurity measures to protect student data. These considerations suggest that effective smartphone integration requires proper institutional support and management.

Institutional and Pedagogical Challenges

Teachers need both technical competence and pedagogical awareness to design meaningful mobile-assisted activities and manage classroom behavior effectively.

Inconsistent institutional policies regarding smartphone use can also complicate implementation, especially when restrictions are applied without considering pedagogical goals. Educators play an important role in guiding students to develop digital responsibility and ethical awareness by helping them distinguish between smartphones as entertainment tools and learning resources.

Addressing these challenges requires targeted professional development, clear instructional objectives, and consistent monitoring of student engagement to ensure that smartphone use supports learning rather than distracts from it. Teachers' professional development should include real classroom scenarios, device troubleshooting, and strategies to combine technology with pedagogy. Regular workshops and peer-sharing sessions can help teachers keep up with emerging technologies. Institutions implementing smartphone integration must budget for continuous professional development.

Continued support helps schools build sustainable digital learning environments. Effective implementation depends on reliable infrastructure, consistent institutional policies, and sustained teacher training.

Discussion

The findings of this study provide observational insights into how smartphone use in Japanese university EFL classrooms influences student engagement and learning practices. Classroom observations showed increased participation during smartphone-based activities, such as vocabulary quizzes (e.g., Quizlet) and collaborative tasks (e.g., messaging applications for group work). For example, students who initially appeared tired or distracted were able to refocus and actively engage in classroom activities.

Students were generally more willing to respond, collaborate, and remain on task when activities incorporated familiar digital tools. For instance, students curated their learning by blending educational content with personal entertainment preferences, watching English-language films, listening to music, or using language apps, thus transforming learning into a meaningful and engaging activity (Viberg et al., 2023). While these observations are encouraging, it is important to note that increased engagement does not necessarily mean improved language proficiency. This study did not measure learning outcomes, and future research should examine whether observable engagement translates into measurable gains. In addition, smartphones enable flexible, individualized learning, allowing students to work at their own pace and revisit content as needed.

However, several challenges were also observed. One recurring issue was student distraction. Although most students used their smartphones appropriately, occasional off-task behavior, such as checking social media, playing games, messaging friends, or taking unrelated photos, was noted and sometimes disrupted the flow of learning. These observations highlight the need for effective teacher management to ensure appropriate use of devices in the classroom.

Students' perceptions of smartphones also influenced their level of engagement. Those who viewed smartphones primarily as entertainment devices tended to demonstrate lower levels of focus during learning activities. It is important to note that issues related to access and resource availability, often reported in lower socioeconomic contexts, were not observed in this study.

Observations further revealed that lessons were more effective when instructors provided clear instructions for smartphone-based tasks, explained their pedagogical purpose, and actively monitored student progress and device use. In contrast, unclear instructions often resulted in increased off-task behavior. This finding suggests a direct relationship between instructional clarity and appropriate device use. It also reinforces the argument that teacher preparation is critical in successful MALL implementation.

This study focused on observable indicators of engagement, such as participation, collaboration, and on-task behavior, rather than direct measures of language proficiency. Engagement was defined as active involvement in classroom activities, including responding to prompts and working with peers. Overall, the findings suggest that smartphones can enhance EFL classroom practices by promoting engagement, supporting autonomous learning, and facilitating collaboration when their use is carefully structured. At the same time, their effectiveness depends on clear pedagogical design, teacher guidance, and institutional support. Smartphones are most effective when used as complementary tools that enhance traditional instruction.

Implications

From a pedagogical perspective, smartphones can support dynamic and interactive EFL lessons that accommodate different proficiency levels and learning styles. They provide immediate feedback, facilitate collaboration, and offer access to authentic materials, allowing students to practice language skills both inside and outside the classroom. However, their effectiveness depends on careful lesson planning and clear instructional guidance. Teachers should design smartphone tasks with explicit linguistic objectives and build in reflection moments where students think about the language they have used or encountered.

From an institutional perspective, smartphones represent a cost-effective alternative to traditional computer labs and language learning resources. Their portability and flexibility enable learners to integrate language practice into their daily routines, supporting sustained engagement and long-term knowledge retention. Institutions should therefore provide reliable infrastructure, clear policies, and ongoing support and training for teachers.

Limitations and Suggestions for Future Research

This study has several limitations. First, these findings are based on classroom observations and do not directly measure long-term language development. Second, the study does not examine the impact of smartphone use on teacher–student interaction or curriculum design. Future research should investigate how smartphone use influences long-term teacher–student relationships, classroom dynamics, and language development.

Third, this study does not measure improvements in learning outcomes. Future empirical research should focus on assessing students' language proficiency gains associated with smartphone use in EFL classrooms.

Fourth, this study was conducted at a single private Japanese University. Findings may not generalize to other institutional types. Comparative studies across multiple sites with more participants would strengthen the evidence base.

Conclusion

In conclusion, this study demonstrates that well-designed smartphone integration can enhance classroom engagement in Japanese university EFL contexts. The observational data suggest that when smartphone activities are clearly structured, pedagogically purposeful, and actively monitored, students demonstrate higher levels of participation and on-task behaviors. While smartphones can enhance engagement, support learner autonomy, and provide access to authentic materials, technical, institutional, and pedagogical challenges remain. Therefore, successful implementation requires clear institutional policies, reliable digital infrastructure,

and ongoing teacher training. As the observation suggests understanding, smartphones also support personalized learning experiences that contribute to both digital literacy and language development. Their affordability and accessibility make them practical tools for institutions seeking to modernize their teaching practices. By addressing the identified challenges and applying the recommendations outlined in this study, educators can maximize the benefits of smartphone integration and improve language learning outcomes. Ultimately, the question is no longer whether students have smartphones, but how we manage them and how we design learning environments that use students' digital abilities to move students away from "distraction mode" toward meaningful and active participation.

References

- Avci, H., & Adiguzel, T. (2017). A Case Study on Mobile-Blended Collaborative Learning in an English as a Foreign Language (EFL) Context. *International Review of Research in Open and Distributed Learning*, 18(7).
- Barr, K. (2011). Mobility in learning: The feasibility of encouraging language learning on smartphones. *Studies in Self Access Learning Journal*, 2, 228–233.
- Bluestein, S. A., & Kim, T. (2017). Expectations and Fulfillment of Course Engagement: Gained Skills and Non-Academic Usage of College Students Utilizing Tablets in an Undergraduate Skills Course. *Education and Information Technologies*, 22(4), 1757–1770. <https://doi.org/10.1007/s10639-016-9515-8>
- Busso, A., & Sanchez, B. (2024). Advancing communicative competence in the digital age: A case for AI tools in Japanese EFL education. *Technology in Language Teaching & Learning*, 6(3), 1–17. <https://doi.org/10.29140/tl.v6n3.1211>.
- Kacetl, J., & Klímová, B. (2019). Use of Smartphone Applications in English Language Learning—A Challenge for Foreign Language Education. *Education Sciences*, 9(3), 179.
- Kumar, S., Wotto, M., & Bélanger, P. (2018). E-learning, M-learning, and D-learning: Conceptual Definitions and Comparative Analysis. *E-learning and Digital Media*, 15(4), 191–216.
- Lai, Y., Saab, N., & Admiraal, W. (2022). Learning Strategies in Self-Directed Language Learning Using Mobile Technology in Higher Education: A Systematic Scoping Review. *Education and Information Technologies*, 27(6), 7749–7780.
- Nuraeni, C., Carolina, I., Supriyatna, A., Widiati, W., & Bahri, S. (2020). Mobile-assisted language learning (MALL): Students' perception and problems with mobile learning in the English language. *Journal of Physics: Conference Series*, 1641(1), Article 012027. IOP Publishing. <https://doi.org/10.1088/1742-6596/1641/1/012027>
- Park, A. (2023, September 19). *What You Need to Know about Japan's Mobile Market*. <https://www.aix.com/japan-mobile-market>
- Redner, R., Parrado, C. H., Cifuentes, J., Shawler, L. A., & Jacobs, E. A. (2024). Evaluating Technology Breaks on Cell Phone Use in a College Classroom. *Frontiers in Education*, (9). <https://doi.org/10.3389/educ.2024.1393070>
- Sari, N. (2025). The role of technology in facilitating EFL learning: A case study approach. *Journal of Education Research*, 5(3), Article 1601. <https://doi.org/10.37985/jer.v5i3.1601>
- Seo, B. K., Hwang, Y., & Cho, H. (2023). Mental health and personality characteristics of university students at risk of smartphone overdependence. *International Journal of Environmental Research and Public Health*, 20(3), 2331. <https://doi.org/10.3390/ijerph20032331>

- Vásquez, V. J. C. (2019). Effects of Mobile Learning on EFL Classrooms. Management, Benefits, and Limitations. *Polo del Conocimiento: Revista científico-profesional*, 4(7), 3–11.
- Viberg, O., Kukulska-Hulme, A., & Peeters, W. (2023). Affective support for self-regulation in mobile-assisted language learning. *International Journal of Mobile and Blended Learning*, 15(2), 1–15. <https://doi.org/10.4018/ijmbl.318226>
- Wang, H., Wang, M., & Li, G. (2022). The Use of Social Media Inside and Outside the Classroom to Enhance Student Engagement in EFL Contexts. *Frontiers in Psychology*, 13, 1005313.
- Wrigglesworth, J. (2020). Using Smartphones to Extend Interaction Beyond the EFL Classroom. *Computer Assisted Language Learning*, 33(4), 413–434.
- Zou, C., Li, P., & Jin, L. (2022). Integrating Smartphones into EFL Classrooms: Student Satisfaction and Perceived Learning Performance. *Education and Information Technologies*, 27(9), 12667–12688.

Keeping a Language Alive: EFL Learners' Practices in Maintaining English Proficiency

Shih-Chieh Chien, National Taipei University of Business, Taiwan

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

In many English as a Foreign Language (EFL) contexts, learners are exposed to English from early childhood through tertiary education; however, sustained proficiency remains difficult to achieve. This difficulty largely stems from the limited functional role of English in learners' everyday lives, which often leads to gradual language attrition once formal instruction ends. Despite this widespread challenge, some learners continue to actively maintain and even develop their English proficiency well beyond their formal schooling years. Examining the experiences of these learners offers important insights into the mechanisms that support long-term language maintenance. This study explores how Taiwanese EFL learners perceive and sustain their English proficiency over time. Participants were purposively selected based on their demonstrated commitment to ongoing language maintenance and were interviewed about their post-educational English learning experiences. Adopting a grounded theory methodology, the study analyzes participants' narratives to uncover recurring patterns, strategies, and developmental processes. The findings indicate that learners commonly undergo an initial period of proficiency decline due to reduced exposure and use. However, rather than remaining passive, they actively respond by constructing individualized and adaptive maintenance practices. These practices are driven primarily by intrinsic motivation and characterized by high levels of learner autonomy and self-regulation. Specifically, participants engage in a range of self-directed activities, including revisiting previously learned materials, selectively consuming English-language media, reading for personal interest, participating in informal discussion communities, and using English for online communication.

Keywords: EFL, English proficiency, language maintenance, motivation, semi-structured interviews

iafor

The International Academic Forum
www.iafor.org

Introduction

Given the global role of English as a primary medium of communication, learners in many English as a Foreign Language (EFL) contexts including Taiwan are introduced to English from preschool and continue formal instruction through university. Despite this prolonged exposure, achieving and sustaining an adequate level of proficiency remains a persistent challenge. One key reason is that English often lacks a meaningful social function in learners' everyday environments, limiting opportunities for authentic use beyond the classroom.

While some learners manage to develop functional proficiency beyond basic survival-level communication, such gains are frequently fragile. In the absence of continued use, language attrition is widespread, and previously acquired skills tend to deteriorate over time. As with other forms of skill development, disuse leads to decline; consequently, language deskilling is a common outcome, and maintaining proficiency poses an ongoing difficulty for many EFL learners.

Despite the practical importance of long-term proficiency maintenance, there remains a notable lack of empirical, data-driven research that systematically examines how learners sustain their language abilities after formal education. This gap is particularly significant given that both teachers and learners would benefit from a clearer understanding of effective maintenance strategies.

Notably, a small group of learners succeeds in actively and strategically maintaining and even further developing their English proficiency. However, little is currently known about the processes, practices, and motivations that underpin their continued progress. Identifying these strategies would not only deepen theoretical understanding of language maintenance but also offer valuable pedagogical implications. Such insights could inform the design of teacher education programs and contribute to the development of instructional approaches that better support learners in sustaining and extending their language proficiency beyond the classroom.

Literature Review

Although the present study focuses on language proficiency maintenance, it is necessary to first consider the phenomenon of language attrition, as the two are closely intertwined. A central question concerns why language attrition occurs in the first place. Bardovi-Harlig and Stringer (2010) identify a range of factors influencing second language attrition, broadly categorized as linguistic and extralinguistic variables. Their work suggests that successful maintenance depends on learners' ability to manage these interacting influences. In contrast, De Bot and Weltens (1995) argue that language knowledge is not entirely lost; rather, reduced use leads to diminished accessibility and performance, not the disappearance of underlying competence.

From a pedagogical perspective, scholars such as Neisser (1984) and Szupica-Pyrzanowska (2016) propose several approaches to counteract attrition. These include embedding language learning within meaningful cultural contexts, fostering contact with target-language communities, and increasing exposure to written materials. Such strategies emphasize the importance of sustained engagement and meaningful use in preserving language ability.

Empirical research further illuminates patterns of language loss and retention. Berman and Olshtain (2015) found that while learners' interlanguage systems tend to remain relatively

stable, certain linguistic features, particularly lexical items and word-order constraints are more vulnerable to attrition. Similarly, Tomiyama (2000) documented a staged process of decline: lexical retrieval difficulties emerged within the first 20 months of non-use, followed by attrition in syntax, morphology, and prepositions between 20 and 33 months. Notably, grammatical morphemes appeared more resistant to loss, and learners retained the ability to communicate spontaneously despite reduced accuracy.

Motivational and social dimensions also play a crucial role in maintenance. Yashiro (1992) observed that returnees were strongly motivated to maintain their foreign language skills in order to sustain interpersonal relationships and cross-cultural identities. Parental beliefs further reinforced this motivation, linking language proficiency to broader dimensions such as worldview and personal development. In addition, structured opportunities, such as continued language classes were found to support both maintenance and meaningful communication.

Interestingly, some studies suggest that language proficiency can be sustained or even improved despite limited direct exposure. Weltens et al. (1989) reported that Dutch learners of French demonstrated gains in overall proficiency over time, attributing this to cognitive maturation, ongoing academic development, and the learning of additional languages. However, grammatical knowledge was more susceptible to attrition than lexical knowledge. Complementing this finding, Snow et al. (1988) showed that receptive skills tend to be retained longer than productive skills, highlighting differential patterns of language retention.

A substantial body of research has also examined instructional and learning strategies that facilitate long-term retention. Schneider et al. (2002) demonstrated that deeper, more cognitively demanding vocabulary learning tasks lead to stronger retention. Rott (1999) found that repeated exposure to vocabulary through reading significantly enhances retention, particularly for receptive knowledge. The importance of spaced review is further supported by Bahrick (1984), whose longitudinal research showed that learners retained a substantial proportion of vocabulary even decades later when learning was reinforced over extended intervals.

Media exposure has likewise been identified as an effective tool for maintenance. Garza (1991) and Markham (1999) found that captioned audiovisual materials significantly improve comprehension and vocabulary recognition. Similarly, Huang and Eskey (2000) demonstrated that captions enhance listening comprehension and overall language development among ESL learners. Extending beyond formal instruction, Valmori (2014) reported that language teachers maintain proficiency through diverse, self-directed activities, including reading, media consumption, travel, online engagement, and participation in professional communities.

In summary, previous research has approached language attrition and maintenance from multiple perspectives, including cognitive, linguistic, social, and instructional dimensions. While some studies focus on patterns of attrition across different language domains, others highlight strategies that support retention and continued development. However, despite these valuable contributions, there remains a notable gap in the literature: few studies have systematically examined or theorized EFL learners' lived experiences of long-term language proficiency maintenance. Addressing this gap is essential for developing a more comprehensive understanding of how learners sustain and extend their language abilities beyond formal education.

Research Method

This study adopts a grounded theory research design, an approach rooted in the work of Strauss and Corbin (1998). Grounded theory is particularly suited to exploring underexamined phenomena, as it enables theoretical insights to emerge inductively from participants' lived experiences. In this study, learners' experiences of maintaining foreign language proficiency were elicited through in-depth discussions, allowing participants to articulate and reflect on their personal practices and trajectories (Giorgi, 1997).

Participants were selected using purposive sampling to identify individuals who had demonstrably sustained their language proficiency and were willing to share their experiences (Kruger, 1988). Following this initial phase, snowball sampling was employed to recruit additional participants who met the study criteria through referrals within existing participant networks. Prior to data collection, all participants provided informed consent, ensuring that ethical standards governing research participation, confidentiality, and data use were fully observed.

Data Collection

Interviews constituted the primary data source in this grounded theory study. The design and conduct of the interviews were guided by the principles outlined by Charmaz (2006), particularly the use of flexible, open-ended questioning to facilitate the emergence of participants' perspectives. Consistent with this approach, the interviews were conducted in a collaborative manner in which participants and the researcher were positioned as co-constructors of meaning rather than occupying hierarchical roles (Scott, 2011). Participants were given autonomy to select the time and location of the interviews, thereby fostering a comfortable and participant-centered environment (Birks & Mills, 2012).

The interviews were semi-structured and guided by open-ended questions without rigidly predetermined agendas. The researcher encouraged participants to elaborate freely on their experiences, allowing the conversation to evolve organically. During the interviews, participants were prompted to provide concrete examples of events, behaviors, and practices in order to deepen and clarify their accounts, including their thoughts, emotions, beliefs, and motivations related to language maintenance (Welman & Kruger, 1999). The overarching aim was to capture shared patterns within a common experiential phenomenon (Marshall & Rossman, 2011).

To enhance analytic depth, the researcher employed memo writing throughout the data collection process to document observations, reflections, and emerging conceptual insights (Miles & Huberman, 1984). Clarification strategies, such as paraphrasing and repeating participants' responses, were used to ensure accuracy of interpretation. Additionally, earlier responses informed subsequent questioning, enabling the progressive refinement of emerging themes. Data collection continued until theoretical saturation was reached, indicated by the absence of new insights or strategies related to language proficiency maintenance.

The interview protocol began with brief biographical questions to contextualize participants' backgrounds, including their educational histories and prior English learning experiences. Subsequent questions focused on their developmental trajectories as English learners, their ongoing engagement with the language, and the strategies they employed to maintain proficiency. In line with the iterative nature of grounded theory, interview questions were

continuously adapted in response to participants' answers and emerging analytical categories. Each interview lasted approximately one hour, was audio-recorded with participants' consent, and was transcribed verbatim for analysis.

Data Analysis

Given the recognized importance of English language proficiency and the need to address the research gap identified in the preceding section, grounded theory was selected as the most appropriate methodological approach. Grounded theory, originally developed by Glaser and Strauss (1967), is defined as the systematic generation of theory from data derived from social research. This approach is particularly well suited to capturing dynamic psychosocial processes and is therefore effective for examining how EFL learners sustain their English language proficiency over time.

Data analysis followed a systematic grounded theory procedure involving open and axial coding. In the initial stage, open coding was conducted through repeated, close readings of the interview transcripts. Segments of data were identified, highlighted, and labeled based on recurring ideas, patterns, and concepts emerging from participants' accounts. This inductive process enabled the identification of preliminary codes grounded in the data.

Subsequently, axial coding was employed to establish relationships among these codes. Related codes were grouped and organized around central phenomena, allowing for the development of broader categories and thematic structures. Through this process, key dimensions and properties of language maintenance practices were identified and conceptually linked.

Data analysis was iterative and ongoing throughout the study. Codes were continuously refined as new data were collected and compared. To enhance analytical rigor, both the researcher and a research assistant independently coded the data during the initial phase. Their coding results were then compared and reconciled to produce a consolidated coding scheme for subsequent analysis. A second round of coding was conducted using this refined framework, followed by additional cross-checking to ensure a high level of agreement and consistency.

All emergent codes were ultimately integrated into higher-order categories that captured the core processes underlying foreign language proficiency maintenance. These categories were further refined through constant comparison with analytic memos recorded during data collection. As a result, the final themes were closely aligned with both the empirical data and the evolving conceptual insights documented throughout the research process.

Results

Self-Directed Learning

After leaving formal language instruction, participants not only sought to maintain their existing level of English proficiency but also actively pursued further development through self-study. Many participants perceived self-directed learning as more engaging and personally rewarding than classroom-based instruction, largely because it allowed them to directly experience the outcomes of their own efforts. In addition, self-study enabled a shift from contrived classroom interactions to more authentic language use, thereby increasing exposure to meaningful communication.

One participant described the value of self-study in maintaining and enhancing language proficiency as follows:

I engaged in a range of self-study activities to maintain and further develop my English proficiency. I took an active role in creating environments that supported my language learning. In formal language classes, I was often restricted to simplified or artificial materials, whereas self-study allowed me to work with authentic texts intended for real communication with native speakers. I began with children's storybooks, then gradually progressed to young adult novels and eventually to general fiction. Similarly, I first watched films with subtitles in the target language and progressively moved toward watching them without subtitles.

As this account illustrates, self-directed language learning offers a high degree of flexibility, allowing learners to tailor their practices according to individual interests, preferences, and motivations. Unlike formal instruction, which is typically structured and externally regulated, self-study enables learners to design personalized pathways for language engagement. The following section further outlines the various self-study strategies employed by participants to sustain and develop their English proficiency.

Review of Previously Learned Content

Participants consistently reported that reviewing previously learned materials played a crucial role in maintaining and in some cases enhancing their language proficiency. They viewed review not merely as repetition, but as a process that facilitates the internalization of knowledge and supports the transition from conscious effort to more automatic language use. Through repeated exposure and practice, learners were able to consolidate their knowledge and move toward greater fluency and ease of retrieval. One participant described this process as follows:

I usually review materials I have already studied. This month, for example, I went back to a coursebook from a previous language class. It consists of 12 chapters, and I read it at least three times, working through one chapter per day while listening to the accompanying dialogues. Through repeated exposure, I was able to retain what I had learned more effectively and apply it with greater ease.

In addition to revisiting course materials, participants also reported reviewing content originally studied for high-stakes examinations, such as university entrance tests. These materials, which often required intensive memorization and practice, were seen as valuable resources for long-term maintenance. One participant explained:

Because the university entrance examination is a nationwide test, I had to study a substantial amount of material to improve my grammar, vocabulary, and reading comprehension. Since I was aware that I would eventually forget what I had learned without continued practice, I regularly review those materials. For me, reviewing is one of the most effective ways to maintain and enhance my language skills.

Taken together, these accounts highlight the importance of systematic review as a self-regulated strategy for sustaining language proficiency. Participants did not treat review as a passive activity; rather, they approached it as a deliberate and ongoing process aimed at reinforcing prior learning, enhancing retention, and promoting automaticity in language use.

Use of Animations and Subtitled Media

Participants reported that watching animations played a significant role in helping them understand how vocabulary and grammatical structures learned in formal instruction are used in authentic communicative contexts. In particular, they perceived cartoons and animations as more accessible and beneficial than films, as these media often feature everyday topics and more comprehensible language. Through such exposure, learners were able to observe how linguistic elements function dynamically to convey meaning. One participant described the value of cartoons as follows:

Cartoons helped me understand how basic words and structures can be used not only to describe events but also to construct imaginative worlds. They also showed me that using language creatively is more important than simply memorizing isolated words.

This account highlights a shift from form-focused learning toward a more functional and creative understanding of language use.

In addition to animations, participants reported using films in the target language as a means of enhancing listening comprehension. A common strategy involved the selective and strategic use of subtitles. Participants adopted different approaches: some preferred subtitles in the target language to reinforce form–meaning connections, while others used subtitles in their first language to support comprehension. Moreover, learners demonstrated varying degrees of reliance on subtitles, ranging from consistent use to more flexible and adaptive practices. One participant explained his approach as follows:

I believe subtitles should be used judiciously. Overreliance on them can weaken my listening skills, as I may become dependent on reading rather than processing spoken language. Since listening is challenging, I typically watch a film with subtitles first and then rewatch it without them. I find that reading subtitles can distract me from fully focusing on listening.

Overall, these findings suggest that participants engaged with audiovisual media in a strategic and self-regulated manner. By adjusting their use of subtitles and selecting appropriate content, they were able to balance comprehension support with the development of listening skills, thereby contributing to the maintenance and gradual improvement of their language proficiency.

Engagement in Group Learning Activities

Participants reported that forming friendships and groups with peers of similar language proficiency and shared interests facilitates effective interpersonal communication. In EFL contexts, where English is rarely used for daily social interaction, group discussions offer a distinctive and valuable opportunity for meaningful language practice. Many participants viewed these discussions as motivating spaces for exchanging ideas and sharing information. One participant particularly emphasized the benefits of joining discussion groups.

Participation in discussion groups pushes me beyond my current level of proficiency. During discussions, it is common to take a stance on an issue. While selecting a position is relatively straightforward, providing well-supported arguments is considerably more challenging. Despite the difficulty of persuading others, this experience strengthens my critical thinking and reasoning skills.

It was also observed that participants with higher proficiency tended to engage in more open-ended discussions, whereas those with lower proficiency were more likely to participate in discussions based on pre-selected topics. One participant described her experience in open-ended classes as follows:

I made an effort to memorize vocabulary, idioms, and expressions related to the assigned topics while also broadening my understanding of them, since the discussion themes were predetermined. I attempted to apply prior knowledge during the discussions. This approach enabled me to continuously refine my language skills while maintaining the proficiency level I had already achieved. I believe my overall proficiency has improved significantly after completing formal language training in school.

Pleasure Reading

Participants reported that reading for leisure was generally perceived as more enjoyable than reading materials designed for language proficiency testing. They further noted that frequent comparisons of proficiency levels among peers contributed to increased learning-related stress. This stress was exacerbated by the requirement to read texts primarily for examination purposes rather than personal interest. One participant explained the benefits of reading for pleasure as follows:

Here, I decide what to read and what not to read. In addition, I read at my own pace. In the past, the texts we studied were either too difficult for me to understand or unrelated to my interests. However, now, during my free time, I choose a story from a list of graded readers and read it in a relaxed manner at my own speed. Since there are no comprehension tests or final examinations, I can continue reading without worrying about unfamiliar vocabulary.

In contrast, participants expressed a clear preference for reading for enjoyment, emphasizing that it allows them to engage with texts aligned with their interests and to read in a more autonomous manner. In this mode, readers actively construct meaning by interpreting words and expressions based on their prior knowledge. One participant highlighted the importance of background knowledge in enhancing reading motivation:

Previously, I was required to read assigned texts in language classes that I knew nothing about. Currently, I pursue my own interests. I read the news every day because I find it very interesting. It is not difficult for me to read news articles in English because my comprehension primarily depends on my prior knowledge. This increases my ability to infer the meaning of unfamiliar words and understand the content more quickly.

Internet-Mediated Activities

Participants also noted that English learning can be supported and enhanced through the easy accessibility of the Internet and the increasing availability of web-based English courses. In addition, online chat rooms and communication platforms allow users to engage in real-time discussions on a wide range of topics. Learners can also ask questions and receive feedback through online forums and social media platforms. One participant, for example, described how she used the Internet to sustain and develop her English proficiency:

Participation in online discussions in chat rooms allowed me to improve my language proficiency. In addition, the need to communicate encouraged me to focus on developing my grammar and vocabulary. However, the most appealing aspect of the Internet is that it provides the most economical means of communicating with people.

Participants also distinguished between traditional textbooks and online materials, noting that the latter are primarily message-oriented rather than designed specifically for language instruction. In other words, online resources are not created with the explicit purpose of teaching language skills, but rather to convey information and knowledge. One participant illustrated the informational function of online resources as follows:

I am already familiar with the food pyramid. However, online lectures and articles on this topic are far more interesting, up to date, and information-rich. I use these resources to maintain and improve my English proficiency while also making dietary improvements. Rather than for social interaction, I primarily use the Internet for accessing and communicating information.

Discussion and Conclusion

In light of the results, participants employed a range of strategies to maintain and enhance their language proficiency, most of which were primarily driven by intrinsic motivation. This result is consistent with the findings of Dörnyei and Ushioda (2021) and Lamb et al. (2019), who argue that learners' motivation and attitudes are more influential than factors such as age and proficiency level in the maintenance of language proficiency. It also corroborates Gardner et al. (1985), who reported that learners with consistently positive attitudes during periods of non-use experienced only minimal decline in speaking ability.

Reviewing learned materials emerged as a frequently reported strategy among participants. In a similar vein, Bahrick (1984) demonstrated that approximately 72% of previously learned material could still be retained even after fifty years, largely as a result of systematic review. Participants also indicated that watching target-language films and intentionally manipulating subtitles were effective strategies for maintaining language proficiency. This finding is consistent with prior research (Peters & Webb, 2018; Reynolds et al., 2022), which has shown that exposure to subtitled films can enhance reading comprehension and facilitate vocabulary acquisition through sustained input.

Moreover, participants identified discussion groups as another important means of sustaining and developing language proficiency. However, this finding contrasts with Yashiro's (1992) study, in which learners reported limited interaction with fluent speakers or foreign interlocutors. Another strategy highlighted in the present study was reading for enjoyment, which allowed participants to engage with authentic texts while simultaneously expanding their knowledge of the world. Similarly, Rott (1999) found that extensive reading for pleasure contributes to the development of learners' factual knowledge. In addition, participants' perceptions of Internet use aligned with those reported by Hoven (1999), as both groups regarded online communication tools as beneficial for improving communicative competence.

While the maintenance of language proficiency may not be a central concern in ESL contexts, it is particularly significant in EFL environments such as Taiwan, where English is seldom used for daily social communication. In ESL settings, language proficiency often functions as a

primary medium for both social and informational exchange once acquired. In contrast, in EFL contexts, language skills are more susceptible to attrition due to limited opportunities for use. As the well-known adage suggests, “use it or lose it.” Therefore, learners need to actively create environments that facilitate ongoing language use in order to prevent skill deterioration. Although many learners experience attrition due to disuse, participants in the present study demonstrated proactive engagement in a variety of strategies to sustain and improve their proficiency. These findings are particularly relevant for learners who have already achieved a certain level of English proficiency in EFL contexts and are seeking ways to maintain and further develop their skills, as well as for teachers aiming to raise awareness of language attrition and its consequences.

Pedagogically, the study offers several implications for foreign language instruction and multilingual education programs. First, teachers should actively foster learner autonomy during formal instruction, as it not only enhances immediate learning outcomes but also supports continued language development beyond formal education (Reeve, 2016). For instance, teachers can encourage learners to reflect on how the target language may be applied in future real-world contexts. Such connections between classroom learning and authentic future use can significantly enhance learner motivation.

Second, given the importance of foreign language education in developing learners’ proficiency, teachers should strive to enrich the learning experience by cultivating a positive classroom atmosphere and integrating elements of enjoyment into instruction. As Jiang and Dewaele (2019) note, teachers often play a central role in shaping learners’ interest in foreign languages. Accordingly, supporting teachers in incorporating engaging and enjoyable pedagogical practices is essential. Learners are more likely to sustain their learning efforts when they experience enjoyment during the language learning process, thereby contributing to the long-term sustainability of language programs.

Finally, teachers can play a crucial role in enhancing learner motivation by intentionally incorporating opportunities for choice and decision-making into classroom practices, thereby strengthening learners’ sense of autonomy and achievement. For example, adopting an autonomy-supportive and encouraging stance can contribute to a more supportive and empowering learning environment (Reeve, 2016). Such pedagogical support may, in turn, enhance learners’ sense of accomplishment and intrinsic motivation, leading to greater commitment to sustained language learning over time.

References

- Bahrack, H. P. (1984). Semantic memory content in permastore: Fifty years of memory for Spanish learned in school. *Journal of Experimental Psychology: General*, 113(1), 1–9.
- Bardovi-Harlig, K., & Stringer, D. (2010). Variables in second language attrition. *Studies in Second Language Acquisition*, 32, 1–45.
- Berman, R. A., & Olshtain, E. (2015). Features of first language transfer in second language attrition. *Applied Linguistics*, 4(3), 234–222.
- Birks, M., & Mills, J. (2012). *Grounded theory: A practical guide*. Sage.
- Charmaz, K. (2006). *Constructing grounded theory*. Sage.
- De Bot, K., & Weltens, B. (1995). Foreign language attrition. *Annual Review of Applied Linguistics*, 15, 151–164.
- Dörnyei, Z., & Ushioda, E. (2021). *Teaching and researching motivation*. Taylor and Francis.
- Gardner, R. C., Lalonde, R. N., & MacPherson, J. (1985). Social factors in second language attrition. *Language Learning*, 35(4), 519–540.
- Garza, T. (1991). Evaluating the use of captioned video materials in advanced foreign language learning. *Foreign Language Annals*, 24, 239–258.
- Giorgi, A. (1997). The theory, practice, and evaluation of the phenomenological method as a qualitative research procedure. *Journal of Phenomenological Psychology*, 28(2), 235–260.
- Glaser, B., & Strauss, A. (1967). *The discovery of grounded theory*. Aldine.
- Goldman, M., & Goldman, S. (1988). Reading with closed-captioned TV. *Journal of Reading*, 31, 458–461.
- Hoven, D. (1999). A model for listening and viewing comprehension in multimedia environments. *Language Learning & Technology*, 3(1), 88–103.
- Huang, H., & Eskey, D. (2000). The effects of closed-captioned television on the listening comprehension of intermediate English as a second language students. *Educational Technology Systems*, 28(1), 75–96.
- Jiang, Y., & Dewaele, J. (2019). How unique is the foreign language classroom enjoyment and anxiety of Chinese EFL learners? *System*, 82, 13–25.
- Kruger, D. (1988). *An introduction to phenomenological psychology* (2nd ed.). Juta.
- Lamb, M., Csizer, K., Henry, A., & Ryan, S. (2019). *The Palgrave handbook of motivation for language learning*. Palgrave Macmillan.

- Markham, P. (1999). Captioned videotapes and second language listening word recognition. *Foreign Language Annals*, 32, 321–328.
- Marshall, C., & Rossman, G. B. (2011). *Designing qualitative research* (5th ed.). Sage.
- McEown, M. S., Noels, K. A., & Saumure, K. D. (2014). Students' self-determined and integrative orientations and teachers' motivational support in a Japanese as a foreign language context. *System*, 45, 227–241.
- Miles, M. B., & Huberman, A. M. (1984). *Qualitative data analysis, a sourcebook of new methods*. Sage.
- Peters, E., & Webb, S. (2018). Incidental vocabulary acquisition through viewing L2 television and factors that affect learning. *Studies in Second Language Acquisition*, 40(3), 551–577.
- Reeve, J. (2016). Autonomy-supportive teaching: What it is, how to do it. In W. C. Liu, J. C. K. Wang, & R. M. Ryan (Eds.), *Building autonomous learners: Perspectives from research and practice using self-determination theory* (pp. 129–152). Springer.
- Reynolds, B. L., Cui, Y., Kao, C. W., & Thomas, N. (2022). Vocabulary acquisition through viewing captioned and subtitled video: A scoping review and meta-analysis. *Systems*, 10(5), 133.
- Rott, S. (1999). The effect of exposure frequency on intermediate language learners' incidental vocabulary acquisition and retention through reading. *Studies in Second Language Acquisition*, 21(4), 589–619.
- Schneider, V. I., Healy, A. F., & Bourne, L. E. (2002). What is learned under difficult conditions is hard to forget: Contextual interference effects in foreign vocabulary acquisition, retention, and transfer. *Journal of Memory and Language*, 46(2), 419–440.
- Scott, H. (2011). Conducting rounded theory interviews online. In V. Martin & A. Gynnild (Eds.), *Grounded theory: The philosophy, method and work of Barney Glaser*. Brown Walker Press.
- Snow, M. A., Padilia, A. M., & Campbell, R. N. (1988). Patterns of second language retention of graduates of a Spanish immersion program. *Applied Linguistics*, 9(2), 182–197.
- Strauss, A., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Sage.
- Tomiya, M. (2000). Child second language attrition: A longitudinal case study. *Applied Linguistics*, 21(3), 304–332.
- Valmori, L. (2014). How do foreign language teachers maintain their proficiency? A grounded theory approach. *MSU Working Papers in Second Language Studies*, 5(1), 18–34.

- Welman, J. C., & Kruger, S. J. (1999). *Research methodology for the business and administrative sciences*. International Thompson.
- Weltens, B., Van Els, T. J., & Schils, E. (1989). The long-term retention of French by Dutch students. *Studies in Second Language Acquisition*, 11(2), 205–216.
- Yashiro, K. (1992). On the foreign language maintenance of the Japanese returnee students. *Intercultural Communication Studies*, 2(1), 57–64.

Effectiveness of an Interschool Global Education Workshop in Reducing Instructional Anxiety Among Elementary School Teachers

Rika Iwami, Hyogo University of Teacher Education, Japan
Makoto Fujiwara, Shinjuku Municipal Ochiai No. 2 Elementary School, Japan

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This study examines the effectiveness of an interschool global education workshop in reducing instructional anxiety among elementary school teachers in Japan. As classrooms become increasingly diverse due to globalization, teachers are expected to implement global and intercultural learning; however, many report low confidence and heightened anxiety when designing and delivering such lessons. While previous research has examined school-based teacher training, little is known about the impact of interschool, dialogue-based professional learning. This study addresses this gap by analyzing a voluntary workshop involving teachers from multiple schools. A total of twelve teachers from eleven public elementary schools in Tokyo participated in a three-hour workshop that included an intercultural simulation activity, dialogue-based reflection, and collaborative lesson design. A pre-post questionnaire was used to measure instructional anxiety. The results indicated a statistically significant decrease in overall instructional anxiety, particularly in lesson design and instructional management anxiety, with a large effect size indicating substantial practical impact. Although English teaching anxiety showed a decreasing trend, the change was not statistically significant. In addition, participants' reflections suggested increased confidence, broader perspectives, and a greater willingness to implement global education. These findings suggest that interschool, dialogue-based professional learning can support teachers in diverse educational contexts. Furthermore, the findings provide preliminary evidence that short, structured, collaborative workshops may offer a practical and scalable approach to professional development in global education, although caution is required when generalizing due to the relatively small sample size. Future research should examine long-term effects and include larger, diverse samples across contexts globally.

Keywords: global education, teacher training, instructional anxiety, professional learning, intercultural education

iafor

The International Academic Forum
www.iafor.org

Introduction

In recent years, classrooms in Japan have become increasingly diverse due to globalization. The number of students with foreign backgrounds has steadily increased, highlighting the need for inclusive education that respects cultural and linguistic diversity. Global education has been recognized as an important approach for addressing these challenges, as it aims to develop learners' global perspectives and intercultural understanding (Kasai, 2009).

Teachers play a central role in implementing global education. However, previous studies have shown that many teachers experience low self-efficacy when teaching in culturally diverse classrooms. The OECD Teaching and Learning International Survey (TALIS) reported that Japanese teachers demonstrate relatively low confidence in teaching multicultural classes (OECD, 2019). This finding has also been discussed in the Japanese context (National Institute for Educational Policy Research [NIER], 2019).

According to Bandura (1977), self-efficacy refers to individuals' beliefs in their ability to successfully perform tasks. Low self-efficacy may lead to increased instructional anxiety, which can discourage teachers from implementing new teaching practices. Previous studies have also suggested that teacher anxiety can influence instructional behavior (Hayashi, 2020).

Teacher training has been identified as a potential approach to reducing instructional anxiety. For example, previous research has explored teacher training programs designed to reduce anxiety through collaborative learning and reflection (Machida & Uchida, 2015). In addition, research on instructional anxiety in foreign language education has provided a useful framework for understanding teachers' concerns (Matsumiya, 2013).

However, most previous studies have focused on school-based programs involving teachers from a single institution. For example, Fujiwara (2025) examined the effects of a school-based workshop and suggested that such training may reduce teachers' instructional anxiety. However, the participants were limited to a single school, and the generalizability of the findings remains limited.

This study contributes to the literature by examining the effects of a voluntary, interschool, dialogue-based professional learning workshop, extending previous single-school research.

Methodology

Participants in this study were twelve elementary school teachers from eleven public elementary schools in Tokyo, Japan. Their teaching experience ranged from three to over twenty years. Participation was voluntary, and informed consent was obtained. All data were anonymized to ensure confidentiality. Data were collected in mid-November 2025.

Instructional anxiety toward global education was measured using a ten-item questionnaire based on a five-point Likert scale. The instrument was adapted from a foreign language teaching anxiety scale developed by Matsumiya (2013), with the term "foreign language activities" replaced by "global education." The original scale was designed to measure instructional anxiety in early English education in Japan, drawing on previous research on teaching anxiety (Onogi & Miyakawa, 1996).

In this study, three subscales were used: lesson design anxiety (3 items), instructional management anxiety (4 items), and English teaching anxiety (3 items), for a total of 10 items. Participants responded using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores indicate higher levels of instructional anxiety toward global education. The questionnaire items are presented in Table 1.

Table 1

Items of the Global Education Instructional Anxiety Scale

Subscale	Item number	Item
Lesson design anxiety	1	I feel anxious about creating teaching plans for global education.
	2	I feel anxious about preparing teaching materials for global education.
	3	I feel anxious about developing an annual curriculum for global education.
Instructional management anxiety	4	I feel anxious about classroom management in global education lessons.
	5	I feel anxious about my teaching skills in global education.
	6	I feel anxious about my ability to express ideas (e.g., language use) in global education lessons.
	7	I feel anxious about team teaching in global education.
English teaching anxiety	8	I feel anxious about my English pronunciation.
	9	I feel anxious about my English pronunciation when teaching global education.
	10	I feel anxious about my English grammar when teaching global education.

The workshop lasted approximately three hours and consisted of three main components.

The first component was an intercultural simulation activity using the card game BARNGA. BARNGA is an experiential learning activity designed to simulate intercultural communication. In this activity, participants learn the rules of a simple card game without verbal communication. After the initial round, players move to different tables, where slightly different rules are applied. Because participants are not allowed to speak, they must rely on observation and nonverbal communication. This often leads to confusion and misunderstanding, simulating intercultural situations in which individuals encounter different implicit rules and expectations. Through reflection, participants become aware of cultural differences and communication challenges.

The second component was a dialogue-based activity. Participants shared their experiences, concerns, and uncertainties related to global education. Through collaborative dialogue, teachers externalized their anxieties and reflected on their teaching practices.

The third component was a lesson design activity. This activity was based on backward design principles, which emphasize identifying learning goals before planning instructional

activities (Wiggins & McTighe, 2012). Participants collaboratively designed global education lessons by first clarifying desired student outcomes and then developing lesson plans aligned with those outcomes.

Results

To examine changes in teachers' instructional anxiety toward global education, pre- and post-workshop scores were compared. The means, standard deviations, and paired-sample *t*-test results for overall instructional anxiety, lesson design anxiety, and instructional management anxiety are shown in Table 2.

Table 2

Instructional Anxiety Before and After the Workshop (N = 12)

	Pre <i>M</i> (<i>SD</i>)	Post <i>M</i> (<i>SD</i>)	<i>t</i>	<i>p</i>	<i>d</i>	95% CI
Overall instructional anxiety	39.17 (9.93)	31.42 (9.01)	3.23*	.008	0.93	[0.05, 1.01]
Lesson design anxiety	12.42 (2.97)	9.92 (3.78)	2.86*	.02	0.83	[0.15, 1.47]
Instructional management anxiety	15.75 (3.91)	12.67 (3.96)	2.62*	.02	0.76	[0.10, 1.39]

Note. * $p < .05$

As shown in Table 2, the mean score for overall instructional anxiety decreased from 39.17 before the workshop to 31.42 after the workshop. A paired-sample *t*-test indicated that this decrease was statistically significant at the 5% level. The effect size for this change was large ($d = 0.93$), suggesting a substantial practical impact. Significant decreases were also observed in lesson design anxiety and instructional management anxiety, with moderate to large effect sizes ($d = 0.83$ and $d = 0.76$, respectively). These results suggest that the workshop may have helped reduce teachers' anxiety related to both lesson planning and classroom instruction.

Next, English teaching anxiety was examined separately. The means, standard deviations, and paired-sample *t*-test results for English teaching anxiety are shown in Table 3.

Table 3

English Instruction Anxiety Before and After the Workshop (N = 12)

	Pre <i>M</i> (<i>SD</i>)	Post <i>M</i> (<i>SD</i>)	<i>t</i>	<i>p</i>	<i>d</i>	95% CI
English instructional anxiety	11.00 (4.69)	8.83 (4.41)	2.08†	.06	0.60	[-0.03, 1.21]

Note. † $p < .10$

As shown in Table 3, the mean score for English teaching anxiety decreased from 11.00 before the workshop to 8.83 after the workshop. Although this decrease did not reach the conventional level of statistical significance, a decreasing trend was observed. The effect size

was moderate ($d = 0.60$), indicating a potential practical effect despite the lack of statistical significance. This result should be interpreted cautiously, as the workshop did not directly aim to improve participants' English language skills.

Discussion

The findings of this study suggest that the interschool workshop contributed to reducing teachers' instructional anxiety toward global education. Significant decreases were observed in overall instructional anxiety, particularly in lesson design anxiety and instructional management anxiety. These results indicate that the workshop supported teachers not only in planning lessons but also in managing instruction in the classroom. Furthermore, the large effect size observed in overall instructional anxiety ($d = 0.93$) suggests that the workshop had a meaningful practical impact, even with a relatively small sample size.

One possible explanation for this reduction is the role of collaborative dialogue. Through sharing experiences and concerns with teachers from other schools, participants were able to externalize their anxieties and reflect on their own teaching practices. The findings are consistent with previous research suggesting that collaborative professional learning and reflective dialogue can contribute to reducing teachers' instructional anxiety (Machida & Uchida, 2015). In this sense, the workshop may have functioned as a professional learning environment in which teachers could reframe their concerns through interaction with peers.

Another important factor may be the experiential nature of the workshop. The BARNGA activity allowed participants to experience confusion and misunderstanding in a simulated intercultural setting. Rather than learning about intercultural communication only at a conceptual level, teachers directly encountered the challenges of interacting under unfamiliar and implicit rules. This experiential component may have helped participants recognize the emotional and practical dimensions of intercultural understanding, thereby reducing uncertainty about implementing global education in their own classrooms.

The lesson design activity may also have contributed to the reduction in anxiety. Because the activity was structured around backward design principles, participants were encouraged to clarify learning goals before selecting classroom activities (Wiggins & McTighe, 2012). This process may have helped teachers organize their ideas more clearly and develop a stronger sense of direction in planning global education lessons. As a result, they may have felt more confident about both lesson preparation and classroom implementation.

In addition to the quantitative results, participants' reflections suggested positive changes in their perceptions. Some teachers reported increased confidence and a broader perspective, while others expressed a greater willingness to implement global education. These findings indicate that the workshop fostered both cognitive and emotional development.

At the same time, English teaching anxiety did not show a statistically significant decrease, although a decreasing trend was observed. One possible reason is that the workshop did not directly aim to improve participants' English language skills. In addition, because participation was voluntary, some teachers may already have had relatively low levels of anxiety about English instruction.

Overall, this study extends previous research conducted in a single-school context by demonstrating the potential value of interschool professional learning. However, the

relatively small sample size should be noted as a limitation, and caution is required when generalizing the findings.

Conclusion

This study examined the effectiveness of an interschool global education workshop in reducing instructional anxiety among elementary school teachers in Japan. The results indicated that participation in the workshop significantly reduced overall instructional anxiety, particularly in lesson design and instructional management. These findings suggest that a short, dialogue-based professional learning experience can have a measurable impact on teachers' confidence in implementing global education.

One important implication of this study is the potential value of interschool professional learning. By bringing together teachers from multiple schools, the workshop created opportunities for collaborative reflection, peer learning, and the sharing of diverse perspectives. Such opportunities appear to support teachers in reinterpreting their own practices and reducing feelings of uncertainty. In addition, the integration of experiential learning through the BARNGA activity and structured lesson design based on backward design principles provided both emotional engagement and practical guidance.

At the same time, the findings also highlight the complexity of instructional anxiety. While anxiety related to lesson design and classroom instruction was significantly reduced, English teaching anxiety did not show a statistically significant change. This suggests that different types of anxiety may require different forms of support. Professional development programs focusing on global education may therefore need to incorporate more targeted support for language-related skills.

Despite its contributions, this study has several limitations. The sample size was small and limited to elementary school teachers in one region, which restricts the generalizability of the findings. In addition, the measurement scale was adapted from a foreign language teaching context, and further development of a scale specific to global education is needed. Moreover, the study focused on short-term changes immediately following the workshop, and long-term effects remain unclear.

Future research should expand the scope of participants to include teachers from different regions and school levels, and should examine the sustainability of the observed effects over time. In particular, further investigation of the role of dialogue and experiential learning in teacher professional development may provide deeper insights into how instructional anxiety can be effectively reduced.

In conclusion, this study provides evidence that voluntary, interschool, dialogue-based professional learning can support teachers in addressing the challenges of global education. As classrooms continue to diversify, such approaches may play an increasingly important role in promoting inclusive and globally oriented teaching practices.

Acknowledgements

This study was partially supported by a research grant from the Alumni Association of Hyogo University of Teacher Education, awarded to Makoto Fujiwara. The authors sincerely thank all participating teachers.

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

The authors declare that DeepL, an AI-assisted translation and writing tool, was used to support proofreading, refining the language, and improving the academic writing style of the manuscript. The use of this tool was limited to enhancing grammatical accuracy, clarity, phrasing, and overall readability. The authors further declare that, apart from DeepL, no other AI or AI-assisted technologies were used to generate or revise the manuscript. All ideas, research design, data collection, analysis, and interpretations are the original work of the authors.

References

- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84(2), 191–215. <https://doi.org/10.1037/0033-295X.84.2.191>
- Fujiwara, M. (2025). Effects of teacher training on reducing instructional anxiety in global education. *Journal of International Liberal Arts Education*, 25, 74–83. https://doi.org/10.57359/jailajournal.11.0_74 (in Japanese)
- Hayashi, A. (2020). Teachers' anxiety in high school settings: An analysis based on teachers' narratives. *Bulletin of the Graduate School of Education, University of Tokyo*, 60, 129–139. (in Japanese)
- Kasai, M. (2009). Characteristics and practices of global citizenship education in the United States. *Global Education*, 11, 38–48. (in Japanese)
- Machida, T., & Uchida, H. (2015). Development of teacher training to reduce foreign language teaching anxiety. *Journal of Elementary School English Education*, 15(1), 34–49. (in Japanese) https://doi.org/10.20597/jesjournal.15.01_34
- Matsumiya, S. (2013). A study on instructional anxiety among elementary school teachers in foreign language activities: Development and validation of an anxiety model. *Japanese Journal of Applied Educational Psychology*, 30(1), 23–35. https://doi.org/10.51003/jjcep.30.1_23 (in Japanese)
- Ministry of Education, Culture, Sports, Science and Technology. (2022). *Report on teacher education, recruitment, and professional development for the Reiwa era*. Retrieved March 14, 2026, from <https://www.mext.go.jp>
- National Institute for Educational Policy Research. (2019). *Teaching and learning international survey (TALIS 2018) Japan report*. Gyosei. (in Japanese)
- OECD. (2019). *TALIS 2018 results (Volume I): Teachers and school leaders as lifelong learners*. OECD Publishing. <https://doi.org/10.1787/1d0bc92a-en>
- Onogi, H., & Miyakawa, J. (1996). Structures and Changes in Perceptions of Student Teachers' Anxiety towards Practice Teaching. *Japanese Journal of Educational Psychology*, 44, 454–46. https://doi.org/10.5926/jjep1953.44.4_454 (in Japanese)
- Wiggins, G., & McTighe, J. (2012). *Understanding by design* (2nd ed.). ASCD.

Strategic Leadership and Its Impact on the Marketing of Educational Services in Private Schools in the State of Kuwait

Ayshah Al-Rabiah, Kuwait University, Kuwait
Meznah Al-azmi, Kuwait University, Kuwait

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This study investigates the extent in which private school principals in the State of Kuwait practice strategic leadership and examines its impact on the marketing of educational services. Employing a descriptive correlational approach, the research utilized a questionnaire administered to a purposive non-random sample of 95 principals (both male and female) from private schools across the state of Kuwait. The findings revealed that participants perceived a high level of strategic leadership practice among school principals, as well as a high level of marketing of educational services. No statistically significant differences were found in perceptions of strategic leadership or marketing practices based on gender. However, significant differences emerged based on job position (favoring principals), school type (favoring bilingual schools), and school gender composition (favoring schools that teaches both genders male and female). In the context of marketing educational services, significant differences were noted in relation to job level (favoring assistant principals), school type, and gender composition, with no significant differences based on gender alone. Furthermore, strategic leadership dimensions accounted for 47.5% of the variance in educational service marketing levels, indicating a predictive relationship. The study concludes with several recommendations, including the enhancement of strategic leadership practices through specialized training programs, the implementation of scientific and practical criteria for the selection of school leaders, and the development of integrated marketing strategies alongside improvements to educational infrastructure to bolster competitive advantage.

Keywords: strategic leadership, educational services marketing, private education, Kuwait

iafor

The International Academic Forum
www.iafor.org

Introduction

In recent years, the private education sector in Kuwait has witnessed considerable growth. According to the Ministry of Education Statistical Report (2022–2023), the number of private schools has reached 609, compared to 875 public schools. Student enrollment figures further reflect this expansion, with 58,852 Kuwaiti students and 109,511 non-Kuwaiti students registered in private schools (Ministry of Education, 2023).

This growth carries several implications. It reflects the strong financial viability of private schools, particularly as evidenced by their continued operation during the COVID-19 pandemic. It also reflects an increasing parental tendency to enroll children in private — especially foreign-language and bilingual — schools, driven by a perception of superior educational quality. As enrollment figures rise and the number of institutions multiplies, competition among private schools has intensified, placing heightened emphasis on the marketing of educational services and on shaping parental decision-making regarding school selection.

Within this context, strategic leadership emerges as an effective managerial framework for guiding and enhancing marketing practices in private educational institutions. Accordingly, this study aims to examine the degree to which private school principals in Kuwait practice the dimensions of strategic leadership, and to investigate its impact on the marketing of educational services. To the best of the researcher's knowledge, a local research gap exists with respect to the nexus between strategic leadership and educational service marketing in Kuwaiti private schools.

Research Questions

The study addresses the following research questions:

- To what degree do private school principals in the State of Kuwait practice the dimensions of strategic leadership?
- What is the level of educational service marketing in private schools in the State of Kuwait?

Research Hypotheses

The study tests the following hypotheses:

- Statistically significant differences exist in the degree of strategic leadership practice and the level of educational service marketing in Kuwaiti private schools based on gender, job position, school type, and student gender composition.
- Strategic leadership practice has a statistically significant impact on educational service marketing in private schools in Kuwait.

Research Objectives

This study aims to:

- Examine the degree of strategic leadership practiced by private school principals in Kuwait.
- Determine the influence of selected demographic variables on strategic leadership and educational service marketing.
- Identify the level of educational service marketing in private schools in Kuwait.

- Explore the effect of strategic leadership on the marketing of educational services in Kuwaiti private schools.

Study Contribution

This study makes several contributions to the existing body of knowledge:

- It identifies strengths and weaknesses in strategic leadership practices and their impact on educational service marketing in private schools.
- It supports the development of more effective leadership practices in response to contemporary educational challenges.
- It addresses a local research gap linking strategic leadership and educational service marketing in Kuwait.
- It provides insights that may assist policymakers and private educational institutions in evidence-informed decision-making.

Operational Definitions

Strategic Leadership is defined as a form of leadership characterized by future vision, imaginative thinking, flexibility, and the capacity to drive necessary strategic change within an organization (Mohammed & Tabidi, 2019). Operationally, it refers to the school principal's ability to positively influence teachers and administrators, develop human capital, and strengthen organizational culture and strategic oversight.

Marketing of Educational Services is defined as a set of managerial and social activities aimed at satisfying the needs of relevant stakeholders through the development and promotion of value-based services (Kotler & Keller, 2016). Operationally, it refers to the school principal's ability to implement marketing practices that attract prospective students, retain stakeholders, and enhance institutional value.

Methodology

The study employed a quantitative descriptive-correlational research design. The target population comprised all private school principals in Kuwait (N = 609) (Ministry of Education, 2023), with a sample of 95 principals selected through non-probability sampling. Data were collected across the academic years 2023/2024 and 2024/2025.

Instrument

Data were collected using a structured questionnaire consisting of three sections: a demographic information section, a strategic leadership scale (24 items), and an educational service marketing scale (22 items). All items were rated on a five-point Likert scale.

Validity

Content validity was established through expert review by academic specialists. Modifications to the instrument were made based on reviewer feedback prior to final administration.

Reliability

Internal consistency was assessed using Cronbach's Alpha, yielding high reliability coefficients for both scales: $\alpha = 0.968$ for the Strategic Leadership scale, and $\alpha = 0.821$ for the Educational Service Marketing scale.

Study Results

The first research question examined the degree to which private school principals in the State of Kuwait practice the dimensions of strategic leadership. The findings revealed a high level of strategic leadership practice, with an overall mean score of ($M = 4.17$). This result indicates that strategic leadership is effectively implemented across private schools in Kuwait, and that principals demonstrate a strong command of its constituent dimensions.

The second research question examined the level of educational service marketing in private schools in the State of Kuwait. The findings indicated a high level of marketing practice across all dimensions overall, with the exception of the promotion dimension. The overall mean score was ($M = 3.70$), reflecting a positive indicator that private schools broadly adopt effective marketing strategies for their educational services.

The first hypothesis examined whether statistically significant differences exist in the degree of strategic leadership practice and the level of educational service marketing based on gender, job position, school type, and school gender composition.

With respect to gender, no statistically significant differences were found across any of the strategic leadership or educational service marketing dimensions. With respect to job position, significant differences emerged in select strategic leadership dimensions — namely human capital, organizational culture, and strategic control — all in favor of school principals. In the domain of educational service marketing, significant differences were identified in the pricing dimension, in favor of assistant principals.

Regarding school type, significant differences were observed in the human capital dimension, favoring bilingual schools, as well as in the educational service marketing and physical environment dimensions, also in favor of bilingual schools. Similarly, findings based on school gender composition revealed significant differences in the human capital, educational service marketing, and physical environment dimensions, generally in favor of mixed-gender schools.

The second hypothesis examined the impact of strategic leadership on the marketing of educational services in private schools in Kuwait. The findings revealed that the dimensions of strategic leadership collectively account for 47.5% of the variance in educational service marketing levels, indicating a statistically significant predictive relationship. Among the individual dimensions, human capital demonstrated the greatest influence on educational service marketing, followed by strategic control and strategic orientation.

Notably, when all strategic leadership dimensions are considered in combination, they account for 67.3% of the total effect on educational service marketing. This finding suggests that the comprehensive and integrated practice of strategic leadership exerts a considerably stronger influence on educational marketing outcomes than the application of any single dimension in isolation.

Conclusion

Summary of Study Findings

This section presents the key findings and recommendations of a study examining the impact of strategic leadership on educational service marketing in private schools in the State of Kuwait. Statistical analyses and fieldwork revealed a set of significant findings that contribute to understanding the nature of the relationship between the study variables, alongside practical recommendations for enhancing the effectiveness of school leadership and improving educational service marketing in private schools.

Strategic Leadership Practices

Participants' perceptions of the degree to which private school principals in Kuwait practice strategic leadership were rated **high**, with an overall mean score of ($M = 4.17$). This positive indicator suggests that private school principals demonstrate a strong command of the dimensions of strategic leadership.

Educational Service Marketing

Participants' perceptions of the level of educational service marketing in Kuwaiti private schools were rated **high** across all dimensions overall, with the exception of the *promotion* dimension. The overall mean score was ($M = 3.70$), a positive indicator reflecting that private schools adopt effective marketing strategies for their educational services. This further underscores principals' commitment to strengthening their competitive positioning in the educational marketplace and their recognition of the importance of differentiation within the private education sector.

Statistically Significant Differences

Statistically significant differences were identified among the mean scores of participants' perceptions regarding strategic leadership and its impact on educational service marketing in Kuwaiti private schools, as follows:

- (a) **Gender.** No statistically significant differences were found among participants' mean scores across all dimensions of strategic leadership or educational service marketing based on the gender variable.
- (b) **Job Title.** Statistically significant differences were identified in certain dimensions of strategic leadership — namely *Human Capital*, *Organizational Culture*, and *Strategic Control* — all in favor of school principals. With respect to educational service marketing, statistically significant differences were found in the *Pricing* dimension, in favor of assistant principals.
- (c) **School Type.** Statistically significant differences were found in the *Human Capital* dimension, favoring bilingual schools. Additionally, significant differences were observed in two dimensions of educational service marketing — *Educational Service Marketing* and *Physical Environment* — both in favor of bilingual schools.
- (d) **School Gender Composition.** Statistically significant differences were identified in the *Human Capital* dimension in favor of mixed-gender schools, as well as in the *Educational Service Marketing* and *Physical Environment* dimensions, also in favor of mixed-gender schools.

Predictive Power of Strategic Leadership

The dimensions of strategic leadership collectively accounted for **47.5%** of the variance in educational service marketing levels, indicating that the degree to which private school principals practice strategic leadership dimensions can serve as a reliable predictor of educational service marketing outcomes. Among individual dimensions, *Human Capital* demonstrated the greatest influence on educational service marketing, followed by *Strategic Control*, and then *Strategic Orientation*. Notably, when all strategic leadership dimensions are considered together, they account for **67.3%** of the variance in educational service marketing in Kuwaiti private schools. This finding suggests that the combined practice of strategic leadership dimensions yields a markedly stronger effect on educational service marketing than the practice of any single dimension in isolation.

Study Limitations

The sample at the level of private school principals constituted a **non-random convenience sample**, which may limit the generalizability of the findings. The study sample comprised 95 principals and assistant principals. The relatively small sample size was largely attributable to the unwillingness of certain private school administrations to cooperate, despite the availability of a formal facilitation letter issued by the Private Education Directorate of the Ministry of Education, which constrained access to a broader sample.

The reliability coefficient for the *Promotion* sub-scale within the Educational Service Marketing instrument was found to be ($\alpha = 0.545$), which is considered relatively low. This may be attributed to the limited number of items in this dimension, which consisted of only three items. The researcher elected to retain these items within the questionnaire to avoid adversely affecting the overall reliability of the Educational Service Marketing scale, which yielded an acceptable coefficient of ($\alpha = 0.821$).

Study Recommendations

In light of the findings of this study, the researcher puts forward the following recommendations:

- **Principal Selection and Pre-service Training.** Private school principals should be selected according to rigorous academic and professional criteria commensurate with the demands of the private education sector. Furthermore, pre-appointment training programs should be provided to raise prospective principals' awareness of the significance of strategic leadership skills and their impact on enhancing educational service marketing.
- **Improvement of Educational Service Marketing.** Schools should develop comprehensive, integrated marketing strategies alongside the renewal of physical infrastructure and educational facilities, thereby strengthening their competitive value proposition in the marketplace.
- **Establishing Specialized Marketing Units.** Private school owners should be made aware of the importance of establishing dedicated educational marketing units within their institutions. This should be accompanied by the development and activation of programs designed to measure beneficiary satisfaction and conduct systematic market needs analyses.
- **Institutional Development.** Schools are encouraged to adopt comprehensive quality management systems, introduce innovative educational programs that are responsive to

market demands, and develop integrated information systems to support strategic decision-making processes.

- **Enhancing Competitiveness.** Private school administrations should develop specialized academic programs that differentiate their institutions from competitors, establish interactive digital platforms tailored to their school communities, and create research and innovation centers for students.
- **Human Capital Development.** Private school principals should prioritize the recruitment of highly qualified educational professionals and ensure the sustained activation of continuous professional development programs for all staff.
- **Improving the School Environment.** Principals are urged to align their institutions with international standards pertaining to the quality of educational facilities. This includes the establishment of smart laboratories, advanced learning centers, and the design of flexible, innovative learning spaces that foster creativity and engagement.
- **Strengthening Community Relations.** Schools should build strategic partnerships with the private sector and reinforce corporate social responsibility initiatives. Additionally, the establishment of dedicated communication platforms for engagement with parents and guardians is strongly recommended.

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

During the preparation of this manuscript, the author used Claude (Anthropic) for the purpose of translating selected sections of the paper from Arabic into English, as well as for proofreading and refining the translated content for academic clarity and consistency. Following the use of this tool, the author reviewed and edited all outputs as necessary and takes full responsibility for the content of the published work.

References

- Hamad, W., & Tibidi, M. (2019). *Dawr al-qiyada al-istratijiyya fi taswiq al-khidamat al-ta'limiyya: Dirasa maydaniyya lil-madaris al-thanawiyya al-khassa bi-wilayat al-Khartum* [The role of strategic leadership in marketing educational services: A field study of private secondary schools in Khartoum State]. [Unpublished doctoral dissertation]. Neelain University.
- Kotler, P., & Keller, K. L. (2016). *Marketing management* (15th ed.). Pearson Education.
- Mohammed, W., & Tabidi, M. (2019). The role of strategic leadership in marketing educational services: A field study of private secondary schools in Khartoum State [Unpublished doctoral dissertation]. University of Neelain, Khartoum.
- Wizarat al-Tarbiya. (2023). *Al-Majmu'a al-ihsa'iyya lil-ta'lim* [Educational statistical yearbook].

Enhancing Online Exam Integrity: A Case Study of the University of Wisdom Land in Myanmar

Ohnmar Nyunt, Kobe Institute of Computing, Japan
Sokout Hamidullah, Kobe Institute of Computing, Japan

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

The COVID-19 pandemic and the 2021 political issue have caused significant disruption to campus-based exams in Myanmar, the diaspora students unable to finish their degrees. To facilitate academic continuity, this research was to determine detailed user requirements through surveys with 51 students and 11 invigilators, and to use these findings to develop an online proctoring system that integrates lightweight multi-models to identify overt and covert cheating actions in real time. The system design includes multi-module: user authentication through one-time password (OTP) code and facial recognition; real-time detection that streams camera, microphone, and system log information; object detection to flag prohibited items; voice detection for spoken responses; face persistence to ensure that only one authorized face is visible; and active window monitoring that prevents copy, paste, multi-tab and multi-app. A mixed-methods pilot was conducted with 20 students and 14 invigilators who each took a 15-minute essay test. Quantitative data was collected through a post-exam questionnaire using 5-point Likert constructs. The teacher group rated a high mean score (4.50) with low variance (0.77), while the students rated with a mean of 4.12 and standard deviation of 1.41. The system indicates a high and balanced accuracy metrics with F1-score of (91.41%) which confirms high reliability in both detecting cheating and preserving legitimate activity. Qualitative results emphasize the strengths of the proposed system, including cost-effectiveness and fairness with less bias. The results of this research indicate that the AI-based multi-modal proctoring system can be used as an academic integrity solution for online exams.

Keywords: AI-assisted real-time proctoring, online exam integrity, distance education, educational technology, online assessment

iafor

The International Academic Forum
www.iafor.org

Introduction

The coronavirus outbreak has brought about massive changes to the conventional educational sector, affecting the process of teaching and assessment across the world. Muzaffar et al. (2021) described that online exams became essential during and after the pandemic for several interrelated reasons grounded in maintaining educational continuity, ensuring safety, and adapting to emergent remote teaching modalities.

As highlighted by Gomersall and Floyd (2023), who examined the experiences of Myanmar students navigating the dual shocks of the COVID-19 pandemic and political instability, online learning platforms became the sole avenue for accessing education when physical schools were closed, and movement was restricted. To counter the extreme disruption caused to education by this shift, a rapid process of technological revolution is necessary to ensure access to educational opportunities and international connections (Aung Tun, 2022). Since there are roughly 5.4 million people in Myanmar who need immediate educational help, the focus of the Myanmar Education Cluster (2025) is that crisis-affected and at-risk children and young people continue to receive quality education, keeping in mind the mental well-being of the young people. Consequently, there is an urgent need for resilient proctoring systems that can adapt to such environmental volatility without compromising academic integrity or fairness. Although online education has enhanced access to education, it has also unveiled some existing problems in the process of assessment, particularly in those institutions that conduct paper-based tests.

The University of Wisdom Land (UWL) is one of the prominent monasteries, established in 2020 by Ashin Dr. Nandamarlabhivamsa, with a Buddhist studies certification courses that has 43 regional exam centers (University of Wisdom Land official resources). Since UWL lacks a mechanism for conducting exams online for Myanmar citizens living abroad, there is a substantial challenge in accessing education for such people. The three main interconnected root causes of the problems related to the assessment integrity of the university include technical constraints, integrity threats, and assessment flaws. These causes generate adverse effects, including student inequity, damage to institutional reputation, and operational burden for staff.

This study concentrates on the integrity-threat dimension because it directly threatens the credibility of exam results and erodes stakeholder trust. Given this context, the present research seeks to design, implement, and evaluate an ethical, AI-driven real-time proctoring framework that verifies examinee identity, detects cheating behaviors through multimodal computer vision and audio analysis, and routes flagged events to human proctors for final adjudication. The overarching goal is to provide UWL with a cost-effective mechanism that restores confidence in its certification process and enables inclusive participation of diaspora students.

Literature Review

A web application for identity verification was developed and implemented by Shkodzinsky and Lutskiv (2022) using the algorithm for face detection and photo fixation to provide precise identity verification at a distance in a Learning Management System (LMS). Such an approach helps meet the important requirement for controlling the security of information using the framework for designing the target system due to the analysis of already existing algorithmic approaches. Moreover, the system architecture of the tool is mostly related to obtaining a picture of the candidate using the camera when they take part in the exam and verifying the individual's identity automatically (Shinde, 2022). For countries like Myanmar,

implementation of such an online platform is one of the key elements in harnessing cutting-edge technologies to transcend organizational gridlock and develop the international connections required for creating a robust, post-rentier education sector.

Recent studies have identified a new automated proctoring system that makes use of the You Only Look Once (YOLO) model and computer vision technologies. The system worked by applying the multimodal technology of analyzing visual and audio information from the camera and microphone. This included behavioral analysis, including face orientation and mouth detection, and real-time audio monitoring. Additionally, Mediapipe technology is used in this system to ensure important functions such as face spoofing. Face spoofing detects when a candidate uses still images or videos to cheat in the proctoring process. Object detection and counting in the environment where the exam is being taken is achieved by making use of pre-trained YOLO weights (Singh et al., 2024). Finally, concerning the practical implications of the model for enforcement and operations, the use of the latter guarantees fair testing by automatically shutting down the examination in case a mobile phone is spotted or if there is more than one individual in the room or no one at all in 10 seconds.

In addition, the facial analysis process employed a two-detector approach that integrates MediaPipe Face Mesh and OpenCV Haar cascades, following the multimodal face mesh approach that increases landmark precision under different lighting conditions (Khabbachi et al., 2024). The identification procedure is carried out using the dlib based face recognition library, which was tested to offer accurate 68 landmarks detection in Gopalakrishnan et al. (2022). By reusing these proven convolutional neural network (CNN) and transformer style architectures, the prototype inherited the strong detection performance documented in the cited works while adapting them to a real time, client side inference pipeline. Ahmad et al. (2021) utilised deep learning and biometric methods, including Histogram of Oriented Gradients (HOG) for face detection and OpenCV for identity verification. To prevent the use of static photos for cheating, the system incorporated eye-blinking detection, while the YOLOv3 model identified prohibited physical objects like mobile phones and textbooks. Evaluation using the FDDB and LFW datasets demonstrated high performance, achieving 97% accuracy in face detection and over 99% in face recognition for smaller groups.

The current research conducted by Tweissi et al. (2022) measured the technical performance of the AiAP model in ensuring academic integrity in online examinations relative to human standards. By employing manual analysis of 244 online exams from a university located in the Middle East, the researchers assessed five indicators of surveillance, such as eye tracking, voice detection based on LSTM models, screen violation using Safe Exam Browser, face recognition by Google Vision API, and eye movement detection. The results of this experiment indicated that there was a statistically significant distinction between the human and AI decisions, which led to many more violations reported by the AiAP technology with 30% (74 of 244) incorrect decisions. Considering the accuracy problems and possible violations of students' rights and equality, the researchers suggested that the AI proctoring cannot be considered sufficient alone but requires the use of human supervision as well.

System-level event monitoring further strengthens reliability. Sokout et al. (2020) analyzed the developed mouse tracking application along with the developed Moodle plugin in a blended course mid-term (20%) examination for the purpose of detecting and identifying the potential cheaters. The model was able to correctly predicted 94% of the students who committed any unlawful acts during the online mid-term examination, which makes it possible to intervene early and prevent illegal actions.

Mutukundu et al. (2025) suggested an AI-powered proctoring tool that relied on a secure MERN stack (MongoDB, Express.js, React, Node.js) framework and leverages TensorFlow.js, along with the COCO-SSD algorithm, for behavior and environment monitoring. The methodology focused on a multi-layered monitoring approach that includes facial recognition, eye tracking, and object detection to identify unauthorized aids such as mobile phones or additional faces. The system design incorporated automated security features like JWT-based authentication, browser lockdowns, and screenshot logging triggered by predefined violation thresholds. Experimental results demonstrated high technical efficacy, with an average face detection accuracy of 95% and a rapid object detection latency of 30ms. According to the results of a survey of academicians in higher education, the use of an AI approach allowed for reducing cheating up to 70% when compared to regular online examinations without proctors.

The research by Patil et al. (2025) presented an AI-powered online proctoring system designed to preserve academic integrity by monitoring student behavior in real-time through computer vision. The proposed solution involved the OpenCV library and MediaPipe framework to track 468 facial landmarks and 21 hand key points, utilizing threshold-based logic to detect deviations in eye gaze and hand presence. Specifically, an alert is triggered if a student's gaze deviates more than 25 degrees from the camera axis for more than three consecutive frames, or if hands move beyond 80% of the frame boundary. A critical design feature was the automated evidence capture, which logs screenshots with timestamps upon violation and terminates the exam session after six warnings. Experiments were performed on twenty volunteers, and the proposed system was found to be efficient in detecting eye and hand movements with a F1 score of 91.4% and 93.7%, respectively. These findings suggest that the proposed multi-modal approach offers a scalable, low-overhead solution for maintaining fairness in remote examinations.

User perception of AI-driven proctoring influences adoption. Nasruddin et al. (2022) demonstrated that during the pandemic, secondary school students' acceptance of online tools was heavily influenced by UX design and emotional well-being. This highlights a gap in current literature, the need for data engineering solutions that explicitly account for these human-centric variables to ensure equitable access in developing regions.

Methodology

The present study employed a cross-sectional, descriptive survey to obtain empirical evidence regarding the demand for, and trust in AI-driven online-exam proctoring among current and prospective students at the University of Wisdom Land (UWL). The questionnaire was disseminated electronically through UWL's alumni list, social-media groups, and personal networks of the principal investigator.

Requirements Gathering

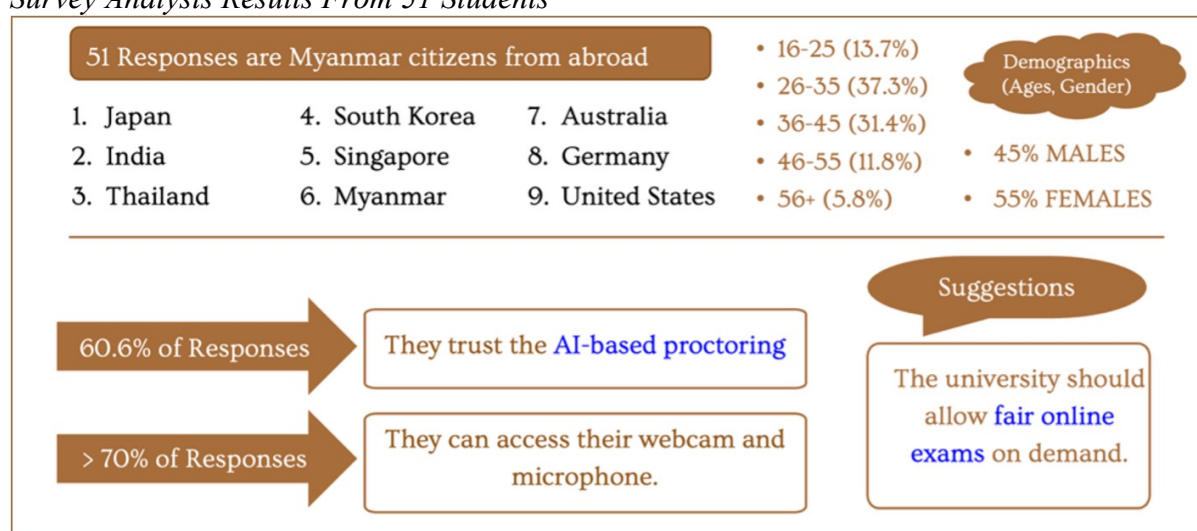
A total of 51 valid responses were received from individuals residing in nine countries. Of these respondents, 51 were students and 11 were teachers or invigilators. The sample was composed of 45% male and 55% female participants, ranging in age from 16 to 66 years; the majority were aged 26-35 years (Figure 1). Regarding technological readiness, above 70% of the student cohort reported having access to both a webcam and a microphone, and 60% indicated willingness to sit the exam from home using an online platform. From the teacher's perspective, 55 % reported having observed suspicious cheating during prior examinations, underscoring the need for robust detection mechanisms. Moreover, 64 % of teachers stated that

their university had requested them to administer an online exam, reflecting the growing demand for remote assessment solutions. In addition, 73 % of examiners expressed a preference for organizing exams to be taken from home via an online platform, highlighting the importance of a web-based, home-compatible architecture.

A large majority voiced interest in incorporating AI-driven functionalities such as facial-voice detection and object recognition, demonstrating enthusiasm for advanced, automated monitoring features. Respondents also emphasized the urgency of implementation, recommending that a Fair Online Exam and Proctoring system be developed. Finally, 90% of examiners indicated a desire to review suspicious activity through log files, captured images, and audio recordings as evidentiary material, reinforcing the necessity for comprehensive evidence-logging and human-in-the-loop review capabilities.

Figure 1

Survey Analysis Results From 51 Students



Moreover, the proposed framework incorporates a simplified user interface to address the specific challenges identified in recent literature. As noted by Nasruddin et al. (2022), negative emotional responses and poor UX can lead to student disengagement. By reducing interface complexity, the system aims to mitigate this factor, thereby improving the overall reliability of the assessment process.

These findings provide a robust, context-specific empirical foundation for the design, implementation, and evaluation of an ethical, multimodal AI-driven proctoring system tailored to the unique constraints and expectations of UWL's geographically dispersed student body. The statistics above constitute the empirical grounding for the system-design requirements articulated in subsequent sections of the paper.

System Architecture

The UWL Online Proctoring System is built on a two-phase architecture comprising pre-exam and exam-time, as shown in Figure 2. This design integrates biometric authentication, device-access control, continuous multimodal monitoring, and secure evidence-logging. The system balances rigorous academic integrity safeguards with real-time processing capabilities, thereby addressing the empirical requirements identified in the preceding survey of students and invigilators at the UWL.

Pre-exam Stage

This stage implements a multi-factor authentication protocol designed to prevent impersonation, account sharing, and unauthorized access. This phase consists of sequential verification checkpoints that ensure only the registered examinee can initiate the examination session.

The process begins with a one-time registration phase, where new students create an account using their e-mail address and a strong password. Immediately after registration, the platform prompts the learner to activate the webcam and capture a high-resolution frontal facial image under consistent lighting. The image is stored in a local folder. Upon successful facial capture, a six-digit OTP is generated and sent to the student's e-mail. The student must enter the OTP within three minutes; successful entry confirms the enrollment and flags the biometric record as verified. For each exam session, the student logs in with their email and password, then grants the browser permission to access the webcam and microphone. A second biometric check compares the live webcam feed with the stored template using a deep learning model. The face verification uses the face recognition library which calculates a face distance (Euclidean distance) between two 128-dimensional face encodings. After passing this check, a fresh OTP is emailed; entering the time-bound OTP unlocks the exam environment.

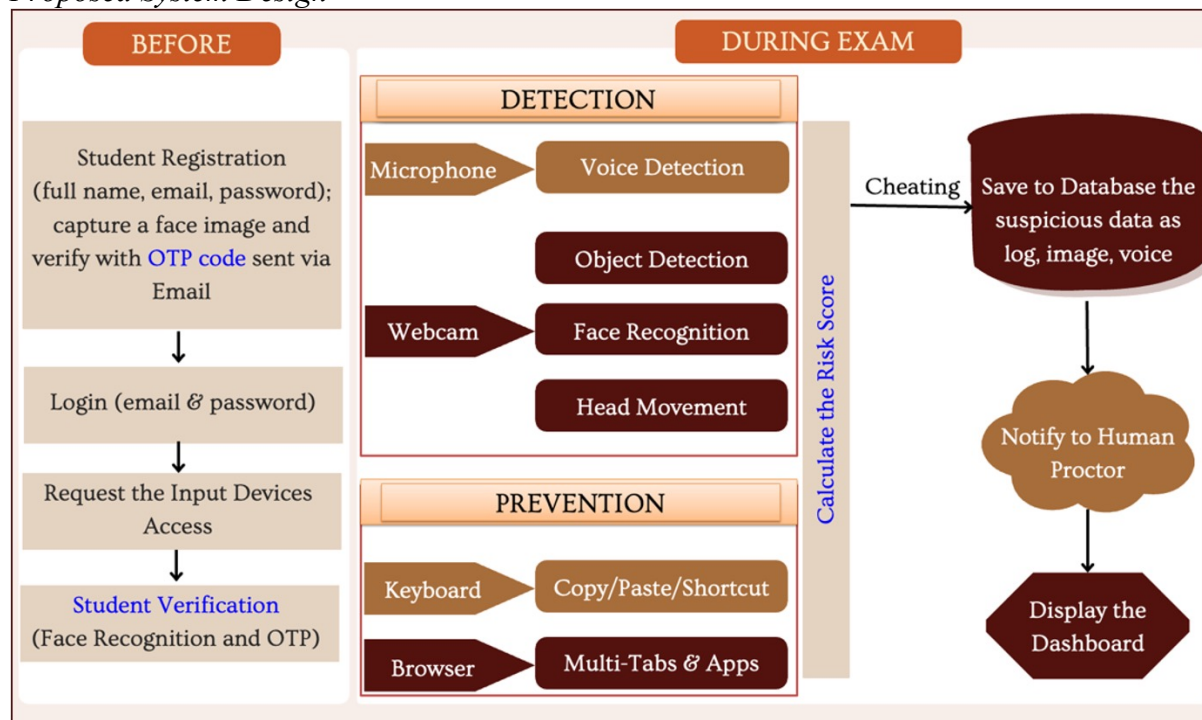
Exam-Time Stage

During the examination, the proposed system continuously detects and prevents cheating behaviors. The details of these services are described as follows.

The detection service operates continuously throughout the examination period, acquiring synchronized audiovisual streams from the examinee's webcam and microphone. Utilizes MediaPipe Face Mesh for facial landmark detection. This service handles face counting and position analysis to ensure the authorized student remains visible throughout the exam. Employs YOLO11m to identify prohibited items such as mobile phones, laptops, and books. The model processes frames at configurable confidence thresholds, flagging violations in real-time. Processes audio streams using NumPy and SciPy for Fast Fourier Transform (FFT) analysis. The service detects human voice patterns by analyzing frequency ranges (85Hz–3000Hz), formant structures, harmonic content, and temporal continuity to distinguish genuine conversation from background noise. Handles all image processing tasks using Pillow and OpenCV, including Base64 encoding/decoding, image resizing, annotation overlays, and compression for storage.

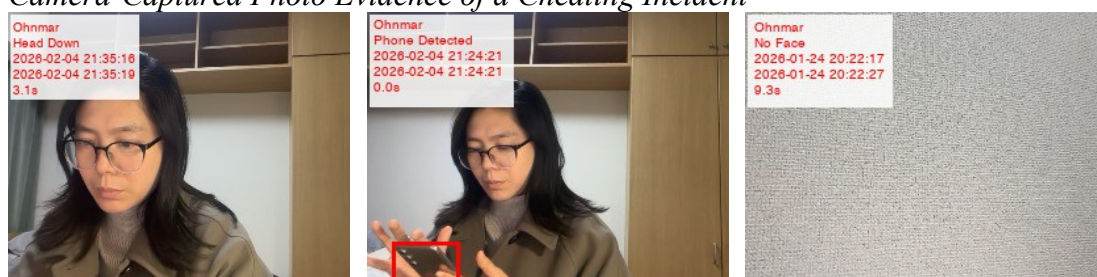
The prevention service enforces a controlled examination environment by restricting user interactions that could facilitate academic misconduct. When a student tries to copy or paste text using either the right-click context menu or keyboard shortcuts, the attempt counter is incremented, and an alert notifies the student that copying is not allowed. Each attempt is logged to the backend with a timestamp. The system monitors when a student switches to a different browser tab or minimizes the exam window. The event is logged with both a start time and an end time, allowing administrators to see exactly how long the student was away from the exam.

Figure 2
Proposed System Design



MySQL is the relational database for data, such as student records, exam sessions, and suspicious events, all of which are labeled with precise timestamps. The detection logs were systematically stored in the “suspicious_events” database table; each entry records the timestamp and type of suspected unethical activity (e.g., no_face, face_mismatch, phone_detected, head_down, copy, paste, voice_detected, etc.). Audio recordings are retained in WAV format and annotated screenshots of suspicious activities and corresponding facial images for verification are stored as media assets. All media files are systematically organized within a structured directory hierarchy under a designated media folder, facilitating efficient retrieval and auditability.

Figure 3
Camera-Captured Photo Evidence of a Cheating Incident



Crucially, the system is designed as a decision-support tool rather than an automated adjudicator to ensure ethical integrity. Upon detecting anomalies, the system assigns a severity level to each incident and presents color-coded records with detailed event information on the admin dashboard. This triggers a mandatory human-in-the-loop verification protocol, where an administrator reviews the flagged media assets, audio segments, and behavioral logs. Final disciplinary actions are determined solely by human judgment based on this evidence, ensuring that the system does not automatically penalize students. This approach mitigates the risk of

false positives arising from technical glitches or environmental factors, thereby upholding fairness and due process in the assessment workflow.

Results and Discussion

The evaluation was carried out with a mixed-methods pilot study with 20 students and 14 invigilators, who each completed a 15-minute, ten-question essay exam delivered through the prototype AI-based proctoring platform online. This pilot study focused on a specific group in Myanmar to ensure the feasibility of the framework. The student was composed of 35% male and 65% female participants, ranging in age from 16 to 65 years; the majority were aged 26–35 years. A total of 527 suspicious cheating data points were extracted from the database and were left for classification. A post-exam questionnaire composed of five-point Likert items was filled out by participants, as well as semi-structured interviews to enable the collection of qualitative data. The Likert responses were analyzed using the system usability scale (SUS) and descriptive statistics (means and standard deviations), while the interview transcripts were coded using thematic coding.

Quantitative Findings

Student Feedback

According to Table 1, the student survey revealed that participants regarded the platform as easy to access with clear instructions, a usability is mean = 4.16 and std = 1.42, indicating that the system's design and responsiveness met most users' expectations. Perceptions of fairness and equality were also high with mean = 4.13 and std = 1.42. Students felt the AI-monitoring process was impartial and that they were treated the same as their peers. Comfort scores were slightly lower with mean = 3.98 and std = 1.37, reflecting that while the system generally did not interrupt the exam, a minority of respondents remained uneasy about being monitored. Satisfaction was strong with mean = 4.21 and std = 1.44, with most students indicating willingness to reuse the proctoring tool and to recommend it to other universities. Overall, the high SUS score is 4.13 and the positive Likert averages suggest that the prototype delivers a usable, fair, and satisfactory remote-exam experience, though modest improvements in perceived comfort could further increase acceptance.

Table 1

Mean and Standard Deviation Using System Usability Scale From Student Feedback

Construct	SUS Item	mean	std
Learnability	Q1. The system was easy to access and log in.	4.16	1.42
	Q2. The instructions were clear and understandable.		
	Q3. The system interface was user-friendly.		
	Q4. The system responded smoothly during the exam.		
Fairness & Equality	Q5. The monitoring process felt fair.	4.13	1.42
	Q6. I felt that I was treated equally compared to other students.		
Comfort	Q7. The system did not interrupt my exam unnecessarily.	3.98	1.37
	Q8. I felt comfortable being monitored during the exam.		
Satisfaction	Q9. I am willing to use this online proctoring system again.	4.21	1.44
	Q10. I would recommend this system to other universities for their future online examinations.		

Admin Feedback

In Table 2, the invigilators' survey shows that the participants regard the prototype as highly accurate and reliable (mean = 4.40, std = 0.80), indicating that the cheating detection results are perceived as trustworthy and that false positives are rare. The workload reduction dimension is most strongly supported (mean = 4.64, std = 0.68), confirming that the system markedly eases manual monitoring while still allowing a brief human review before reaching a final decision. The usability of the administrative tools is also rated very positively (mean = 4.62, std = 0.82); teachers find the generated reports useful, the dashboard user-friendly, and the evidence-review process convenient.

Table 2

Mean and Standard Deviation Using System Usability Scale From Admin Feedback

Construct	SUS Item	mean	std
Accuracy & Reliability	Q1. The system helps reduce academic dishonesty.	4.40	0.80
	Q2. The cheating detection results are accurate and reliable.		
	Q3. Wrong cheating reports are minimal.		
Workload Reducing	Q4. The system reduces manual monitoring workload.	4.64	0.68
	Q5. Human review is necessary before making final decisions.		
Usability	Q6. Reports generated by the system are useful.	4.62	0.82
	Q7. The admin dashboard is easy to use.		
	Q8. Reviewing exam evidence is convenient.		
Trust in AI Decisions	Q9. I trust the AI-based detection results of the system.	4.21	0.89
Security & Privacy Balance	Q10. The system balances exam security and student privacy.	4.64	0.63

System Evaluation

For the evaluation of the system's performance, an automated data collection system was implemented. The detection logs were recorded systematically in a database table named "suspicious_events" during the pilot testing process. Each record in the table represents a particular incident at a certain timestamp in which the model has detected possible unethical activities like "no_face", "face_mismatch", "copy", "paste", and so on. The data related to suspicious cheating activities was analyzed for eight monitoring categories in Table 3.

The system showed absolute precision of 100% in detecting physical copy-paste attempts and multi-tab/multi-app behavior. Although the voice detection exhibited a lower recall of 77.94%, this indicates a conservative detection threshold, which ensures that only obvious acoustic cheating is recorded in the table, thus preventing false accusations. Moreover, the object detection also exhibited a lower recall of 76.56%, which indicates the limitations of the conventional pre-trained COCO dataset (Common Objects in Context). To improve the detection sensitivity and reduce false negatives, future versions of the system will include training the model on a customized, domain-specific dataset. From Table 3 and Table 4, with a total of 452 true positives (TP), the system achieved an overall precision of 93.20%, which indicates a low rate of false accusations with only 33 false positives and 52 false negatives. The recall of the system is that about 89.68% of the cheating attempts are detected. The F1-score of the system is that 91.41% balances the two aspects, which confirms that the multimodal

architecture provides high reliability in both cheating detection and maintaining legitimate activity.

Table 3

System Evaluation for Suspicious Cheating Behaviors

Detection category	No. of instances	* TP	* FP	* FN	Precision (%)	Recall (%)	F1-score (%)
No Face	64	46	6	12	88.46	79.31	83.64
Multiple Faces	16	12	2	2	85.71	85.71	85.71
Face Mismatch	16	12	4	0	75.00	100.00	85.71
Head Movement	149	124	17	9	87.94	93.94	90.84
Object Detection	68	49	4	15	92.45	76.56	83.76
Copy/Paste	86	86	0	0	100.00	100.00	100.00
Tab Switch/ Multi Apps	70	70	0	0	100.00	100.00	100.00
Voice Detection	68	53	0	15	100.00	77.94	87.60
Total	527	452	33	52			

Note. * TP - True Positive : Cheating correctly identified.
 * FP - False Positive : Normal behavior incorrectly flagged as cheating.
 * FN - False Negative : Cheating attempt missed by the system.

Table 4

Feature-Wise Accuracy for Suspicious Cheating Behaviors

Metric	Formula	Calculated Value
Precision	$TP/(TP+FP)$	93.20%
Recall	$TP/(TP+FN)$	89.68%
F1-score	$2*((precision*recall)/(precision+recall))$	91.41%

Note. * TP - True Positive : Cheating correctly identified.
 * FP - False Positive : Normal behavior incorrectly flagged as cheating.
 * FN - False Negative : Cheating attempt missed by the system.

Qualitative Insights

Cost Effectiveness

The interviewees repeatedly highlighted the financial burden imposed by conventional examinations. Thirteen participants (65% of the sample) mentioned travel expenses, accommodation, and the cost of printed question papers as major deterrents, especially for students residing in remote provinces. The proposed system can now be taken from a laptop without the need for physical venues. Participants also pointed out ancillary benefits of the digital approach: the system is eco-friendly, eliminating the consumption of paper and the carbon footprint associated with travel; it requires fewer staff, thereby cutting personnel costs; and it offers remote-testing options for overseas learners who cannot attend an exam center in person. Collectively, these qualitative observations suggest that the AI-enabled online proctoring platform delivers a markedly more cost-effective and environmentally sustainable assessment solution compared with traditional exam administration.

Stress Reduction

Many respondents (60% of the sample) described the heavy workload imposed on invigilators and faculty members as a major source of stress that undermines staff wellbeing. The respondents reported that extensive supervision causes fatigue, reduced concentration, and

consequently an increased risk of missing irregularities. The AI-driven proctoring system relieves the stress associated with the heavy workload by automating the process of routine monitoring, with downloadable manuals and demonstration videos that simplify preparation. Additionally, the system allows students to take the exam from the comfort of their homes, thus eliminating travel-related stress and anxiety, which in turn reduces the burden on both students and staff, thereby contributing to a healthier, less stressful assessment environment.

Bias and Fairness

The qualitative data revealed pervasive concerns about bias and subjectivity inherent in face-to-face examinations. Half of the participants explicitly cited no bias of the invigilators as an advantage of the proposed system, implying that the current manual process suffers from human prejudice. These accounts reveal a systemic lack of standardisation in invigilation practices, whereby personal relationships and discretionary judgement can affect exam integrity. The automated monitoring implemented in the prototype eliminates personal bias, reduces reliance on human proctors, and generates real-time alerts that are forwarded to administrators for immediate review.

Robust Integrity Framework

The interview data consistently argued that the traditional setting fails to reliably prevent or identify cheating. The 40% of respondents explicitly described the manual approach as easy to cheat and can't catch every cheater, indicating a systemic inability to enforce academic integrity. The proposed AI-driven system implements multiple preventive layers: an OTP-based login combined with strong password policies and face-verification to block impersonation; shortcut-key blocking to prevent copy-paste and key-logger attacks; and automated monitoring of head-movement, webcam feeds, and keyboard, mouse, and browser activities. Rather than flagging every micro-movement, the algorithm concentrates on significant behavioural anomalies, thereby reducing false-positive alerts. Detected events are streamed in real time to administrators, who receive concise summaries and can review the corresponding evidence files, such as annotated screenshots, audio clips, and activity logs, to make informed decisions.

The system was evaluated both on an individual feature basis and through an overall confusion matrix. While the system showed near-perfect performance in browser activity detection is 100%, the detection of unauthorized materials exhibited a slightly lower accuracy is 72% due to variations in lighting and device orientation. Moreover, the pilot evaluation shows that the online proctoring prototype can deliver a usable and workload-reducing assessment environment for both examinees and invigilators. Quantitative results (SUS = 4.13 for students, SUS = 4.52 for teachers) confirm that the system is perceived as reliable, secure, and user-friendly. Qualitative data further reveal that participants value the bias-free, cost-effective, and stress-reducing nature of the automated solution, while also recognizing its potential to enhance cheating prevention through multimodal monitoring.

Conclusion and Future Work

This research proposed and tested a functional online proctoring system powered by AI (React frontend, FastAPI backend, MySQL database) through a mixed-methods pilot study involving 20 students and 14 teachers at the University of Wisdom Land. The qualitative findings clearly

support that the AI-powered solution can overcome human bias, administrative overhead, stress for both examinees and invigilators, and improve cheating prevention capabilities.

However, there are still some limitations that need to be addressed, such as trust in AI outcomes, privacy concerns, and network stability in low-bandwidth settings. Although the system has a well-balanced accuracy metric with F1-score of 91.41%, the focus is still on optimizing the recall value of 89.68% to further reduce the number of unethical incidents going undetected and to ensure a more rigorous proctoring environment.

Future work will integrate the mobile-first, dual-camera, offline resilience, and automated essay scoring features to make the system more applicable in the developing countries. Moreover, the next logical step to improve the recall value would be to train the customized proctoring dataset. The small sample size and single institution context also constrain the external validity of the findings. By addressing these limitations, the proposed solution can evolve into a sustainable, equitable alternative to traditional invigilation, enabling continuous and high-integrity assessment in resource-constrained and geographically distributed higher-education environments.

Finally, it is imperative to highlight the specific context within which the study has been conducted. Since the host university was founded in 2020 and has never held any online exams before, the current system can be considered a pilot test for the adoption of the approach.

Acknowledgements

The author would like to express the sincere gratitude to the Japan International Cooperation Agency (JICA) for their financial support and funding of this research, and is deeply grateful to the supervisor for their invaluable guidance and continuous support throughout the study. The appreciation also extends to the Kobe Institute of Computing (KIC) and the relevant personnel at the University of Wisdom Land (UWL) for their institutional assistance. Furthermore, the author would like to thank all the participants who took part in the surveys, pilot project, and interviews, as well as the individuals who provided insightful suggestions and technical support. Their contributions were essential to the completion of this research.

References

- Ahmad, I., AlQurashi, F., Abozinadah, E., & Mehmood, R. (2021). A novel deep learning based online proctoring system using face recognition, eye blinking, and object detection techniques. *International Journal of Advanced Computer Science and Applications*, 12(10). <http://dx.doi.org/10.14569/IJACSA.2021.0121094>
- Aung Tun. (2022). The political economy of education in Myanmar: Recorrecting the past, redirecting the present and reengaging the future. *Institute of Southeast Asian Studies* (ISEAS).
- Gomersall, S., & Floyd, A. (2023). Resilience: Myanmar students' experiences of overcoming eLearning challenges during COVID-19 and political instability. *Asia Pacific Education Review*, 24(3), 447–459. <https://doi.org/10.1007/s12564-022-09781-6>
- Gopalakrishnan, K., Dhiyaneshwaran, N., & Yuges, P. (2022). Online proctoring system using image processing and machine learning. *International Journal of Health Sciences*, 6(S5), 891–899. <https://doi.org/10.53730/ijhs.v6nS5.8777>
- Khabbachi, I., Mdaghri-Alaoui, G., Zouhair, A., & Mahboub, A. (2024). A cheating detection system in online exams through real-time facial emotion recognition of students. *2024 International Conference on Computing, Internet of Things and Microwave Systems (ICCIMS)*, 1–5. <https://doi.org/10.1109/ICCIMS61672.2024.10690812>
- Mutukundu, S., Tiwari, A., Kumbhar, A., & Kulkarni, V. (2025). Smart proctoring system for secure and fair online exams. *International Research Journal of Engineering and Technology (IRJET)*, 12(4), 93–101.
- Muzaffar, A.W., Tahir, M., Anwar, M.W., Chaudry, Q., Mir, S.R., & Rasheed, Y. (2021). A systematic review of online exams solutions in e-learning: techniques, tools, and global adoption. *IEEE Access*, 9, 32689–32712. <https://doi.org/10.1109/ACCESS.2021.3060192>
- Myanmar Education Cluster. (2025). Education Cluster Strategy 2022-2025. *Myanmar Information Management Unit*. https://themimu.info/sites/themimu.info/files/edu_public/Education_Cluster_Strategy_2022-2025.pdf
- Nasruddin, Z. A., Ariffin, N. H. M., Md Norwawi, N., Ismail, R., Abidin, A. W. Z., & Nor, F. N. S. M. (2022). Evaluating User Experience (UX) Factors and Emotions of Open Distance Learning (ODL) during the Pandemic Covid-19 among Secondary School Students. *International Journal of Information and Education Technology*, 12(12), 1374–1380. <https://doi.org/10.18178/ijiet.2022.12.12.1761>
- Patil, A. V., Chavan, P. A., Jadhav, S. R., Phodkar, A. U., Gulame, M. B., & Pimpalkar, A. P. (2025). Online exam proctoring application using-AI. *International Journal of Science and Research Archive*, 15(2), 1228–1234. <https://doi.org/10.30574/ijrsra.2025.15.2.1440>

- Shinde, H. B. (2022). Exam conduction and proctoring system using face detection. *International Journal of Scientific Research in Engineering and Management*, 6(1). <https://doi.org/10.55041/IJSREM11444>
- Shkodzinsky, A., & Lutskiv, V. (2022). Automated AI-based proctoring for online testing in E-learning system. *Scientific Journal of the Ternopil National Technical Technology*, 107(3), 76–85. https://doi.org/10.33108/visnyk_tntu2022.03.076
- Singh, T., Nair, R. R., Babu, T., & Duraisamy, P. (2024). Enhancing academic integrity in online assessments: Introducing an effective online exam proctoring model using YOLO. *Procedia Computer Science*, 235, 1399–1408. <https://doi.org/10.1016/j.procs.2024.04.131>
- Sokout, H., Purnama, F., Mustafazada, A. N., & Usagawa, T. (2020). Identifying potential cheaters by tracking their behaviors through mouse activities. *2020 IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE)*, 951–955. <https://doi.org/10.1109/TALE48869.2020.9368400>
- Tweissi, A., Al Etaiwi, W., & Al Eisawi, D. (2022). The accuracy of AI-based automatic proctoring in online exams. *Electronic Journal of e-Learning*. <https://doi.org/10.34190/ejel.20.4.2600>
- University of Wisdom Land. (n.d.). *Home*. <https://www.universitywisdomland.edu.mm/>

Contact email: topsunshine@gmail.com

Role of School Libraries in Conserving Sensitive Environments: A Case Study on the Bolgoda Ecosystem in Sri Lanka

Thushari Seneviratne, University of Kelaniya, Sri Lanka
Asanka Gunawardana, University of Moratuwa, Sri Lanka
Chulantha Jayawardena, University of Moratuwa, Sri Lanka
Upali Chandrasekara, University of Kelaniya, Sri Lanka

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

Developing eco-sensitive citizens requires pro-environmental attitudes from childhood, with tailored educational strategies. This study examines how school libraries can facilitate environmental education on the Bolgoda ecosystem. A self-developed questionnaire was distributed to secondary-level students selected through stratified random sampling. Data from 841 respondents were analysed to assess environmental knowledge, information-seeking behaviours, and learning preferences. Results indicate minimal formal engagement with the ecosystem: while 74.3% of students had heard, only 28.1% had seen related media, 19% had visited, 5.5% had read, and merely 2.1% had formally studied. The average ecosystem knowledge score was notably low at 2.53 out of 10 (SD = 2.17, 95% CI [2.38, 2.68]), with 27.4% showing zero knowledge. Moreover, students' interests were strongly oriented toward recreational aspects (78.4%) rather than critical environmental interaction (8.2%). While 80% of students identified school libraries as potential venues for environmental education, only 60% visited them at least once a month, and a majority of 65.4% preferred practical learning through environmental excursions. Chi-square analysis indicated that active engagement methods, such as exposure to visual media ($P = 0.014$) and site visits ($P = 0.011$), were significantly associated with higher environmental knowledge levels than passive methods, including hearing ($P = 0.165$), reading ($P = 0.165$), and formal study ($P = 0.800$). This disparity highlights a fundamental mismatch between traditional information-sharing and learning preferences. Hence, it is recommended to revisit environmental education strategies by integrating practical learning approaches into school library programs to better align with students' learning preferences and enhance environmental knowledge.

Keywords: environmental education, school libraries, estuarine ecosystems

iafor

The International Academic Forum
www.iafor.org

Introduction

Ecosystems are essential to life on Earth, providing services that satisfy diverse needs. Climate change and biodiversity loss are two of the major twenty-first-century challenges that can irreversibly alter ecosystems and disrupt their services, ultimately affecting sustainable development (Förster, 2022). Effective conservation, management of the natural environment, and environmental education help sustain these services. According to UNESCO, environmental education aims to achieve three sustainable goals outlined in the Tbilisi Declaration (UNESCO & UNEP, 1977), and they are:

- To foster awareness and concern about economic, social, political, and ecological interdependence in urban and rural areas;
- To provide every person with opportunities to acquire the knowledge, values, attitudes, commitment, and skills needed to protect and improve the environment;
- To create new patterns of behaviour of individuals, groups, and society as a whole towards the environment.

Based on these three goals, environmental education can be defined as the process of helping individuals to enhance their knowledge, attitudes, and practices regarding the environment, and explore present and future environmental issues. Environmental education also enhances critical thinking, problem-solving, and effective decision-making skills in relation to the environment. The latest addition to Gardner's Theory of Multiple Intelligences (Davis et al., 2011) "Naturalistic Intelligence", described as vigilant about nature, can also be incorporated into environmental education. Further, Chapter 36 of Agenda 21, adopted in 1992 by the United Nations, calls for reorienting environmental education to achieve sustainable development from childhood (UN Department of Economic and Social Affairs, 1992). Millennium Development Goals in 2000 (Tariq et al., 2025) and the 2030 agenda for sustainable development emphasise the need to increase environmental awareness at all levels of society, providing access to information and knowledge across society, assisted by the availability of ICTs (UNESCO, 2020). Hence, environmental education is essential to cultivate environmentally literate and responsible citizens (Akinsemolu & Onyeaka, 2025).

The Millennium Development Goals and Sustainable Development Goals have recognised the role of libraries in developing environmentally literate citizens (Tariq et al., 2025). On the other hand, libraries have been positioned as enablers of development and partners with governments and development agencies by signing the Lyon Declaration on Access to Information and Development in 2014 (IFLA, 2014). In line with these, the Central Environmental Authority in Sri Lanka has developed environmental education and awareness programs to cater for preschool children to general public (Central Environmental Authority, 2024), and they can be listed as follows:

- Preschool Program
- Eco Club Program for primary school students
- National Environmental Pioneer Program (NEPP) for secondary school students
Environmental Pioneer Forums and Green Youth Club for school leavers
- Green Leader Program for student teachers at the National College of Education

The authority has also recognised the need to persuade children to utilise school libraries for environmental education and awareness (Central Environmental Authority, 2020). School libraries can serve as centres for environmental education by bridging the gap between formal curriculum requirements and local ecological knowledge (Elaturoti, 2018). Not limited to traditional classroom instruction, school libraries offer flexible learning surroundings where

students can engage with diverse information sources. In the context of local ecosystem conservation, school libraries can function as follows:

- as centres of local ecological know-how,
- as centres for raising awareness about threatened habitats,
- as facilitators of community-based conservation initiatives, and
- as promoters of environmental stewardship among school children.

Hence, this case study investigates the role of school libraries in enhancing environmental awareness and conserving the Bolgoda ecosystem through targeted information services and community engagement. The study examines the current library usage patterns, levels of environmental awareness, students' knowledge of the Bolgoda ecosystem, prior exposure to ecosystem-related information, information-seeking behaviours, and perceptions of how libraries might contribute to conservation education among school library users in the Bolgoda region. Specifically, this study addresses the following research questions:

- How frequently do school children visit school libraries, and for what purposes?
- What is their prior information engagement on the Bolgoda Ecosystem?
- What is the baseline level of environmental knowledge about the Bolgoda ecosystem?
- What are their preferred methods and topics for learning about this sensitive ecosystem?
- What role could libraries play in disseminating environmental information about local ecosystems?
- How can school libraries be strategically positioned to enhance environmental stewardship?

Literature Review

The ability of school libraries to develop environmental knowledge, attitudes and practices among younger generations is particularly influential for sensitive and threatened ecosystems. Also, raising awareness through school libraries directly contributes to several Sustainable Development Goals, highlighting a strategic avenue for ecosystem protection. The Bolgoda ecosystem, the largest natural freshwater lake in Sri Lanka, provides a compelling case for how library and information centres can foster environmental awareness. Located in the Colombo and Kalutara Districts of Sri Lanka's Western Province, Bolgoda supports rich biodiversity and provides essential ecological services, including flood regulation, water purification, fisheries, and recreation (Central Environmental Authority, 2013). However, it faces escalating threats from development, pollution, solid waste, mangrove destruction, and unsustainable fishing (Central Environmental Authority, 2025). Limited awareness, especially among local youth, further endangers the system (Seneviratne et al., 2024; Seneviratne, Darshani, et al., 2025; Seneviratne, Perera, et al., 2025).

Australia-Indonesia BRIDGE School Partnership Program between MAN Insan Cendekia Gowa and St. John's Grammar School is such an initiative (Inayah et al., 2025). It investigates how cross-cultural educational initiatives can enhance students' sustainability consciousness in Indonesia. Using a mixed-methods approach, a structured sustainability awareness questionnaire was administered to 96 students, and the results have been analysed using descriptive statistics and paired-samples *t*-tests. The findings indicate a statistically significant increase in students' sustainability awareness following their participation in the partnership's projects, including eco-brick making, virtual environmental discussions, and intercultural exchanges. Students demonstrated a greater sense of environmental responsibility and

demonstrated measurable changes in daily habits, such as reducing plastic use and promoting green practices.

Nurwindo et al. (2020) investigated the influence of the “Adiwiyata” eco-school program on environmental literacy. “Adiwiyata” was implemented by the Ministry of Environment in Indonesia to promote knowledge and awareness of environmental conservation among high school students in Malang, East Java. Surveying 275 students from four state high schools, data was collected through a questionnaire covering four aspects of environmental literacy (EL) defined as ecological knowledge, environmental effect, cognitive skills, and behaviour. The findings revealed that students' EL was significantly influenced by both school type and grade level. Students in Adiwiyata schools demonstrated higher levels of EL across most aspects, except environmental effect, where non-Adiwiyata students scored higher. Additionally, grade level was found to significantly influence cognitive skills, with higher grade students tending to demonstrate better overall EL. The study concludes that the Adiwiyata program positively impacts students' environmental literacy, suggesting that structured eco-school initiatives are effective in cultivating environmentally literate learners.

Public libraries have taken an active role in promoting environmental sustainability within their communities. Rajic (2024) highlights how the “Radislav Nikčević” public library in Jagodina, Serbia, designs and delivers a range of environmentally focused activities, including recycling workshops, environmental storytelling, arts and crafts, and community actions, particularly targeting preschool and primary school children. The study suggests that such programmes are effective in fostering a love of nature, stimulating creative thinking, and helping children develop a deeper understanding of environmental issues. Rajic has also emphasised the importance of evaluating these programmes through user experience surveys and participatory methods to ensure they remain relevant, effective, and responsive to the needs of young participants.

Donaldson (2024) examines the role of teacher-librarians in promoting eco-literacy and environmental learning in schools. She highlights the importance of collaboration between teacher-librarians, teachers, and students, as well as the value of experiential and outdoor learning in building students' connection to the environment. According to Donaldson, climate change education and eco-anxiety among young learners need to be integrated into the curriculum through initiatives such as Genius Hour projects and EcoSchools actions. Additionally, Donaldson discusses grants to support practical environmental projects, including composting and food-waste reduction, underscoring the role of library resources and programming in fostering environmental stewardship among students.

A survey was conducted among 206 public and 17 school libraries in Scotland to gather data on the various activities undertaken to achieve and promote sustainability, particularly Sustainable Development Goal 13 (SDG13) (climate change) (Chowdhury et al., 2025). It was revealed that 75% of the public libraries are running learning activities addressing climate change and sustainability. Seed libraries, lend-and-mend hubs, upcycling programmes, community garden projects, and sustainability-themed author events are some examples. On the other hand, 76% of school libraries provide a sustainability book collection and information for users; 41% also collaborate with teachers to educate students.

Previous studies have explored environmental education programmes, eco-school initiatives, and sustainability activities conducted by libraries. However, several gaps exist in the existing literature. Multiple research initiatives focus on structured environmental programmes, but

school libraries have received limited scholarly attention. Also, studies focus on environmental literacy outcomes rather than examining environmental information engagement. And most research addresses broad environmental issues such as climate change and sustainability, with relatively little emphasis on local ecosystems. However, lack of empirical evidence from the Sri Lankan context regarding the role of school libraries in fostering environmental awareness and stewardship has motivated this study to investigate on how school library user engagements with information related to the Bolgoda ecosystem. It explores the potential of school libraries in promoting awareness and actively contributing to environmental conservation.

Methodology

Study Area

The study was conducted within the Bolgoda ecosystem catchment area. It spans six Divisional Secretariat Divisions (DSDs) located in Colombo and Kalutara Districts of Western Province of Sri Lanka, namely Ratmalana, Moratuwa, and Kesbawa in Colombo District, and Panadura, Bandaragama, and Kalutara in Kalutara District.

Research Design

This study employed a quantitative research design, using a structured, self-administered questionnaire as the primary data collection tool. A quantitative approach was considered appropriate because it enables the systematic assessment of environmental awareness levels, information needs, and library usage patterns across a large and geographically dispersed student population (Ashley & Bill, 2006).

Population and Sample

The target population of this study involved school library users reading for the G.C.E. (Ordinary Level) and G.C.E. (Advanced Level) within the six DSDs of the Bolgoda region. The Table 1 indicates total population of school library users across the six DSDs, where required sample size was determined using Yamane's (1967) formula for finite populations (1):

$$n = N / (1 + Ne^2) \quad (1)$$

where n is the required sample size, N is the total population size, and e is the desired level of precision (set at 0.05, corresponding to a $\pm 5\%$ margin of error). Applying this formula to the total district-wise population yielded a minimum required sample size of 780 respondents, ensuring adequate representativeness.

Table 1
Study Population Eligible for the Survey

District	DSD	G.C.E. (Ordinary Level)	G.C.E. (Advanced Level)	Sub-Total	Total (N)
Colombo	Ratmalana	1939	916	2855	12173
	Moratuwa	3055	1408	4463	
	Kesbewa	3206	1649	4855	
Kalutara	Panadura	6190	4524	10714	22018
	Bandaragama	2231	1034	3265	
	Kalutara	4521	3518	8039	
				Total	34191

Source: Department of Census and Statistics (2024)

Proportionate stratified random sampling was then applied to allocate the sample across the six DSDs in proportion to the population size of each stratum, using the formula (2):

$$N_h = (N_h / N) \times n \quad (2)$$

where n_h is the sample size of the stratum, N_h is the population of the stratum, and N is the total population size. The resulting stratum sample sizes are presented in Table 2.

Table 2
Study Sample Allocation Among the 6 Divisional Secretariat Divisions

District	DSD	Population of Stratum (N_h)	Sample Size of Stratum	Total (N_h)
Colombo ($N = 12173$)	Ratmalana	2855	91	387
	Moratuwam	4463	142	
	Kesbewa	4855	154	
Kalutara ($N = 22018$)	Panadura	10714	191	393
	Bandaragama	3265	58	
	Kalutara	8039	144	
			Total	780

Data Collection Instrument

Survey data was collected using a self-developed, structured questionnaire comprising six sections. Section 1 collected demographic information, including age, gender, educational level, DSD, frequency of library visits, and primary purposes of library use. Section 2 assessed students' prior engagement with information about the Bolgoda ecosystem through five modes of exposure (Given et al., 2023): having heard, read, systematically studied, visited, or seen pictures and videos of the ecosystem. Section 3 consisted of ten *true/false/don't know* statements designed to measure factual knowledge of the Bolgoda ecosystem, from which a composite knowledge score ranging from 0 to 10 was derived. The statements were developed based on the standard descriptions of wetlands stipulated by the National Wetland Directory of Sri Lanka (Central Environmental Authority et al., 2006). Section 4 presented ten topics related to the Bolgoda ecosystem and asked respondents to select up to five topics they would most like to learn about, thereby capturing their information needs. Section 5 required respondents to indicate their single preferred format for receiving ecosystem-related information. Section 6

captured perceptions of the usefulness of the school library as a resource for environmental awareness, measured on a four-point scale ranging from *Not Useful* to *Very Useful*.

The questionnaire's internal consistency was evaluated prior to analysis using Cronbach's alpha across all 34 items. The resulting coefficient of 0.750 indicated an acceptable internal consistency of the instrument.

Data Collection Procedure

The survey was administered in school libraries across all six DSDs within the Bolgoda region following ethical approval and authorisation from relevant school authorities. Questionnaires were distributed to students during routine library visits and collected upon completion. Despite the minimum required sample size of 780, a total of 841 complete questionnaires were received, which may have increased the statistical precision of the estimates and support the representativeness of the sample.

Data Analysis

All responses were coded, entered, pre-processed, and analysed using IBM SPSS Statistics for Windows, version 27. The analysis followed a structured sequence. First, frequency distributions and descriptive statistics were generated to provide a demographic profile of respondents and to summarise responses for each questionnaire section. Second, a composite knowledge score was computed by summing the number of correct responses to the ten *true/false/don't know* statements in Section 3 (score range: 0–10). Third, mean knowledge scores by gender, educational level, and DSD were calculated, facilitating comparison of knowledge levels across subgroups. Finally, chi-square tests of independence were conducted to examine whether significant associations existed between respondents' knowledge scores and their modes of prior information engagement, as well as between knowledge scores and preferred learning formats. Additionally, a one-sample *t*-test was conducted to determine whether the population's mean knowledge score differed significantly from a hypothesised benchmark value of 5 out of 10. A significance level of 0.05 was applied to all inferential analyses.

Results and Discussion

Demographic Profile of Respondents

The demographic characteristics of 841 (participants from school library users across six DSDs of the Bolgoda region) are summarised in Table 3. Respondents ranged in age from 13 to 19 years, with the majority representing the 15-year (29.43%) and 16-year (33.41%) age groups, reflecting a predominantly mid-secondary school population with a mean age of approximately 16 years. The sample reflected a moderate male majority, comprising 494 males (58.81%) and 346 females (41.19%). Regarding educational level, most respondents were studying at the G.C.E. Ordinary Level (74.26%), while the remaining 25.74% were G.C.E. Advanced Level students, consistent with the typical enrolment structure of secondary schools in the region. Geographical distribution across the six DSDs: Ratmalana (12.1%), Panadura (20.2%), Moratuwa (19.5%), Bandaragama (9.2%), Kesbewa (20.0%), and Kalutara (19%), reflected a balanced representation except Bandaragama. It recorded a comparatively lower proportion of respondents due to the smaller student population.

Table 3*Demographic Profile of Respondents*

Variable	Description	Percentage
Gender	Male	58.8
	Female	41.2
Age	13 years	0.5
	14 years	10.5
	15 years	29.4
	16 years	33.4
	17 years	11.6
	18 years	12.4
	19 years	2.2
Educational Level	G.C.E. (Ordinary Level)	74.3
	G.C.E. (Advanced Level)	25.7
DSD	Ratmalana	12.1
	Panadura	20.2
	Moratuwa	19.5
	Bandaragama	9.2
	Kesbawa	20.0
	Kalutara	19.0

Library Usage Patterns

Table 4 presents the frequency of library visits among respondents. Although most students visited the library either rarely (32.36%) or weekly (28.33%), 60% reported visiting at least once a month. This finding suggests that frequent library use is the dominant pattern among the sample, which may enhance library-based environmental awareness programmes.

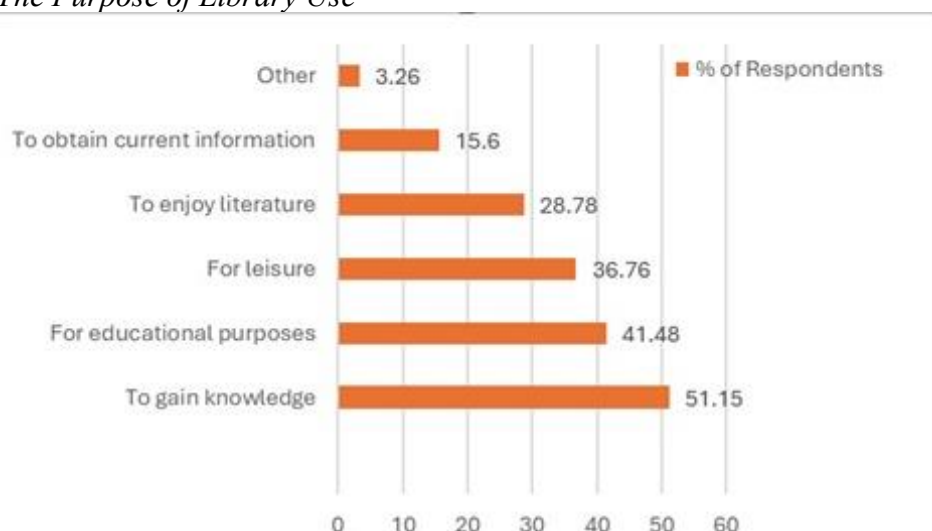
Table 4*Frequency of Library Visits*

Frequency of Library Visit	Number	Percentage
Daily	49	5.98
Several Days a Week	156	19.05
Weekly	232	28.33
Monthly	51	6.23
Once Every Few Months	66	8.06
Rarely	265	32.36

Purpose of Library Use

As the purpose of library use was a multiple-response question, a total of 827 valid respondents across all sub-items were recorded. According to Figure 1, gaining knowledge was the most frequently reported purpose (51.15%), followed by educational purposes (41.48%), and leisure-related use (36.76%). Enjoying literature (28.78%) and obtaining current information (15.60%) were reported less frequently. The high proportion of knowledge-seeking and educational motivations among library users is an encouraging finding. It suggests that the student population already approaches the library as a resource for learning. Hence, library-based initiatives that include environmental conservation content can be successful.

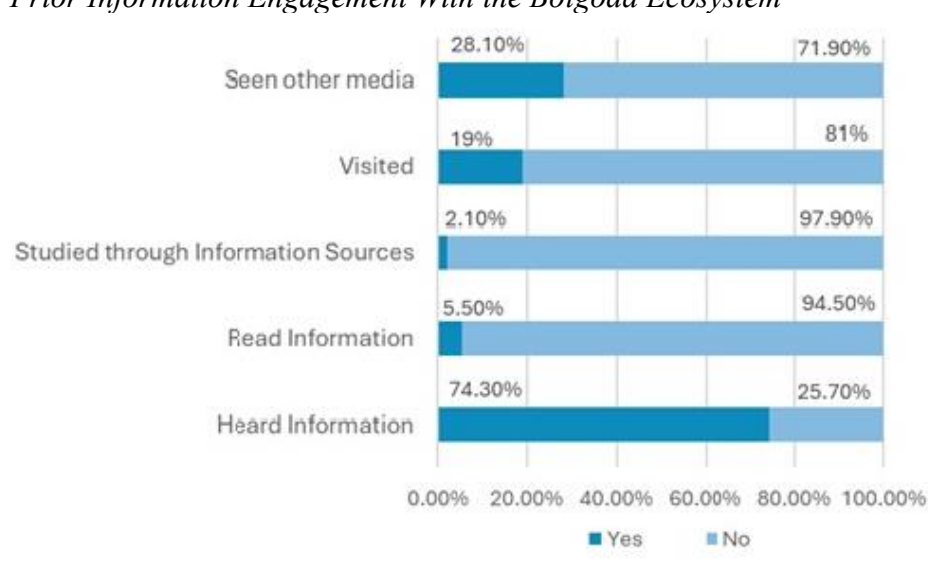
Figure 1
The Purpose of Library Use



Information Engagement

Section 2 of the survey assessed respondents' prior engagement with information on the Bolgoda ecosystem through five modes of exposure. As this was a multiple-response item, respondents could select more than one option. As shown in Figure 2, having *heard* information about the Bolgoda ecosystem was the most common form of engagement (74.28%). Having *seen pictures, photographs, or videos* ranked second (28.08%), followed by having *visited* the ecosystem (19.03%). In contrast, reading information was minimal (5.51%), and conducting *a systematic study* was the least reported (2.10%). These findings suggest that while a substantial proportion of the sample had some passive awareness of the Bolgoda ecosystem, deeper and more deliberate forms of engagement, such as reading, research, and direct visitation, remained limited. This highlights a clear gap that school libraries are well-positioned to address by providing curated reading materials, research resources, and organised field visits centred on the Bolgoda ecosystem.

Figure 2
Prior Information Engagement With the Bolgoda Ecosystem



Factual Knowledge on the Bolgoda Ecosystem

Section 3 assessed respondents' factual knowledge of the Bolgoda ecosystem through 10 *true/false/don't know* statements, yielding a composite knowledge score ranging from 0 to 10. Of the 841 respondents, 778 provided valid responses. The mean knowledge score was 2.53 (SD = 2.17), with a median of 2.00 and a mode of 0, indicating generally low knowledge levels. The score distribution was positively skewed (skewness = 0.421), with scores concentrated at the lower end (Figure 3). According to the results, 27.4% of respondents scored zero. Scores of 3 (15.2%) and 4 (13.2%) were the next most common, while only a very small proportion of respondents achieved high scores ($\leq 2.3\%$ scored 7 or above). Over 65% of respondents scored 3 or below, and over 89% scored 5 or below. The negative kurtosis value (-0.787) indicates a flatter-than-normal distribution, reflecting the wide spread of scores across the lower range (Figure 3). These findings reveal a generally low level of factual knowledge about the Bolgoda ecosystem among the study population, underscoring the significant potential for school libraries to play a meaningful role in improving environmental literacy through targeted information provision and conservation education resources.

Figure 3
Distribution of Knowledge Score

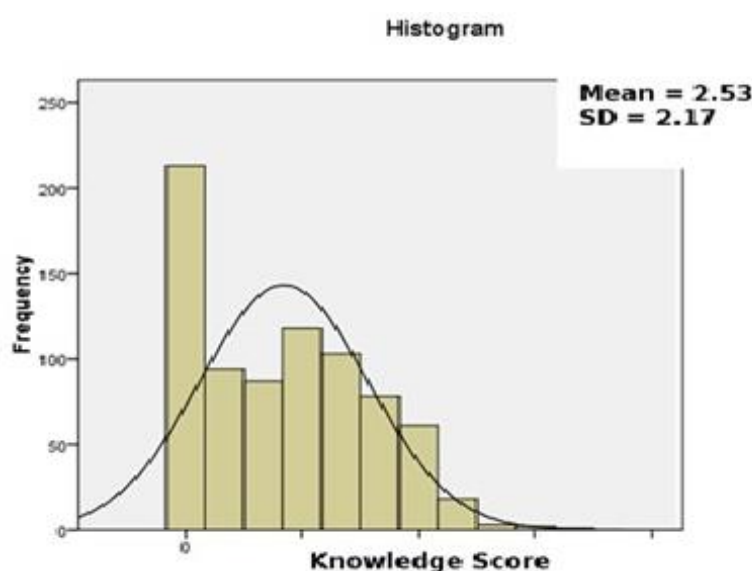


Table 5 presents mean knowledge scores by gender, educational level, and DSD. Female respondents demonstrated a slightly higher mean score (2.60) than males (2.48), though the difference was negligible. Regarding educational level, A/L students demonstrated a higher mean knowledge score (2.73) than O/L students (2.49), as expected, given that A/L students are older and have had greater academic exposure to environmental topics. Across DSDs, Panadura recorded the highest mean knowledge score (3.19), followed by Kesbewa (2.81) and Moratuwa (2.62). Kalutara recorded an intermediate score (2.42), while the lowest mean scores were observed in Ratmalana (2.22) and Bandaragama (2.19). These spatial variations may reflect differences in proximity of schools to the Bolgoda ecosystem, the quality and availability of relevant library resources, or varying levels of community engagement with conservation issues across the divisions.

Table 5
Mean Knowledge Score by Demographic Variables

Variable	Description	Mean Knowledge Score	Standard Deviation
Gender	Male	2.48	2.10
	Female	2.60	2.23
Educational Level	G.C.E. (Ordinary Level)	2.49	2.11
	G.C.E. (Advanced Level)	2.73	2.36
DSD	Ratmalana	2.22	2.12
	Panadura	3.19	1.68
	Moratuwa	2.62	2.26
	Bandaragama	2.19	1.87
	Kesbewa	2.81	2.11
	Kalutara	2.42	2.63

Association Between Information Engagement and Knowledge

Chi-square test results assessing the associations between respondents' knowledge scores and their five modes of prior engagement with information about the Bolgoda ecosystem are presented in Table 6.

Table 6
Significance of Knowledge Score and Information Engagement

Mode of Prior Engagement	X^2	df	P-value
Have Heard Information	14.168	10	0.165
Have Read Information	6.175	10	0.800
Have Conducted a Systematic Study	10.711	10	0.380
Have Visited the Ecosystem	23.311	10	0.010
Have Seen Pictures/Photographs/Videos	22.206	10	0.014

Of the five engagement modes tested, two showed statistically significant associations with knowledge score: having *visited* the ecosystem ($P = 0.010$) and having *seen pictures, photographs, or videos* of the ecosystem ($P = 0.014$). These findings indicate that experiential and visual forms of engagement are meaningfully linked to higher levels of factual knowledge about the ecosystem, suggesting that libraries should organise field visits, documentary screenings, and photographic exhibitions to improve environmental literacy among students.

The remaining modes, having heard information, having read information, and having conducted a systematic study, did not show significant associations with knowledge score. This suggests that passive or incidental exposure to information, even though reading, does not yield factual knowledge gains, highlighting the importance of active and immersive learning experiences in conservation education. However, Ambarwati et al. (2026) indicated that integrating ecological knowledge, ecological attitudes, and literary engagement provides a strong foundation for students' ecological behaviour among junior school students engaged in literacy and environmental conservation activities, such as eco-literacy clubs, green classes, etc.

Knowledge Score Benchmark Analysis

A one-sample *t*-test was conducted to assess whether the mean knowledge score differed significantly from a benchmark value of 5. The sample mean (2.53, SD = 2.17) was significantly lower than the benchmark ($P < 0.05$), with a mean difference of -2.470. The 95% confidence interval (-2.62, -2.32) indicates that the true population mean knowledge score lies between 2.38 and 2.68, well below the benchmark of 5. This finding provides strong statistical evidence that the level of factual knowledge about the Bolgoda ecosystem among school library users in the Bolgoda region is significantly below. This strengthens the earlier descriptive findings and highlights the critical need for targeted school library-based environmental education interventions to bridge the substantial knowledge gap identified in this study.

Information Needs on the Bolgoda Ecosystem

Section 4 of the survey asked respondents to select up to five topics they would most like to learn about. Table 7 presents the results. The most frequently selected topic was activities around the ecosystem, such as fishing, boating, and bird watching (78.40%), suggesting that respondents are primarily drawn to the experiential and recreational dimensions of the ecosystem. This was followed by interest in attractive locations within the Bolgoda environment (68.86%) and plant and animal species associated with the ecosystem (60.96%). Tourist accommodation around the Bolgoda Lakes ranked fourth (57.22%), indicating a notable interest in the area's tourism potential. Conversely, topics more directly related to environmental stewardship and scientific understanding, such as water quality (28.19%), environmental conservation efforts (34.41%), threats to the ecosystem (35.11%), and the size and capacity of the reservoir (36.33%), received lower levels of interest. The geographical location of the ecosystem (46.42%) and its historical or cultural significance (44.80%) recorded intermediate levels of interest. These findings are notable in the context of this study. While the high interest in activities, locations, and biodiversity presents clear opportunities for library-based environmental engagement, the relatively low demand for information on conservation efforts, threats, and water quality suggests that students have yet to develop a strong conservation-oriented information consciousness. This points to a significant role for school libraries not only in responding to existing information needs but also in proactively cultivating awareness of the ecological challenges facing the Bolgoda ecosystem through curated collections, programmes, and guided inquiry activities.

Table 7

Information Needs on the Bolgoda Ecosystem

Information Need	Selected Percentage
1. Geographical location of the Bolgoda Ecosystem	46.42
2. Size and capacity of Bolgoda Reservoir	36.33
3. Activities around the Bolgoda Ecosystem (fishing, boating, bird watching, etc.)	78.40
4. Attractive locations within the Bolgoda environment	68.86
5. Historical or cultural significance of the Bolgoda Ecosystem	44.80
6. Plant and animal species associated with the Bolgoda environment	60.96
7. Environmental conservation efforts related to Bolgoda	34.41
8. Tourist accommodations around the Bolgoda Reservoir	57.22
9. Water quality of Bolgoda	28.19
10. Threats to the Bolgoda Ecosystem	35.11

Preferred Format for Learning About the Bolgoda Ecosystem

Section 5 of the survey asked respondents to select a single preferred format for receiving information about the Bolgoda ecosystem. Accordingly, environmental tours were the most preferred format (65.38% of valid responses), making it by far the dominant choice among the sample. This was followed by social media (13.63%) and video presentations (13.03%). Lectures (5.67%), brochures/posters (1.57%), and other formats (0.72%) were the least favoured options.

A Chi-square test confirmed a significant association between knowledge score and preferred learning format ($P < 0.05$), indicating that respondents' knowledge levels varied meaningfully by preferred learning format.

The strong preference for environmental tours is a particularly significant finding. It indicates that school children are not passive consumers of environmental information. They desire active, place-based learning experiences that bring them into direct contact with the Bolgoda ecosystem. This aligns closely with the chi-square results, which demonstrated that having visited the ecosystem was significantly associated with higher knowledge scores.

Taken together, these findings highlight the potential for school libraries to take a facilitative role in organising or promoting environmental tours and to complement such experiences with supporting resources such as field guides, maps, and multimedia content. The secondary preference for social media and video presentations further suggests that digital and visual formats are well-suited to reaching this student population, presenting additional avenues for library-led environmental awareness initiatives.

Further, school librarians can also be facilitators for school projects carried out under Environmental Pioneer Programs and Environmental Eco Club programmes. By understanding their information needs and information-seeking behaviour, school librarians can ensure the supply of relevant information to solve specific problems and make effective decisions. Guiding and directing towards crowdsourcing or citizen science initiatives would add excitement and fun. They can be used as games (Murray, 2015). Librarians should think about how gamification could be applied in their context. As such, librarians can be coordinators in bringing projects to build citizen scientists, not only to monitor their surroundings but also to become partners in environmental conservation (Malalgoda & Sithara, 2025).

Perceived Usefulness of the School Library

According to the results of Section 6, the sample shows a positive perception of library usefulness in developing environmental awareness. The largest proportion of respondents rated the library as *Very Useful* (45.34%), followed by *Somewhat Useful* (38.60%). Collectively, over 83% of valid respondents viewed the school library as at least somewhat effective for fostering environmental awareness. A small minority indicated *No Idea* (12.01%) or rated the library as *Not Useful* (4.04%). The mean rating was 3.25 (SD = 0.82), with a median of 3.00 and a mode of 4, confirming that the central tendency of perceptions is strongly oriented towards the useful end of the scale. The negative skewness (-0.29) further corroborates this, indicating a leftward skew in responses toward the higher end of the scale.

The findings are encouraging and carry important implications for the study. The strong positive perception of library usefulness among school students in the Bolgoda ecosystem

catchment area suggests that libraries are already recognised as credible and valuable information resources within this community. This existing goodwill provides a sound foundation upon which school libraries can build targeted environmental conservation programmes, expand their collections of Bolgoda-related materials, and position themselves as active contributors to ecosystem literacy and conservation awareness in the region. As such, opportunities provided by the Millennium Development Goals and Sustainable Development Goals for libraries to develop as partners in achieving a sustainable environment can be fully utilized. It is also essential to address issues like inadequate facilities, limited financial resources, technological barriers, and a lack of awareness and understanding by librarians (Tariq et al., 2025).

Conclusion

The findings of this research reveal the extent to which school children understand the ecological value and vulnerabilities. It also identifies critical knowledge gaps that educational interventions must address, and students' preferred formats for receiving environmental information. The study provides actionable insights into designing effective library-based outreach programs while the research evaluates students' perceptions of libraries as potential platforms for environmental education, assessing credibility of institutions as useful sources of ecological information. By examining the intersection of information science, environmental education, and conservation practice through the lens of a specific threatened ecosystem and its surrounding communities, this research contributes to broader discussions about the role of libraries in addressing environmental challenges. The findings could apply to other sensitive ecosystems in Sri Lanka, where libraries currently remain as a largely untapped resources for conservation education. Furthermore, understanding what library users know, what they want to learn, and how they prefer to access environmental information represents the essential first step in transforming libraries from passive repositories into active agents of ecosystem conservation. Therefore, the outcomes of this study could make a significant implication for both library science and conservation practice.

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

The author(s) used Grammarly (desktop application, version current as of 2026) for proofreading and language refinement.

References

- Akinsemolu, A. A., & Onyeaka, H. (2025). The role of green education in achieving the sustainable development goals: A review. *Renewable and Sustainable Energy Reviews*, 210, 115239. <https://doi.org/10.1016/j.rser.2024.115239>
- Ambarwati, A., Prasetyo, H. D., Murniatie, I. U., & Umamah, A. (2026). Literature-based environmental literacy for middle school students' understanding of local ecology in East Java. *Bioweb of Conferences*, 04013(2025), 1–9. <https://doaj.org/article/ac82954adfec4ea181758c56f2c3dedd#:~:text=https%3A//doi.org/10.1051/bioconf/202620904013>
- Ashley, P., & Bill, B. (2006). Quantitative and qualitative approaches to research in environmental management. *Australasian Journal of Environmental Management*, 13(2), 70–78. <https://doi.org/10.1080/14486563.2006.10648674>
- Central Environmental Authority. (2013). *Bolgoda environmental protection area*. https://www.cea.lk/web/?option=com_content&view=article&layout=edit&id=1162
- Central Environmental Authority. (2020). *Prioritisation of environmental research/study/survey relevant to the mandate of the Central Environmental Authority*. Central Environmental Authority.
- Central Environmental Authority. (2024). *Environmental education & awareness, promotion, information services*. <https://www.cea.lk/web/component/content/article?layout=edit&id=56>
- Central Environmental Authority. (2025). *Bolgoda lake*. https://www.cea.lk/web/?option=com_content&view=article&layout=edit&id=1806
- Central Environmental Authority, International Union for Conservation of Nature, & International Water Management Institute. (2006). *National Wetland Directory of Sri Lanka*. The Central Environmental Authority.
- Chowdhury, G., Jack, E., Macquarrie, K., & Mcnamara, S. (2025). LIS sector's contributions to climate action : Indicators for measuring success. *IFLA Journal*, 51(4), 982–997. <https://doi.org/10.1177/03400352241310528>
- Davis, K., Christodoulou, J., Seider, S., Gardner, H., Davis, K., Christodoulou, J., Seider, S., & Gardner, H. (2011). *The theory of multiple intelligences*. <https://ssrn.com/abstract=2982593>
- Department of Census and Statistics. (2024). *District statistical handbook*. <https://www.statistics.gov.lk/ref/HandbookDictionary#gsc.tab=0>
- Donaldson, T. (2024). Librarians as eco-literacy leaders: Creating a culture of environmental learning in the library. *Canadian School Libraries Journal*, 8(3), 12.

- Elaturoti, A. B. (2018). Sustainable development: The role of school libraries. *Library Philosophy and Practice (e-Journal)*, 2196.
<https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=5604&context=libphilprac/1000>
- Förster, J. (2022). *Linkages between biodiversity and climate change and the role of science-policy-practice interfaces for ensuring coherent policies and actions 02*.
https://unfccc.int/sites/default/files/resource/Thematic_Paper_2_Linkages_Between_Biodiversity_and_Climate_Change_and_the_Role_of_Science-Policy-Practice_Interfaces_for_Ensuring_Coherent_Po.pdf
- Given, L. M., Case, D. O., & Willson, R. (2023). *Looking for information: Examining research on how people engage with information*. Emerald Publishing Limited.
- IFLA. (2014). *Lyon Declaration on access to information and development*.
<https://repository.ifla.org/handle/20.500.14598/3498>
- Inayah, N., Muhtadi, A., & Fadriawan, A. A. (2025). Enhancing students' sustainability awareness through international collaboration: A study of the Australia-Indonesia Sister School Initiative. In *Proceedings of The Asian Conference on Education & International Development 2025*, 1–14.
- Malalgoda, D., & Sithara, D. (2025). *Can science and community save Jaffna's groundwater ?* <https://www.iwmi.org/blogs/can-science-and-community-save-jaffnas-groundwater/>
- Murray, T. E. (2015). The Human Nature of Information Work. *Journal of Library Administration*, 55(4), 320–328. <https://doi.org/10.1080/01930826.2015.1038933>
- Nurwindo, N., Amin, M., Ibrohim, I., & Sureb, S. (2020). The Role of eco-school program (Adiwiyata) towards environmental literacy of high school students. *European Journal of Educational Research*, 9(3), 1089–1103. <https://doi.org/10.12973/eujer.9.3.108918>
- Rajić, J. (2024). Green information literacy for children in the library - Raising environmental awareness for a greener future. In *Proceedings of 16th International Conference on Education and New Learning Technologies*, 6055–6062.
<https://doi.org/10.21125/edulearn.2024.1443>
- Seneviratne, T., Liyanaarachchi, W., & Jayawardena, C. (2024). Awareness on Bolgoda wetlands: A study on Panadura Public Library users. In *Proceedings of 18th National Conference on Library & Information Science 2024*, 42–43.
- Seneviratne, T. M., Darshani. R.A.D.N., Jayanthi, Y. C., Chandrasekera, W. U., & Jayawardena, C. L. (2025). Information needs for environmental awareness: A study on library contributions for Bolgoda ecosystem, Sri Lanka. In *Proceedings of the Annual Sessions WILDLANKA International Symposium*, 32.

Seneviratne, T. M., Perera, M. U. I., Peiris, M. L. W., Gurusinghe, C. W., Jayawardena, C. L., & Chandrasekera, W. U. (2025). Information engagement and environmental awareness on the Bolgoda ecosystem among public library users in the Kesbewa Divisional Secretariat Division, Sri Lanka. In *81st Annual Sessions of Sri Lanka Association for the Advancement of Science 2025: Special Session on Interdisciplinary & Transdisciplinary Studies*, 220.

UN Department of Economic & Social Affairs. (1992). *Agenda 21*.
<https://sdgs.un.org/publications/agenda21#:~:text=Agenda%2021%20is%20a%20comprehensive,human%20impacts%20on%20the%20environment>

UNESCO & UNEP. (1977). Tbilisi Declaration. <https://www.gdrc.org/uem/ee/tbilisi.html>

UNESCO. (2020). *Education for sustainable development: a roadmap*. UNESCO.
<https://doi.org/10.54675/YFRE1448>

Yamane, T. (1967). *Statistics: An introductory analysis* (2nd ed.). Harper and Row.

Contact email: thusharims@uom.lk

Study Smarter, Not Harder: Development and Preliminary Validation of a Diagnostic Tool to Support Academic Success

Izel Marie B. Guatno, De La Salle University, Philippines

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

A common complaint among first-year law students is that they spend a significant amount of time and effort studying, yet this does not always translate into academic success. Empirical research suggests that this may be due to learning strategies adopted during their undergraduate years that do not correlate with improvement of law school grade point averages (GPA). Other studies highlight the adoption of self-regulated learning strategies for law students to help them succeed in school. However, law schools lack accessible diagnostic instruments to help students identify deficits in their study habits. This study presents the development and preliminary validation of a diagnostic tool to measure the cognitive and metacognitive study habits of first-year law students, specifically for a law school based in the Philippines. The design is grounded in the HowULearn Framework of the University of Helsinki (Parpala & Lindblom-Ylänne, 2012) and Schwartz's Expert Learning Cycle (2008). The diagnostic tool used a 5-point Likert scale. Legal education faculty and high-performing upper-level law students were engaged for content validity. The tool was piloted with a cohort ($n = 50$) to assess internal consistency using Cronbach's Alpha, exploratory factor analysis, and confirmatory factor analysis. The results show a valid and reliable diagnostic tool that can also be used for empowering students. The process can help first-year law students improve their learning strategies and provide educators with a data-driven framework for early academic support in higher education contexts.

Keywords: academic support, legal education, study habits, learning strategies

iafor

The International Academic Forum
www.iafor.org

Introduction

Compared to other graduate school programs, legal education is considered one of the most performance-based curricula (Christensen, 2009). It is also described as a rigorous and stressful experience for students, requiring support in the transition to the first year of law (Field et al., 2013). Apart from the stressful environment, the cognitive transition is also difficult, as many students enter law school ill-prepared for the rigors of legal education and lacking strong critical thinking skills that law educators can build on (Cooper, 2016).

Some students enter law school having succeeded in undergraduate environments that largely reward information retrieval. However, they have not been properly educated, trained, or equipped with the analytical skills required to study law (Viator, 2012). They overestimate their writing and research skills and enter law school inadequately trained in information literacy. (Gallacher, 2007). Additionally, studies predicting law school success also show that previous grades of students in undergraduate programs are less likely to predict their first-year law academic performance (Knezevich & Camara, 2019; Thomas, 2003).

Undergraduate Study Habits and Academic Success

Research also shows that study habits from undergraduate years that are carried over to law school do not translate into success in the first year of law. Cooper and Gurung (2018), in their study on law learning strategies, found that students who apply undergraduate study habits, such as re-reading and memorizing cases, fall into a learning trap, and these habits negatively correlate with academic success in law school. Traditionally, first-year students are encouraged to spend more hours studying law. However, Kimball, Farmer, and Monson (1981) found that students' increased effort was less strongly associated with improved first-year grades. Instead, their ability to handle legal materials and their Law School Admission Test (LSAT) results are much more significant to their performance. An earlier research on study habits of law students (Loftman, 1975) supports this, as behaviors that first-year law students think help improve their grades (e.g., habitual reading and note-taking) are not statistically significant for their academic performance.

Law School Paradox

Law school demands analogical reasoning, issue-spotting, and the synthesis of legal doctrines. Thus, when students apply undergraduate effort to law school mechanics, they often encounter a paradox wherein their high effort yields low academic performance. This paradox can be understood through two established educational frameworks:

Student Approaches to Learning (SAL)

Originating from Marton and Säljö (1976), this framework distinguishes between “Surface Learning” and “Deep Learning.” The surface approach to learning focuses on learning facts to pass a course and involves preoccupation with unreflective strategies such as memorizing and reproducing the learning material (Prosser & Trigwell, 1998; Spada & Moneta, 2012). Many students enter law school inadequately prepared, relying on surface approaches to studying and with illusions of competence (Cooper, 2016).

Self-Regulated Learning (SRL)

Zimmerman's (2002) model of SRL focuses on the cyclical nature of learning: forethought (planning), performance (action), and self-reflection. Schwartz (2008) proposes that law schools should help first-year law students become self-regulated learners, as this leads to better student outcomes.

Supporting First-Year Law Students

Given these concerns about abilities, study habits, and expectations for academic performance, law schools face the challenge of effectively supporting first-year students. Often, law schools rely on self-help resources for law learning skills, often using a non-empirical and anecdotal method (Cooper & Gurung, 2018). Every law school must establish a thorough strategy to promote student success (Franklin & Christopher, 2025). Hence, this study focused on the development of a formative assessment tool and its preliminary validation to help assess first-year law students' approaches to learning, with the results of which can eventually be used as a resource to help students improve their academic performance. The tool is inspired by the HowULearn Framework of the University of Helsinki (Parpala & Lindblom-Ylänne, 2012), which examines how students study, and by Schwartz's Expert Learning Cycle (2008), which recognizes the importance of self-regulated strategies (such as organizing the learning environment) for succeeding in law school.

Methodology

Participants

This study was conducted with first-year law students of a law school in the capital of the Philippines during the first semester of the academic year. As this was a preliminary validation, fifty ($N = 50$) students were selected through purposive sampling to ensure that different types of first-year law students (e.g., working, non-working, full-time, part-time, etc.) from the population were included. The diagnostic tool was administered during Week 6 of the semester, strategically timed to ensure students had experienced various law school learning activities to form study habits, while still having time to benefit from guidance on how to improve before the final exams.

Instrument Design

The assessment tool, the Strategic Learning Inventory (SLI), was developed to measure Deep Learning (which involves rule synthesis and critical thinking), Surface Learning (passive learning approaches like re-reading and highlighting), and Organization (such as study routine). The items were scored on a 5-point Likert scale (1 = Never, 5 = Always). A continuous threshold of 3.5 was established to differentiate between "Established Habits" 3.5–5.0) and "Developing Habits" (1.0–3.4).

Instrument Reliability and Validity

Internal consistency reliability was evaluated for the three dimensions of the diagnostic tool. The 4-item Surface Learning subscale demonstrated acceptable reliability (Cronbach's $\alpha = 0.70$, McDonald's $\omega = 0.71$). For the remaining constructs, the Spearman-Brown coefficient was utilized as Cronbach's α is highly sensitive to scale length and

mathematically penalizes two-item measures (Eisinga et al., 2013). The two-item subscales demonstrated modest but acceptable reliability for a rapid-formative pilot instrument, with Spearman-Brown coefficients of 0.58 for Deep Learning and 0.50 for Organization.

Prior to the deployment of the instrument, Content Validity was also conducted. A panel of faculty and high-performing peer tutors was invited to review the items. The panel ensured that each item accurately reflected the rigor of the first year of law school. In addition, a Confirmatory Factor Analysis was also conducted to ensure the instrument's structural validity. The refined 8-item model demonstrated an excellent, robust fit to the data (CFI = 1.00, TL = 1.01, RMSEA = 0.00), confirming that all retained items loaded significantly onto their respective theoretical constructs ($p < .05$).

Results

Cohort Profile Distribution

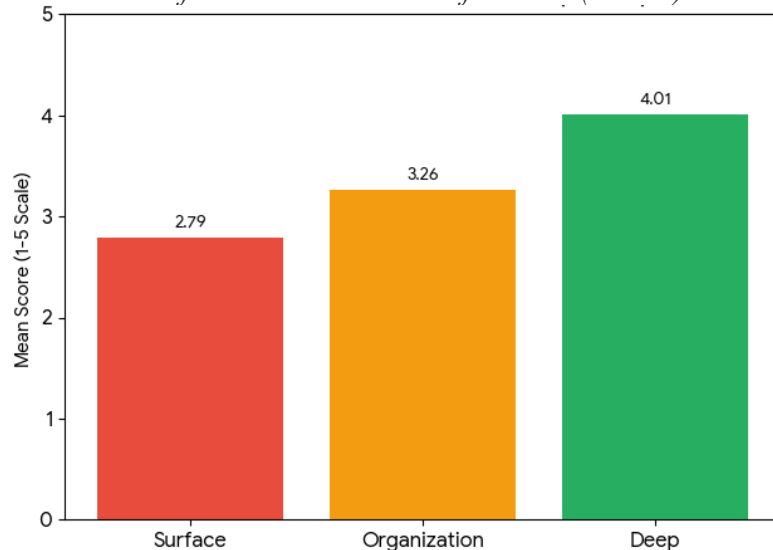
Based on the results of the SLI diagnostic, the sample was distributed into the four learning profiles as follows:

- The Strategist (High Deep / High Org): 44%
- The Box-Checker (Low Deep / High Org): 4%
- The Philosopher (High Deep / Low Org): 46%
- The Drifter (Low Deep / Low Org): 6%

Meanwhile, the figure below shows the mean for each dimension, arranged from lowest to highest:

Figure 1

Mean Scores for Each Dimension of the SLI (Sorted)



Discussion

The data show that the cohort self-reported exceptionally high cognitive understanding (Deep = 4.01, established habit) and poor structural discipline (Organization = 3.26, developing habit). It appears that the first-year law students of this group know which learning strategies

to use (Deep Learning), but lack the structural scaffolding and time-management skills (Organization) to actually execute them. It could also reflect social desirability bias.

The results can also help the law school adopt a more proactive approach in helping first-year law students based on their learning profiles. Most of the students in the cohort fall under a high deep/low organization profile (Philosopher). The students may understand the Socratic method and self-report high levels of rule synthesis, but their daily habits are chaotic. They do not follow a strict reading schedule, lack a distraction-free study environment, and rely heavily on cramming. The law school can thus support these learners through teaching effective time management, calendar blocking, and organizing their study areas.

Students with a high deep/high organization profile (Strategist) may be able to handle a massive reading volume with strict discipline while actively testing their understanding through hypothetical rule application. While they may need less academic support from the law school, they may benefit from an academic success program that has systems in place to assist them when they have acute needs or crisis (Franklin & Christopher, 2025).

Meanwhile, students with low deep, high organization profile (Box-checker) may need more academic support as they are likely to spend hours passively re-reading and heavily highlighting. They mistake physical exhaustion for intellectual synthesis, creating a dangerous “Illusion of Competence.” Due to familiarity with material, they miss the opportunities to refine, synthesize, and consolidate their knowledge (Cooper & Gurung, 2018).

As for students with a low deep and low organization profile (Drifter), the law school may need to monitor them as they are at high risk of academic probation. They lack strategic learning strategies, the capacity to synthesize the law, and the discipline to survive the volume of law school reading materials.

Conclusions

There is a disconnect between the expectations of law schools for first-year law students and their academic performance. Law schools need more reliable information to better understand how students study and learn, and to create more meaningful interventions that support their academic success.

The development and preliminary validation of a diagnostic tool is a step in the right direction. This study validated the 8-item Strategic Learning Inventory (SLI). The tool accurately categorizes first-year law students into distinct behavioral profiles. The Confirmatory Factor Analysis also indicated a good fit (CFI = 1.00, RMSEA = 0.00). Furthermore, descriptive statistics from this study’s cohort effectively identified a widespread studying vulnerability (“The Philosopher”/high deep, low organization profile), which helped identify immediate, data-driven interventions. By providing students with data on their study approaches at Week 6, legal educators can break the illusion of competence and provide the support necessary to ensure long-term academic success.

Limitations and Next Phase of Research

While the SLI’s quantitative validation yielded a structurally sound assessment tool, there is an inherent risk with self-report instruments, such as the possibility of Social Desirability Bias in the Deep Learning dimension. As such, the next phase of this research will employ a mixed-

methods approach utilizing qualitative cognitive interviews. By observing a stratified sample of first-year law students as they complete the inventory, the researchers will be able to evaluate the cognitive friction underlying their item responses, thereby reconciling what students report they do with their actual daily behaviors. Eventually, the SLI can be adopted by the law school to empower both students and faculty to optimize studying strategies early, thereby improving student retention and reducing academic probation.

Acknowledgements

The author expresses appreciation to the panel that reviewed the instrument's content validity and to the peer reviewers who provided feedback on the paper.

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

The author used Grammarly for Education to proofread and check for plagiarism in this paper. The tool was used to ensure correct grammar and syntax, and to verify that the writing did not include uncredited material or AI-generated text. The author carefully reviewed all suggestions before including them in the final copy.

References

- Christensen, L. (2009). If we care about how our students learn. *St. John's Law Review*, 83 (3), Article 2.
- Cooper, J. (2016). Smarter law learning: Using cognitive science to maximize law learning. *Capital University Law Review*, 44, 551.
- Cooper, J. M., & Gurung, R. A. R. (2018). Smarter Law Study Habits: An Empirical Analysis of Law Learning Strategies and Relationship with Law GPA. *Saint Louis University Law Journal*, 62(2), 363–395.
- Eisinga, R., Grotenhuis, M., & Pelzer, B. (2013). The reliability of a two-item scale: Pearson, Cronbach, or Spearman-Brown? *International Journal of Public Health*, 58(4), 637–642.
- Field, R., Duffy, J., & Huggins, A. (2013). Supporting transition to law school and student well-being: The role of professional legal identity. *The International Journal of the First Year in Higher Education*, 4(2), 15–25.
- Franklin, K., & Christopher, C. M. (2025). Defining the discipline: Six pillars of academic success programming in law schools. *Journal of Legal Education*, 73(3), 795–816. <https://jle.aals.org/home/vol73/iss3/6/>
- Gallacher, I. (2007). Who are those guys? The results of a survey studying the information literacy of incoming law students. *Social Science Research Network*. <http://dx.doi.org/10.2139/ssrn.1004088>
- Kimball, E. L., Farmer, L. C., & Monson, D. G. (1981). Ability, effort, and performance among first-year law students at Brigham Young University. *American Bar Foundation Research Journal*, 6(3), 671–697.
- Knezevich, L., & Camara, W. (2019). The LSAT is still the most accurate predictor of law school success. *LSAC Research Report* (No. 19-01). Law School Admission Council.
- Loftman, G. R. (1975). Study habits and their effectiveness in legal education. *Journal of Legal Education*, 27(4), 418–472.
- Marton, F., & Säljö, R. (1976). On qualitative differences in learning: I—Outcome and process. *British Journal of Educational Psychology*, 46(1), 4–11.
- Parpala, A., & Lindblom-Ylänne, S. (2012). Using a research instrument for developing quality at the university. *Quality in Higher Education*, 18(3), 313–328. <https://doi.org/10.1080/13538322.2012.733493>
- Prosser, M., & Trigwell, K. (1998). Teaching in higher education. In B. Dart & G. Boulton-Lewis (Eds.), *Teaching and learning in higher education* (pp. 250–268). Acer.
- Schwartz, M. H. (2008). *Expert learning for law students* (2nd ed). Carolina Academic Press.

- Spada, M., & Moneta, G. B. (2012). A metacognitive-motivational model of surface approach to studying. *Educational Psychology*, 32(1), 45–62.
- Thomas, D. A. (2003). Predicting law school academic performance from LSAT scores and undergraduate grade point averages: A comprehensive study. *Arizona State Law Journal*, 35, 1007–1028.
- Viator, J. E. (2012). Legal education's perfect storm: Law students' poor writing and legal analysis skills collide with dismal employment prospects, creating the urgent need to reconfigure the first-year curriculum. *Catholic University Law Review*, 61(3), 735–778.
- Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory Into Practice*, 41(2), 64–70.

Contact email: izel.guatno@dlsu.edu.ph

Weekly Titles as Micro-Advance Organisers: Small Design Choices for Pedagogical Memory

Ian Frank, Future University Hakodate, Japan

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

In multi-week university courses, especially those taught annually or intermittently, instructors can face the challenge of erosion of pedagogical memory. After a year, it may be surprisingly difficult to recall the original intent behind activities, examples, and conceptual transitions. We discuss how the simple, low-cost intervention of assigning each week a concise title or one-sentence summary can have an outsized impact, functioning as instructor-facing micro-advance organisers. This observation arose through reflective analysis and iterative engagement with a low-code class materials system, where the need to manage and update course artefacts made these micro-design elements especially visible. Whereas ideas such as Lang's Small Teaching focus on micro-activities inside the classroom, the emphasis here is on micro-design decisions that shape both the structure of a course and the cognitive experience of the educator. Drawing on Ausubel's theory of advance organisers, narrative cognition, and the broader metaphor of wayfinding, the paper argues that weekly titles serve as conceptual landmarks that orient instructors within a course's evolving narrative. This kind of signposting holds broad relevance across learning contexts, as it requires no technology, budget, or institutional infrastructure, making it readily transferable across resource-diverse settings. The paper develops a pedagogical wayfinding perspective and discusses practical implications for reflective teaching practice, faculty development, and the design of teaching environments, suggesting that although sustainable improvement is often pursued through large-scale reform, small and reusable design practices may offer an under-appreciated pathway.

Keywords: pedagogical wayfinding, course design, reflective teaching practice, advance organisers, narrative structure in education

iafor

The International Academic Forum
www.iafor.org

Introduction

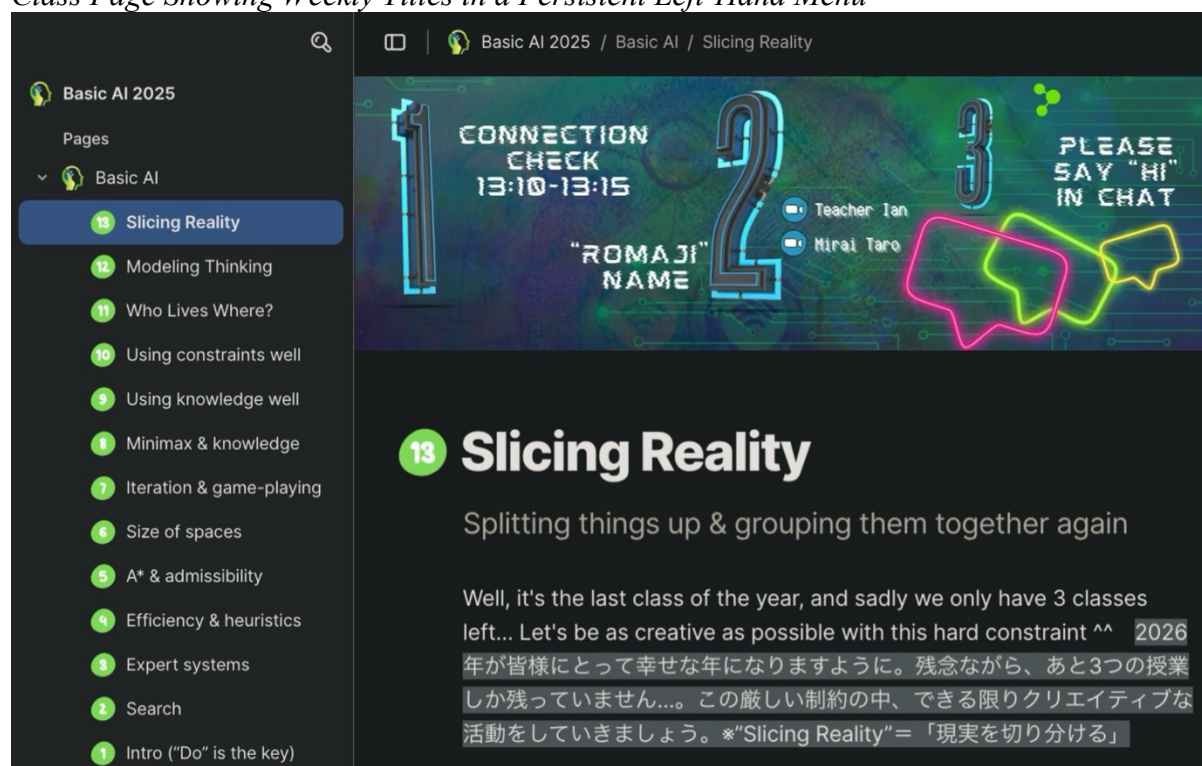
Seemingly minor organisational choices can play a significant role in how educators experience and sustain their teaching over time. This paper examines intentional weekly titles as supports for instructor recall, narrative coherence, and reflective course redesign across multiple years of teaching. In doing so, it foregrounds pedagogical wayfinding as an underexplored design concern in education, framing weekly titles as “You are here” markers that help educators maintain orientation within a course’s evolving conceptual narrative.

A focus on weekly titles may at first seem almost trivial: more an administrative convenience than a pedagogical intervention. Many educators will already label class weeks in some fashion (“Week 1,” “Part 3,” “Algorithms I”), and most learning management systems provide a default structure that encourages this kind of naming. The focus here, however, is on more intentional weekly titles, including the use of subtitles and one-sentence summaries, and on their potential effects on an educator’s ability to shape, recall, and sustain the underlying logic of a course. Figure 1 shows an example of intentional weekly titles presented together in a class context, functioning as persistent reference points for both educators and students. This kind of course framing may be familiar, but this paper brings a reflective and conceptual approach to the practice.

Thus, rather than presenting a new system or teaching method, the paper examines this familiar element of course organisation as a site of pedagogical design. It situates weekly titles within existing discussions of teaching, advance organisers, narrative structure, and small pedagogical interventions, introducing pedagogical wayfinding as a lens for understanding how instructors maintain orientation within a course over time. The paper then examines how weekly titles can function as narrative anchors across repeated course deliveries, supporting pedagogical memory, reflection, and revision. Finally, it considers the broader implications of this perspective for reflective teaching practice and for the design of educational environments. A complementary, system-oriented account of the low-code infrastructure and interface design decisions that supported this practice is presented elsewhere (Frank, in press).

Background and Related Work

The challenge addressed in this paper is familiar to many instructors: the gradual erosion of pedagogical memory. Returning to a course after a gap of a year or more, it can be surprisingly difficult to recall why particular activities were chosen, why a specific example appears in Week 7 rather than Week 3, or how an earlier demonstration was intended to scaffold a later concept. While this difficulty is rarely framed explicitly as a research problem, it has clear practical consequences for teaching quality—particularly in institutions where courses rotate between instructors, where teaching loads are high, or where opportunities for sustained reflection are limited. Foundational work on teaching as professional practice has long emphasised that effective instruction depends on accumulated, structured pedagogical knowledge rather than on isolated techniques (Schön, 1983; Shulman, 1987). However, less attention has been paid to how such knowledge is preserved, retrieved, or re-entered over time.

Figure 1*Class Page Showing Weekly Titles in a Persistent Left-Hand Menu*

Note. Viewing all weeks simultaneously foregrounds the narrative structure and can support pedagogical wayfinding by making progression, emphasis, and themes visible at a glance. *Source.* chinou.ianlab.org

Much of the existing literature on teaching improvement is primarily concerned with enhancing student learning and engagement, even when it focuses on instructors' actions. Work on classroom activities, assessment design, feedback strategies, and educational technology adoption typically frames improvement in terms of what students do, experience, or achieve. Influential approaches such as *Small Teaching* (Lang, 2016) emphasise how minor adjustments to instructional practice can yield meaningful learning gains, while instructional and learning design frameworks highlight sequencing, scaffolding, and alignment at the level of modules or curricula (Biggs & Tang, 2011; Wiggins & McTighe, 2005). This paper considers the comparatively under-studied cognitive work involved in sustaining pedagogical intent over time, particularly as instructors re-enter courses after long intervals.

Within cognitive and educational psychology, several well-established concepts offer useful lenses for framing this as a design concern. Ausubel's theory of advance organisers emphasises the value of providing learners with high-level conceptual structures that anchor new material to what they already know (Ausubel, 1968). Classic examples include a brief conceptual overview at the start of a unit, a schematic diagram that situates upcoming topics, or a framing question that signals how new ideas relate to earlier ones. While advance organisers are typically discussed as student-facing supports, the same mechanism can plausibly operate for instructors, helping to stabilise and reactivate conceptual schemas across repeated encounters with a course. Similarly, research on narrative cognition suggests that people remember and make sense of complex material more effectively when it is organised as a coherent sequence rather than as disconnected topics (Bruner, 1986). Together, these perspectives point to the importance of signposting and conceptual landmarks, even at relatively small scales, and motivate examining weekly titles as potential supports for instructor orientation and pedagogical memory.

Seen in this light, weekly titles—despite their apparent triviality—can function as cognitive anchors for instructors. They allow educators to re-enter the “narrative world” of a course more quickly, preserving planning decisions that might otherwise fade. By forcing articulation of what a week is really about, they encourage coherence and highlight conceptual transitions. Crucially, they also enable a form of *pedagogical wayfinding*: an ongoing sense of where one is within the conceptual landscape of a course, how one arrived there, and where the learning journey is heading.

The concept of wayfinding originates in environmental design and urban studies, most notably in the work of Kevin Lynch, who described it as the process by which people form mental representations of complex environments in order to orient themselves, make decisions, and move purposefully through space (Lynch, 1960). Wayfinding research has traditionally examined how cues such as landmarks, paths, districts, and signage support navigation in physical and informational environments. Importantly, wayfinding is not simply about efficiency; it is closely tied to feelings of confidence, coherence, and well-being when operating within complex systems.

When applied to pedagogical contexts, wayfinding offers a useful lens for understanding how instructors and learners orient themselves within the conceptual landscapes of educational subject matter. Figure 2 summarises how weekly titles can be positioned at the intersection of several established educational perspectives, with pedagogical wayfinding providing a unifying frame.

In earlier work (Frank, 2012), principles of wayfinding from environmental design were applied to education, arguing that learners’ navigation of abstract conceptual landscapes presents challenges analogous to those of traversing physical spaces. The present paper extends the perspective more generally to educators, treating curricula, syllabi, and related educational artefacts as navigational supports that shape interpretation, decision-making, and orientation over time. Rather than focusing on curriculum-wide structures or learner-facing guidance, the emphasis is on instructor-facing micro-signage: specifically, the use of intentional weekly titles. From this perspective, weekly titles can be understood as conceptual landmarks that help instructors re-orient themselves within a course after periods of absence and maintain a sense of direction as the course evolves across iterations. In wayfinding terms, they support the primary “You are here” function that anchors navigation within a larger map.

Seen through this lens, weekly titles occupy a distinctive position at the intersection of several established educational frameworks, as visualised in Figure 2. From the perspective of advance organiser theory (Ausubel), they act as compact cues that activate and stabilise conceptual schemas. From narrative theory (Bruner), they resemble story beats: small but meaningful markers of progression that give structure and momentum to an unfolding narrative. From Small Teaching (Lang), they exemplify micro-design decisions—sustainable, low-effort practices that accumulate into broader pedagogical coherence over time. Wayfinding offers a unifying frame that connects these perspectives, suggesting how such minimal artefacts can support orientation, memory, and intentional design.

Figure 2*Conceptual Positioning of Weekly Titles Through a Pedagogical Wayfinding Lens*

The notion of pedagogical wayfinding, approached here through the concrete and familiar practice of assigning weekly titles, is not primarily about directing students along a prescribed path. Rather, it concerns the educator's own ability to navigate a course as a lived design space: to remember why choices were made, to recognise where conceptual shifts occur, and to see how individual sessions contribute to an overall educational vision. Weekly titles, despite their apparent simplicity, can provide a lightweight yet persistent mechanism for sustaining this orientation. The following section builds on this perspective by examining how weekly titles can function as pedagogical wayfinding markers when used deliberately over time, supporting instructors' reflection, revision, and re-entry into a course across repeated deliveries.

Weekly Titles as Pedagogical Wayfinding in Practice

This section presents a concrete example of how weekly titles can operate as pedagogical wayfinding markers, drawing on sustained use across repeated deliveries of a single university course. Figure 3 reproduces the full sequence of weekly titles and subtitles for the same AI course introduced in Figure 1, allowing the class to be read as a longitudinal conceptual narrative rather than as a series of isolated sessions.

For the instructor, this representation provides a single, consolidated view of all titles and subtitles, making it easier to grasp the overall conceptual landscape of the course as a whole. Students, in contrast, typically encounter titles sequentially and must navigate into individual pages to access subtitles and contextual detail. This difference in visibility matters. The instructor's overview functions as a map: it supports reflection on emphasis, pacing, and transition, and enables deliberate reshaping of how the course narrative is presented and experienced. Through this kind of map, the instructor is not merely reading the landscape, but actively revising and re-composing it across iterations of the course.

Figure 3*Longitudinal View of Weekly Titles and Subtitles for a 15-Week Undergraduate AI Course*Contents DX > **Class Story**

Week ↑	Class Title	Sub-title
Wk01	Intro ("Do" is the key)	Welcome to my online class! I hope we can learn a lot together
Wk02	Search	Our first algorithm: "depth first search"
Wk03	Expert systems	"Expert systems" & thinking (backwards)
Wk04	Efficiency & heuristics	How to identify "better"?
Wk05	A* & admissibility	The rabbit and the tortoise...
Wk06	The size of spaces	(And a preview of "iteration")
Wk07	Iteration & game-playing	How game programmers found a search improvement...
Wk08	Minimax & knowledge	Modelling the moves of the enemy
Wk09	Using knowledge well	Where we meet networks...
Wk10	Using constraints well	Reasoning with networks...
Wk11	Who Lives Where?	AI solves logic puzzles!
Wk12	Modeling Thinking	Can networks represent the world?
Wk13	Slicing Reality	Splitting things up & grouping them together again
Wk14	Framing ideas	World models with structure
Wk15	Understanding the world	An empty queue (and evaluation)

Note. Read vertically, the titles give a conceptual narrative for the course, while subtitles capture some of the pedagogical intent and transitions that support instructor orientation and course redesign over time.

Viewed in this way, the overview foregrounds questions of intent and transition: *What is this week really about? How does it connect to what came before? What kind of conceptual work should stand out at this point in the course?* Engaging with these questions across iterations can reshape the internal logic of a course, encouraging greater coherence and making its pedagogical structure more legible both retrospectively and prospectively.

The points below illustrate several distinct functions of weekly titles in pedagogical wayfinding, focusing on what becomes visible when such titles are treated as part of an evolving course narrative.

Weekly Titles as Narrative Material

The weekly titles shown in Figures 1 and 3 were developed incrementally across multiple iterations of the same course. They were not designed in advance as a complete narrative, nor were they intended as a formal framework for students. Instead, they emerged through routine acts of preparation and reflection, gradually accumulating into a sequence that can be read retrospectively as a conceptual journey. While Figure 1 shows the titles within the lived context of a class page, Figure 3 renders the sequence more legible in condensed form across the semester. Read in this way, the titles function as narrative material: they capture shifts in

emphasis, framing, and conceptual focus, while also supporting recall and suggesting opportunities to reconsider or reshape the course's flow.

Titles as Compact Records of Pedagogical Intent

Read sequentially, weekly titles reveal more than topic coverage. They encode decisions about emphasis, pacing, and conceptual transition that are often difficult to reconstruct after time has passed. A title such as *Slicing Reality*, for example, does more than name content; it frames the week's activity as a particular kind of cognitive operation and signals how students are expected to engage with complexity at that point in the course. In this sense, weekly titles can function as compact records of pedagogical intent, preserving not only what was taught but how it was meant to be understood within the broader course narrative. This function becomes particularly salient when instructors return to a course after a long interval.

Titles as Supports for Iterative Course Refinement

Across repeated deliveries, explicit weekly titles make misalignments easier to notice. Titles that feel vague or out of place stand out when read alongside neighbouring weeks, prompting reconsideration, while titles that capture a week's intent effectively tend to persist across iterations, stabilising key moments in the course narrative. This process can also extend to surrounding student-facing text, prompting revision of descriptions, subtitles, or class-page explanations so that they better match the conceptual role implied by the title. In this way, weekly titles support a low-friction form of revision embedded in routine preparation rather than treated as a separate evaluative task. At a micro-design scale, these adjustments accumulate gradually, reshaping the course through repeated acts of noticing and re-framing rather than through wholesale redesign.

Titles as Anchors for Instructor-Facing Annotations

Figure 3 provides a concrete example of weekly titles paired with one-line summaries, creating a supporting layer of instructor-facing design artefacts. While titles form the visible surface of the course narrative, accessible to students as signposts of conceptual progression, summaries and short reflective notes can help instructors preserve the context, rationale, and experience beneath those labels.

In this role, titles act as stable reference points around which brief annotations can accumulate. Summaries capture intended focus in compact form, while notes record how a session unfolded and what may require adjustment. Together, they form a lightweight but durable record of pedagogical intent that extends beyond the title itself. Over time, this layered structure supports re-engagement and refinement: titles cue recognition, while summaries and notes supply the detail needed to interpret them in light of prior experience.

Titles as Inspiration for Syllabus and Course Communication

Weekly titles can also serve as prompts for refreshing the outward-facing presentation of a course. When a title captures the conceptual role of a week clearly, it can suggest improvements not only to internal planning and class delivery, but also to the wording of syllabi and other student-facing materials. In the course discussed in this paper, the main weekly titles were included as-is in the most recent round of syllabus revision. This can bring life and coherence to descriptions that might otherwise remain flat or administrative in tone. In this use, titles

support not only instructor-facing wayfinding, but also more intentional framing of the course as it is encountered by others, with possible implications at the institutional level.

Supporting Reflective Practice in the Age of AI

Weekly titles can support reflective practice when they are treated as more than static labels. Read together as a developing story, they give educators a high-level vantage point from which to ask whether a course still makes sense as a whole: whether the emphasis feels appropriate, whether transitions are working, and whether the overall direction remains aligned with instructional intent. In this role, titles help make the course available for reflective inspection during routine preparation.

One contemporary support for this reflective stance comes from the use of AI tools as lightweight brainstorming partners. While high-level course design remains difficult to delegate or evaluate at a glance, suggestions at the level of weekly titles and concise summaries are more readily open to human judgement. In this context, AI-generated variations can serve both as prompts for exploration and as points of comparison, helping instructors surface alternative framings or confirm existing ones before selecting or refining a final version. Used in this way, AI does not replace pedagogical judgement; it lowers the cost of exploration, making reflective use of weekly titles more accessible under real teaching constraints.

Taken together, these perspectives show how a commonly overlooked aspect of course organisation can support pedagogical wayfinding when treated as a site for reflection rather than as mere administration. The following section considers some broader implications for reflective teaching practice and the design of educational environments.

Implications for Reflective Teaching Practice and Educational Design

The previous section highlighted several ways in which weekly titles can function as conceptual landmarks within a course's evolving landscape. In physical navigation systems, the absence of clear landmarks or "You are here" indicators is widely recognised as a design failure; in educational settings, by contrast, comparable orientation cues are often implicit, informal, or entirely absent. The position of this paper is that this absence is not neutral: without persistent orientation markers, pedagogical intent must be repeatedly reconstructed, increasing cognitive load and weakening narrative continuity.

What, then, are the practical remedies? Foremost may be the importance of teaching environments and tools that at least permit, and ideally encourage, the articulation of weekly intent. These need not be sophisticated platforms or new technologies. Rather, environments that surface weekly structure, preserve titles over time, and make them easy to revisit can quietly reinforce reflective practice. Treating weekly titles as first-class elements of course design rather than incidental labels increases the likelihood that they may become resources for reuse, comparison, and discussion across iterations. This may be particularly valuable in courses dealing with abstract or technically complex subject matter, where local coherence can easily obscure global structure.

A second implication concerns faculty development. Although institutional change is always challenging, the practice of weekly titling lends itself particularly well to collaborative, workshop-based forms of professional learning. Rather than beginning from abstract principles of course design, educators can be invited to bring, create, or revise titles for a course they are

actively teaching, and to share both the resulting titles and the experience of articulating them. Since titles are compact and familiar, they lower the barrier to discussion, making pedagogical intent visible without requiring extensive documentation or wholesale redesign. In this way, faculty development can gain an emphasis on shared sense-making around narrative, emphasis, and transition.

One challenge may be that the value of weekly titles is often not immediately apparent. Early on, articulating weekly intent can feel like unnecessary overhead or “busy work,” particularly under high teaching loads. The benefits tend to emerge only retrospectively, across multiple deliveries of the same course. But this delayed appreciation is itself instructive. Practices that primarily support long-term orientation and reflective re-entry are easy to overlook in environments that prioritise short-term efficiency or visible innovation. Making such practices explicit, shareable, and discussable is therefore a central challenge for faculty development initiatives.

From a workshopping perspective, the potential of these ideas is further strengthened by their connection to broader cultural practices that shape expectation, memory, and interpretation. For example, television episode titles often operate as narrative cues whose significance becomes clear only in retrospect; anyone who has seen the *Breaking Bad* episode “Face Off” will remember the moment when the title’s deeper meaning becomes apparent. In writing craft, similarly, devices such as loglines, beat sheets, and chapter titles help authors and readers orient themselves within a larger narrative arc (e.g., Mittell, 2015). Drawing attention to these familiar examples can help educators recognise how brief textual cues shape anticipation and meaning, and why titles matter beyond simple labelling.

Some writers, such as Jacobs (2010), have taken the transformative potential of “themes” to surprising extremes through so-called “lifestyle experiments,” in which individuals adopt a weekly constraint or focus to provoke reflection and change. While pedagogical practice is not a lifestyle experiment, the analogy is suggestive. An institution inviting faculty to adopt explicit weekly titles for a limited period, and to share reflections on the experience, would likely raise eyebrows. Yet in contexts characterised by rapid educational change, resource constraints, and the need to scale reflective practice without extensive infrastructure, such low-risk, time-bounded experiments may offer a pragmatic route to capacity building, in addition to reflecting educationally beneficial practice.

Whatever the approach taken, this paper has suggested that instructor-facing wayfinding practices merit greater attention in both educational research and faculty development. Attention to small, sustainable design practices can open new avenues for institutional growth as well as reflective teaching and educational design. By treating weekly titles not as administrative labels but as navigational landmarks, educators and organisations can support ways of thinking about courses that are collaborative, resilient, and imaginative.

Conclusion

This paper has examined the practice of assigning intentional weekly titles in multi-week university courses, interpreting their role through a pedagogical wayfinding lens. Weekly titles were framed as instructor-facing micro-advance organisers that can function as lightweight “You are here” markers within a course, supporting orientation, coherence, and pedagogical memory across repeated deliveries. Rather than seeking to demonstrate effectiveness through formal evaluation, the paper aimed to make visible why such a deceptively simple practice can

have disproportionate influence on how courses are designed, revisited, and sustained over time.

By situating weekly titles at the intersection of advance organiser theory, narrative cognition, small teaching, and wayfinding, the paper reframes them as a meaningful pedagogical design choice rather than a purely organisational device. In fields such as cartography, architecture, and interface design, explicit orientation cues are treated as fundamental to usability. In education, by contrast, comparable supports for instructor orientation are often implicit, informal, or left to individual habit. Framing the absence of such cues as consequential rather than neutral helps bring weekly titles into view as a significant element of pedagogical design, particularly in courses that are complex, abstract, or taught intermittently across years.

Seen in this light, weekly titles represent a minimal, low-cost practice that requires no specialised technology, training, or institutional infrastructure. Their simplicity supports transfer across diverse educational contexts, including those characterised by limited resources, high teaching loads, or instructor turnover. At the same time, the practice aligns naturally with contemporary teaching workflows, in which small, repeatable design decisions accumulate into durable pedagogical structure.

Future work could extend this perspective by identifying other micro-design practices that support instructor orientation, exploring disciplinary differences in pedagogical wayfinding, or examining how educational platforms might better preserve and surface pedagogical intent over time. Attending to weekly titles as a design concern can itself be read as a signpost, pointing toward forms of sustainable pedagogical improvement that arise not from large-scale reform, but from small, deliberate design acts that help educators know where they are—and where they are going.

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

Generative AI tools were used during the writing process to support drafting and editing. The author retained full control over the content and is responsible for all interpretations and conclusions presented in this paper.

References

- Ausubel, D. P. (1968). *Educational psychology: A cognitive view*. Holt, Rinehart & Winston.
- Biggs, J., & Tang, C. (2011). *Teaching for quality learning at university* (4th ed.). Open University Press.
- Bruner, J. (1986). *Actual minds, possible worlds*. Harvard University Press.
- Frank, I. (2012). Which way for education? *Proceedings of the International Conference on Responding to the 21st Century Demands for Educational Leadership and Management in Higher Education*, Ho Chi Minh City, Vietnam.
- Frank, I. (in press). Pedagogical experience platforms: Supporting instructor memory, orientation, and reflection through low-code educational infrastructure. *Proceedings of the IEEE International Conference on Advanced Learning Technologies (ICALT) 2026*. IEEE.
- Jacobs, A. J. (2010). *My Life as an Experiment: One Man's Humble Quest to Improve Himself by Living as a Woman, Becoming George Washington, Telling No Lies, and Other Radical Tests*. Simon & Schuster.
- Lang, J. M. (2016). *Small teaching: Everyday lessons from the science of learning*. Jossey-Bass.
- Lynch, K. (1960). *The image of the city*. MIT Press.
- Mittell, J. (2015). *Complex TV: The Poetics of Contemporary Television Storytelling*. NYU Press.
- Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. Basic Books.
- Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, 57(1), 1–22.
- Wiggins, G., & McTighe, J. (2005). *Understanding by design* (Expanded 2nd ed.). ASCD.

Contact email: ianf@fun.ac.jp

Generative Artificial Intelligence in Mathematics Education: A Systematic Literature Review Using the PRISMA Framework

Jennifer Dela Torre, Higher Colleges of Technology, United Arab Emirates
Jero Sayco, Higher Colleges of Technology, United Arab Emirates

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

The emergence of generative artificial intelligence (GenAI), in particular large language models (LLMs), is reshaping mathematics education by offering new forms of tutoring, feedback, problem generation, and personalized learning. This systematic review, following the PRISMA methodology, synthesizes empirical studies published from 2020 to 2025 that examine the application of GenAI in mathematics learning at secondary and tertiary levels. From an initial yield of 68 records across multiple databases, 32 were retained after screening and quality assessment, with 22 meeting criteria for detailed synthesis. The review finds that GenAI tools can significantly support mathematical problem solving, provide timely feedback, adapt instruction to learner needs, and increase accessibility. However, issues of output correctness, over-reliance, reduced deep reasoning, academic integrity, and limited long-term evidence remain. The paper concludes with recommendations for pedagogical integration, teacher training, assessment redesign, and future research directions.

Keywords: generative artificial intelligence, large-language models, mathematics education, PRISMA

iafor

The International Academic Forum
www.iafor.org

Introduction

Artificial intelligence has rapidly evolved in recent years, shifting from data analysis tools to generative AI technologies capable of producing text, code, images, and more (Bommasani et al., 2021; Kasneci et al., 2023a). Large language models (LLMs) like OpenAI's GPT-4, Google's Gemini, and Anthropic's Claude leverage deep neural networks trained on vast datasets to generate coherent responses (Brown et al., 2020). These systems, including domain-specific and multimodal models, have notably impacted educational settings by enabling personalized, adaptive interactions that respond to learners' needs. In mathematics education, GenAI tools such as ChatGPT, Microsoft Copilot, Google Gemini, and Wolfram Alpha provide on-demand support, guiding students through concepts, offering visual explanations, and helping identify errors, transforming study practices and facilitating both procedural and conceptual understanding.

This transition, however, prompts concerns about learning, assessment, and academic integrity as automated systems can generate solutions instantly, potentially changing traditional views on effort and competence (Bastani et al., 2024a; Frieder et al., 2023; Kasneci et al., 2023b). Research indicates GenAI can boost engagement and performance (Bauer et al., 2025; Menlah & Boateng, 2025), but unstructured or excessive use may undermine independent reasoning and durable mathematical competence. Prior studies and reviews are fragmented and methodologically diverse, making it difficult to synthesize the impact on mathematical thinking and instruction. Therefore, this review applies PRISMA procedures to consolidate evidence from peer-reviewed research (2020–2025) on LLM-based tools in secondary and tertiary mathematics education, distinguishing supported benefits from speculative claims and highlighting areas where evidence remains limited, such as fairness and long-term effectiveness.

Theoretical Framework

This section positions the review within (a) foundational scholarship on generative AI and large language models, (b) learning sciences construct that explain how GenAI may influence mathematics learning, and (c) systematic review methodology using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) approach (Page et al., 2021).

Generative AI and Large Language Models as Foundation Models

Generative artificial intelligence (GenAI) refers to models that create new artifacts such as text, code, images, and worked solutions, rather than simply classifying or predicting based on existing data. In education, large language models (LLMs) dominate, generating natural language by learning statistical patterns from extensive datasets. These LLMs, known as “foundation models,” are trained at scale and adapted for tasks like tutoring and feedback (Bommasani et al., 2021). Their few-shot abilities allow them to perform educational tasks from prompts with little training (Brown et al., 2020), making them well suited for simulating tutoring, explanation, and assessment support through scalable dialogic interaction (Kasneci et al., 2023a).

GenAI in Mathematics Education

Theoretical accounts highlight that LLMs can generate explanations, strategies, prompts, and feedback to support learning, but they also risk producing incorrect or misleading reasoning.

These models are reliable for factual retrieval and some undergraduate tasks, but less so for advanced reasoning, where errors may look plausible to beginners (Frieder et al., 2023). Validity in mathematics depends on correct steps, not just answers. The educational value of LLMs depends on how they are used and supervised, as accuracy issues and misuse are closely tied to their benefits (Kasneci et al., 2023b).

GenAI connects with theories of feedback, cognitive load, and engagement. Feedback is most helpful when it clarifies goals and supports thinking, not just answers (Hattie & Timperley, 2007). AI can provide timely, personalized feedback, but incorrect or unexplained feedback can hinder understanding. Cognitive Load Theory shows GenAI can reduce unnecessary load by clarifying language and structuring steps, but may harm learning if it replaces students' reasoning (Sweller, 2011). Engagement frameworks like ICAP show GenAI is best for learning when students evaluate and revise AI outputs, not just copy them (Chi & Wylie, 2014).

GenAI impacts assessment, equity, and responsible use. It allows instant solutions, which can disconnect student effort from competence. Unrestricted access can boost short-term performance but harm long-term learning, while guided designs help avoid this (Bastani et al., 2024b). GenAI can improve accessibility through personalized explanations and language support, but equity depends on access and governance. Responsible use requires oversight, assessment redesign, and policies that protect learners (UNESCO, 2023).

Systematic Review and PRISMA

Given the rapid and varied emergence of evidence on GenAI in mathematics education, this paper uses a systematic review guided by PRISMA 2020 standards to ensure transparent and reproducible synthesis. PRISMA structures evidence selection, minimizes bias with explicit criteria, and limits conclusions to what included studies support, enhancing the review's credibility (Page et al., 2021).

Rationale and Research Questions

Rationale

Generative AI's rapid growth offers new possibilities and challenges for mathematics educators. Ongoing issues like limited individualized support, slow feedback, and difficulty fostering conceptual understanding persist, especially for students with disabilities and second-language learners. GenAI can help by personalizing explanations and providing prompt feedback, potentially reducing some barriers when used thoughtfully, though it won't solve all structural problems.

Results from the literature are mixed: some studies report better attention, engagement, or understanding, but outcomes vary widely. Institutional guidance and training often lag adoption, so educators sometimes improvise. This highlights the need to synthesize empirical evidence to clarify GenAI's impact on math learning and teaching in real classrooms.

Research Questions

Based on the current state of the field, this study investigates the following research questions:

RQ1: In what ways has generative AI been utilized to deliver personalized mathematics tutoring, and what effects does this have on students' mathematical understanding, problem-solving performance, and motivation?

RQ2: How do generative AI tools facilitate feedback, error diagnosis, and formative assessment in mathematics, and to what extent is the feedback generated by large language models accurate, useful, and pedagogically meaningful?

RQ3: What influence do explanations and solution strategies generated by large language models have on students' mathematical reasoning, strategic thinking, and depth of conceptual understanding?

RQ4: In what ways are generative AI tools being leveraged to support assessment in mathematics, and what is their impact on assessment validity and student learning outcomes?

RQ5: How does the implementation of generative AI affect accessibility and equity in mathematics education?

RQ6: What risks, limitations, and ethical considerations have been identified regarding the use of generative AI in mathematics education, and how do these concerns inform frameworks for responsible implementation?

Methodology

This systematic review followed PRISMA, which provides a rigorous and transparent framework for reporting systematic reviews.

Search Strategy

The review searched Scopus, Web of Science, ERIC, and IEEE Xplore as main sources, with Google Scholar for extra coverage. Search terms combined generative AI (like "GPT-4," "ChatGPT," "LLM," "generative AI") and mathematics education (such as "mathematics education," "math problem solving"), using Boolean operators to focus on studies linking GenAI and math teaching or learning. The search included studies from January 2020 onward, reflecting the rise of modern LLMs in education.

Inclusion and Exclusion Criteria

Studies had to be peer-reviewed articles or conference papers with empirical findings, focusing on secondary or tertiary math education or related math-intensive programs. Only studies using generative AI, specifically LLM-based systems, were included. Research had to be published in English and centered on contemporary GenAI tools.

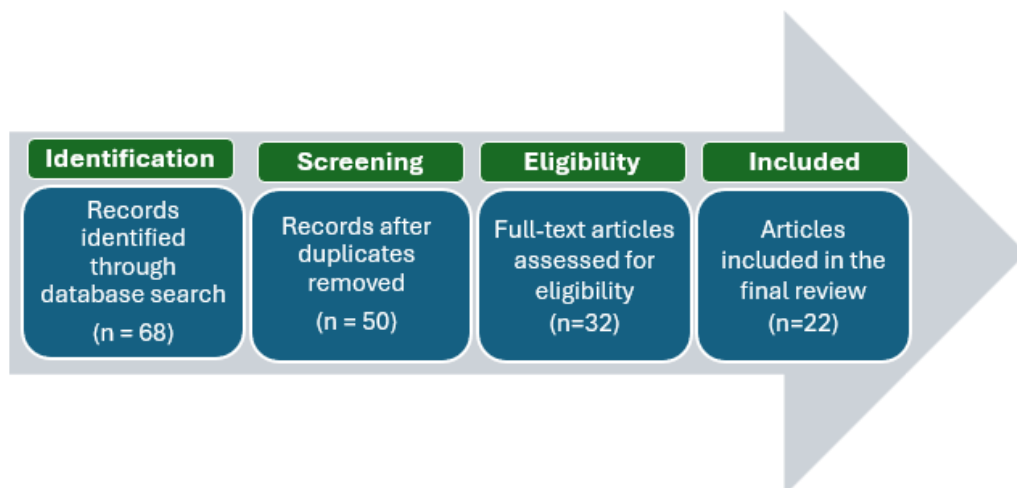
Studies were excluded if they focused on non-math subjects, lacked empirical data, used non-generative AI, or were not peer-reviewed (such as dissertations, preprints, or media articles). These criteria ensured all included studies were relevant and evidence-based.

Screening and Selection

The search yielded 68 records; after removing 8 duplicates, 60 were screened by title and abstract. Ten were excluded for not focusing on math learning or generative AI. Fifty full texts were reviewed, with 18 excluded for missing scope criteria or empirical data. Thirty-two studies were then assessed for quality, resulting in 22 studies included in the final synthesis. The process is shown in the PRISMA diagram (Figure 1).

Figure 1

Methodology Framework Based on PRISMA (Page et al., 2021)



Results and Discussion

This section synthesizes findings from the 22 studies remained in the review, grouped by application type and educational effect.

Tutoring and Personalized Instruction

Table 1

GenAI as Personalized Math Tutor and Learning Support

Study (Authors, Year)	Research Design	Sample / Context	GenAI Application	Key Outcomes
Kasneci et al. (2023b)	Experimental	University calculus students	ChatGPT as conceptual tutor	Improved conceptual explanations, clearer reasoning patterns.
Menlah and Boateng (2025)	Field experiment	400 undergraduate students	AI-based tutoring for problem solving	Higher task performance: benefits were strongest among students reporting higher mathematics anxiety.
Brandibur et al. (2025)	Mixed-methods	313 undergraduate students	LLM-supported mathematics instruction using structured prompt patterns	Students reported higher engagement; identified errors more efficiently; viewed AI as a supportive complement rather than a substitute for the instructor.
Kaya and Yavuz (2025)	Comparative quantitative analysis	NAEP mathematics tasks (Grades 4, 8, 12); U.S. large-scale assessment data	LLM problem-solving (ChatGPT-4o, GPT-4)	Models outperformed most student cohorts; performance remained stable as task difficulty increased; less sensitivity to task complexity.

GenAI tools are increasingly used for personalized math support, offering conversational explanations and adaptive practice. Outcomes include better conceptual understanding and improved completion of complex tasks. At the university level, LLMs support independent study by providing detailed, stepwise solutions. Kasneci et al. (2023b) found that ChatGPT improved students' clarity and reasoning, showing potential for enhancing engagement with mathematical ideas.

Research indicates AI tutoring is especially helpful for students with math anxiety. Menlah and Boateng (2025) observed that those receiving AI guidance solved more problems correctly, with the biggest improvements among anxious students. Immediate, responsive support may lower stress and encourage persistence.

The way GenAI is designed affects learning. Clear prompts and scaffolds keep students engaged and help them correct errors. Most students see AI as a helpful tool, not a replacement for teachers. Brandibur et al. (2025) highlight that GenAI works best alongside teacher guidance.

Large-scale assessment shows advanced language models excel at calculation and rule-based tasks. Kaya and Yavuz (2025) found models outperformed most students and stayed consistent as tasks got harder. However, strong answer accuracy does not guarantee deep understanding, and teacher-led instruction remains key for fostering reasoning.

Feedback, Error Diagnosis, and Formative Assessment

Table 2

GenAI for Feedback and Error Diagnosis

Study (Authors, Year)	Research Design	Sample / Context	GenAI Application	Key Outcomes
Holmes and Tuomi (2022)	Quantitative evaluation	Secondary algebra	Automated procedural feedback	78% accuracy; improved revision behaviors
Abdelghani et al. (2023)	Quasi-experimental	University proof-writing	LLM feedback for proofs	Improved logical structure, coherence, and metacognition
Bauer et al. (2025)	Randomized controlled experiment	Introductory statistics students	AI-generated adaptive feedback on problem solutions	Improved statistical skills; increased interest in statistics; stronger effects for lower-performing students
Walkington (2025)	Qualitative	K–12 and higher education teachers	GenAI-supported feedback & planning	Reduced workload; highlighted pedagogical challenges

This subsection reviews generative AI's role in feedback, error diagnosis, and formative assessment in mathematics. Studies assess AI feedback accuracy and its effects on student revision and teaching.

GenAI is effective for formative assessment by providing prompt, targeted feedback, helping students identify and fix errors during revision. In math, automated feedback supports immediate correction, and Holmes and Tuomi (2022) found AI feedback can guide students in algebra tasks.

At the university level, AI feedback improves logical structure in proof-based tasks and encourages reflection, supporting metacognitive reasoning (Abdelghani et al., 2023).

Adaptive feedback in statistics enhances student skills and interest, especially for lower-performing students, as shown by Bauer et al. (2025).

Qualitative studies note that while teachers value AI feedback for reducing workload and planning, it may miss subtle reasoning errors or deeper misconceptions (Walkington, 2025).

Overall, generative AI works best as a complement to teaching. AI feedback is most reliable for stepwise tasks and is effective when students re-examine and justify their answers; instructional design should encourage students to interpret and verify feedback independently.

Effects on Students' Mathematical Reasoning, Strategic Thinking, and Conceptual Understanding

Table 3

GenAI for Mathematical Reasoning, Explanation, and Inquiry

Study (Authors, Year)	Research Design	Sample / Context	GenAI Application	Key Outcomes
García Navarro et al. (2025)	Comparative performance evaluation	High school and first-year engineering mathematics tasks (20 problems)	GPT-3.5, GPT-4, Wolfram GPT, LLaMA-2, Gemini	GPT-4 beat GPT-3.5; Wolfram GPT helped results slightly; however, persistent reasoning limitations remain a challenge.
Parra et al. (2024)	Comparative error analysis	High school geometry problems	ChatGPT, Bard, and others	Geometry reasoning was weak; frequent conceptual errors; language barriers made these weaknesses worse.
Wang and Fan (2025)	Classroom study	Secondary math students	ChatGPT as a problem solver	Less “productive struggle” for students; risk that learning stays on the surface.

Table 3 highlights how students' reasoning and explanations shift when interacting with LLM-generated solutions. Studies compare human and AI explanations, analyze classroom use, and trace errors. Results show that AI support does not always lead to better understanding and can sometimes hide gaps in comprehension.

Recent research finds that LLMs, like GPT-4, can model step-by-step problem-solving and offer alternative strategies, especially when integrated with math-specific tools (García Navarro et al., 2025). Yet, students often struggle with tasks that need conceptual transfer, showing that following procedures does not guarantee deep understanding.

Subject differences matter. For geometry, AI explanations often include conceptual errors and incomplete justifications (Parra et al., 2024). Language also impacts results, as performance can vary across languages based on training data.

Classroom studies show that students who mainly use AI solutions tend to skip productive struggle and prefer surface revisions, which can limit strategic thinking (Wang & Fan, 2025). Unrestricted access may encourage imitation instead of sense-making, especially in older students.

Overall, AI-generated explanations can help or hinder learning. They may introduce new strategies and support planning if students engage critically, but errors and overreliance can lead to shallow understanding. The impact depends on both the model's quality and whether students are required to check and compare solutions themselves.

Assessment, Question Generation, and Scaffolding

Table 4

GenAI for Assessment, Question Generation, and Scaffolding

Study (Authors, Year)	Research Design	Sample / Context	GenAI Application	Key Outcomes
Meissner et al. (2024)	Expert-reviewed evaluation study	Higher education mathematics (240 generated items)	LLM-generated competence-based e-assessment items (ItemForge; GPT-3.5, GPT-4; RAG)	High-quality item alignment; strong linguistic quality; taxonomy fit; solution inaccuracies
Widjaja and Yohannis (2025)	Design and evaluation study	Secondary education MCA mathematics items	GenAI-based automatic question generation (Gemini 1.5 Pro; multimodal)	Diverse question types; strong curriculum alignment; reduced teacher workload
McGalliard and Otten (2025)	Qualitative task analysis	Middle and high school mathematics tasks	GenAI responses to cognitively demanding problems (ChatGPT, Gemini)	Mixed reasoning quality; frequent logical errors; improvement with prompting; strong pedagogical discussion value
Yu et al. (2025)	Two-phase experimental evaluation	Advanced undergraduate mathematics (logic course)	LLM-based automated question generation with RAG and DOK	Improved question correctness and relevance; stronger higher-order reasoning alignment

Table 4 shows that research has explored how generative AI supports assessment activities in secondary and college math, such as item generation, task design, and scaffolding. These tools may boost efficiency but can raise concerns about validity, since AI responses lack human judgment and may contain errors like missing steps or incomplete reasoning. Without review, such flaws can limit the range of student thinking and reduce trust in assessment results.

In higher education, GenAI is used to create quizzes and tasks that match course outcomes. Meissner et al. (2024) found that LLM-based systems can produce items with strong linguistic quality and alignment, but inaccuracies in solutions highlight the need for expert review.

In secondary schools, Widjaja and Yohannis (2025) reported that generative AI can create varied questions aligned with curriculum, helping teachers save time. Still, oversight is needed to ensure items accurately reflect learning objectives.

Evaluations show that AI-generated solutions sometimes omit key steps or misrepresent concepts. McGalliard and Otten (2025) noted that prompting strategies can improve quality but reliability depends on use. Overreliance may weaken confidence in judgments of student understanding.

Experimental work suggests GenAI can support complex assessment items when combined with retrieval and reasoning prompts. Yu et al. (2025) found that prior questions and structured frameworks improve item quality and cognitive alignment. With good safeguards, GenAI may help design assessments that focus on conceptual understanding.

Generative AI is used for creating assessment items and scaffolding responses. While these uses can improve efficiency and alignment, concerns remain about validity, especially when solutions appear correct but lack complete reasoning. The impact depends on expert review, sound instructional practice, and careful implementation to avoid undermining math evaluation quality or deep learning.

Accessibility, Equity, and Inclusion: Supporting Diverse Learners

Table 5

GenAI for Accessibility, Equity, and Inclusion

Study (Authors, Year)	Research Design	Sample / Context	GenAI Application	Key Outcomes
Canonigo (2025)	Qualitative interpretive study	Secondary mathematics teachers and students (urban public schools)	ChatGPT for personalized feedback, inquiry, and scaffolding	Greater learner agency and participation; shifts in classroom interaction patterns; risk of over-reliance without teacher guidance.
Agbo et al. (2025)	Conceptual review with practice synthesis	Mathematics education for students with learning disabilities	AI-driven adaptive learning and personalized feedback systems	Increased participation; more individualized support; greater learner independence; potential equity benefits.
Rizos et al. (2024)	Case study	Students with special educational needs	AI-generated individualized worksheets	Increased engagement; improved self-efficacy; reported a more supportive classroom experience.

The studies summarized in Table 5 indicate that GenAI may influence accessibility and equity in mathematics education, with effects that depend strongly on learner characteristics and implementation conditions. Across classroom-based accounts and case studies, the learning environment appears to mediate whether AI tools reduce barriers or introduce new forms of disadvantage.

One consistent finding is that GenAI can increase access to support by tailoring explanations and pacing individual learners. In secondary contexts, Canonigo (2025) reported that students using ChatGPT received more immediate feedback and expressed greater comfort asking questions. Such interactions may shift classroom participation patterns by enabling students to engage with content privately and at their own pace. However, the study also cautioned that, without teacher oversight, some learners may become overly dependent on AI-provided guidance; balancing increased access with sustained sense-making remains essential.

Evidence from special education contexts suggests that GenAI may reduce affective barriers to mathematics engagement when materials are adapted to learners' needs. Rizos et al. (2024) worked with students experiencing learning difficulties using AI-generated individualized worksheets. The authors reported increased engagement and reduced anxiety during practice,

plausibly because task difficulty and presentation were better matched to students' profiles. These findings suggest that targeted personalization may contribute to more supportive learning experiences for some learners.

Beyond individual classrooms, Agbo et al. (2025) suggest that adaptive learning systems may support students with learning disabilities by providing responsive feedback and tailored instructional pathways. When lessons adjust on the fly using real-time data, support can be more individualized than conventional approaches. However, scaling such systems remains a challenge, and potential benefits depend on careful implementation, including teacher mediation and appropriate resourcing.

Overall, the reviewed studies suggest that GenAI may contribute to more equitable participation by providing additional avenues for explanation, language support, and individualized pacing. At the same time, these benefits are not automatic. Effective implementation requires teacher guidance, monitoring for over-reliance, and attention to differential access. Under these conditions, GenAI may support equity goals rather than reinforcing existing disparities.

Risks, Limitations, and Ethical Concerns

Table 6

Risks, Ethical Considerations, and Limitations of GenAI in Math Education

Study (Authors, Year)	Research Design	Sample / Context	GenAI Application	Key Outcomes
Silgado-Tuñón et al. (2025)	Qualitative interview study	University mathematics professors (n = 10)	GenAI for text editing, content generation, idea organization	Pragmatic use patterns; limited classroom integration; epistemic ambivalence; need for PD
Bastani et al. (2024a)	Randomized field experiment	1,028 university students	Standard vs. "learning-safe" GPT tutors	Standard AI boosts short-term performance but harms long-term learning
Frieder et al. (2023)	Analytical review	STEM and mathematics education	ChatGPT for problem solving	Hallucinated solutions; assessment integrity risks
Kasneci et al. (2023a)	Systematic interdisciplinary review	Higher education, including mathematics	LLMs for tutoring and explanation	Accuracy risks; student dependence; need for human oversight

Table 6 highlights key risks of using generative AI in math education, such as output accuracy, assessment integrity, and learner dependence. These issues guide responsible implementation.

Bastani et al. (2024a) found that unrestricted AI tutoring improves immediate performance but may weaken retention and understanding. Designs focused on hints and guided reasoning produce more sustained learning, stressing the need to promote cognitive effort.

Output correctness is a recurring issue. Frieder et al. (2023) showed LLMs may generate answers with invalid steps that seem correct, misleading learners. Kasneci et al. (2023a) also urge verification and human oversight, especially for explanation and tutoring.

Over-reliance is another risk. LLMs can reduce student effort in planning and justifying work. Kasneci et al. (2023a) warn this may lessen engagement with mathematical reasoning, so GenAI should support, not replace, student thinking.

For instructors, Silgado-Tuñón et al. (2025) found GenAI is used more for writing support than direct teaching. Professors have concerns about trustworthiness and need clearer ethics policies and professional development for consistent use.

In summary, risks tied to accuracy, academic integrity, and dependence are central. The literature recommends responsible use through instructional design, transparency, and governance, with ongoing professional development and clear policies to ensure GenAI supports learning without harming reasoning or assessment validity.

Summary of Findings

Research shows generative AI impacts math teaching and learning in varied ways, with effects differing by context.

Reported benefits include adaptive pacing, timely feedback, and greater responsiveness in practice and assessment. Studies indicate students may build stronger explanations when AI prompts reasoning. For teachers, AI can reduce routine tasks like drafting feedback and generating practice items, allowing more time for planning and targeted support.

However, studies warn against using AI without clear structure and oversight. Students might disengage from difficult tasks and rely on AI for answers rather than reasoning independently. Output errors, from minor inaccuracies to plausible but incorrect explanations, remain a concern. Uncritical reliance in assessment can threaten validity. Effective use depends on embedding GenAI within instructional goals and teacher-led practices.

Instructional context is crucial. Teachers shape whether GenAI promotes verification, reflection, and strategy comparison. When AI is used in structured activities requiring students to evaluate and justify outputs, learning is more favorable. Without guidance, GenAI may encourage surface-level completion.

Equity is closely linked to access and design. GenAI can provide personalized support for students with learning challenges or developing academic language, reducing barriers to participation.

But equity benefits depend on access. Advanced tools are not available everywhere, possibly worsening disparities. Most evidence focuses on short-term outcomes, with few studies on long-term effects, making it unclear if gains are sustained or just temporary.

Literature is mainly from higher education, with fewer studies in secondary schools or resource-constrained environments. Studies from non-Western systems are rare. Rapid evolution of models and platforms makes findings quickly outdated. GenAI can support math learning under the right conditions, but outcomes rely on careful planning, governance, and ongoing human involvement.

Conclusion

Generative AI is changing mathematics education, with LLM-based tools offering adaptive support, timely feedback, and flexible learning options. Research from 2020 to 2025 finds these systems can raise student engagement and reduce test anxiety, while helping some learners with diverse needs. GenAI can complement instruction in classrooms with varied student abilities and high workload.

However, positive outcomes depend on thoughtful use. Poorly designed implementation can reduce conceptual understanding and procedural skills. Benefits are most likely when AI is integrated into structured lessons with an emphasis on verification, reflection, and educator guidance rather than relying solely on AI-generated answers.

Effective use will require ongoing teacher development and redesigned assessments focusing on reasoning and justification. Clear institutional policies are needed for equity, transparency, and integrity. Future research should include long-term studies in varied educational settings, especially for learners facing barriers. GenAI is best seen as a resource to support teaching when used with clear goals and ethical safeguards.

Recommendations

Based on this review, key recommendations for integrating generative AI in math education include viewing AI as a tool to support, not replace, human instruction. Educators should use AI to promote deeper reasoning, encouraging students to evaluate and revise AI-generated solutions. Such reflective practice is crucial for authentic learning.

Schools must not only provide technology but also set up clear frameworks for their purposeful and pedagogical use in daily lessons.

Researchers should focus on studying generative AI in real classrooms to inform best practices, especially for intervention and assessment. AI is useful for informal learning, but high-stakes testing requires strong safeguards. Students need explicit instruction on AI literacy, verification, and critique, best taught through hands-on activities.

Policies should define AI's role in coursework and exams to ensure equity and transparency. Teacher training must be comprehensive, enabling lesson redesign and effective use of AI. Equitable access for under-resourced schools and privacy protections is essential. Trust in AI requires ongoing monitoring, transparency, and ethical practice.

Future research should track long-term effects of AI in diverse settings and focus on how AI integrates with regular instruction and feedback. Developing reliable ways to measure AI-linked learning outcomes is also needed, while maintaining educational integrity and ethics.

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

During the preparation of this manuscript, the authors used Microsoft Copilot integrated within Microsoft Word to help improve the clarity and quality of the writing, including grammar, spelling, and overall readability. All suggestions were reviewed and edited by the authors, who take full responsibility for the final content.

References

- Abdelghani, M., Yusuf, K., & Park, H. (2023). AI-supported feedback for mathematical proofs: An empirical investigation. *International Journal of STEM Education*, 10(4), 211–225.
- Agbo, C. M., Ugwuanyi, C. C., Okeagu, R. U., & Salifu, M. (2025). Leveraging on Artificial Intelligence (AI) to Make Learning More Inclusive for Students with Learning Disabilities in Mathematics Education. *International Journal of Latest Technology in Engineering Management & Applied Science*, 14(5), 1073–1078. <https://doi.org/10.51583/IJLTEMAS.2025.140500114>
- Bastani, H., Bastani, O., Sungu, A., Ge, H., Kabakçı, Ö., & Mariman, R. (2024a). Generative AI can harm learning. The Wharton School Research Paper. Available at SSRN: <https://ssrn.com/abstract=4895486>. or <http://dx.doi.org/10.2139/ssrn.4895486>
- Bastani, H., Kim, S., Xu, L., & Yuan, F. (2024b). Generative AI without guardrails can harm learning: Evidence from a large-scale randomized experiment. *Science Advances*. Advance online publication.
- Bauer, E., Richters, C., Pickal, A. J., Klippert, M., Sailer, M., & Stadler, M. (2025). Effects of AI-generated adaptive feedback on statistical skills and interest in statistics: A field experiment in higher education. *British Journal of Educational Technology*, 56, 1735–1757. <https://doi.org/10.1111/bjet.13609>
- Bommasani, R., Hudson, D. A., Adeli, E., Altman, R., Arora, S., von Arx, S., Bernstein, M. S., Bohg, J., Bosselut, A., Brunskill, E., Brynjolfsson, E., Buch, S., Card, D., Castellon, R., Chatterji, N., Chen, A., Creel, K., Davis, J. Q., Demszky, D., ... Liang, P. (2021). *On the opportunities and risks of foundation models*. arXiv. <https://arxiv.org/abs/2108.07258>
- Brandibur, O., Filipowicz-Chomko, M., Girejko, E., Kaslik, E., Mozyrska, D., Mureşan, R., Pappas, N., Tănasie, A., & Zaharia, C. (2025). Higher mathematics education and AI prompt patterns: Examples from selected university classes. *Applied Sciences*, 16, 339. <https://doi.org/10.3390/app16010339>
- Brown, T. B., Mann, B., Ryder, N., Subbiah, M., Kaplan, J., Dhariwal, P., Neelakantan, A., Shyam, P., Sastry, G., Askell, A., Agarwal, S., Herbert-Voss, A., Krueger, G., Henighan, T., Child, R., Ramesh, A., Ziegler, D. M., Wu, J., Winter, C., ... Amodei, D. (2020). Language models are few-shot learners. *Advances in Neural Information Processing Systems*, 33, 1877–1901.
- Canonigo, A. M. (2025). *AI in math education: Shifting the balance toward student empowerment*. *Frontiers in Artificial Intelligence and Applications*, 454, 454–462. <https://doi.org/10.3233/FAIA250744>
- Chi, M. T. H., & Wylie, R. (2014). The ICAP framework: Linking cognitive engagement to active learning outcomes. *Educational Psychologist*, 49(4), 219–243. <https://doi.org/10.1080/00461520.2014.965823>

- Frieder, S., Pinchetti, L., Chevalier, A., Griffiths, R. R., Salvatori, T., Lukasiewicz, T., Petersen, P. C., & Berner, J. (2023). Mathematical capabilities of ChatGPT. arXiv. <https://arxiv.org/abs/2301.13867>
- García Navarro, A. L., Koneva, N., Hernández, J. A., & Sánchez-Macián, A. (2025). On the Use of Large Language Models at Solving Math Problems: A Comparison Between GPT-4, LLaMA-2 and Gemini. *International Journal of Interactive Multimedia and Artificial Intelligence*, 9(5), 40–50. <https://doi.org/10.9781/ijimai.2025.03.001>
- Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research*, 77(1), 81–112. <https://doi.org/10.3102/003465430298487>
- Holmes, W., & Tuomi, I. (2022). Automated feedback systems in mathematics education: Accuracy and limitations. *British Journal of Educational Technology*, 53(5), 1482–1499.
- Kasneci, E., Sessler, K., & Bannert, M. (2023a). *ChatGPT in higher education: A study of conceptual math explanations*. *Computers and Education: Artificial Intelligence*, 4, 100150.
- Kasneci, E., Sessler, K., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günemann, S., Hüllermeier, E., Krusche, S., Kübler, J., Löw, T., Mollick, E., Sailer, M., Schmidt, A., Seidel, T., Stadler, M., Weller, J., Kuhn, J., & Kasneci, G. (2023b). *ChatGPT for good? On opportunities and challenges of large language models for education*. *Learning and Individual Differences*, 103, 102274. <https://doi.org/10.1016/j.lindif.2023.102274>
- Kaya, D., & Yavuz, S. (2025). Can Generative AI and ChatGPT break human supremacy in mathematics and reshape competence in cognitive-demanding problem-solving tasks? *Journal of Intelligence*, 13(4), 43. <https://doi.org/10.3390/jintelligence13040043>
- McGalliard, W., & Otten, S. (2025). AI Responses to Challenging Problems and Educator Responses to AI Availability. *Digital Experiences in Mathematics Education*, 11(2), 319–332. <https://doi.org/10.1007/s40751-024-00167-4>
- Menlah, C. K. A., & Boateng, F. O. (2025). Examining the effect of AI-based tutoring systems on students' mathematical problem-solving skills: The moderating role of mathematics anxiety. *Journal of Pedagogical Sociology and Psychology*, 7(3), 5–17. <https://doi.org/10.33902/jpsp.202536137>
- Meissner, A., Schneider, J., Förster, M., & Kuhn, J. (2024). *LLM-generated competence-based e-assessment items: Opportunities and limitations for higher education mathematics*. arXiv. <https://arxiv.org/abs/2406.0xxxx>
- Page, M. J., Moher, D., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... McKenzie, J. E. (2021). PRISMA 2020 explanation and elaboration: Updated guidance and exemplars for reporting systematic reviews. *BMJ*, 372, n160. <https://doi.org/10.1136/bmj.n160>

- Parra, V., Sureda, P., Corica, A., Schiaffino, S., & Godoy, D. (2024). Can Generative AI Solve Geometry Problems? Strengths and Weaknesses of LLMs for Geometric Reasoning in Spanish. *International Journal of Interactive Multimedia and Artificial Intelligence*, 8(5), 65–74. <https://doi.org/10.9781/ijimai.2024.02.009>
- Rizos, I., Foykas, E., & Georgakopoulos, S. V. (2024). Enhancing mathematics education for students with special educational needs through generative AI: A case study in Greece. *Contemporary Educational Technology*, 16(4), ep535.
- Silgado-Tuñón, D. A., Sureda, P., López-Flores, J. I., & Magallanes, E. (2025). Exploring university mathematics professors' perceptions and use of GenAI: a conceptual fields approach. *Amazonia Investiga*, 14(86), 250–263. <https://doi.org/10.34069/AI/2025.86.02.19>
- Sweller, J. (2011). Cognitive load theory. In J. Mestre & B. H. Ross (Eds.), *Psychology of learning and motivation* (Vol. 55, pp. 37–76). Elsevier. <https://doi.org/10.1016/B978-0-12-387691-1.00002-8>
- UNESCO. (2023). *Guidance for generative AI in education and research*. UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000386693>
- Walkington, C. (2025). The implications of generative artificial intelligence for mathematics education. *School Science and Mathematics*. Advance online publication. <https://doi.org/10.1111/ssm.18356>
- Wang, J., & Fan, W. (2025). The effect of ChatGPT on students' learning performance, learning perception, and higher-order thinking: insights from a meta-analysis. *Humanit Soc Sci Commun* 12, 621 (2025). <https://doi.org/10.1057/s41599-025-04787-y>
- Widjaja, S. Y., & Yohannis, A. (2025). *AI-powered automatic question generation for teachers*. In Proceedings of the 2025 International Conference on Smart Computing, IoT and Machine Learning (SIML) (pp. 1–6). IEEE. <https://doi.org/10.1109/SIML65326.2025.11081160>
- Yu, Y., Krantz, A., & Lobczowski, N. G. (2025). *From recall to reasoning: Automated question generation for deeper math learning through large language models* (arXiv preprint). <https://arxiv.org/abs/2505.11899>

Contact email: jdelatorre@hct.ac.ae

Physics Curricular Complexity and Enrollment Barriers Analysis

Ahl G. Balitaon, University of the Philippines Los Baños, Philippines

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

The critical low enrollment in the Bachelor of Science in Mathematics and Science Teaching (BS-MST) Physics major at the University of the Philippines Los Baños (UPLB) is frequently attributed to student perception without objective analysis of the program's structure. Physics presents intrinsic academic difficulties, characterized by abstract concepts and heavy reliance on advanced mathematics, contributing to high student anxiety. This study addresses the core question: To what extent do structural and sequential differences between the four BS-MST majors create inherent barriers for the Physics track? Employing a comparative structural analysis based on Curricular Analytics, this research models the curriculum structure as a network to quantify structural complexity using the metrics for delay and blocking factors. The framework assumes that high structural complexity is inversely related to student completion rates. Findings indicate that while the overall unit load is uniform, the Physics major exhibits significantly higher sequential rigidity and severe failure penalty. The core PHYS 71/72 sequence acts as a high blocking factor for multiple downstream specialized courses, imposing maximal constraint and minimal recovery capacity, thereby amplifying academic risk. This structural disadvantage validates student anxieties and functions as an objective disincentive. The study concludes that reducing critical prerequisite dependencies is essential for mitigating this complexity and improving enrollment. This calls for careful curriculum design to curtail overload and enhance implementation.

Keywords: curriculum, analytics, physics

iafor

The International Academic Forum
www.iafor.org

Introduction

The progress of society significantly relies on Science, Technology, Engineering, and Mathematics (STEM) disciplines, yet many specialized programs struggle with attrition and low enrollment (De Jong & Campoli, 2018; Diate & Mordeno, 2021). Enrollment in highly specialized programs, such as the Bachelor of Science in Mathematics and Science Teaching (BS-MST) major in Physics at the University of the Philippines Los Baños (UPLB), faces critical and chronic challenges. While low recruitment is often ascribed to subjective student anxieties about the difficulty of physics, this study posits that the curriculum structure itself may constitute an objective source of disincentive (Hazari et al., 2010; Irene, 2023).

A curriculum designed with excessive structural complexity can directly hinder student progression, thereby increasing the risk of delayed graduation or students choosing to opt out entirely (Heileman et al., 2018; Lin et al., 2025; Orleans, 2007). The primary purpose of this research is to investigate the extent to which structural and sequential differences between the four BS-MST majors (Biology, Chemistry, Mathematics, and Physics) create inherent barriers or disincentives for prospective students. By shifting the focus from student “deficits” to institutional “scaffolds,” this analysis seeks to provide a data-driven foundation for curricular optimization.

Literature Review

STEM Persistence and Gatekeeper Courses

Global efforts to bolster the STEM workforce often face challenges related to student attrition and low completion rates. Foundational subjects, commonly termed “gatekeeper” courses (e.g., general chemistry or introductory physics), are often responsible for high attrition rates and increased time to graduation for inadequately prepared students. Negative experiences or poor academic performance in these foundational courses are recognized factors contributing to students leaving STEM pathways (De Jong & Campoli, 2018; Diate & Mordeno, 2021).

Physics is frequently regarded as difficult due to its abstract concepts, reliance on advanced mathematics, and demand for strong problem-solving skills. This intrinsic difficulty often leads to high student anxiety, which is negatively correlated with academic performance (Irene, 2023). For Filipino students, challenges in physics are compounded by issues like unmastered prerequisite skills in literacy and numeracy and a lack of necessary physical facilities or laboratory equipment in schools (Hermoso, 2025; Irene, 2023).

Physics Identity and Career Choice

A student's decision to pursue a field like physics is strongly linked to their “physics identity,” a construct influenced by their perceived performance, competence, recognition by others, and interest in the field. High school experiences emphasizing conceptual understanding and real-world/contextual connections positively predict the development of this identity. Conversely, physics careers are often perceived as demanding substantial personal time and lacking opportunities for working with people, resulting in career outcome expectations that can be negatively related to developing a strong physics identity (De Jong & Campoli, 2018).

Curricular Structure and Complexity

Beyond individual experiences, the intrinsic architecture of an academic program significantly influences a student's ability to successfully navigate to graduation. Curricular Analytics treats the curriculum as a complex system and systematically analyzes how structural properties impact student progression.

Structural complexity is quantified by mapping the curriculum as a directed graph where courses are vertices, and prerequisite relationships are defined by edges. Two critical structural factors derived from this model directly predict student risk:

Delay Factor

Measures the length of the longest prerequisite pathway passing through a course, establishing a lower bound on the minimum number of terms required for completion.

Blocking Factor

Quantifies the number of downstream courses for which a single course acts as a prerequisite. A high blocking factor identifies critical gateway courses where failure generates a catastrophic "failure penalty," blocking a large portion of the subsequent curriculum (Heileman et al., 2018).

Curricular Overload and Implementation

A persistent challenge is curriculum overload, which occurs when obsolete content is retained alongside new requirements, increasing the cognitive burden on students (Chen et al., 2023; Chen et al., 2025). Successful curriculum implementation also relies on teacher acceptance, which is mediated by their perceived ease of understanding and integration of the curriculum (Chen et al., 2023; Li et al., 2025; Măță and Suci, 2011). In the Philippine context, teachers face challenges such as inadequate training, heavy workloads, and limited resources, which can hinder the implementation of supportive learning environments (Hermoso, 2025; Irene, 2023).

Methodology

This study utilized a comparative document analysis of the official 2018 BS-MST curricula for the Biology, Chemistry, Mathematics, and Physics majors at UPLB (UPLB, 2018). The methodology focused on three specific stages:

Quantitative Metrics Comparison

The first stage involved extracting and comparing key metrics across the four tracks, including total unit loads, major-specific units, required mathematics units, and general education electives (Basu et al., 2025; UPLB, 2018). This established whether the programs maintained quantitative parity in terms of overall student workload.

Sequential and Structural Network Mapping

Using the official curriculum flowcharts, the study mapped the prerequisite chains for each major as directed acyclic graphs (UPLB, 2018). This step identified courses with high intrinsic

structural constraints and characterized the “path hierarchy” of each major (Heileman et al., 2018).

Quantification of Structural Constraints

Specific structural barriers were computed based on the principles of Curricular Analytics. This included calculating the delay factor for the core pedagogical sequence and the blocking factor for the foundational science sequences. The “failure penalty” was quantified by measuring the number of units and semesters a student would be delayed following a non-passing grade in a critical gateway course (Heileman et al., 2018).

Results

Comparative Quantitative Metrics

The review of the required academic workload showed uniformity across the majors, suggesting that total unit burden is not the primary source of structural differentiation. The Biology major requires 141 units, Chemistry and Physics require 140 units, and Mathematics requires 142 units. All curricula share the same foundational calculus sequence (MATH 25, MATH 27, AMAT 19) and core introductory science classes in the first year.

Common Structural Baseline: The MST Chain

All four majors are anchored by a linear seven-semester sequence of Education and MST courses. This sequence establishes a high baseline delay factor for every student in the program.

Linear Chain

MST 101a → 101b → 101c → 101d → MST 123 → MST 200a → MST 200b

Computation

For MST 101a, the delay factor is 7 (vertices on the path) and the blocking factor is 6 (subsequent reachable courses), resulting in a course “cruciality” score of 13. This establishes that the MST pedagogical sequence alone requires a minimum of seven academic terms to complete.

The Physics Major as a Structural Outlier

The primary structural differences emerge in the subsequent sequencing of major-specific courses. The Physics major introduces a highly constrained, linear pathway starting in the second year, contributing significantly to its structural complexity.

Accelerated Sequence

The Physics major mandates the completion of the 10-unit PHYS 71/72 sequence by the end of the second year. In contrast, tracks like Biology and Mathematics often defer PHYS 72 until the third or even fourth year, significantly lowering its structural impact.

High Blocking Factor in Physics

Successful completion of PHYS 72 & 72.1 is the sole prerequisite for three critical specialized courses in the third year: APHY 101 (3 units), APHY 102 (3 units), and PHYS 192.1 (2 units).

The Failure Penalty

A single failure in PHYS 71 in the first semester of the second year creates a massive roadblock. It blocks PHYS 72, which in turn blocks 8 units of specialized major work in the third year, effectively delaying graduation by one full academic year.

Discussion

The analysis confirms that the BS-MST Physics major is structurally disadvantaged, as its curriculum is structured in a way that maximizes academic risk. This rigidity transforms the inherent difficulty of the program into an existential threat to timely graduation.

Rigidity and Recovery Capacity

The strictly linear nature of the Physics track represents an “anti-pattern” of high complexity. While students in other tracks have parallel sequences that allow them to continue major-specific work even if they fail a foundational science course, the Physics major offers the lowest “degrees-of-freedom” for academic recovery. This structure institutionalizes student anxiety by ensuring that the consequences of a single non-passing grade are catastrophic (Irene, 2023).

Implications for Curricular Reform

Curriculum development efforts should aim to move from “gatekeeping” to “scaffolding” (Sampson et al., 2024). Strategies to reduce the blocking factor of critical courses like PHYS 72 include:

Curricular Deconstruction

Using the Ebel framework to separate “need to know” foundational concepts from “nice to know” content, allowing specific required modules to be integrated concurrently into specialized courses rather than acting as strict roadblocks (Chen et al., 2023; Hazari et al., 2010).

Converting Prerequisites to Co-requisites

Redesigning the curriculum map to allow specialized Applied Physics courses to be taken concurrently with foundational sequences, drastically increasing degrees of freedom and preventing a one-year stall for minor setbacks (Crişan and Enache, 2015; Hazari et al., 2010; So et al., 2024).

Instructional Scaffolding

Implementing active learning models, such as inquiry-based learning and digital simulations, to lower the cognitive barrier and reduce failure rates in high-blocking gateway courses (Irene, 2023; Sastre-Vazquez et al., 2013).

Conclusion

This comparative analysis confirms that structural and sequential differences create inherent barriers for students considering the BS-MST Physics track. While total units are comparable across all majors, the Physics major suffers from significantly higher sequential rigidity and a disproportionately severe failure penalty. The program's reliance on linear prerequisite chains acts as a structural filter that discourages enrollment and amplifies the inherent difficulty of the subject.

To fix enrollment, the institution must “fix the graph” by reducing structural complexity and increasing recovery capacity. Restructuring the curriculum to allow for parallel pathways and modular integration of foundational concepts is essential for securing the future of the physics education pipeline.

Acknowledgement

The author gratefully acknowledges the Institute of Physics and the Math and Science Teaching Program under the College of Arts and Sciences, UPLB, for their administrative and technical support. Furthermore, this participation was made possible through the financial support of the Academic Development Fund's Oral Presentation in National or International Conferences (OPNIC) Grant from the Office of the Vice Chancellor for Academic Affairs, UPLB. Finally, the author expresses his deepest love and gratitude to his wife, son, and family for their unwavering support and inspiration.

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

The author declares that Grammarly, an AI-assisted writing software, was used in proofreading and refining the language used in the manuscript. The usage was limited to correcting grammatical and spelling errors and rephrasing statements for accuracy and clarity. The author further declares that, apart from Grammarly, no other AI or AI-assisted technologies have been used to generate content in writing the manuscript. The ideas, design, procedures, findings, analyses, and discussion are originally written and derived from careful and systematic conduct of the research.

References

- Basu, P., Malik, D. J., & Graunke, S. (2025). A 24-year longitudinal study on a STEM gateway general chemistry course and the reduction of achievement disparities. *PLoS ONE*, 20(2), e0318882. <https://doi.org/10.1371/journal.pone.0318882>
- Chen, A. M. H., Brown, S., Mark, K., & McBane, S. (2023). An overview of instructional approaches and decision-making strategies to curtail curricular overload. *American Journal of Pharmaceutical Education*, 87(1), 100013. <https://doi.org/10.1016/j.ajpe.2022.12.001>
- Chen, A. M. H., Thornby, K., & Law, A. V. (2025). Curricular assessment blueprint and needs analysis for the social, administrative, and behavioral foundational sciences. *American Journal of Pharmaceutical Education*, 89(1), 101346. <https://doi.org/10.1016/j.ajpe.2024.101346>
- Crişan, A., & Enache, R. (2015). Increasing curricular quality at the adult training programs level. A possible approach. *Procedia - Social and Behavioral Sciences*, 203, 180–185.
- De Jong, D., & Campoli, A. (2018). Curricular coaches' impact on retention for early-career elementary teachers in the USA: Implications for urban schools. *International Journal of Mentoring and Coaching in Education*. <https://doi.org/10.1108/IJMCE-09-2017-0064>
- Diate, K., & Mordeno, I. C. V. (2021). Filipino physics teachers' teaching challenges and perception of essential skills for a supportive learning environment. *Asia Research Network Journal of Education*, 1(2), 61–76.
- Hazari, Z., Sonnert, G., Sadler, P. M., & Shanahan, M.-C. (2010). Connecting high school physics experiences, outcome expectations, physics identity, and physics career choice: A gender study. *Journal of Research in Science Teaching*, 47(8), 978–1003. <https://doi.org/10.1002/tea.20363>
- Heileman, G., Abdallah, C., Slim, A., & Hickman, M. (2018). Curricular Analytics: A Framework for Quantifying the Impact of Curricular Reforms and Pedagogical Innovations. *arXiv preprint arXiv:1811.09676*. <https://doi.org/10.48550/arXiv.1811.09676>
- Hermoso, J. S. (2025). Strategies and challenges in teaching physics: The anxiety levels and academic performance of physics learners. *AIDE Interdisciplinary Research Journal*, 12, 832–942.
- Irene, E. A. (2023). Evaluation of teacher education curricula and its relevance to licensure examination using Context, Input, Process and Product (CIPP) model. *Social Sciences & Humanities Open*, 8(1), 100607. <https://doi.org/10.1016/j.ssaho.2023.100607>
- Li, P.-A., Liou, C.-H., Tai, W.-H., Yu, I.-C., Tsai, G.-T., & Chen, Y.-S. (2025). Constructing pedagogical identity through experiential curriculum: A grounded theory study of facilitators in outdoor education. *International Journal of Educational Research*, 134, 102857. <https://doi.org/10.1016/j.ijer.2025.102857>

- Lin, M.-Y., Hong, J.-C., Chin, T.-J., & Chen, N. (2025). The influence of preschool teachers' critical thinking attitude on their perceived ease of understanding and integrating, and attitude toward implementation of a new curriculum. *Thinking Skills and Creativity*, 57, 101868. <https://doi.org/10.1016/j.tsc.2025.101868>
- Măță, L., & Suci, A. I. (2011). The curricular innovative model focused on developing pedagogical competences of teachers of Language and communication. *Procedia Social and Behavioral Sciences*, 12, 274–282.
- Orleans, A. V. (2007). The condition of secondary school physics education in the Philippines: Recent developments and remaining challenges for substantive improvements. *The Australian Educational Researcher*, 34(1), 33–54.
- Sampson, S., Nelson, A., Cardarelli, R., & Roper, K. L. (2024). Ensuring the “health” of a curricular program evaluation: Alignment and analytic quality of two instruments for use in evaluating the effectiveness of an interprofessional collaboration curriculum. *Evaluation and Program Planning*, 102(1), 102377. <https://doi.org/10.1016/j.evalprogplan.2023.102377>
- Sastre-Vazquez, P., D'Andrea, R., Villacampa, Y., & Navarro-Gonzalez, F. J. (2013). The curricular value of mathematics in non-mathematics degree. *Procedia - Social and Behavioral Sciences*, 93, 1663–1667.
- So, K., Lee, S. Y., & Choi, Y. (2024). Teachers' sense-making of the decentralizing curriculum reform policy: A comparative case study in South Korea. *International Journal of Educational Research*, 125, 102331. <https://doi.org/10.1016/j.ijer.2024.102331>
- University of the Philippines Los Baños. (2018). *2018 Bachelor of Science in Mathematics & Science Teaching (BS-MST) Curriculum (Major in Biology, Chemistry, Mathematics, and Physics) & Flowcharts*. Institutional Document.

Why Children Stay Home? Uncovering Demand-Side Barriers to Early Childhood Education in Manokwari, West Papua

Simon Sili Sabon, National Research and Innovation Agency (BRIN), Indonesia

Yendri Wirda, National Research and Innovation Agency (BRIN), Indonesia

Nur Listiawati, National Research and Innovation Agency (BRIN), Indonesia

The Asian Conference on Education & International Development 2026

Official Conference Proceedings

Abstract

This study examines demand-side barriers that limit participation in Early Childhood Education (ECE) in Manokwari Regency, West Papua. Despite the strategic role of ECE in supporting child development, participation rates in this region remain relatively low compared to other provinces in Indonesia. The study employs a qualitative case study approach, with data collected through semi-structured interviews with parents, village heads, ECE teachers, and officials from the local Education Office. Thematic analysis reveals that low participation is shaped by the interaction of geographical, economic, cultural, and governance-related factors. Geographical barriers, including remoteness, limited infrastructure, and the uneven distribution of ECE centres, reduce children's access to services. Economic barriers arise from both direct and indirect costs, further exacerbated by delays in the disbursement of School Operational Assistance (BOS) funds and the inconsistent utilization of Special Autonomy Funds (Otsus), although some villages have used these funds to provide incentives for ECE teachers. Cultural factors also play a significant role, including early marriage practices, grandparent-led caregiving patterns, and local beliefs that restrict children under the age of three from leaving the house. This study concludes that improving ECE participation in Papua requires community-based and culturally sensitive approaches, supported by integrated fiscal policies. Policy implications include optimizing the use of Otsus funds for ECE operations, strengthening inter-village collaboration, enhancing the capacity of local teachers, and engaging traditional and religious leaders in promoting ECE as a shared community responsibility.

Keywords: early childhood education, Papua, demand-side barriers, cultural factors, parental perceptions

iafor

The International Academic Forum

www.iafor.org

Introduction

Education is both a fundamental need and a constitutional right of all citizens. Article 28C (1) of the 1945 Constitution of the Republic of Indonesia states that every individual has the right to develop themselves through the fulfilment of their basic needs, including education, and to benefit from advancements in science, technology, arts, and culture. This underscores that education is not merely a necessity but also an inherent individual right. Furthermore, Article 31 of the Constitution affirms that every citizen has the right to education and mandates the government to provide it, allocate at least 20% of the national and regional budgets to the education sector, and require citizens to undertake formal education.

ECE plays a crucial role in laying the foundation for children's development. It serves not only as preparation for entry into primary education but also provides essential stimulation for brain growth and development (Knudsen et al., 2006; Luby et al., 2013). A growing body of research shows that human brain development progresses most rapidly in the early years from birth to 2 years (Gilmore et al., 2018), between the ages of 2–5 children gain comprehension of shape and colour (Lowery et al., 2022), and brain maturation continues in cortical volume, surface area, and thickness which associated with cognitive skills like reading, problem solving, and social-emotional regulation between 5 to and 8 years (Houston et al., 2014). The period between 0–8 years often referred to as the “golden age” as in this period physical, cognitive, emotional, and social growth and integrated (Özmert, 2005). During this phase, the brain is highly responsive to environmental stimulation. Failure to fully utilize this critical period may result in lost developmental potential (Brown & Jernigan, 2012; Mackes et al., 2020). In this case parental roles and family engagement as early intervention can provide proper nutrition for brain and physical development, and enhances literacy, numeracy, and social-emotional development.

Previous studies also indicate that children who participate in ECE tend to achieve higher academic performance in later stages of education (Campbell et al., 2012), thereby increasing their likelihood of attaining better life outcomes. In addition, ECE participation contributes to children's social development, including their ability to behave appropriately, interact effectively, and function positively within school and community environments (Cliffe, 2025; Sylva & Colman, 2018). Moreover, children who attend ECE are found to have a lower risk of engaging in delinquent or criminal behaviour in adulthood (Schweinhart, 2013).

Given these benefits, public awareness—particularly among parents—regarding the importance of early education and stimulation is critical to ensuring that every child has optimal developmental opportunities. ECE has been widely recognized as fundamental to children's future success. However, in practice, public awareness and willingness to enrol children in ECE programs, both in Indonesia generally and in Papua specifically, remain relatively low.

Data from BPS-Statistics Indonesia (2025) show that the Gross Enrolment Rate (GER) for ECE in Indonesia remains far from ideal, reaching only 36.19 percent. The situation is even more concerning in the six provinces of Papua, where none has achieved a GER above the national average. West Papua records the highest participation rate at 25.27 percent, while other provinces fall below this figure. The lowest rate is observed in Highland Papua, where the GER stands at only 3.1 percent. In this context, parental awareness of the importance of ECE and cognitive stimulation becomes increasingly critical to ensure that children receive optimal developmental opportunities. Accordingly, this study aims to explore why children of ECE age in Manokwari remain at home by examining demand-side barriers from the perspective of

parents. The analysis focuses on cultural beliefs, household economic conditions, perceptions of the benefits and quality of ECE, and the role of children within the family. It also considers how the views and influence of village leaders shape community decisions regarding ECE participation.

This study offers a novel contribution, as most previous research has primarily focused on supply-side factors such as infrastructure and the availability of teachers, while studies on parental decision-making in the Papuan context remain limited. By presenting qualitative empirical evidence from Manokwari and highlighting the role of community leadership as a social mediator, this study contributes to a deeper understanding of demand-side barriers to ECE participation. The findings are expected to inform the development of more context-sensitive and inclusive ECE policies and interventions, particularly for remote and economically vulnerable regions.

The Concept of Demand-Side Barriers in Education

In general, access to education is determined not only by the availability of services (supply) but also by barriers on the demand side. Justino (2016) emphasizes that, within education systems, barriers to access arise not only from supply-side constraints—such as the availability of schools and infrastructure—but also from demand-side factors, including poverty, cultural aspects (such as values, norms, and local beliefs), social trauma, and insecurity. These factors reflect the economic, social, and psychological conditions of households that influence parents' decisions to send their children to school (Justino, 2016; UNESCO & UNICEF, 2024).

Deschênes (2007) further explore the relationship between demand-side variables—such as family background and perceptions of the returns to education—and educational participation. Their findings indicate that intergenerational socioeconomic conditions and expectations regarding the benefits of education directly shape parental decisions about children's participation in education. Thus, physical access to schools does not automatically translate into participation; rather, demand-side factors, particularly family-related conditions, play a decisive role.

Demand-Side Barriers to ECE Participation

ECE participation is defined as the level of engagement of young children in educational services prior to primary school (OECD, 2022). In the Indonesian context, ECE participation refers to the extent to which children aged 3–6 is enrolled in and actively attending ECE programs, including both formal institutions (e.g., kindergartens and Islamic kindergartens) and non-formal services such as playgroups and other similar programs. Various barriers, both from the supply and demand sides, contribute to low ECE participation (UNESCO, 2021). This world organization identifies several supply-side factors contributing to low ECE participation. First, limited facilities and infrastructure in many regions—particularly in disadvantaged, frontier, and outermost (3T) areas—result in shortages of classrooms, play equipment, and learning materials, thereby restricting service coverage. Second, there is a lack of qualified educators, as many ECE teachers do not possess adequate formal qualifications or professional training. Third, the distribution of ECE institutions is uneven, with many concentrated in urban or administrative centers, leaving remote areas underserved. Fourth, inadequate funding remains a persistent issue, particularly for private ECE providers facing operational constraints. Fifth, low quality standards and weak monitoring systems contribute to uneven service quality across regions.

In contrast, Copeland et al. (2025) identify five key demand-side barriers to ECE participation. These include: (i) low parental awareness of ECE options and benefits (awareness and perception), (ii) financial constraints (household economic conditions), (iii) concerns about social environments and skepticism toward formal education for very young children (cultural norms), (iv) the role of children within the household, and (v) trust in the quality of ECE services.

Parental Awareness and Perceptions of ECE

Mulia and Kurniati (2023) find that parental perceptions and knowledge regarding the importance of ECE significantly influence decisions to enroll children in ECE programs. Similarly, other studies show that the more positive parents' perceptions of the role and benefits of ECE, the more likely they are to enroll their children (Afni et al., 2025). However, despite a general awareness of the importance of ECE, some parents still perceive ECE as non-essential and merely preparatory for primary school. As a result, they may choose not to enroll their children in ECE programs.

Economic Factors

Kachi et al. (2020) demonstrate that household economic constraints—including both direct and indirect costs—significantly reduce the likelihood of children participating in ECE, particularly among low-income families. Direct costs include enrollment or registration fees, monthly tuition fees, uniforms, and school supplies (e.g., bags, shoes, stationery, and books). The indirect costs, on the other hand, include transportation to and from ECE Centers, lost working time as parents accompany or pick up their children, and additional consumption expenses such as meals, snacks, and hygiene-related needs (OECD, 2022). These combined financial burdens often discourage families from enrolling their children in ECE programs.

Cultural Factors

Cultural factors constitute an important dimension of demand-side barriers, as local values, norms, and beliefs can shape household decisions regarding children's participation in formal education. In certain contexts, traditional beliefs, language differences, and cultural identity may reduce families' motivation to engage with ECE services (Justino, 2016; UNESCO & UNICEF, 2024). Ghosh and Steinberg (2022) find that parental attitudes toward ECE—including beliefs that young children should be cared for at home by mothers or extended family members—contribute to low participation rates in ECE. In addition, parental skepticism toward formal education for very young children plays a significant role. Puroila and Kuusisto (2021) highlight that parental engagement is strongly influenced by their perceptions of the relevance of ECE; skepticism or doubt tends to reduce participation.

The Role of Children in the Household

The allocation of caregiving responsibilities within the household—such as older siblings caring for younger ones or children contributing to domestic work—can significantly limit children's participation in ECE. UNICEF (2024) reports that children, particularly girls, often spend considerable time on caregiving and household tasks, reducing their opportunities to attend ECE programs. This finding is consistent with studies by (Bhatnagar et al., 2025; Purohit & Khanna, 2025) which found that child labor often competes with child opportunities and

abilities to education, especially those with disadvantaged household. These facts limited children access to ECE.

Trust in Service Quality

Parental trust in the quality of ECE services is a key factor in increasing participation. Fadilah et al. (2025) emphasized improving service quality of ECE strengthen parental trust and increase the likelihood that children will be enrolled and retained in such programs. On the other hand, Kearney et al. (2023) further highlights that negative school environments, including intimidation and bullying, are associated with lower attendance rates. Parental concerns about children's safety—such as fears of bullying—may lead to school avoidance behaviors, ultimately contributing to lower participation in formal education services, including ECE.

Methodology

This study employs a qualitative case study design to explore demand-side barriers that influence parents' decisions not to enroll their children in ECE institutions. A qualitative approach was chosen to obtain an in-depth and contextualized understanding of the lived experiences and considerations of parents and community actors regarding ECE participation. Data were collected through semi-structured interviews.

The study participants consisted of two parents whose children of ECE age were not enrolled in any ECE institution, two village heads, four heads of ECE Centers, and one head of the ECE division at the Manokwari District Education Office. Informants were selected using purposive sampling to ensure a diversity of perspectives spanning household, community, and institutional levels.

The research instrument consisted of an interview guide focusing on perceptions of the benefits of ECE, economic and cultural considerations, and barriers to accessing ECE services. All interviews were transcribed and analyzed using a thematic approach (Braun & Clarke, 2006). Data triangulation was conducted by comparing findings from parents, ECE providers, and government officials to enhance the validity of the results. The analysis was directed toward identifying key themes related to socioeconomic constraints, culturally embedded caregiving practices, and geographical challenges that shape parental decision-making regarding children's participation in ECE.

Results and Discussion

Overview of ECE Accessibility in Manokwari Regency

Interviews with officials from the Manokwari District Education Office provide an overview of the accessibility of ECE services in the region. While ECE institutions are present in most districts, their distribution remains uneven and is largely concentrated in urban areas. In mountainous districts such as Warmare, Masni, and Tanah Rubuh, the number of ECE centers is still very limited, and some are no longer operational due to teacher shortages or a low number of enrolled children.

Officials noted that the ratio of ECE institutions to villages remains low: "Not every village has an ECE center. Some must merge with neighboring villages because the number of children

is small.” In addition, several centers have ceased operations because teachers have relocated or have not received honoraria for extended periods. Limited transportation access further exacerbates the situation. As one official explained, “Some ECE centers can only be reached by river, so when the water level rises, teachers cannot access them.”

These conditions have direct implications for inequalities in access to ECE services. For families in remote areas, distance and geographical constraints are key reasons why children do not participate in ECE. As noted by an official, “If the center is far and the road is difficult, parents will choose to keep their children at home.” Thus, barriers to access are not solely a matter of physical distance but also reflect limitations in human resources, infrastructure, and institutional capacity at the village level. This overview underscores that, before examining demand-side barriers, the availability of services must first be understood.

Geographical Barriers and Accessibility

Geographical constraints emerge as one of the most significant barriers to ECE participation in Manokwari. Several villages, such as Indonbey and Udapi Ilir, are located far from educational service centers, with poor road conditions and limited transportation options. One village official explained, “There have been proposals to establish an ECE center, but it has not been realized due to limited central government funding and the small number of children. Perhaps collaboration with neighboring villages will be considered.”

This statement highlights that geographical challenges are closely intertwined with administrative and demographic constraints. These findings reinforce previous studies (Fayanto et al., 2023; UNESCO, 2015), which identify geographical remoteness as a major barrier to access to early childhood services. Furthermore, representatives from the Education Office emphasized that the distribution of ECE institutions remains uneven, and efforts to establish new centers are often constrained by technical requirements and funding limitations from the central government. This indicates that geographical barriers extend beyond physical distance, reflecting broader governance gaps between centrally designed policies and local implementation capacity.

Direct and Indirect Cost Constraints

Interviews with parents indicate that household economic limitations constitute a primary barrier to accessing ECE. One mother explained, “When I suggest sending the child to school, the grandmother asks who will take care of the child, since we have to go to the garden.” This statement reflects the presence of indirect costs—specifically the loss of time and labor, as parents must accompany and pick up their children.

From an institutional perspective, the Education Office noted that most ECE centers in Manokwari continue to operate on a self-help basis, relying heavily on BOS funds, which are often disbursed late. As one official stated, “Many ECE centers suspend their activities because BOS funds have not yet been disbursed, and parents are unable to pay fees.” As a result, institutions struggle to cover operational costs or provide financial relief to low-income families.

However, interviews with village officials reveal local initiatives to utilize Otsus funds to support ECE. Several villages allocate a portion of these funds to provide incentives for non-formal ECE teachers. One village official explained, “We use a small portion of the Otsus funds

to provide transportation allowances or incentives for ECE teachers, so they remain motivated to come.”

Although relatively modest in scale, these initiatives demonstrate a growing awareness among local governments that the sustainability of ECE services depends on providing incentives to grassroots educators. Nevertheless, the Education Office noted that the use of Otsus funds for ECE remains unsystematic, with each village implementing different approaches. In most cases, these initiatives are ad hoc rather than part of an integrated village development plan aligned with regional education policies.

This situation suggests that financial barriers to ECE are not solely the result of fiscal constraints but also stem from fragmented governance across different levels of administration. The allocation of BOS, Otsus, and Village Funds remains insufficiently integrated within a coherent and consistent ECE financing framework. Consequently, fiscal support mechanisms that should be complementary instead operate in isolation and fail to ensure the sustainability of ECE services. The combination of household economic burdens, delays in BOS disbursement, and the suboptimal utilization of Otsus funds reinforces demand-side barriers to ECE participation.

Knowledge and Perceptions of the Benefits of ECE

Most parents in rural communities still perceive ECE primarily as a place for children to play rather than as an essential form of education. One village official explained, “Most people wait until kindergarten age, then send their children directly to kindergarten. Before that, they just let them play.” This perspective reflects a low perceived return to ECE—namely, the extent to which parents believe that schooling at an early age is beneficial.

The Education Office further noted that the low quality of ECE services also shapes community perceptions. Many ECE teachers in the region are not formally certified and have not received adequate pedagogical training, which reduces public trust in the value of ECE. This aligns with findings by Boyd and Newman (2019) and Heckman et al. (2010), who suggest that perceptions of the long-term benefits of education are strongly influenced by the quality of services received. Thus, the low demand for ECE in Manokwari is driven not only by limited parental awareness but also by inadequate service quality on the supply side.

Cultural Preferences in Childcare Practices

Local cultural values in West Papua remain a central consideration in family decisions regarding ECE. Interview findings indicate that childcare practices in Manokwari are strongly shaped by traditional social structures, intergenerational relationships, and local spiritual beliefs. Several informants reported that early marriage remains relatively common, particularly in rural communities. In some cases, young girls are married due to social obligations or family debts. Such marriages often end in early divorce, with children subsequently being raised by their grandparents. However, these grandparents are typically still engaged in subsistence work, such as farming, leaving them with limited time to support children’s schooling. As noted by the Education Office, “Many children are raised by elderly caregivers, so there is no one to take them to school, especially when the biological parents are separated.”

In addition, there exists a customary belief that children under the age of three should not be taken outside the home, due to fears that they may fall ill or be affected by supernatural forces (locally referred to as *suanggi*). Within this belief system, if a young child becomes ill after being taken outside, grandparents or extended family members may strongly reprimand the parents for violating these norms. One informant stated, “If a young child is taken outside, they might get sick. Grandparents can get angry and say that *suanggi* has sent harmful winds.” As a result, in households with both ECE-aged children and infants under three years old, mothers are often unable to take older children to ECE centers due to family restrictions on leaving the house with a baby. Consequently, decisions not to enroll children in ECE are not solely based on rational economic considerations but also reflect adherence to social norms and family structures that prioritize child safety within a spiritual and communal framework.

This phenomenon highlights that cultural barriers to ECE participation in Papua extend beyond perceptions of formal education to encompass belief systems and power relations within extended families. Local customs and spiritual values create a strong “ecology of caregiving,” in which decisions about child-rearing are not made solely by nuclear parents but are influenced by the moral authority of grandparents and the broader community. Nevertheless, adaptive efforts have begun to emerge in several villages. The Education Office has reported initiatives such as church-based ECE programs and extended family-based approaches, in which ECE teachers visit children’s homes to conduct short learning and play sessions—particularly for families constrained by cultural restrictions on taking children outside the home. Such approaches demonstrate the potential for integrating local cultural values with ECE goals, in line with the concept of context-sensitive early education (Bonney et al., 2026). Thus, cultural factors in West Papua should be understood not only as barriers but also as opportunities to design ECE models that respect the social and spiritual context of local communities without undermining the cultural values that underpin their way of life.

The Role of Community and Village Government

Interviews with village officials reveal that support for ECE at the community level remains limited. Most villages do not yet have routine mechanisms for collecting data on early childhood populations, and the establishment of ECE services often depends on individual initiatives or non-formal institutions. As one village official noted, “Ideally, the community could help the village collect data, but so far the number of ECE-aged children recorded is still very small.”

The Education Office confirmed that coordination between the district office and village governments remains weak, particularly in terms of data collection and program planning for ECE. This condition reflects a governance gap at the local level, where policies exist but are not effectively connected to implementation capacity on the ground. Bruns et al. (2011) emphasize the importance of local leadership in strengthening participation in basic education. In the context of Manokwari, the roles of village heads, teachers, and religious leaders are crucial in building social legitimacy for ECE services.

Synthesis and Policy Implications

A synthesis of cross-level interviews—encompassing parents, village heads, ECE providers, and officials from the Education Office—reveals that barriers to ECE participation in Manokwari Regency are multidimensional and mutually reinforcing. Geographical, economic, cultural, and governance-related factors do not operate independently; rather, they interact to

create a cycle of persistently low demand for ECE. From a structural perspective, geographical remoteness, limited infrastructure, and the uneven distribution of ECE institutions reduce children's access to services. Economically, the burden of both direct and indirect costs borne by households is not adequately offset by existing public financing mechanisms. Although BOS funds and, to some extent, Otsus funds have been utilized to support ECE teachers, their allocation remains inconsistent and insufficiently systematized. Meanwhile, cultural factors—including early marriage practices, grandparent-led caregiving, and customary restrictions on the mobility of young children—further reinforce social constraints that hinder ECE participation.

These findings underscore the need for an ecosystem-based policy approach to ECE in West Papua—one that integrates social, cultural, and institutional dimensions. ECE should not be viewed merely as a formal education service, but as part of a broader community-based social network rooted in local values. Accordingly, effective policy interventions must be cross-sectoral, linking education, regional fiscal policy, village governance, and religious institutions. By conceptualizing ECE as a social ecosystem embedded within local customs and spiritual life, strategies to increase participation in ECE in West Papua should prioritize community-based collaboration and the sustainable use of local resources. Such an approach provides a foundation for developing affirmative policies that not only expand the number of ECE institutions but also strengthen the social legitimacy of ECE within Papuan cultural contexts.

Conclusion

This study reveals that low participation in ECE in Manokwari Regency is the result of a complex interaction among geographical, economic, cultural, and governance-related factors. Access to ECE services remains limited, particularly in mountainous and remote village areas, where distance, transportation, and the availability of teachers pose significant challenges. Economic barriers are also substantial, encompassing both direct and indirect costs borne by households. In addition, local cultural values and spiritual beliefs continue to shape household decision-making. Practices such as early marriage, grandparent-led caregiving, and customary restrictions on children under the age of tree leaving the home create a complex social system that often constrains children's participation in ECE.

From a governance perspective, delays in the disbursement of BOS funds and the suboptimal utilization of Otsus funds present additional challenges to the sustainability of ECE institutions. Nevertheless, local initiatives have emerged, including the use of Otsus funds to provide incentives for ECE teachers, partnerships with churches, and the implementation of integrated ECE models such as *one-roof ECE programs*. These efforts reflect the emergence of adaptive, context-based policy directions.

Therefore, increasing ECE participation in West Papua requires not only expanding the number of institutions but also strengthening social networks, improving coordination across levels of government, and harmonizing fiscal support with local cultural values. Based on these findings, several policy recommendations are proposed:

1. Adopting Socio-Cultural Approaches in Promoting ECE: Traditional leaders, religious figures, and grandparents should be actively involved in raising community awareness about the importance of ECE. Communication strategies should emphasize that ECE complements, rather than replaces, family caregiving roles.

2. Integrating the Use of Otsus Funds for ECE: Regional governments should establish formal guidelines to ensure that Otsus funds are systematically allocated to support ECE operations, teacher incentives, and community-based educational activities.
3. Strengthening Village-Based ECE and Inter-Village Collaboration: Village-level or inter-village ECE models should be promoted, particularly in sparsely populated areas, with supervision from the Education Office to ensure service continuity despite limited student numbers.
4. Optimizing Village Funds for Non-Formal ECE: Technical regulations should be developed to enable Village Funds to support non-formal ECE, including improving learning facilities and providing locally relevant educational play materials.
5. Enhancing the Capacity and Professionalism of Local ECE Teachers: Regular training programs for community-based ECE teachers should be implemented, alongside simplified certification systems recognized within national education data systems, to improve service quality and public trust.
6. Strengthening Early Childhood Data Systems and Cross-Level Coordination: An integrated data system between the Education Office and village governments should be developed to support evidence-based and efficient ECE planning.
7. Affirmative Support for Remote and Mountainous Areas: Additional support should be provided in the form of transportation allowances for teachers, logistical subsidies, and flexible accreditation mechanisms for ECE institutions in hard-to-reach areas.

Through these strategies, ECE policy in West Papua can become more context-sensitive, equitable, and sustainable. The integration of fiscal support mechanisms (BOS funds and Otsus funds), community participation, and respect for local cultural values will form a critical foundation for improving human capital development in Papua from early childhood.

Acknowledgements

This research was funded under the funding program of the Research Organization for Social Sciences and Humanities (OR IPSH), National Research and Innovation Agency (BRIN), and the Southeast Asian Ministers of Education Organization, Centre for Early Childhood Care, Education and Parenting (SEAMEO CECCEP). The authors extend sincere appreciation to all SEAMEO CECCEP staff for their support and assistance during data collection process in Manokwari. Deep gratitude to all informants—parents, village heads, heads of ECE institutions, ECE teachers, and officials from the Education Office—who generously shared their experiences and perspectives.

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

The authors acknowledge the use of artificial intelligence (AI) technologies in supporting brainstorming and translation during the preparation of this article, as well as in refining the language of the manuscript to enhance accuracy and clarity. All ideas, research design, procedures, findings, analyses and discussions are original and derived from the careful and systematic conduct of the study.

References

- Afni, J., Zulfikri, & Lestari, M. C. D. (2025). Persepsi Orang Tua Terhadap Pentingnya Pendidikan Anak Usia Dini Di Jorong VI Rumbio Kecamatan Rao Utara [Parents' Perceptions of the Importance of Early Childhood Education in Jorong VI Rumbio, North Rao]. *Indonesian Journal of Islamic Early Childhood Education*, 9(2). <https://doi.org/10.51529/ijiece.v9i2.486>
- Bhatnagar, S., Ahluwalia, G., S. Kumar, H., Kumari, S., Mishra, S., & P. Khan, H. (2025). Investigating the relationship between poverty, access to education, and hazardous child labor. *Multidisciplinary Science Journal*, 7, 2025ss0330. <https://doi.org/10.31893/multiscience.2025ss0330>
- Bonney, E. A., Akosah, E. F., Tawiah-Mensah, J. E., Tetteh, A. A., & Kafu, G. Y. (2026). Culturally Responsive Pedagogy: Leveraging Ethno-Cultural Approaches To Enhance Mathematics and Science Teaching in Ghana's Early Childhood Development Programs. *Early Childhood Education Journal*. <https://doi.org/10.1007/s10643-025-02089-1>
- Boyd, W., & Newman, L. (2019). Primary + Early Childhood = chalk and cheese? Tensions in undertaking an early childhood/primary education degree. *Australasian Journal of Early Childhood*, 44(1), 19–31. <https://doi.org/10.1177/1836939119841456>
- BPS-Statistics Indonesia. (2025). *Gross Enrolment Ratio in Early Childhood Care and Education (GER/ECCE) by Province*.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Brown, T. T., & Jernigan, T. L. (2012). Brain Development During the Preschool Years. *Neuropsychology Review*, 22(4), 313–333. <https://doi.org/10.1007/s11065-012-9214-1>
- Bruns, B., Filmer, D., & Patrinos, H. A. (2011). *Making Schools Work*. World Bank. <https://doi.org/10.1596/978-0-8213-8679-8>
- Campbell, F. A., Pungello, E. P., Burchinal, M., Kainz, K., Pan, Y., Wasik, B. H., Barbarin, O. A., Sparling, J. J., & Ramey, C. T. (2012). Adult outcomes as a function of an early childhood educational program: An Abecedarian Project follow-up. *Developmental Psychology*, 48(4), 1033–1043. <https://doi.org/10.1037/a0026644>
- Cliffe, J. (2025). Creating a nurturing environment in early childhood education and care, with a focus upon relationships, awe and wonder. In *Social Pedagogy in Education* (pp. 21–31). Routledge. <https://doi.org/10.4324/9781003533276-3>
- Copeland, K. A., Amsterdam, A., Gerker, H., Bennett, D., Ladipo, J., & King, A. (2025). Why is ECE enrollment so complicated? An analysis of barriers and co-created solutions from the frontlines. *Early Childhood Research Quarterly*, 71, 12–25. <https://doi.org/10.1016/j.ecresq.2024.11.007>

- Deschênes, O. (2007). Estimating the Effects of Family Background on the Return to Schooling. *Journal of Business & Economic Statistics*, 25(3), 265–277. <https://doi.org/10.1198/073500106000000567>
- Fadilah, F., Ningsih, A. D., & Hasibuan, R. H. (2025). The Impact of Service Quality and Trust in Early Childhood Education: Why Parents Stay—or Walk Away? *Seulanga : Jurnal Pendidikan Anak*, 6(1), 37–48. <https://doi.org/10.47766/seulanga.v6i1.6079>
- Fayanto, S., Ulfa, S., Praherdhiono, H., Shinta, N. D., Takda, A., Sahara, L., & Balulu, N. (2023). Design of Exo Physics Book Based on Mobile Application as a Means of Literacy Learning Media for Remote Areas in Indonesia. *Journal of Learning for Development*, 10(3), 411–426. <https://doi.org/10.56059/jl4d.v10i3.846>
- Ghosh, S., & Steinberg, H. (2022). Parents' attitudes and unequal opportunities in early childhood development: Evidence from Eastern India. *Journal of Early Childhood Research*, 20(3), 413–430. <https://doi.org/10.1177/1476718X221077170>
- Gilmore, J. H., Knickmeyer, R. C., & Gao, W. (2018). Imaging structural and functional brain development in early childhood. *Nature Reviews Neuroscience*, 19(3), 123–137. <https://doi.org/10.1038/nrn.2018.1>
- Heckman, J. J., Moon, S. H., Pinto, R., Savelyev, P. A., & Yavitz, A. (2010). The rate of return to the HighScope Perry Preschool Program. *Journal of Public Economics*, 94(1–2), 114–128. <https://doi.org/10.1016/j.jpubeco.2009.11.001>
- Houston, S. M., Lebel, C., Katzir, T., Manis, F. R., Kan, E., Rodriguez, G. G., & Sowell, E. R. (2014). Reading skill and structural brain development. *NeuroReport*, 25(5), 347–352. <https://doi.org/10.1097/WNR.0000000000000121>
- Justino, P. (2016). Supply and demand restrictions to education in conflict-affected countries: New research and future agendas. *International Journal of Educational Development*, 47, 76–85. <https://doi.org/10.1016/j.ijeducdev.2016.01.002>
- Kachi, Y., Kato, T., & Kawachi, I. (2020). Socio-Economic Disparities in Early Childhood Education Enrollment: Japanese Population-Based Study. *Journal of Epidemiology*, 30(3), 143–150. <https://doi.org/10.2188/jea.JE20180216>
- Kearney, C. A., Dupont, R., Fensken, M., & Gonzálvez, C. (2023). School attendance problems and absenteeism as early warning signals: review and implications for health-based protocols and school-based practices. *Frontiers in Education*, 8. <https://doi.org/10.3389/educ.2023.1253595>
- Knudsen, E. I., Heckman, J. J., Cameron, J. L., & Shonkoff, J. P. (2006). Economic, neurobiological, and behavioral perspectives on building America's future workforce. *Proceedings of the National Academy of Sciences*, 103(27), 10155–10162. <https://doi.org/10.1073/pnas.0600888103>
- Lowery, K., Nikam, B., & Buss, A. T. (2022). Dimensional label learning contributes to the development of executive functions. *Scientific Reports*, 12(1), 11008. <https://doi.org/10.1038/s41598-022-14761-2>

- Luby, J., Belden, A., Botteron, K., Marrus, N., Harms, M. P., Babb, C., Nishino, T., & Barch, D. (2013). The Effects of Poverty on Childhood Brain Development. *JAMA Pediatrics*, 167(12), 1135. <https://doi.org/10.1001/jamapediatrics.2013.3139>
- Mackes, N. K., Golm, D., Sarkar, S., Kumsta, R., Rutter, M., Fairchild, G., Mehta, M. A., Sonuga-Barke, E. J. S., Sonuga-Barke, E., Kennedy, M., Kreppner, J., Knights, N., Kumsta, R., Maughan, B., & Schlotz, W. (2020). Early childhood deprivation is associated with alterations in adult brain structure despite subsequent environmental enrichment. *Proceedings of the National Academy of Sciences*, 117(1), 641–649. <https://doi.org/10.1073/pnas.1911264116>
- Mulia, P. S., & Kurniati, E. (2023). Partisipasi Orang Tua dalam Pendidikan Anak Usia Dini di Wilayah Pedesaan Indonesia [Parental Participation in Early Childhood Education in Rural Areas of Indonesia]. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 7(3), 3663–3674. <https://doi.org/10.31004/obsesi.v7i3.4628>
- OECD. (2022). *Education at a Glance 2022: OECD Indicators*. OECD Publishing. <https://doi.org/10.1787/3197152b-en>
- Özmert, E. N. (2005). Early childhood development and nutrition. *Cocuk Sagligi ve Hastaliklari Dergisi*, 48(2), 179–195.
- Purohit, P., & Khanna, S. (2025). Impact of Child Labor on the Health and Well-Being of Children in Rural Communities. In *Rural Futures* (pp. 321–346). Jenny Stanford Publishing. <https://doi.org/10.1201/9781003741732-12>
- Purola, K., & Kuusisto, A. (2021). Parental participation and connectedness through family social capital theory in the early childhood education community. *Cogent Education*, 8(1). <https://doi.org/10.1080/2331186X.2021.1923361>
- Schweinhart, L. J. (2013). Long-term follow-up of a preschool experiment. *Journal of Experimental Criminology*, 9(4), 389–409. <https://doi.org/10.1007/s11292-013-9190-3>
- Sylva, K., & Colman, P. (2018). Preschool Intervention to Prevent Behaviour Problems and School Failure. In *Parenting, Schooling and Children's Behaviour* (pp. 75–88). Routledge. <https://doi.org/10.4324/9780429450747-5>
- UNESCO. (2015). *Education for All Global Monitoring Report 2015: Education for All 2000-2015: Achievements and challenges*. GEM Report UNESCO. <https://doi.org/10.54676/LBSF6974>
- UNESCO. (2021). *Inclusive early childhood care and education: from commitment to action*. UNESCO.
- UNESCO, & UNICEF. (2024). *Global report on early childhood care and education: the right to a strong foundation*. UNESCO. <https://doi.org/10.54675/FWQA2113>

UNICEF. (2024). *Time Spent on Unpaid Domestic and Caregiving Services by Children in India Insights into gender, age and learning* (pp. 1–31). UNICEF Innocenti – Global Office of Research and Foresight.

Contact email: simo003@brin.go.id

Specifics in Expert Assessments of Educational Profiles Based on Personality Strengths Among European Countries

Maya Fyodorova-Radicheva, Paisii Hilendarski University of Plovdiv, Bulgaria

Dora Levterova-Gadjalova, Paisii Hilendarski University of Plovdiv, Bulgaria

Galina Tzokov, Paisii Hilendarski University of Plovdiv, Bulgaria

The Asian Conference on Education & International Development 2026

Official Conference Proceedings

Abstract

The present study aims to identify distinctive features in the perception and expert assessment of students' strengths in the context of educational profiles in different European countries. Growing differentiation in the field of education necessitates the development of more effective and sustainable models for personalization in school education. This search for appropriate methodologies and environments for optimizing and individualizing the learning experience has led to the emergence of numerous innovative practices and tools. Educational profiles are particularly beneficial tools that enable significant individualization of the learning process. The combined use of educational profiles and artificial intelligence enables the creation of online learning platforms capable of providing a unique learning trajectories, thereby significantly optimizing the learning process. Introducing such training paths can also be done successfully in a multinational environment, which adds even more value to the effort to develop relevant and effective educational profiles. Our study examines the specificities associated with the perception of educational profiles in a multinational context, enabling a case analysis based on the specific expertise of various European countries. The study involves 16 scientists (experts) from 6 European countries (Bulgaria, Turkey, Spain, Portugal, Finland, Poland), who give their expert assessment of an educational profile in a short questionnaire specially designed for this purpose. Certain specific features are observed, the scientific significance of which is discussed in detail in this paper.

Keywords: experts, educational profile, personal strengths, student profile

iafor

The International Academic Forum

www.iafor.org

Introduction

Educational systems around the world are remarkably diverse and employ a variety of structures and methodologies in the educational delivery process. There are no unified standards for or uniformity in these types of activities, either globally or within Europe. In the context of increasing globalization, however, practical conditions necessitate the search for ways to synchronize the outputs of the educational systems of countries within the European Economic Area, where the transfer of knowledge and skills from one country's educational system to another's labor market is becoming increasingly common (European Commission, 2025). At the same time, educational systems in different countries can vary significantly from one another along a number of indicators. For example, the period of compulsory education in the six countries included in this study begins earliest in Bulgaria (starting at age 4) and ends earliest in Bulgaria and Spain (at age 16). On the other hand, the period of compulsory education begins and ends latest in Finland, Poland, and Portugal (from age 7 to 18) (European Commission, 2025). Similar differences can be found in other aspects of education systems as well. A comprehensive transformation of the education system requires an in-depth debate among countries, as well as addressing a vast amount of cultural issues that cannot be quickly resolved. At the same time, however, the labor market imposes requirements that cannot be postponed. That necessitates the development of a model to support the establishment of a system of nationally valid competencies that would form the basis of the debate on education. Educational profiles, as a concept, hold significant potential for achieving this goal. Therefore, this study focuses on the elaboration of an international expert assessment of the concept of educational profiles based on students' strengths, as suggested by us.

Literature Review

Systems for diagnostically assessing students' educational profiles involve a multi-component set of methods and tools designed to accurately evaluate students' cognitive abilities, interests, and career orientation. These systems integrate pedagogical and psychological assessment with objective criteria used to analyze the educational process. In the contemporary paradigm, a wide range of methodologies is used (Levterova-Gadjalova et al., 2023). The main models for profile construction include:

- Questionnaires and Self-Assessment – This method is based on students' reflection upon everyday situations, allowing them to identify their personal preferences through self-assessment.
- Standardized assessment – Administration of validated questionnaires to measure various dimensions of personality and intellectual capacity.
- Assessment against educational standards – Evaluation of the degree to which competencies outlined in the curricula for specific subjects have been acquired from the students during the educational process. Main method used from the educational systems around the world.
- Observation and expert assessment – Direct monitoring of behavior in an educational setting. In the Bulgarian context, this method is fundamental to assessing individual needs for additional support for personal development (Ministerstvo na obrazovaniето i naukata, 2017).
- Digital diagnostics and intelligent tutoring systems – This method is undergoing the most dynamic development, as it integrates artificial intelligence and adaptive algorithms to analyze the learning process in real time. Unlike the traditional methods,

digital systems enable active diagnostics that not only record results but also modulate the behavior of the learner on the e-learning platforms (Tzouveli et al., 2008).

Contemporary research has highlighted the role of artificial intelligence in education for identifying individual learning styles and cognitive aptitudes. Through tracking the “digital footprints” of learners’ progress, adaptive learning systems provide personalized content tailored to the specific needs of each learner (Luckin & Holmes, 2016). The implementation of these technologies allows an expansion of the scope of profiling, shifting from static assessment to dynamic prediction of educational outcomes.

Globally, approaches to the exploration of student profiles vary widely. Different axes are used depending on the central characteristic of the system. Some models emphasize the characteristics of sensory processing, while others focus on personality traits or the development of specific knowledge, skills, and competencies necessary for lifelong development.

Contemporary research has highlighted the role of artificial intelligence in education for identifying individual learning styles and cognitive aptitudes. Through tracking the “digital footprints” of learners’ progress, adaptive learning systems provide personalized content tailored to the specific needs of each learner (Luckin & Holmes, 2016). The implementation of these technologies allows an expansion of the scope of profiling, shifting from static assessment to dynamic prediction of educational outcomes.

Globally, approaches to the exploration of student profiles vary widely. Depending on the central characteristic of the system, different axes are employed. While some models emphasize sensory processing characteristics, others focus on personality traits or the acquisition of specific knowledge, skills, and competencies that are essential for lifelong development.

Within the context of the American educational framework, various approaches to the educational profile are employed. Newer models, disseminated and implemented by NGOs, focus on different domains related to the student’s socio-cultural environment—family, culture, and community (Avallone, 2026). For other models, the focus is on learning styles and predominant intelligence (EL Education, 2026). The use of the cluster analysis approach, meanwhile, reveals the presence of two main domains in students’ learning profiles at the end of their education—cognitive and motivational (Alexander & Murphy, 1999) — and allows for the formulation of four main learning styles: integrated strategy users, information organizers, mental learners, and limited strategy users, where the highest results on achievement tests are found among students who use integrated learning strategies (Rogiers et al., 2019). In the U.S. public education system, learning profiles are primarily used to develop individualized education programs for students with special needs, within the context of the legal provisions defined in the Individuals with Disabilities Education Act (IDEA) (U.S. Department of Education, 2026).

At the global scale, however, there is also a long-standing practice of actively using learning profiles as a key tool in school education. The use of the VARK model with students who are already literate and possess skills in reflection and self-monitoring has been in use in New Zealand’s educational system as early as 1987. Within this framework, the questionnaire has been used as a primary model for identifying students’ sensory learning preferences (Fleming & Baume, 2006), which allows for better personalization of educational materials. The

acronym for its name comes from the four main sensory styles—Visual, Auditory, Reading/Writing, and Kinesthetic (Fleming, *I'm different; not dumb. Modes of presentation [VARK] in the tertiary.*, 1995). The widespread use of this type of model is directly linked to the early profiling of learners, since the creation of individual student profiles allows for the establishment of personalized learning paths as early as middle school. However, there is also considerable strong criticism directed at Fleming's model and other similar models. The main criticism is directed at the lack of any clear evidence that the learning outcomes actually improve as a result of the model's use (Nancekivell et al., 2020; Newton & Miah, 2017; Pashler et al., 2008). Directing students towards the sensory styles identified through the methodology does not have a positive effect on academic achievement or student well-being in the educational setting (Nancekivell et al., 2020). The inconsistency of the model also encompasses the existence of an extremely wide variety of preferred models in practical work with students (Pashler et al., 2008). The existence of individual differences regarding preferred styles of information presentation does not imply that these preferences correspond to actual individual characteristics of cognitive information processing. Although this type of profiling has been used for over 20 years in global practice, no study has confirmed any benefits in terms of the learning process (Nancekivell et al., 2020; Newton & Miah, 2017). These findings have prompted the search for new working models that can provide real added value to the educational process. These models must take into account not only sensory and neuro-processual approaches to the delivery of instructional content, but also a holistic view on the educational process. Such models are designed to meet the requirements that the digitization and globalization of our society place on education.

The creation of educational profiles is also used by many European countries, but this approach is mostly focused on supporting the educational process for children who need extra support, such as those with special educational needs, children at risk, migrant children, and also gifted and talented children. An example of this is the Portuguese government's policy on creating educational profiles for migrant children, with the aim of supporting their integration into the Portuguese educational environment (Portal de serviços públicos da República Portuguesa, 2026). In Spain, the educational system focuses on the specific needs of the child and student over the course of 2-year cycles, without creating a holistic profile for the student (European Agency for Special Needs and Inclusive Education, 2026). In Finland, educational profiles are used not only in the context of special educational needs and additional support, but also as a tool for creating an individual competency-based learning path and for developing personalized digital lifelong learning services (Digital service package for continuous learning) (Ministry of Education and Culture, 2026). The use of educational profiles in Poland is relatively limited, with the primary focus being placed on the development of a profile for students who have completed their compulsory education (Ministry of Education and Culture, 2026). On its part, Turkey has introduced, as a useful innovation, the development of an educational profile for students consisting of four general integrated areas, which are divided into 10 sub-competencies, each of which is expressed as six different desired outcomes (four integrity areas are divided into 10 sub-competencies and each of these 10 competencies is expressed as 6 different student outcomes) (European Commission, 2025). As already mentioned, in Bulgaria, educational profiles are fundamental to the assessment of individual needs for additional support in the country's inclusive education system (Ministerstvo na obrazovanieto i naukata, 2017).

Educational profiles are often identified as a fundamental tool for the improvement and harmonization of educational standards in developing countries, where access to education is often limited. In this setting, educational profiles serve as a quick and effective model for

assessing educational needs and guiding learning along the most appropriate educational pathways (RISE, 2026). The development of educational profiles is a key factor in optimizing pedagogical interaction and realizing the full potential of school-based educational programs in society. For this reason, the international organization UNESCO emphasizes the need to develop a holistic educational profile not only during school education but also at the very end of it. In this regard, UNESCO (2017) advocates the need to develop a holistic educational profile that encompasses the development of the student throughout the entire course of compulsory education. This conceptual framework is hierarchically structured and includes: an axiological core—based on fundamental values such as sovereignty, responsibility, integrity, and civic participation—and a periphery of competencies—critical and creative thinking, scientific and technological literacy, digital communication, and autonomy (UNESCO, 2017).

Even though the principles of this approach are founded on a humanistic perspective and coherence, its traditional application through teacher surveys reveals serious methodological shortcomings. One of the main problems is relative subjectivity, whereby evaluative statements often do not correlate directly with theoretical constructs and suffer from low statistical validity and reliability. It follows that they carry a significant probability of error. Therefore, most methodologies for identifying specific details in the educational profile use standardized questionnaires that examine the various aspects of the profiles in detail. For this reason, the present study focuses on the creation of precisely such an instrument. We can identify three main approaches to the educational profiles, in terms of their role as a tool for personalization in education—approaches based on the learner’s existing knowledge (Learner models), on the learner’s competency profile (Competency-based profiling), and on the learning analytics profile (Learning analytics-based profiling). All three models play a significant role in the development of curricula that allow the personalization of learning and allow teachers to adapt their teaching so that students can self-regulate and monitor their own learning (Barthakur et al., 2023).

The differences in approaches do not hinder the formulation of a comprehensive international and multinational approach to the student’s educational profile. On the contrary, they provide a broad foundation upon which a comprehensive model for developing educational profiles could be built.

Methodology

In the present questionnaire, we utilize the profile of the learner’s strengths. We sought the expert opinion of an international team of education experts regarding a questionnaire that includes five core profiles based on students’ strengths. These five profiles are as follows:

- Social competencies profile;
- Emotional profile;
- Behavioral profile;
- Cognitive profile;
- Sensory profile;

Mapping the educational profile of students by describing their strengths is an innovative approach aimed at creating a holistic profile that enables the learning process and outcomes to be practically oriented toward achieving optimal learning outcomes.

A 5-point rating scale is provided for each question, as follows: 1 – Never, 2 – Very rare, 3 – Sometimes, 4 – Often, and 5 – Always.

Experts assess the relevance of each question to the corresponding scale based on their experience and expert knowledge within the context specific to their country.

Table 1

Questionnaire for Expert Assessment of Educational Profiles Based on the Student's Strengths Questionnaire. 5 – Factor Model

Social competence profile	Emotional profile	Behavioral profile	Cognitive profile	Sensory profile
1.1 Demonstrate an ability for positive communication with others.	2.1 Able to recognize emotions and emotional reactions.	3.1 Demonstrates a drive for prosocial behavior.	4.1 Learn from past mistakes.	5.1 Demonstrates good sensory integration and awareness. Adequate sensory processing of incoming information
1.2 Loves to collaborate with others.	2.2 Exhibits the ability to adopt another person's perspective.	3.2 Has a good sense of humor.	4.2 Learns best when doing different things/making things.	5.2 Demonstrates ability to discriminate between significant and irrelevant sensory information. Able to separate important from unimportant information for a given task.
1.3 Understands non-verbal communication signals.	2.3 Has an optimistic attitude to life.	3.3 Able to follow instructions with accuracy.	4.3 Uses cognitive strategies for learning and problem solving.	5.3 Observing and ability to identify changes related to transformation/modification in sensory information.
1.4 Is able to ask for support when needed.	2.4 Establishes trustworthy affective attachment to significant others.	3.4 Able to organize their learning and leisure time.	4.4 Demonstrates an ability to think with an attention to the details.	5.4 Good semantic processing of structural elements (figures, background, shapes, objects).
1.5 Participate with ease in different group games and activities.	2.5 Able to express their feelings openly and appropriately to the social situation.	3.5 Plans and implements consistent actions to accomplish a given goal.	4.5 Able to use imagination to create creative solutions and conduct mental experiments.	5.5 Precision and sensitivity to the fine details of the sensory image.

The survey was conducted in December 2025 with paper forms. All experts provided their informed consent to participate in the study. The data were collected in accordance with ethical standards for conducting research involving human subjects. No personal data was collected in the study. All analyses were performed by using IBM SPSS Statistics 25.

Results and Discussion

All profiles show high average ratings (Min = 5; Max = 25) – Social (20.31), Emotional (21.06), Behavioral (20.75), Cognitive (20.75), Sensory (21.13). That can be considered as a significant mark for the perceived relativeness of the scales, according to the subjects. The descriptive statistics of the expert assessment results are showed in Table 2.

Table 2

Five Scales Descriptive Statistics – Results by Countries

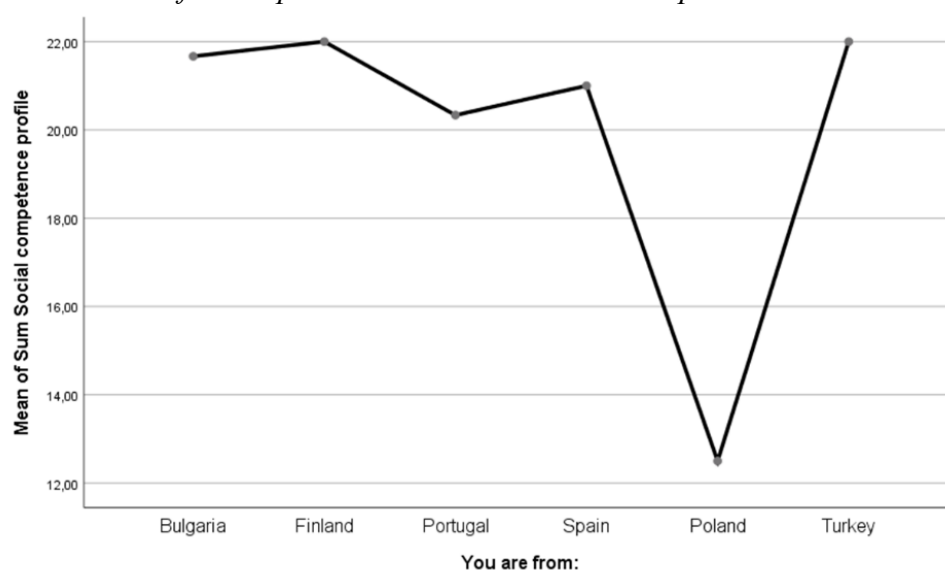
Descriptives									
		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Sum Social competence profile	Bulgaria	3	21.6667	0.57735	0.33333	20.2324	23.1009	21.00	22.00
	Finland	3	22.0000	3.60555	2.08167	13.0433	30.9567	18.00	25.00
	Portugal	3	20.3333	1.52753	0.88192	16.5388	24.1279	19.00	22.00
	Spain	2	21.0000	1.41421	1.00000	8.2938	33.7062	20.00	22.00
	Poland	2	12.5000	2.12132	1.50000	-6.5593	31.5593	11.00	14.00
	Turkey	3	22.0000	3.00000	1.73205	14.5476	29.4524	19.00	25.00
	Total	16	20.3125	3.66458	0.91615	18.3598	22.2652	11.00	25.00
Sum Emotional profile	Bulgaria	3	22.0000	1.00000	0.57735	19.5159	24.4841	21.00	23.00
	Finland	3	21.0000	2.00000	1.15470	16.0317	25.9683	19.00	23.00
	Portugal	3	19.0000	1.00000	0.57735	16.5159	21.4841	18.00	20.00
	Spain	2	23.5000	0.70711	0.50000	17.1469	29.8531	23.00	24.00
	Poland	2	21.0000	5.65685	4.00000	-29.8248	71.8248	17.00	25.00
	Turkey	3	20.6667	4.04145	2.33333	10.6271	30.7062	17.00	25.00
	Total	16	21.0625	2.64496	0.66124	19.6531	22.4719	17.00	25.00
Sum Behavioral profile	Bulgaria	3	20.6667	0.57735	0.33333	19.2324	22.1009	20.00	21.00
	Finland	3	23.6667	0.57735	0.33333	22.2324	25.1009	23.00	24.00
	Portugal	3	17.0000	1.73205	1.00000	12.6973	21.3027	15.00	18.00
	Spain	2	20.5000	0.70711	0.50000	14.1469	26.8531	20.00	21.00
	Poland	2	20.5000	6.36396	4.50000	-36.6779	77.6779	16.00	25.00
	Turkey	3	22.0000	3.00000	1.73205	14.5476	29.4524	19.00	25.00
	Total	16	20.7500	3.04412	0.76103	19.1279	22.3721	15.00	25.00
Sum Cognitive profile	Bulgaria	3	20.6667	2.08167	1.20185	15.4955	25.8378	19.00	23.00
	Finland	3	22.6667	1.52753	0.88192	18.8721	26.4612	21.00	24.00
	Portugal	3	18.0000	2.00000	1.15470	13.0317	22.9683	16.00	20.00
	Spain	2	23.0000	2.82843	2.00000	-2.4124	48.4124	21.00	25.00
	Poland	2	18.5000	6.36396	4.50000	-38.6779	75.6779	14.00	23.00
	Turkey	3	21.6667	3.05505	1.76383	14.0775	29.2558	19.00	25.00
	Total	16	20.7500	3.10913	0.77728	19.0933	22.4067	14.00	25.00

Sum Sensory profile	Bulgaria	3	21.0000	1.00000	0.57735	18.5159	23.4841	20.00	22.00
	Finland	3	22.6667	1.52753	0.88192	18.8721	26.4612	21.00	24.00
	Portugal	3	19.6667	3.21455	1.85592	11.6813	27.6521	16.00	22.00
	Spain	2	22.5000	0.70711	0.50000	16.1469	28.8531	22.00	23.00
	Poland	2	20.0000	2.82843	2.00000	-5.4124	45.4124	18.00	22.00
	Turkey	3	21.0000	3.60555	2.08167	12.0433	29.9567	18.00	25.00
	Total	16	21.1250	2.33452	0.58363	19.8810	22.3690	16.00	25.00

National-level analysis reveals certain distinctive features. In terms of the first scale, which characterizes the social competence profile of students' strengths, a significant difference is observed in the form of a notably lower assessment given by the experts from Poland compared to those from other countries. Experts from all countries gave a score between 20 and 22 raw points (scale average 20.3125), with the highest score on this profile awarded by experts from Finland and Turkey (22). Experts from Poland gave an average score of just 12.5 raw points. This major discrepancy on the scale is due to particularly low scores on the item 1.4 Is able to ask for support when needed. и 1.5 Participate with ease in different group games and activities.

Figure 1

Mean Values of the Expert Assessment on Social Competence Scale



Note/Source: Author analysis generated with IBM SPSS Statistics 25.

The grade on the Emotional Profile scale shows highest grade in Spain (23.5), Bulgaria (22.0) and the lowest – Portugal (19.0). No significant difference was found on this scale.

The Behavioral Profile score is highest in Finland (23.67) and Turkey (22.0), and lowest in Portugal (17.0). On this scale, too, the difference is not statistically significant.

On Cognitive scale profile the highest score is in Spain (23.0) and Finland (22.67), and the lowest in Portugal (18.0). On Sensory profile the highest in Finland (22.67) and Spain (22.5) again and the lowest – Portugal (19.67). There are no statistical significant difference in the both results.

Table 3
ANOVA Test Hypothesis Statistics Results

		ANOVA				
		Sum of Squares	df	Mean Square	F	Sig.
Sum Social competence profile	Between Groups	145.604	5	29.121	5.216	0.013
	Within Groups	55.833	10	5.583		
	Total	201.438	15			
Sum Emotional profile	Between Groups	27.771	5	5.554	0.720	0.623
	Within Groups	77.167	10	7.717		
	Total	104.938	15			
Sum Behavioral profile	Between Groups	72.667	5	14.533	2.191	0.136
	Within Groups	66.333	10	6.633		
	Total	139.000	15			
Sum Cognitive profile	Between Groups	56.500	5	11.300	1.277	0.346
	Within Groups	88.500	10	8.850		
	Total	145.000	15			
Sum Sensory profile	Between Groups	19.917	5	3.983	0.644	0.672
	Within Groups	61.833	10	6.183		
	Total	81.750	15			

These results clearly demonstrate the overall absence of any statistically significant differences in the experts' evaluations across all scales. The only exception is the opinion of the experts from Poland regarding the students' social competence profile, as already commented. This aspect allows us to conclude that, despite the relatively small sample size, the methodology used yields consistent results due to the broad representation of experts from various European countries.

Conclusions and Recommendations

We can say that, overall, experts from Portugal gave the lowest average scores on all scales, with the exception of the social competence scale. Experts from Finland, Spain, Bulgaria, and Turkey gave comparable, fairly similar scores on all scales, which were relatively close to the maximum number of possible points.

Experts from Poland give the lowest average score on the social competence scale, which is also the lowest average score for the entire questionnaire and the only one with statistically significant differences. The other average assessments of these experts are comparable and, on some scales, even higher than those of their colleagues from Portugal.

In conclusion, it can be summarized that the influence of cultural characteristics is most evident in relation to the social competence profile. This highlights the need to develop a different, more up-to-date framework for assessing this aspect of students' personal strengths within the educational system. This scale should inevitably include personality strengths that more accurately reflect, in a broader sense, the cultural characteristics of the European population.

Despite this, one can argue that there is a significant consensus among experts from various European countries, which provides a solid basis for the development of an effective, multinational toolkit for the assessment and implementation of the educational profile of the individual student, based entirely on the strengths of the individual's personality. This aspect is also linked to the main recommendation that can be drawn from the current study, which is aimed at developing a coherent and consistent methodology for assessing students' educational profiles based on their personal strengths not only on national, but also at European level.

Acknowledgements

This publication has been funded by the National Scientific Programme "Development of Research and Innovation in the Field of Bulgarian Pre-school and School Education." The author bears full responsibility for the content of this document, which under no circumstances can be considered an official position of the Institute of Education.

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

The author declares that no AI or AI-assisted technologies have been used to generate, refine, or correct the content in the manuscript. The ideas, design, procedures, findings, analyses, and discussion are originally written and derived from careful and systematic conduct of the research.

References

- Alexander, P., & Murphy, K. (1999). Learner profiles: Valuing individual differences within classroom communities. *American Psychological Association*, 413–436.
<https://doi.org/https://doi.org/10.1037/10315-018>
- Avallone, A. (2026). *New Designs for School*. Next generation learning:
<https://www.nextgenlearning.org/>
- Barthakur, A., Dawson, S., & Kovanovic, V. (2023). Advancing learner profiles with learning analytics: A scoping review of current trends and challenges. *Conference: LAK23: 13th International Learning Analytics and Knowledge Conference*. Arlington, USA. <https://doi.org/10.1145/3576050.3576083>
- EL Education. (2026). *Helping All Learners: Learning Profile*. EL Education:
<https://www.eleducation.org/>
- European Agency for Special Needs and Inclusive Education. (2026). *Country information for Spain - Legislation and policy*. EASNIE 30 years: <https://www.european-agency.org/>
- European Commission. (2025). *The Joint Research Centre: EU Science Hub*. The Joint Research Centre: EU Science Hub: https://joint-research-centre.ec.europa.eu/projects-and-activities/education-and-training/digital-transformation-education/digital-competence-framework-citizens-digcomp/digcomp-framework_en#definition-of-digital-competence
- European Commission. (2025). *The structure of European education systems*.
<https://doi.org/10.2797/7270983>
- Fleming, N. (1995). I'm different; not dumb. Modes of presentation (VARK) in the tertiary. *Proceedings of the 1995 Annual Conference of the Higher Education and Research Development Society of Australasia*, 18, 308–313.
- Fleming, N., & Baume, D. (2006). Learning Styles Again: VARKing up the right tree! *Educational Developments*, 7(4), 4–7.
- Levterova-Gadjalova, D., Atanasova, J., Tsokov, G., Takeva, Y., Trichkov, I., Sivakova, V., & Dushkova, I. (2023). Priobshchavastho obrazovanie [Inclusive education]. Plovdiv: University Press “Paisii Hilendarski”.
- Luckin, R., & Holmes, W. (2016). *Intelligence Unleashed: An argument for AI in Education*. London: Pearson.
- Ministerstvo na obrazovaniето i naukata [Ministry of Education and Science]. (2017). Naredba za priobshchavastoto obrazovanie. [Regulations on Inclusive Education]. MON.
- Ministry of Education and Culture. (2026). *Ministry of Education and Culture*. Ministry of Education and Culture : <https://okm.fi/>

- Nancekivell, S., Shah, P., & Gelman, S. (2020). Maybe They're Born With It, or Maybe It's Experience: Toward a Deeper. *Journal of Educational Psychology*, 112(2), 21–235. <https://doi.org/http://dx.doi.org/10.1037/edu0000366>
- Newton, P., & Miah, M. (2017). The Myth of Learning Styles. *Frontiers in Psychology*, 8(444). <https://doi.org/10.3389/fpsyg.2017.00444>
- Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. (2008). Learning Styles: Concepts and Evidence. *Psychological Science in the Public Interest*, 9(3), 105–119. <https://doi.org/10.1111/j.1539-6053.2009.01038.x>
- Portal de serviços públicos da República Portuguesa. (2026). *Migrants: Education in Portugal for children, youth and adults*. Portal de serviços públicos da República Portuguesa: <https://www2.gov.pt/en/migrantes-viver-e-trabalhar-em-portugal/migrantes-ensino-em-portugal-para-criancas-jovens-e-adultos>
- RISE. (2026). *Research on Improving Systems of Education (RISE)*. Research on Improving Systems of Education (RISE): <https://riseprogramme.org/>
- Rogiers, A., Merchie, E., & Van Keer, H. (2019). Learner profiles in secondary education: Occurrence and relationship with performance and student characteristics. *The Journal of Educational Research*, 112(3), 385–396. <https://doi.org/https://doi.org/10.1080/00220671.2018.1538093>
- Tzouveli, P., Mylonas, P., & Kollias, S. (2008). An intelligent e-learning system based on learner profiling and learning resources adaptation. *Computers & Education*, 51(1), 224–238. <https://doi.org/https://doi.org/10.1016/j.compedu.2007.05.005>
- UNESCO. (2017). *Students' Profile by the End of Compulsory Schooling*. <https://media.unesco.org/sites/default/files/webform/r2e002/5cc205caa4280ed89a84b01d2e4df5e5432896ad.pdf>
- U.S. Department of Education. (2026). *IDEA Individuals with Disabilities Education Act*. Retrieved from Topic Areas: <https://sites.ed.gov/idea>

Spanish and English Proficiency at Kindergarten as Predictors of Later Academic Achievement

Brian A. Collins, Hunter College–The City University of New York, United States
Claudio O. Toppelberg, Harvard Medical School, United States

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

The growing linguistic diversity in U.S. schools creates a need to better understand how early bilingual language abilities contribute to later academic achievement. This study investigates English and Spanish oral proficiency at kindergarten as predictors of academic performance from third through sixth grade among second-generation Latino children of immigrants. Children's English and Spanish skills were directly assessed using the Woodcock Language Proficiency Battery-Revised, and achievement outcomes were obtained from state English Language Arts (ELA) and Math standardized exams (MCAS). Linear regression models controlling for poverty, gender, and maternal education demonstrated that English proficiency at kindergarten significantly predicted ELA and Math performance across all four grade levels. Importantly, Spanish proficiency uniquely contributed to predictions of later achievement above and beyond English, significantly predicting ELA through sixth grade and Math outcomes through fifth grade. Overall, models explained moderate proportions of variance in academic performance ($R^2 = .22-.35$). Findings demonstrate that both English and Spanish proficiency at school entry are meaningful predictors of long-term academic outcomes, drawing attention to the developmental and educational value of supporting dual language abilities. This work supports evidence-based practices and policies that leverage emergent bilingual children's full linguistic repertoire to promote equitable academic success.

Keywords: bilingual, children of immigrants, academic outcomes

iafor

The International Academic Forum
www.iafor.org

Introduction

Today's schools have experienced an unprecedented increase in the numbers of emergent bilingual children. Currently, one in four children in American schools are from homes where a language other than English is spoken, the majority come from Spanish speaking homes (U.S. Census, 2020). An extensive amount of research has demonstrated the important role of English proficiency in predicting the long-term academic achievement of emergent bilingual students (Halle et al., 2012; Reardon & Galindo, 2009; Slama, 2012). However, there remains a critical need for additional research on the role of children's home languages and later academic performance (Duarte, 2020; Joshi, 2025). Theoretical work suggests strong associations between home language proficiency and school success. Theories related to linguistic transfer and dual language abilities indicate that children who fully develop both their home language and English are more likely have positive academic outcomes, yet, there is a continued need for more empirical studies to support this relationship (Collins et al., 2011; Heineke & Vera, 2022; Sun et al., 2018). The current linguistic diversity in U.S. public schools has not been met with evidence-based educational practices that best support emergent bilingual children. Understanding how early English and Spanish abilities influence emergent bilingual children's later achievement is critical for informing policies and practices that promote equitable educational opportunities for this rapidly growing population (Irwin et al., 2022).

Support for home language development that emergent bilinguals receive at school in the early grades may be associated with later academic outcomes. Research has evidenced links between children's language competence and school success, but these relations have yet to be fully examined in bilingual children and the contribution of both home and school languages (Toppelberg & Collins, 2025). Several longitudinal studies have shown that children's early language English proficiency predicts later decoding and reading comprehension skills and is also associated with academic performance in English (Luft Baker et al., 2023; Mancilla-Martinez & Lesaux, 2017). Furthermore, children's English proficiency have demonstrated to be the most important indicator of achievement their scores in both English and in later school years (Uriarte et al., 2011).

The academic achievement Latino children of immigrants, often measured through standardized assessments, has improved over the last several decades (Santiago et al., 2014). Historically, Latino children score below their peers on reading and math assessments with increasing gaps in later school years (Reardon & Galindo, 2009; Samson & Collins, 2012), therefore, identifying factors which support their long-term academic development during the early school years is imperative (Gandara & Contreras, 2009; Rumberger et al., 2009). Performance on high-stakes standardized tests have taken on an increasingly important role in determining academic achievement and are a key indicator of success for many schools. There are well warranted concerns and critiques of standardized testing when used as a singular measure of student achievement. Nevertheless, they do offer insight to students' academic performance with scores that are easily comparable to other subgroups and populations. Such reports have indicated that the majority Latino students in fourth and eighth grade are not proficient in reading and mathematics (National Center for Education Statistics, 2024) and persistent achievement gaps remain.

To a considerable extent, low achievement of Latino children of immigrants reflects the negative impact of factors associated with poverty and other socioeconomic variables (Duncan & Brooks-Gunn, 1997; Hernandez et al., 2007). Poverty is one of the strongest predictors of academic achievement (Fram et al., 2007; Shay et al., 2024). Socioeconomic status (SES) has

a significant role in academic achievement, including parental education, that impact students' potential for school success (Beals & Porter, 2000). As Latino bilingual children of immigrants are more likely from economically disadvantaged backgrounds they are at higher academic risk (Reardon & Galindo, 2009). Furthermore, the effect of gender on academic achievement has been documented with girls typically outperforming boys (Sáenz et al., 2023; Steinmann & Strietholt, 2026; Thomas et al., 2024). Beyond the effects of poverty and gender, however, factors leading to lower academic outcomes in Latino children are not fully understood. An additional such potential factor affecting academic performance is the high variability in dual language proficiencies (Spanish/English) of Latino children of immigrants. In order to meet the linguistic demands of diverse environments, children must have the language abilities necessary to perform academically and function in schools. Meaningful language interactions are foundational for learning (Vygotsky & Cole, 1978). Home language support in the early grades may leverage existing language skills and support literacy skill development for improved long-term outcomes (Espinosa & García, 2012; García & Kleifgen, 2018). Bilingual children who are proficient in both languages have better academic outcomes than children who have limited proficiency in one or both languages (Collins, 2014). On the other hand, children with low language abilities are more likely to be poor readers in elementary school and suffer long-term under-achievement (M. Kieffer, 2012; M. J. Kieffer, 2012; Proctor et al., 2005; Reese et al., 2000).

Dual language proficiencies have been recognized as important predictors of other types of school functioning, including engagement, motivation, social behavior (inter/intrapersonal, and affective interactions) essential for navigating school. Previous work has evidenced that Spanish and English proficiencies account for over one-third of the variance in school engagement in kindergarten (Collins et al., 2011), leading to present research questions that have yet to be investigated such as, how dual language proficiencies are related to children's academic outcomes in later school years. Oral language skills are key in the acquisition of knowledge and learning (Reed & Lee, 2020). Children's language proficiency (e.g., vocabulary knowledge, phonological processing, syntax, and listening comprehension) are closely associated with later academic success therefore requires unique consideration.

Many studies have found strong links between language proficiency and academic performance among monolingual samples (Snow & Matthews, 2016), with language development consistently linked to later academic achievement in mathematics and English Language Arts (Duncan et al., 2020). However, there is a lack of research on bilingual children and the role of their dual language proficiencies on their academic achievement. Emergent bilingual children who are able to leverage their full linguistic repertoire are better able to progress in learning new concepts and content knowledge which is not language specific and may be learned and retrieved through either language (García et al., 2025).

Therefore, the present study investigates Latino children of immigrants' academic achievement at 3rd to 6th grade as predicted by their English and Spanish proficiency kindergarten. Emergent bilingual children's proficiency in their home and school language at school entry may be supportive of long-term academic outcomes. These relationships are particularly important for children from economically disadvantaged backgrounds that are at higher risk of academic struggles and challenges related to high stakes standardized tests, which are often a key indicator of school success (Duncan et al., 2007). We aim to extend current knowledge about the relation between early language abilities and later academic outcomes to address the following research questions:

RQ1. After considering socioeconomic factors, do children's Spanish and English proficiency at kindergarten predict academic outcomes at third through sixth grade? RQ2. Does Spanish proficiency explain unique variance beyond English?

Methodology

This study investigates how Spanish and English proficiencies in the early school years are related to children's performance on standardized academic exams in later elementary grades. Second-generation Latino immigrant children were recruited at kindergarten entry from urban public schools in a large Northeast United States school district.

Participants

Children in this study were selected by rigorous eligibility criteria resulting in a sample with demographics and backgrounds similar to those of Spanish-speaking families living in urban areas in the Northeast U.S. Children of immigrants who were born in the US and were first language speakers of Spanish were included in the study. All children were screened to meet the following inclusion criteria. All children were born in the continental U.S. with at least one parent who was born in Puerto Rico, Dominican Republic or other Latin American country and currently residing in the mainland US. Puerto Rican families were included as they share many characteristics of other Latino immigrant families and account for a substantial proportion of this population in the Northeast U.S. Children must have been living in a predominantly Spanish-speaking home with minimal or no exposure to English before age three. Children with developmental disorders or other severe sensory-motor sequelae of neurological trauma or disorder were excluded.

Measures

Spanish and English oral language abilities were directly assessed using the Woodcock Language Proficiency Battery-Revised (WLPB-R) at kindergarten (mean age 6;1). School records of individual children's performance on State exams (MCAS) were obtained from the school district.

Dual Language Proficiencies

Children's oral language proficiencies in each language were directly assessed using the English and Spanish versions of the Woodcock Language Proficiency Batteries-Revised (WLPB-R): (Woodcock, 1991; Woodcock & Muñoz-Sandoval, 1995). The WLPB-R measures specific linguistic domains of language skills and is considered a strong standardized measure of oral language proficiency of English and Spanish. Four individually measured test scores (Memory for Sentences; Picture Vocabulary; Listening Comprehension, and Verbal Analogies) yield an oral language cluster score, which is used in the present analyses. Memory for Sentences is a mixed expressive-receptive measure of syntactic and semantic competence, where the child is asked to repeat words, phrases and then whole sentences that increase in length. Picture Vocabulary is a measure of expressive semantics (vocabulary) that requires naming pictures of items. Listening Comprehension is a receptive measure of syntactic and semantic competence, where the child listens to increasingly complex sentences or passages and is asked to provide the word that is missing at the end of the sentence or the passage. Verbal Analogies is a receptive measure of semantics, where the child is asked to provide a brief verbal answer to a missing item in a sentence that carry logical relationship. The WLPB-R

demonstrates strong psychometric properties with reliability coefficients for both forms alphas from 0.84–0.92 across all age ranges (Woodcock & Muñoz-Sandoval, 1995).

Academic Outcomes

Children's academic performance was measured at third through sixth grade using test scores from The Massachusetts Comprehensive Assessment System (MCAS). This assessment of academic achievement is required for all students and includes Reading (Grade 3), English Language Arts (Grades 4, 5, 6), Math (Grades 3, 4, 5, 6) and is administered each Spring (Massachusetts Department of Education, 2008). The MCAS has been the primary measure of academic achievement in Massachusetts for more than three decades and are aligned with Massachusetts learning standards. MCAS tests are not graded on a curve. The MCAS ELA test is divided into 2 sessions and the Math test is also divided into 2 sessions. All MCAS test sessions are untimed. However, test sessions have been designed to be completed within 150 minutes for each ELA session and 90–120 minutes for each Math session. The MCAS ELA measures reading and comprehension, written expression and understanding of language, grammar, and vocabulary in context. Includes selected-response and constructed-response questions. The MCAS Math measures conceptual understanding and skills, problem solving, and grade-specific domains such as operations and algebraic thinking, number and operations in base ten, number and operations in fractions, and measurement and data and geometry. Includes multiple-choice, short-answer, and open-response questions that require showing work.

Covariates

Poverty, Child Gender, and Maternal Education data were collected when the children were in kindergarten, through multidimensional surveys administered during the parent interviews at home. Questions adapted from the Methods for the Epidemiology of Child and Adolescent Mental Disorders (MECA) study (Goodman et al., 1998) were used to determine the primary caregiver, socioeconomic status (poverty, and maternal education) and child's gender. A child was considered to be living in poverty when his or her household was a recipient of at least one government program which ties eligibility to income threshold levels (Census, 2000); these programs included: WIC, Food Stamps, Head Start, Section 8 housing assistance, and Welfare. The highest level of schooling the parents completed (elementary only, partial high school, complete high school, etc.) was recorded using ordinal scores ranging from 0 (no formal education) to 12 (MA/PhD) reflecting both education level attained and years of education.

Analytic Strategy

We examined the academic outcomes of children at third through sixth grade predicted by their English and Spanish language proficiencies at kindergarten. Bivariate correlations were first conducted to investigate the association of Spanish and English proficiency and later academic performance. Our analyses included linear regression models controlling for socioeconomic variables of poverty, gender, and maternal education. In each regression model we sequentially included the predictors, starting first with the socioeconomic control variables then entering children's English oral language proficiency and lastly children's Spanish oral language proficiency. A separate regression model was conducted testing the contribution and prediction of each variable above and beyond previous variables entered in the model academic performance on MCAS exams at 3rd, 4th, 5th and 6th grade. We hypothesized that children with higher language proficiency at kindergarten would have higher academic outcomes in later

school years. Furthermore, we hypothesize that children's Spanish and English proficiencies will uniquely account for substantial variance of academic outcomes above and beyond the contribution of community, socioeconomic factors.

Results

Preliminary analyses of all study variables were conducted with measures of central tendency and variability and were determined to be suitable for further analyses. Regarding missingness, analyses of each variable were conducted to check whether missing status was associated with other study variables. For the predictor variables collected in kindergarten, including language proficiency and control variables, coverage was higher than 99%. The academic outcome variables collected in third-sixth grade coverage was 80–63%, respectively, mostly due to attrition from children leaving the school district. Children with missing and complete data were compared using t-test analyses and did not differ significantly on any of the study variables. Descriptive findings (Table 1) include group sizes (N), unadjusted means (M), and standard deviations (SD) for each of the independent variable subgroups including demographic, language proficiency, and MCAS raw score means.

Results indicate that 86% percent of the children were living in poverty. The sample was evenly split with 50% girls and boys. Maternal education indicated that 70% of mothers had completed secondary school. The mean score for the language proficiencies at kindergarten for both Spanish (M = 67, SD = 21) and English (M = 70, SD = 19) were both well below the normed mean standard score (SS) of 100. Below-average performance for dual language children on measures of oral academic language proficiency is typical when using standardized measures with monolingual norms and has been reported in studies of similar populations using the same measures (Oller & Eilers, 2002; Pérez et al., 2007).

Table 1

Descriptive Statistics of All Study Variables

	N	Minimum	Maximum	Mean	Std. Deviation
Poverty	228	0	2	1.72	0.696
Gender	228	0	1	0.50	0.501
Mother's Education	228	0	12	5.14	2.740
WLPB-R English Oral Proficiency (K)	226	18	114	69.64	18.666
WLPB-R Spanish Oral Proficiency (K)	227	6	113	67.37	21.142
MCAS ELA 3rd grade	184	8	47	27.51	9.345
MCAS ELA 4th grade	174	17	64	41.95	11.529
MCAS ELA 5th grade	160	8	47	30.96	9.239
MCAS ELA 6th grade	144	8	68	39.34	12.794
MCAS MATH 3rd grade	184	6	38	24.04	7.959
MCAS MATH 4th grade	174	7	49	30.63	9.719
MCAS MATH 5th grade	159	5	52	30.35	12.045
MCAS MATH 6th grade	144	7	53	30.28	11.674

Bivariate correlations were conducted between all study predictors and outcome variables (*see Table 2*). We found significant, moderate correlations ($r = .158-.288$; $p \leq 0.01$, 2-tailed) between the socioeconomic variables and academic outcome variables. Moderate and strong associations ($r = .196-.489$; $p \leq 0.01$, 2-tailed) were found between all kindergarten language

proficiency scores for English and Spanish and MCAS ELA and Math scores at 3rd, 4th, 5th and 6th grade.

Table 2

Bivariate Pearson Correlations of Study Predictor and Outcome Variables

	MCAS ELA				MCAS MATH			
	3rd Grade	4th Grade	5th Grade	6th Grade	3rd Grade	4th Grade	5th Grade	6th Grade
Poverty ^a	-.158*	-.203**	-.238**	-.225**	-.258**	-.242**	-.198*	-.191*
Gender ^b	.029	-.049	-.056	-.114	.079	.029	.000	-.050
Mother's Education	.222**	.227**	.288**	.174*	.074	.214**	.274**	.159
English Oral Proficiency (K)	.455**	.489**	.472**	.414**	.390**	.426**	.406**	.435**
Spanish Oral Proficiency (K)	.263**	.329**	.352**	.347**	.247**	.214**	.330**	.196*

*Significant at the $p < 0.05$ level

** Significant at the $p < 0.01$ level

a. Not in poverty is denoted as 1 and in poverty is denoted as 2

b. Female is denoted as 0, and male is denoted as 1

In the controlled regression analyses, socioeconomic variables of poverty, gender, and maternal education were somewhat significantly related to children's performance on measures of English Language Arts and Math. Poverty was negatively related to children's ELA scores at 4th–6th grade, and children's Math scores at 3rd and 4th grade. Gender had a mainly non-significant role in children's later academic performance on ELA and Math scores. Maternal education significantly predicted children's ELA scores at 3rd–5th grade, and children's Math scores at 4th and 5th grade. Overall, the control variables accounted for low amounts of variance in the regression models (R^2 s' .07–12).

English proficiency predicted scores on ELA MCAS scores at 3rd ($\beta = .42$; $p < .001$), 4th ($\beta = .45$; $p < .001$), 5th ($\beta = .41$; $p < .001$), and 6th ($\beta = .39$; $p < .001$) grade. After considering English, Spanish proficiency at Kindergarten significantly predicted English MCAS scores at 3rd ($\beta = .22$; $p < .001$), 4th ($\beta = .26$; $p < .001$), 5th ($\beta = .27$; $p < .001$), and 6th ($\beta = .24$; $p < .001$) grade. Overall, the predictors of these models significantly accounted for moderate percentages (R^2 s = .27–.33) of variability in the outcome measures (see Table 3).

Table 3

Multiple Regression Models Predicting MCAS ELA in Grades 3,4,5, and 6

	MCAS 3 ELA			MCAS 4 ELA			MCAS 5 ELA			MCAS 6 ELA		
	Block 1	Block 2	Block 3	Block 1	Block 2	Block 3	Block 1	Block 2	Block 3	Block 1	Block 2	Block 3
Poverty	-.13	-.08	-.08	-.16*	-.12	-.12	-.18*	-.15*	-.15*	-.19*	-.17*	-.14
Gender	.01	.01	.05	-.06	-.05	.00	-.08	-.08	-.03	-.15	-.15*	-.10
Maternal ED	.20**	.11	.11	.20**	.10	.10	.26**	.15*	.15	.15	.05	.06
English		.42**	.39**		.45**	.41**		.41**	.36**		.39**	.34**
Spanish			.22**			.26**			.27**			.24**
R^2	.07**	.23**	.27**	.08**	.27**	.33**	.12**	.28**	.35**	.09**	.23**	.28**
ΔR^2	.07**	.16**	.04**	.08**	.19**	.07**	.12**	.16**	.07**	.09**	.14**	.05**

Similar results were demonstrated for English proficiency predicting children's later performance on Math MCAS scores at 3rd ($\beta = .37$; $p < .001$), 4th ($\beta = .38$; $p < .001$), 5th ($\beta =$

.35; $p < .001$), and 6th ($\beta = .42$; $p < .001$) grade. After considering English, Spanish proficiency at Kindergarten significantly predicted Math MCAS scores at 3rd ($\beta = .22$; $p < .001$), 4th ($\beta = .17$; $p < .05$), 5th ($\beta = .27$; $p < .001$) grade; Spanish did not significantly predict Math MCAS at 6th grade. Overall, the predictors of these models significantly accounted for moderate percentages (R^2 s = .22–.28) of variability in the outcome measures (see Table 4).

Table 4

Multiple Regression Models Predicting MCAS Math in Grades 3,4,5, and 6

	MCAS 3 MATH			MCAS 4 MATH			MCAS 5 MATH			MCAS 6 MATH		
	Block 1	Block 2	Block 3	Block 1	Block 2	Block 3	Block 1	Block 2	Block 3	Block 1	Block 2	Block 3
Poverty	-.26**	-.22**	-.22**	-.21**	-.17*	-.18*	-.14	-.12	-.12	-.16	-.14	-.13
Gender	.08	.08	.12	.02	.03	.06	-.03	-.02	.03	-.09	-.09	-.07
Maternal Ed	.02	-.06	-.06	.17*	.09	.08	.24**	.15	.15*	.13	.02	.03
English		.37**	.34**		.38*	.36**		.35**	.30**		.42**	.40**
Spanish			.22**			.17*			.27**			.08
R^2	.08**	.20**	.25**	.09**	.22**	.25**	.10**	.26**	.28**	.06*	.22**	.22**
ΔR^2	.08**	.13**	.05**	.09**	.14**	.03*	.10**	.11**	.07**	.06**	.16*	.07

Overall, each of the regression models showed consistent and direct associations of children's English and Spanish proficiency at kindergarten and their performance on later academic standardized measures. These associations were evidenced after controlling for important socioeconomic factors which have been shown to be related to children's academic achievement. Children's ability in both their home and school language as they enter school has a lasting effect on how they will perform in later school years.

Discussion

The primary purpose of this study was to investigate changes in dual language proficiencies of Latino children of immigrants in their first year of school (kindergarten) in relation to their later academic success. These findings underscore the importance of home and school language proficiency as key predictors of achievement for emergent bilingual children. There was a consistent positive relationship between children's English and Spanish proficiency at kindergarten and their scores in both ELA and Math at 3rd–6th grade. This indicates that the higher the level of English or Spanish proficiency when children begin school, the higher their scores in both English and Math will be later in elementary school. Moreover, the findings not only support previous research demonstrating the important role that English plays in academic success (Halle et al., 2012; Reardon & Galindo, 2009), but also demonstrate that emergent bilinguals' proficiency in their home language, Spanish, significantly predicts their later academic performance. The study determines that English and Spanish at kindergarten uniquely predict third through sixth grade performance in English Language Arts and Math assessments, even after controlling for important socioeconomic variables. Children with higher proficiencies in English and Spanish were likely to have higher levels of academic outcomes.

Children's English oral language proficiency in kindergarten consistently predicted later academic performance in ELA and Math at each grade levels. English proficiency significantly predicted ELA outcomes from third through sixth grade, with standardized coefficients ranging from $\beta = .39$ to $.45$. Similar magnitudes were observed for Math outcomes ($\beta = .35$ to $.42$). These findings align with extensive literature identifying oral language as foundational for literacy development and later academic achievement. Early oral proficiency likely supports

reading comprehension, vocabulary growth, academic discourse skills, and the ability to access increasingly complex curricular content.

The strength and stability of English proficiency as a predictor across consecutive grade levels underscores the long-term academic implications of school-entry language skills. These findings support developmental theories suggesting that early language competence begins a cumulative processes with initial advantages in vocabulary and processing skills facilitating greater academic engagement and learning opportunities over time.

Unique Contribution of Spanish Proficiency

A key finding of this study evidences that Spanish proficiency at kindergarten uniquely predicts later academic achievement above and beyond English proficiency and socioeconomic factors. Spanish proficiency significantly predicted ELA outcomes across all grades examined ($\beta = .22$ to $.27$) and predicted Math outcomes at third, fourth, and fifth grade ($\beta = .17$ to $.27$), though not at sixth grade. These findings provide empirical support for interdependence and cross-linguistic transfer theories, which propose that proficiency in the home language facilitates the development of academic skills across languages. Spanish oral language skills contribute to conceptual knowledge, morphosyntactic knowledge, vocabulary depth, and metalinguistic awareness which support academic learning in English. Importantly, Spanish proficiency accounted for unique variance in academic outcomes even after English proficiency was entered into the regression models. This suggests that home language competence is not merely a proxy for general language ability but represents a distinct developmental capacity. These findings challenge deficit-oriented perspectives that prioritize rapid English acquisition at the expense of home language maintenance. Instead, they support additive bilingual models that promote dual language development.

The finding that both English and Spanish proficiency predicted achievement in Math further underscores the language demands inherent in mathematical thinking and learning which requires comprehension of word problems, understanding of specialized vocabulary, and engagement in abstract reasoning expressed linguistically. Our findings extend a previous study which found in a sample of 270 Latino dual language learners that oral language skills attribute to mathematics performance (Foster, 2016). Oral language proficiency, both in English and in Spanish may contribute to conceptual understanding related to looking for patterns and relationships, making connections, reasoning that extends beyond literacy-based tasks.

Socioeconomic Factors

Consistent with prior research, poverty and maternal education were associated with academic outcomes, though the amount of variance explained by these socioeconomic variables was relatively low ($R^2 = .07-.12$). Poverty was negatively associated with ELA outcomes in later grades and with early Math outcomes, while maternal education predicted several ELA and Math outcomes. As children from economically disadvantaged backgrounds have been shown to be at higher academic risk based on end-of-year standardized testing (Winke & Zhang, 2019), our findings demonstrate that language proficiency may be an even more important predictor.

Interestingly, in our models, gender showed minimal effects which contradicts extensive research demonstrating girls at an academic advantage. Notably, language proficiency substantially increased the explained variance in academic outcomes ($R^2 = .22-.33$),

highlighting that early language skills account for meaningful differences in academic trajectories beyond structural socioeconomic risks.

Implications

Our findings have the potential to inform educational practices and support interventions targeted at specific skills associated with successful academic outcomes. Supporting the development of dual language proficiencies at school has been shown to be beneficial to children's academic achievement (Thomas & Collier, 1995). The present study offers new information which may inform educational programs that support dual language development and curriculum aimed at promoting academic achievement and school success. This study directly responds to the calls to contribute to greater understanding to our increasingly diverse student populations in the U.S. and around the globe. A number of scholars (Garcia-Coll et al., 1996; National Academies of Sciences, 2017) have urged the field of education to consider multiple factors and processes that affect outcomes among linguistically and culturally diverse students. A recent report (National Academies of Sciences, Engineering, and Medicine, 2017) emphasized a need for more longitudinal studies to investigate how academic achievement is related to variations in children of immigrants' levels of home and school language proficiency.

The present study contributes to our understanding of children of immigrants in a number of ways. While most studies have focused on immigrant adolescents and adults, research on younger children is lacking, making it difficult to piece together their developmental trajectories. The current study analyzes the association between early language experiences to collectively predict children's later academic skills. Findings from the present study have the potential to inform broad educational practices and support interventions that target dual language children of immigrants.

Additional longitudinal studies that investigate academic trajectories and how home language and English relate to school-based outcomes while accounting for relevant control variables are needed. The present study benefits from a longitudinal design spanning kindergarten through sixth grade, the use of standardized assessments, and rigorous eligibility criteria that produced a relatively homogeneous sample of second-generation Latino children from Spanish-speaking homes. The study findings have important implications for educational practice and policy. Given that the majority of the children in our sample was living in poverty, these findings are particularly striking, suggesting that language development may be modifiable and potentially protective factor within economically marginalized contexts. Variability in children's English and Spanish proficiency significantly predicted later academic outcomes. Language-focused interventions may represent a leverage point for reducing achievement gaps among children from immigrant and low-income backgrounds.

Our findings underscore the importance of assessing and supporting oral language development in both languages at school entry. Early screening and intervention for children with lower performing dual language profiles may yield long-term academic benefits. Furthermore, the unique contribution of Spanish proficiency provides empirical support for dual language and bilingual education programs that foster home language development alongside English and adds to a body of research which supports programs that continuously, and simultaneously, develop children's skills in both their home language and English (Collier & Thomas, 2017; Collins, 2014; García & Kleifgen, 2018; Goodrich et al., 2021).

Limitations and Recommendations

Several limitations of this study should be noted. Attrition mainly due to the high mobility of immigrant families reduced outcome data coverage to 63% by sixth grade, though our analyses indicated no systematic differences between children with complete and missing data. Additionally, the lack of bilingual language assessments with bilingual norms may underestimate bilingual competence. Research incorporating dynamic and bilingual norm-referenced assessments would provide more relative estimates of language competence among dual language learners. Likewise, there are many serious concerns regarding the appropriateness of end of the year standardized testing as a central measure of student achievement. Additionally, the present study focused exclusively on oral language proficiency and did not include measures of instructional context or classroom language practices, which may mediate observed associations. Nevertheless, it does allow insight of student academic performance and provide comparisons across time, groups, and districts which was simply not measured in certain subgroups of students, such as emergent bilinguals, from many years (Gort et al., 2008). Lastly, the present study reports on Latino children of immigrants from an urban district in the Northeast U.S., which may limit generalizability to other Latino subgroups or geographic contexts.

Future research should explore mechanisms underlying the observed cross-linguistic effects, including potential mediators such as executive functioning, literacy development, and instructional experiences. Longitudinal path analysis would shed light on individual patterns of change over time and could further demonstrate direct and indirect relationships of early language proficiency on later achievement. Further investigation of bilingual instructional models and classroom practices would also help determine how educational contexts leverage early language advantages.

Conclusion

This study has the potential to inform educational policy and instruction for emergent bilingual children in schools. Findings from this study may further inform our understanding of factors related to their academic achievement and help inform interventions and educational supports for Latino children of immigrants for school success. Our findings demonstrate that early bilingual oral language proficiency, both in English and in Spanish, plays a significant and lasting role in shaping academic achievement among Latino children of immigrants from Spanish-speaking homes. English proficiency at school entry predicts their later ELA and Math performance, while Spanish proficiency provides additional, unique predictive variation across multiple grades. These results challenge deficit perspectives of emergent bilingual learners and demonstrate that home language proficiency is a critical academic asset. Supporting dual language competence in the early years is not merely culturally affirming—it is academically consequential.

References

- Beals, R. E., & Porter, R. (2000). Bilingual Students and the MCAS. *READ Perspectives*, 117–133.
- Census, U. S. B. o. t. (2000). *Census of Population*.
- Collier, V. P., & Thomas, W. P. (2017). Validating the power of bilingual schooling: Thirty-two years of large-scale, longitudinal research. *Annual review of applied linguistics*, 37, 203–217. <https://doi.org/10.1017/S0267190517000034>
- Collins, B. A. (2014). Dual language development of Latino children: Effect of instructional program type and the home and school language environment. *Early Childhood Research Quarterly*, 29(3), 389–397. <https://doi.org/doi.org/10.1016/j.ecresq.2014.04.009>
- Collins, B. A., & Toppelberg, C. O. (2021). The role of socioeconomic and sociocultural predictors of Spanish and English proficiencies of young Latino children of immigrants. *Journal of Child Language*, 48(1), 129–156. <https://doi.org/10.1017/S0305000920000203>
- Collins, B. A., Toppelberg, C. O., Suárez-Orozco, C., O'Connor, E., & Nieto-Castañón, A. (2011). Cross-sectional associations of Spanish and English competence and wellbeing in Latino children of immigrants in kindergarten. *International Journal of Sociology of Language*, 208(2011), 5–23. <https://doi.org/10.1515/IJSL.2011.010>
- Duarte, J. (2020). Translanguaging in the context of mainstream multilingual education. *International journal of multilingualism*, 17(2), 232–247. <https://doi.org/10.1080/14790718.2018.1512607>
- Duncan, G. J., & Brooks-Gunn, J. (1997). *Consequences of Growing Up Poor*. Russell Sage Foundation.
- Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A. C., Klebanov, P., Pagani, L. S., Feinstein, L., Engel, M., & Brooks-Gunn, J. (2007). School readiness and later achievement. *Developmental psychology*, 43(6), 1428–1446. <https://doi.org/10.1037/0012-1649.43.6.1428>
- Duncan, R. J., Duncan, G. J., Stanley, L., Aguilar, E., & Halfon, N. (2020). The kindergarten Early Development Instrument predicts third grade academic proficiency. *Early Childhood Research Quarterly*, 53, 287–300. <https://doi.org/10.1016/j.ecresq.2020.05.009>
- Espinosa, L. M., & García, E. (2012). *Developmental assessment of young dual language learners with a focus on kindergarten entry assessments: Implications for state policies*. Center for Early Care and Education Research–Dual Language Learners (CECER-DLL). Chapel Hill: The University of North Carolina, Frank Porter Graham Child Development Institute.

- Foster, C. (2016). Confidence and competence with mathematical procedures. *Educational Studies in Mathematics*, 91(2), 271–288. <https://doi.org/10.1007/s10649-015-9660-9>
- Fram, M. S., Miller-Cribbs, J. E., & Van Horn, L. (2007). Poverty, race, and the contexts of achievement: Examining educational experiences of children in the US South. *Social Work*, 52(4), 309–319.
- Gandara, P. C., & Contreras, F. (2009). *The Latino education crisis: The consequences of failed social policies*. Harvard University Press.
- García, O., Johnson, S. I., & Seltzer, K. (2025). *The translinguaging classroom: Leveraging student bilingualism for learning*. ERIC.
- García, O., & Kleifgen, J. A. (2018). *Educating emergent bilinguals: Policies, programs, and practices for English learners*. Teachers College Press.
- Garcia-Coll, C., Lamberty, G., Jenkins, R., McAdoo, H. P., Crnic, K., Wasik, B. H., & Vazquez, G. H. (1996). An integrative model for the study of developmental competencies in minority children. *Child development*, 67(5), 1891–1914. <https://doi.org/10.1111/j.1467-8624.1996.tb01834.x>
- Goodman, S. H., Hoven, C. W., Narrow, W. E., Cohen, P., Fielding, B., Alegria, M., Leaf, P. J., Kandel, D., Horwitz, S. M., Bravo, M., Moore, R., & Dulcan, M. K. (1998). Measurement of risk for mental disorders and competence in a psychiatric epidemiologic community survey: The National Institute of Mental Health Methods for the Epidemiology of Child and Adolescent Mental Disorders (MECA) study. *Social Psychiatry*, 33(4), 162–173. <https://doi.org/10.1007/s001270050039>
- Goodrich, J. M., Thayer, L., & Leiva, S. (2021). Evaluating achievement gaps between monolingual and multilingual students. *Educational Researcher*, 50(7), 429–441. <https://doi.org/10.3102/0013189X21999043>
- Gort, M., de Jong, E. J., & Cobb, C. D. (2008). SEeIng through a bilingual lens: Structural and ideological contexts of Structured English Immersion in three Massachusetts districts. *Journal of Educational Research & Policy Studies*, 8(2), 41–67.
- Halle, T., Hair, E., Wandner, L., McNamara, M., & Chien, N. (2012). Predictors and outcomes of early versus later English language proficiency among English language learners. *Early Childhood Research Quarterly*, 27(1), 1–20. <https://doi.org/10.1016/j.ecresq.2011.07.004>
- Heineke, A. J., & Vera, E. M. (2022). Beyond language and academics: Investigating teachers' preparation to promote the social-emotional well-being of emergent bilingual learners. *Journal of Teacher Education*, 73(2), 145–158.
- Hernandez, D. J., Denton, N. A., & Macartney, S. E. (2007). Children in Immigrant Families-The US and 50 States: National Origins, Language, and Early Education. Research Brief Series. *SRCD Social Policy Report*, 22(3).

- Irwin, V., De La Rosa, J., Wang, K., Hein, S., Zhang, J., Burr, R., Roberts, A., Barmer, A., Bullock Mann, F., & Dilig, R. (2022). Report on the Condition of Education 2022. NCES 2022-144. *National Center for Education Statistics*.
- Joshi, P. R. (2025). Home language-based instruction and students' academic performance. *International Journal of Bilingual Education and Bilingualism*, 28(7), 808–827.
- Kieffer, M. (2012). Before and after third grade: Longitudinal evidence for the shifting role of socioeconomic status in reading growth. *Reading and Writing*, 25(7), 1725–1746.
- Kieffer, M. J. (2012). Early oral language and later reading development in Spanish-speaking English language learners: Evidence from a nine-year longitudinal study. *Journal of Applied Developmental Psychology*.
- Luft Baker, D., Park, Y., & Andress, T. T. (2023). Longitudinal predictors of bilingual language proficiency, decoding, and oral reading fluency on reading comprehension in Spanish and in English. *School Psychology Review*, 52(4), 421–434.
- Mancilla-Martinez, J., & Lesaux, N. K. (2017). Early indicators of later English reading comprehension outcomes among children from Spanish-speaking homes. *Scientific Studies of Reading*, 21(5), 428–448.
- Massachusetts Department of Education. (2008). Progress Report on Students Attaining the Competency.
- Miller, J. F., Heilmann, J., Nockerts, A., Iglesias, A., Fabiano, L., & Francis, D. J. (2006). Oral language and reading in bilingual children. *Learning Disabilities Research & Practice*, 21(1), 30–43.
- Nakamoto, J., Lindsey, K. A., & Manis, F. R. (2008). A cross-linguistic investigation of English language learners' reading comprehension in English and Spanish. *Scientific Studies of Reading*, 12(4), 351–371.
- National Academies of Sciences, Engineering, and Medicine. (2017). *Promoting the Educational Success of Children and Youth Learning English: Promising Futures*. N. A. Press.
- Oller, D. K., & Eilers, R. E. (Eds.). (2002). *Language and literacy in bilingual children: Child language and child Development*. Multilingual Matters.
<http://ezpl.harvard.edu/login?url=http://search.epnet.com/login.aspx?direct=true&AuthType=cookie,ip,url,uid&db=eric&an=ED465300&loginpage=loginpage=login.asp>
- Páez, M. M., Tabors, P. O., & López, L. M. (2007). Dual language and literacy development of Spanish-speaking preschool children. *Journal of Applied Developmental Psychology*, 28(2), 85–102. <https://doi.org/10.1016/j.appdev.2006.12.007>
- Proctor, C. P., August, D., Carlo, M. S., & Snow, C. (2006). The intriguing role of Spanish language vocabulary knowledge in predicting English reading comprehension. *Journal of Educational Psychology*, 98(1), 159.

- Proctor, C. P., Carlo, M., August, D., & Snow, C. (2005). Native Spanish-speaking children reading in English: Toward a model of comprehension. *Journal of Educational Psychology*, 97(2), 246–256.
- Reardon, S. F., & Galindo, C. (2009). The Hispanic-White achievement gap in math and reading in the elementary grades. *American Educational Research Journal*, 46(3), 853–891.
- Reed, J., & Lee, E. L. (2020). The Importance of Oral Language Development in Young Literacy Learners: Children Need to Be Seen and Heard. *Dimensions of Early Childhood*, 48(3), 6–9.
- Reese, L., Garnier, H., Gallimore, R., & Goldenberg, C. (2000). Longitudinal analysis of the antecedents of emergent Spanish literacy and middle-school English reading achievement of Spanish-speaking students. *American Educational Research Journal*, 37(3), 633–662.
- Rumberger, R. W., Arellano, B., Zavella, P., & Gutiérrez, R. (2009). Understanding and addressing the California Latino achievement gap in early elementary school. *Mexicans in California: Transformations and challenges*, 61.
- Sáenz, V. B., Ponjuán, L., & Figueroa, J. L. (2023). Current trends and future outlooks on the pervasive gender gap in educational attainment for Latino males. In *Ensuring the success of Latino males in higher education* (pp. 3–20). Routledge.
- Samson, J., & Collins, B. A. (2012). *Preparing All Teachers to Meet the Needs of English Language Learners*. C. f. A. Progress.
- Santiago, C. D., Gudiño, O. G., Baweja, S., & Nadeem, E. (2014). Academic achievement among immigrant and U.S.-born Latino adolescents: Associations with cultural, family, and acculturation factors. *J Community Psychol*, 42(6), 735–747.
<https://doi.org/10.1002/jcop.21649>
- Shay, D., Shavit, Y., & Sasson, I. (2024). Poverty in early childhood and future educational achievements. *Early Child Development and Care*, 194(5-6), 655–668.
- Shen, Y. (2025). Relative importance of early literacy and executive function skills on Spanish–English emergent bilinguals’ English reading achievement across primary years. *Journal of Educational Psychology*.
- Slama, R. B. (2012). A longitudinal analysis of academic English proficiency outcomes for adolescent English language learners in the United States. *Journal of Educational Psychology*, 104(2), 265.
- Snow, C. E., & Matthews, T. J. (2016). Reading and language in the early grades. *The Future of Children*, 57–74.
- Steinmann, I., & Strietholt, R. (2026). Reading more, achieving more? Long-term gender gaps in reading behavior and reading achievement. *Studies in Educational Evaluation*, 88, 101581.

- Sun, H., Yussof, N. T. B., Mohamed, M. B. B. H., Rahim, A. B., Bull, R., Cheung, M. W., & Cheong, S. A. (2018). Bilingual language experience and children's social-emotional and behavioral skills: a cross-sectional study of Singapore preschoolers. *International Journal of Bilingual Education and Bilingualism*, 24(3), 324–339. <https://doi.org/10.1080/13670050.2018.1461802>
- Thomas, D. P., Hopwood, B., Hatisaru, V., & Hicks, D. (2024). Gender differences in reading and numeracy achievement across the school years. *The Australian Educational Researcher*, 51(1), 41–66.
- Thomas, W. P., & Collier, V. (1995). Language minority student achievement and program effectiveness. *California Association for Bilingual Education Newsletter*, 17(5), 19.
- Toppelberg, C. O., & Collins, B. A. (2025). Predictive Models of Longitudinal Dual Language Profiles of Young Latino Children. *Journal of Child and Family Studies*, 34, 1–17. <https://doi.org/10.1007/s10826-025-03153-5>
- United States Census Bureau. (2020). *Age by language spoken at home by ability to speak English for the population 5 years and over: 2020 census of population*.
- Uriarte, M., Karp, F., Gagnon, L., Tung, R., Rustan, S., Chen, J., Berardino, M., Stazesky, P., de los Reyes, E., & Bolomey, A. (2011). Improving educational outcomes of English language learners in schools and programs in Boston Public Schools. *Gastón Institute Publications*, 154.
- Vygotsky, L. S., & Cole, M. (1978). *Mind in society: Development of higher psychological processes*. Harvard University Press.
- Winke, P., & Zhang, X. (2019). How a third-grade reading retention law will affect ELLs in Michigan, and a call for research on child ELL reading development. *TESOL Quarterly*, 53(2), 529–542.
- Woodcock, R. W. (1991). *Woodcock Language Proficiency Battery-Revised. English and Spanish forms. Examiner's manual* (1st ed.). The Riverside Publishing Company.
- Woodcock, R. W., & Muñoz-Sandoval, A. F. (1995). *Woodcock Language Proficiency Battery-Revised. Spanish Form, Supplemental Manual*. (First ed.). Riverside Publishing.

KI4ING: Integrating Generative AI Into Engineering Education – A Prototype LMS for Intelligent Tutoring in Technical Mechanics

Christopher Klupak, University of Hamburg, Germany

Elmar Dammann, University of Hamburg, Germany

Simon Vock, University of Hamburg, Germany

Jula Brüggmann, University of Hamburg, Germany

Julius Groß, University of Hamburg, Germany

The Asian Conference on Education & International Development 2026

Official Conference Proceedings

Abstract

Engineering programmes are widely regarded as demanding fields of study, with high dropout rates especially in early semesters. Foundational subjects such as Technical Mechanics pose particular challenges, requiring students to integrate conceptual understanding, mathematical reasoning, and structured problem-solving. Meanwhile, generative AI is increasingly used as an informal learning tool, often without sufficient guidance, raising concerns about surface-level learning strategies. The KI4ING project investigates how generative AI can be systematically embedded in digital learning environments to support students in Technical Mechanics. Following a Design-Based Research approach, the project combines iterative system development with empirical insights from expert interviews and accompanying student studies examining learning behaviour, problem-solving processes, and AI use in practice. Key findings reveal persistent difficulties in structuring solution strategies, applying conceptual knowledge, and critically engaging with AI-generated outputs. These insights directly informed the design of a custom AI-supported learning environment integrating a Moodle-based learning management system, a dialogue-based AI tutor, and structured learning pathways. The system's modular architecture enables domain-specific configuration, scaffolding-oriented interaction, and privacy-conscious deployment in higher education. This paper presents the conceptual design and technical implementation of the KI4ING system and discusses how empirically grounded design decisions can foster structured problem-solving and deeper conceptual understanding in engineering education.

Keywords: generative AI, engineering education, technical mechanics, intelligent tutoring systems, problem-solving approach

iafor

The International Academic Forum

www.iafor.org

Introduction

Engineering programmes are widely recognised as demanding fields of study, requiring students to develop both conceptual understanding and advanced analytical problem-solving skills. Despite their importance for technological and economic development, engineering programmes are characterised by comparatively high dropout rates, particularly during the early stages of study (Heublein et al., 2022; Klöpping et al., 2017). Foundational subjects such as Technical Mechanics play a central role in this context, as they often represent significant learning barriers that influence students' academic progression (Kautz et al., 2018).

Learning in Technical Mechanics is strongly problem-oriented and requires students to integrate conceptual knowledge with mathematical reasoning and structured solution strategies. However, empirical evidence suggests that many students struggle with these requirements. In particular, difficulties arise in structuring problem-solving processes, selecting appropriate solution strategies, and transferring theoretical knowledge to concrete tasks (Dammann & Lang, 2019). These challenges are further compounded by the fact that students often rely on surface-level learning strategies rather than developing deeper conceptual understanding (Biggs & Tang, 2011).

At the same time, the rapid development of generative artificial intelligence (AI) is increasingly influencing students' learning practices. Recent studies and reports indicate that generative AI tools are already widely used by students as informal learning aids (EY, 2024; Kasneci et al., 2023). These systems are often used to generate explanations, solve tasks, and receive immediate feedback. While such tools offer significant potential for supporting learning processes, they also pose risks, including unreflective use, overreliance on AI-generated solutions, and the reinforcement of superficial learning strategies. In addition, previous research has highlighted that AI systems in education often lack pedagogical structuring and domain-specific alignment, which limits their effectiveness in formal learning environments (Holmes et al., 2019).

Initial empirical findings from student research projects conducted within the KI4ING context further support these observations. Results from a survey-based study indicate that students perceive generative AI as a helpful learning tool, particularly for obtaining explanations and solving tasks, while at the same time highlighting uncertainties regarding appropriate use and potential risks (Golod, 2025). Complementary qualitative studies focusing on learning processes in Technical Mechanics reveal that students frequently experience uncertainty when approaching problem-solving tasks and often apply incomplete or incorrect solution strategies. Think-aloud protocols show that learners sometimes rely on overly simplified approaches or struggle to recall and apply relevant formulas and concepts, indicating gaps in both conceptual understanding and problem-solving competence.

However, existing AI tools are typically designed as general-purpose applications and are not well suited for integration into structured learning environments in higher education. In particular, they often lack domain-specific configurability, scaffolding-based interaction, and compliance with data protection requirements, which limits their applicability in formal educational settings.

The KI4ING project addresses this gap by investigating how generative AI can be systematically integrated into digital learning environments to support students in Technical Mechanics. The project follows a Design-Based Research approach and aims to develop an AI-

supported learning environment that combines structured learning pathways with dialog-based tutoring and feedback mechanisms.

The aim of this paper is to present the conceptual design and prototype implementation of the KI4ING system and to discuss its potential contribution to AI-supported learning in engineering education.

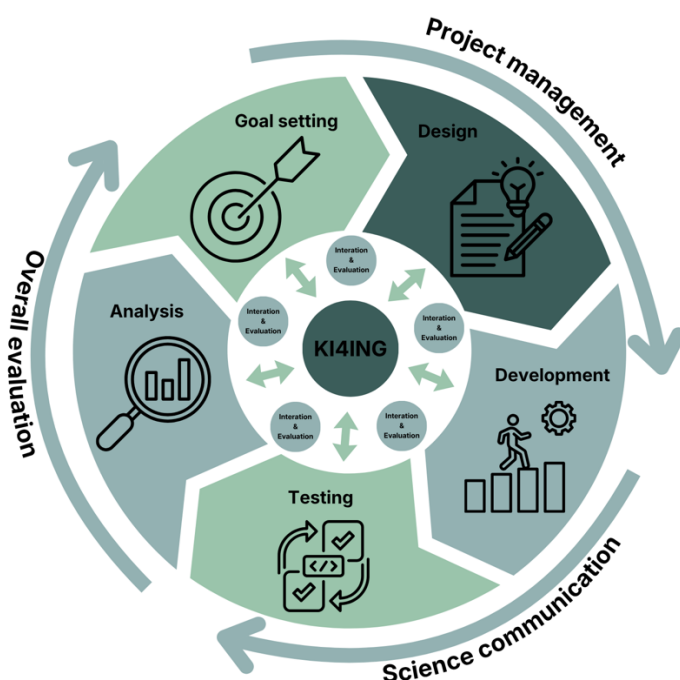
Methodology

The KI4ING project follows a Design-Based Research (DBR) approach to guide the development and investigation of an AI-supported learning environment for Technical Mechanics. DBR is particularly suitable for research that aims to design, implement, and iteratively refine educational interventions in authentic learning contexts while simultaneously generating transferable design knowledge (Euler & Collenberg, 2018; Reinmann, 2020).

The methodological approach combines the systematic development of a technological solution with the continuous integration of empirical insights from multiple data sources. The development process is structured as an iterative cycle consisting of problem analysis, design, implementation, testing, and refinement. These phases are revisited throughout the project in order to improve both the technical system and the underlying instructional design.

Figure 1

Design Based Research Based on Reinmann, 2020; Euler & Collenberg, 2018



In addition to these general DBR principles, the KI4ING development process explicitly incorporates a structured analysis of existing AI-based tools. This analysis aimed to identify technological, pedagogical, and legal limitations of current systems, particularly with regard to domain-specific applicability, scaffolding-based interaction, integration into learning management systems, and compliance with data protection requirements. The findings of this analysis revealed that existing tools are typically designed as general-purpose applications and

are not well suited for structured use in higher education contexts. These insights directly informed the design decisions underlying the KI4ING system.

As part of the initial context analysis, semi-structured expert interviews were conducted with lecturers in Technical Mechanics from several German universities and universities of applied sciences. The interviews aimed to explore typical learning challenges, existing support structures, and the role of digital tools and generative AI in current teaching and learning practices. The findings indicate that Technical Mechanics courses are characterised by large student cohorts, high failure rates in early semesters, and considerable variation in students' learning strategies.

In addition to the expert perspective, the KI4ING project is informed by accompanying student research projects conducted within the project context. These include a bachelor's thesis (Golod, 2025), a completed master's thesis (Merke, 2025), and an ongoing study that builds on previous findings. The studies investigate students' learning behaviour, problem-solving processes, and their use of generative AI in the context of Technical Mechanics.

Methodologically, these studies employ a combination of quantitative and qualitative approaches. Survey-based data provide insights into students' perceptions and usage patterns of generative AI as a learning tool (Golod, 2025). Complementary qualitative approaches, including semi-structured interviews and think-aloud protocols, allow for an in-depth analysis of students' problem-solving processes (Merke, 2025). The think-aloud method enables the reconstruction of cognitive processes during task completion by capturing students' verbalised reasoning while solving engineering problems (Ericsson & Simon, 1993).

The analysis of these data reveals recurring patterns in students' learning processes. Students frequently experience difficulties in structuring solution strategies, selecting appropriate methods, and transferring theoretical knowledge to concrete problem contexts. Furthermore, the findings indicate that generative AI is already widely used as an informal support tool, although often without critical reflection on the correctness of the generated outputs.

Taken together, the methodological approach of KI4ING can be understood as a form of triangulation across different perspectives and data sources. While the expert interviews provide insight into structural challenges in teaching Technical Mechanics, the accompanying student studies contribute a more fine-grained understanding of how learners actually approach tasks, where they experience uncertainty, and how they already make use of generative AI in their learning processes. This combination is particularly valuable for the development of the KI4ING platform, as it allows design decisions to be informed not only by lecturers' assumptions about typical learning barriers but also by empirical observations of students' reasoning and behaviour.

In this regard, the completed student studies provide complementary evidence. Survey findings indicate that generative AI is already widely used by students as a learning tool, with one study reporting AI use for learning among a large majority of respondents. At the same time, the qualitative analyses show that many learners still struggle with basic conceptual understanding, the selection of appropriate strategies, and the structured execution of solution processes. Within the DBR framework, these combined insights are particularly relevant because they help identify both the technological opportunities and the pedagogical requirements that should shape the ongoing development of the KI4ING system.

At the current stage of the project, the KI4ING system is in the prototype development phase, and comprehensive evaluation with students has not yet been conducted. Instead, the focus of this paper lies on the design rationale, system implementation, and the integration of empirical insights into the development process. Future research will involve systematic evaluation phases, including expert-based testing and student-based studies, to further refine the system within subsequent DBR cycles.

KI4ING System Concept

The KI4ING system is designed as an AI-supported learning environment that aims to support students in learning Technical Mechanics, with an initial focus on Statics I. The pedagogical concept combines structured learning pathways with dialog-based AI support to assist students during problem-solving processes.

The conceptual design of the KI4ING system is based on both pedagogical considerations and identified limitations of existing AI tools. As outlined in the methodological analysis, current generative AI systems are typically designed as general-purpose applications and tend to provide complete solutions rather than supporting structured learning processes. In addition, they often lack domain-specific alignment and cannot be easily integrated into institutional learning environments. These limitations highlight the need for a system that combines pedagogical guidance with domain-specific control and technical integration.

Technical Mechanics is widely perceived as a challenging subject, particularly in the early stages of engineering education. Students often experience difficulties in understanding abstract concepts, structuring solution processes, and applying theoretical principles to complex problems (Dammann & Lang, 2019). These challenges are further reflected in empirical findings from accompanying student research within the KI4ING project. Qualitative analyses of students' problem-solving processes indicate that learners frequently struggle to structure their reasoning, select appropriate solution strategies, and transfer conceptual knowledge to specific tasks (Merke, 2025). In addition, survey-based findings show that students increasingly rely on generative AI tools as informal learning aids, often without critically reflecting on the correctness of the generated outputs (Golod, 2025).

In response to these challenges, the didactic design of the KI4ING system is grounded in the principle of scaffolding, which emphasises guided support to facilitate learning processes (Wood et al., 1976). Instead of providing direct solutions, the AI tutor is designed to support students through guided hints, targeted questions, and conceptual explanations. This approach directly addresses the observed tendency of both students and AI tools to focus on final answers rather than structured reasoning processes. By guiding learners through intermediate steps, the system aims to foster deeper conceptual understanding and improve problem-solving competence.

A further central design principle is the integration of learning-oriented feedback. The system is intended to provide feedback that supports reflection on solution processes rather than merely indicating correctness. This is particularly relevant in light of empirical findings showing that students often struggle to evaluate both their own solutions and AI-generated outputs. The emphasis on feedback is supported by research highlighting its importance for learning outcomes (Hattie, 2008).

Conceptually, the KI4ING system follows a layered architecture that integrates a learning management system with AI-supported tutoring functionality and structured domain knowledge. The Moodle learning management system serves as the central access point, providing course structure, learning materials, and access to exercises. Within this environment, a dialog-based AI tutor enables natural language interaction and supports students in analysing problem statements, identifying relevant physical principles, and reflecting on intermediate solution steps. This integration addresses the need for embedding AI functionality within structured learning environments rather than relying on external tools.

A central feature of the system is the provision of personalised learning pathways that take into account differences in students' prior knowledge, learning strategies, and individual needs. Upon entering the platform, students provide contextual information about their study programme and complete a self-assessment of their current level of understanding. In addition, an optional diagnostic test enables a more detailed assessment of foundational competencies in Statics I. Based on these inputs, the system assigns students to an appropriate learning pathway. In the current implementation, this assignment follows a rule-based and semi-adaptive approach, enabling differentiated learning sequences without relying on fully automated adaptive learning algorithms.

The design of these learning pathways is directly informed by empirical insights into students' learning processes. Findings from qualitative studies indicate that many students tend to apply surface-level strategies and experience difficulties in linking conceptual understanding with procedural steps. These observations highlight the importance of structuring learning content in a way that gradually increases complexity while providing continuous guidance. Accordingly, the task pool underlying the learning pathways is organised according to conceptual focus and level of difficulty, allowing students to progressively develop their understanding from basic principles to more complex problem-solving scenarios.

In addition to task-level support, the system provides learning-oriented feedback based on students' interactions. This feedback highlights recurring difficulties, identifies areas for improvement, and suggests subsequent learning steps. By combining structured learning pathways with dialog-based AI support and feedback mechanisms, the KI4ING system aims to create a coherent learning environment that supports both conceptual understanding and the development of problem-solving competence in Technical Mechanics.

Overall, the KI4ING system concept reflects an attempt to integrate generative AI into a pedagogically structured and domain-specific learning environment that addresses both the opportunities and limitations of current AI technologies in higher education.

KI4ING Prototype Development

The development of the KI4ING platform began with a structured benchmarking of existing AI-powered tools and platforms, including WolframAlpha, Perplexity AI, ChatGPT, Fobizz, DeepSeek, Google Gemini, NotebookLM, and Claude, among others. Each tool was assessed across multiple dimensions relevant to the KI4ING use case: domain-specific competence in Technical Mechanics, pedagogical quality of feedback, LMS integration capability, file format support, and data protection compliance. While several tools, notably ChatGPT and Perplexity AI, demonstrated strong capabilities for processing engineering problems and generating step-by-step solutions, two fundamental limitations emerged consistently across the evaluated options. First, all tested tools tended to deliver complete solutions upon request rather than

guiding students through the problem-solving process in a scaffolded manner, which is pedagogically counterproductive in the context of engineering education. Second, the vast majority of tools were assessed as critically non-compliant or legally uncertain with respect to GDPR requirements applicable to German higher education: most collect and transfer user data to third countries without sufficient legal safeguards, and the only tool offering full GDPR compliance (Fobizz) does not support external LMS integration. These findings established that no off-the-shelf solution simultaneously satisfied the requirements of domain-specific configurability, scaffolding-based instructional design, Moodle integration, and adequate data protection. This provided the primary rationale for constructing a custom, modular architecture, with Moodle as the LMS, OpenAI GPT-4.1 as the language model, FlowiseAI as the low-code RAG pipeline builder, and Langfuse as the observability and evaluation layer.

Following the technology selection, Moodle was deployed via an external hosting provider and configured as the central student-facing environment, providing course structure, learning pathway management, and access to assignments. The AI chatbot, built on FlowiseAI, was embedded directly into the Moodle interface via an iFrame, ensuring that students can interact with the AI tutor without leaving the course environment. This integration is pedagogically intentional: presenting the tutoring system as a natural extension of the course rather than a separate tool lowers the threshold for student engagement. To address the multimodal nature of engineering tasks, which typically combine textual problem descriptions, geometric sketches, and mathematical notation, the system supports assignment documents in both PDF and LaTeX format, and integrates a MathType formula editor directly within the chat interface. This allows students to input mathematical expressions graphically rather than manually, removing a significant usability barrier for early-semester students without prior experience in formal mathematical notation.

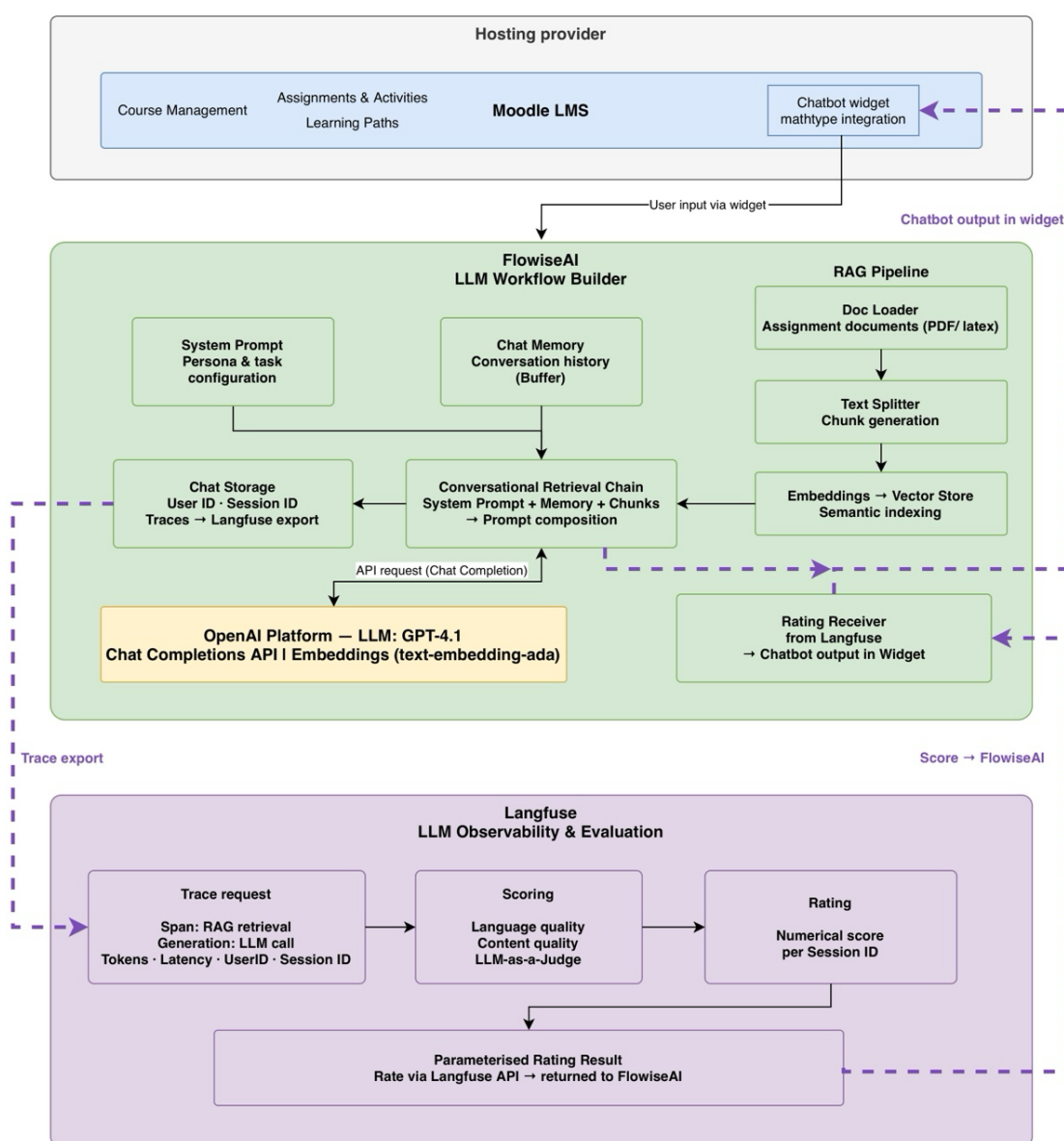
A critical element of the implementation was the design and iterative refinement of the system prompt, which governs the persona, instructional approach, and behavioural constraints of the AI tutor. Configured centrally within FlowiseAI and transmitted with every API request, the system prompt is the primary mechanism through which the chatbot's behaviour is shaped. The central design challenge was steering the language model away from its default tendency to provide immediate, complete answers and towards a scaffolding-oriented interaction style in which students are guided through guiding questions, partial hints, and conceptual explanations rather than receiving ready-made solutions. This required substantial iterative refinement: successive prompt versions were tested against a range of task types and student query patterns, and progressively adjusted to achieve more consistent scaffolding behaviour. These observations from the development process indicate that effective prompt engineering in domain-specific educational contexts demands a close interplay of technical iteration, subject-matter expertise, and pedagogical judgement, and remains an ongoing design challenge to be investigated further in the upcoming evaluation phases.

Alongside the functional components described above, a privacy-preserving data architecture was implemented as a foundational design principle. Rather than linking chatbot interactions to identifiable student accounts, the system assigns each user a pseudonymised UserID and each session a unique SessionID, both generated automatically and captured by Langfuse during each interaction. No student names, email addresses, or institutional identifiers are transmitted to or stored within the tracing infrastructure. This pseudonymisation approach serves a dual purpose: it enables session-level analysis and evaluation (including the automated quality scoring planned for later development stages) without requiring access to personal data,

and it limits the scope of personal data processing to what is strictly necessary for the system's educational function.

The KI4ING system is built on a modular, API-based architecture that integrates four main components: the Moodle Learning Management System as the student-facing interface (blue), FlowiseAI as the central workflow and RAG pipeline engine (green), the OpenAI platform as the underlying language model provider (yellow), and Langfuse as the observability and evaluation layer (purple). Together, these components form a closed-loop system in which student interactions are processed, grounded in domain-specific content, evaluated, and (in future development stages) fed back into adaptive learning path recommendations. Figure 2 provides a schematic overview of the data flows described below.

Figure 2
KI4ING Architecture Diagram



The core processing layer (green) is implemented in FlowiseAI, which manages the full lifecycle of each chatbot interaction through a Retrieval-Augmented Generation (RAG)

pipeline. When a student submits a query, the system performs a semantic similarity search against an in-memory vector store to retrieve the most relevant chunks of domain-specific assignment content. These documents, loaded as PDF and LaTeX files and indexed via OpenAI's text-embedding-ada-002 model, serve as the factual grounding for the chatbot's responses. The retrieved chunks are then combined with the session's conversation history buffer and the centrally configured system prompt into a single composed prompt by the Conversational Retrieval Chain, which is subsequently dispatched to the language model. The conversation buffer is session-scoped, preserving contextual coherence across dialogue turns within a session while avoiding the accumulation of persistent personal interaction histories. This RAG architecture is a critical design choice for the KI4ING use case: general-purpose language models, when queried without domain-specific retrieval, tend to generate responses that are either overly generic or factually inconsistent with the specific tasks and conventions used in the course. By anchoring every response in the actual assignment content, the system substantially reduces this risk and ensures that AI-generated guidance remains aligned with the pedagogical material students are working with.

The language model powering the system is GPT-4.1, accessed via the OpenAI Chat Completions API. It processes the composed prompt and returns a response displayed in the student-facing widget within Moodle. The same OpenAI platform also provides the embedding model (text-embedding-ada-002) used to index assignment content in the vector store. All interactions are simultaneously traced in Langfuse, which records each session as a structured hierarchy of events: a RAG span capturing the retrieval step, a generation event logging the full prompt and model response, and associated metadata including token counts, response latency, and the pseudonymised UserID and SessionID. No personally identifiable information is transmitted to or stored within Langfuse. Student interactions are linked exclusively to anonymised identifiers, consistent with the privacy-preserving architecture described above.

The three remaining development steps represent the planned trajectory from the current prototype towards a more analytically capable and adaptive system. In a first extension, an automated end-to-end session evaluation pipeline will be implemented using an LLM-as-a-Judge approach, in which a secondary language model assesses each recorded session along two quality dimensions, language quality and content quality, and assigns a numerical score per SessionID, returned to FlowiseAI via the Langfuse API. Building on this infrastructure, the system will aggregate scores across all sessions of a given user and deliver personalised, privacy-preserving formative feedback directly within the chat interface, supporting students in reflecting on their progress without exposing personal session content. In the final planned stage, longitudinal scoring patterns will be used to identify recurring conceptual difficulties and dynamically adjust individual learning paths, directing students towards exercises and content that target their specific areas of weakness. The realisation of these components is contingent on the availability of sufficient interaction data from upcoming student testing phases and on the formal validation of the automated evaluation mechanisms and is planned as a medium-term development goal within the DBR framework.

Discussion and Future Work

The KI4ING project is currently in the prototype development phase and provides initial insights into the design and implementation of AI-supported learning environments for Technical Mechanics (cf. figure 3). While comprehensive empirical evaluation with students has not yet been conducted, the development process is informed by a combination of expert perspectives and empirical insights from accompanying student studies.

A central finding across these data sources is the importance of structured support for problem-solving processes. In Technical Mechanics, learning is not limited to understanding individual concepts but requires the ability to organise and structure complex solution procedures. Qualitative analyses of students' problem-solving processes indicate that learners frequently struggle with structuring their reasoning and selecting appropriate solution strategies (Merke, 2025). In many cases, students rely on incomplete or incorrect approaches or express uncertainty regarding relevant formulas and methods. These observations highlight the need for guided support mechanisms that go beyond providing final answers.

Figure 3

Example Task Shown in Chatbot Widget Implemented in KI4ING Learning Platform Prototype

The screenshot displays the KI4ING Learning Platform interface. On the left is a navigation menu with categories like 'Grundbegriffe', 'Zentrales Kraftsystem', and 'Allgemeines Kraftsystem'. The main area shows a task titled 'Aufgabenstellung' with a diagram of a mass m suspended by two ropes from a horizontal support. The diagram includes dimensions a , b , and c , and forces F_{S1} and F_{S2} . Below the diagram, the task text describes the setup and asks for the forces F_{S1} and F_{S2} . On the right, a chatbot widget labeled 'KI-Tutor' is active, showing a conversation where the user asks for help, and the tutor provides context and asks for clarification.

More specifically, the accompanying student studies suggest that the challenges addressed by KI4ING are not limited to advanced or highly specialised topics, but can already be observed in fundamental areas of Technical Mechanics. Think-aloud protocols indicate that students sometimes apply oversimplified strategies even in introductory tasks and show uncertainty when recalling appropriate formulas or deciding how to proceed. In one case, a learner directly added orthogonal force components instead of treating them as vector quantities, while in other cases students explicitly stated that they knew there “had to be a formula” but were unsure how to apply it. Such observations point to difficulties not only in content knowledge, but also in the monitoring and regulation of one’s own problem-solving process.

At the same time, the available findings should not be interpreted as evidence of a general lack of motivation. On the contrary, the analyses reported in the accompanying master’s thesis indicate that students also show metacognitive potential, for example by openly articulating uncertainty, critically checking intermediate results, or deliberately requesting support. These observations are highly relevant for KI4ING, because they suggest that students do not simply need answers, but rather structured and responsive support that helps them stabilise and refine their reasoning processes.

These findings are consistent with the limitations identified in existing AI tools, which tend to prioritise answer generation over guided learning processes and are not designed for structured integration into formal educational settings. The benchmarking conducted during the development of the KI4ING prototype further confirmed that current systems typically lack scaffolding-oriented interaction, domain-specific configurability, and integration into institutional learning environments.

The KI4ING system addresses these challenges by implementing a dialog-based AI tutor that supports students through scaffolding-based interaction. Instead of delivering complete solutions, the system guides learners through problem-solving steps and encourages reflection on intermediate results. This design aligns with established instructional approaches that emphasise guided learning and structured support as key mechanisms for fostering conceptual understanding (Wood et al., 1976).

Another important aspect concerns the role of feedback in AI-supported learning environments. The KI4ING system places strong emphasis on learning-oriented feedback that helps students reflect on their reasoning processes and identify areas for improvement. Empirical findings from student studies suggest that while learners value AI-generated feedback, they often do not critically evaluate its correctness. This highlights the importance of designing feedback mechanisms that actively support reflection and critical engagement. These considerations are consistent with educational research demonstrating the significant impact of feedback on learning outcomes (Hattie, 2008).

In addition, the findings underline the growing role of generative AI as an informal learning tool. Survey-based results indicate that students already use AI systems extensively for solving tasks and obtaining explanations (Golod, 2025). However, this use is often characterised by a lack of structured guidance, which may reinforce surface-level learning strategies. The KI4ING approach addresses this issue by embedding AI functionality within a structured learning environment that combines domain-specific knowledge with pedagogically guided interaction.

From a technical perspective, the prototype implementation demonstrates that the integration of generative AI into higher education contexts requires custom system architectures rather than relying on existing off-the-shelf solutions. In particular, the combination of a learning management system, a retrieval-augmented AI pipeline, and a privacy-preserving data infrastructure proved essential for meeting both pedagogical and institutional requirements. These findings highlight the importance of aligning technological design decisions with didactic and regulatory constraints.

Future work will focus on the systematic evaluation and iterative refinement of the KI4ING system. In line with the Design-Based Research approach, the next phase involves expert-based evaluation with “critical friends” to assess the usability, technical reliability, and pedagogical coherence of the system. This will be followed by student-based testing in authentic learning contexts, where user interactions, learning processes, and the effectiveness of AI-supported feedback will be analysed in more detail.

The insights gained from these evaluation phases will inform subsequent development cycles and contribute to a deeper understanding of how generative AI can be effectively integrated into engineering education. In particular, future research will examine how structured AI support influences students’ problem-solving strategies, conceptual understanding, and learning behaviour over time.

Overall, the KI4ING project highlights both the opportunities and challenges of integrating generative AI into domain-specific learning environments and contributes to the development of empirically informed design principles for AI-supported learning in Technical Mechanics.

Conclusion

This paper presented the conceptual design and prototype development of the KI4ING system, an AI-supported learning environment for Technical Mechanics. Building on a Design-Based Research approach, the project aims to explore how generative AI can be adapted to provide technically reliable and pedagogically meaningful support for students in engineering education.

The integration of empirical insights from both expert interviews and accompanying student research highlights the relevance of addressing persistent challenges in students' learning processes. In particular, the findings underline the importance of supporting structured problem-solving, fostering conceptual understanding, and promoting reflective engagement with AI-generated outputs. The results further indicate that students already make extensive use of generative AI tools, but often without sufficient guidance, which can reinforce superficial learning strategies.

The KI4ING system responds to these challenges by combining structured learning pathways with dialog-based AI tutoring and learning-oriented feedback. In doing so, it demonstrates how generative AI can be embedded within pedagogically designed learning environments that not only provide answers but actively support learning processes and the development of problem-solving competence. At the same time, the project illustrates that the effective use of generative AI in higher education requires custom system architectures that integrate domain-specific knowledge, pedagogical control, and institutional requirements such as data protection.

An important strength of the KI4ING project lies in the integration of accompanying student research into the development process. By combining survey-based findings, qualitative process analyses, and think-aloud protocols, the project gains a more detailed understanding of students' learning behaviour, their use of generative AI, and their typical difficulties in problem-solving. These insights make it possible to align the system more closely with the needs of the target group and to translate empirical findings into concrete design decisions.

While the current work focuses on the design and implementation of the prototype, future research will investigate its effectiveness in authentic learning contexts. Planned evaluation phases, including expert-based testing and student-based studies, are expected to provide valuable insights into user interaction patterns, the usability of the system, and the impact of AI-supported feedback on learning processes.

Through iterative testing and refinement, the KI4ING project aims to contribute to a deeper understanding of how generative AI can be effectively integrated into higher education. In this regard, the project not only provides a concrete technological solution but also contributes to the development of empirically grounded design principles for AI-supported learning in engineering education.

References

- Biggs, J., & Tang, C. (2011). *Teaching for quality learning at university* (4th ed.). Open University Press.
- Dammann, E., & Lang, M. (2019). Unterschiede des mathematischen Wissens bei Studierenden des Bauingenieurwesens zu Studienbeginn [Differences in Mathematical Knowledge among Civil Engineering Students at the Beginning of Their Studies]. *Journal of Technical Education (JOTED)*, 7(1), 53–55.
- Ericsson, K. A., & Simon, H. A. (1993). *Protocol analysis: Verbal reports as data* (Rev. ed.). MIT Press.
- Euler, D., & Collenberg, B. (2018). Design-based research. In R. Tippelt & B. Schmidt-Hertha (Eds.), *Handbuch Bildungsforschung* (pp. 101–120). Springer.
- EY. (2024). *Generative AI in education: Opportunities and challenges*. Ernst & Young.
- Golod, L. (2025). *Generative AI as a learning support tool in higher education: Student perspectives and usage patterns*. [Bachelor's thesis, University of Hamburg].
- Hattie, J. (2008). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge.
- Heublein, U., Richter, J., Schmelzer, R., & Sommer, D. (2022). *Ursachen des Studienabbruchs in Deutschland. Deutsches Zentrum für Hochschul- und Wissenschaftsforschung (DZHW)* [Causes of University Dropout in Germany. German Centre for Higher Education Research and Science Studies (DZHW)].
- Holmes, W., Bialik, M., & Fadel, C. (2019). *Artificial intelligence in education: Promises and implications for teaching and learning*. Center for Curriculum Redesign.
- Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günnemann, S., Hüllermeier, E., Krusche, S., Kutyniok, G., Michaeli, T., Nerdel, C., Pfeffer, J., Poquet, O., Sailer, M., Schmidt, A., Seidel, T., ... Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences*, 103, 102274.
- Kautz, C., Brose, A., & Hoffmann, N. (2018). *Tutorien zur Technischen Mechanik* [Tutorials in Engineering Mechanics]. Springer Vieweg.
- Klöpping, S., Ressel, W., Bruder, R., Krieg, A., Scherfer, M., Umbach, E., & Dachsberger, S. (2017). *Studienabbruch in den Ingenieurwissenschaften. Empirische Analyse und Best Practices zum Studienerfolg* [University Dropout in Engineering Sciences: Empirical Analysis and Best Practices for Academic Success]. Herbert Utz Verlag.

Merke, J. (2025). *Künstliche Intelligenz und studentisches Lernen in der Technischen Mechanik: Eine qualitative Studie zur studentischen Arbeitsweise und Unterstützungsangeboten* [Artificial Intelligence and Student Learning in Engineering Mechanics: A Qualitative Study on Students' Working Methods and Support Services]. [Master's thesis, University of Hamburg].

Reinmann, G. (2020). Design-based research. In *Handbuch Hochschullehre*. Springer.

Wood, D., Bruner, J. S., & Ross, G. (1976). The role of tutoring in problem solving. *Journal of Child Psychology and Psychiatry*, 17(2), 89–100.

Contact emails: christopher.andre.klupak@uni-hamburg.de
Elmar.dammann@uni-hamburg.de
simon.vock@uni-hamburg.de
jula.bruegmann@uni-hamburg.de
julius.gross@uni-hamburg.de

A Model for Educational Profiles of Students Based on Their Strengths and Competencies

Dora Levterova-Gadjalova, Paisii Hilendarski University of Plovdiv, Bulgaria
Ivan Trichkov, Paisii Hilendarski University of Plovdiv, Bulgaria
Maya Fyodorova-Radicheva, Paisii Hilendarski University of Plovdiv, Bulgaria
Lilyana Chobanova, Paisii Hilendarski University of Plovdiv, Bulgaria
Andreyana Katusheva, Paisii Hilendarski University of Plovdiv, Bulgaria

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

The following article is dedicated to the creation of an innovative methodology for the structuring of students' educational profiles. Contemporary education is provoked by the revolutionary development of digital smart technologies. In this context, inclusive education following the paradigm of United Nations' sustainable development Goal 4 for Quality Education (United Nations, 2025) faces new challenges, including the implementation of educational profiles of students in personalized education. The effectiveness of personalized education requires a holistic approach to recognizing the manifestations of personality in the educational environment in order to successfully implement individualized educational trajectories for students. The present work describes an innovative toolkit for structuralizing students' educational profiles through the prism of their personal strengths. The questionnaire was piloted among 238 participants, each of whom was selected according to established criteria for competence and professional experience. Statistical data analysis clearly indicated the presence of five main factors (social competence, emotional, cognitive, behavioral, and sensory) that constitute the integral system of the educational profile of students' personal strengths. Each of the abovementioned factors is discussed in details and in the context of the interaction between the individual cross-factor relationships. In conclusion, a working model for educational profiles of students according to their strengths and competencies is presented.

Keywords: educational profile, personal strengths, student profile

iafor

The International Academic Forum
www.iafor.org

Introduction

Educational profiles are an essential tool that helps examine and personalize the educational process. They are used in various forms and educational settings, but their common goal is to provide the most accurate and comprehensive picture of the learner, reflecting the unique aspects of their personality, interests, and educational needs. These profiles allow for the reality of the learning environment to be interpreted through the student's individual characteristics, enabling more precise planning and adaptation of the learning process.

Educational profiling systems combine various methods and tools designed to assess students' abilities, interests, level of training and professional orientation. The systems combine both pedagogical and psychological assessment and employ a variety of criteria and analytical approaches to track the progress and effectiveness of the educational experience (Levterova-Gadjalova et al., 2023). The aim is to create a foundation for informed decision-making regarding the student's individual educational pathway. In the context of the digitalization of education, the importance of educational profiles is growing even further. Contemporary digital platforms enable the collection and analysis of large volumes of data on students' achievements, interests, and learning behaviors. This creates an opportunity for real-time updates to profiles and a more precise personalization of learning experience with the help of adaptive systems and artificial intelligence. In a digital environment, the educational profile becomes not merely a static characteristic, but an evolving data set that supports and guides both the teacher and the student in the process of both learning and career guidance (Luckin & Holmes, 2016; Tzouveli et al., 2008). The increasingly widespread use of digital technologies in the learning process makes it possible to optimize the role of these advantages in the improvement of the educational process. However, to use this potential to the fullest, it is important to develop a comprehensive and coherent model for building this profile. Furthermore, the model should reflect as fully as possible the individual characteristics of each student, while also enabling the identification of appropriate recommendations and a course of action for working with them. This requires the inclusion of the distinctive features of the various aspects of personality functioning in the educational environment. Each of these aspects can have a significant impact on the overall development, as well as the academic success, of the child and student in the educational environment.

Literature Review

It can be said that a child's cognitive abilities have the most noticeable and direct connection to the learning process. Indeed, there is some evidence that the speed of cognitive processing, the ability to organize perception, as well as the working memory, have a strong positive correlation with academic success (Nesayan et al., 2019). These characteristic features play a significant role in the comprehension of educational content, and taking their specific characteristics into account in students leads to the optimization and improvement of the educational process and academic performance in any educational setting. Therefore, understanding these characteristics is a key factor in academic success. In an educational setting, one of the most commonly used methods for diagnosing students' cognitive profiles is the WISC (Wechsler Intelligence Scale), which assesses five key parameters: the Verbal Comprehension Index (VCI), Visual Spatial Index (VSI), Fluid Reasoning Index (FRI), Working Memory Index (WMI), and the Processing Speed Index (PSI) (Wechsler, 2026). These methods are widely used in the assessment of the cognitive abilities of both typically developing children and gifted children, as well as those with special needs. However, the assessment with this model is time-consuming and labor-intensive, and requires additional

specialized training for its administration. For this reason, in practice, this approach is only applied when there are indications of particularities in the cognitive development of the child or student. In contemporary educational settings, cognitive functioning is typically assessed through the associated patterns of sensory processing of information.

Analysis of a student's sensory profile is widely used in a variety of contexts and educational paradigms. One of the most popular methodologies worldwide is VARK. It includes four primary sensory styles: Visual, Auditory, Reading/Writing, and Kinesthetic (Fleming, *I'm different; not dumb. Modes of presentation (VARK) in the tertiary.*, 1995). To measure the profile, a 16-item questionnaire (originally 13) is used, offering the opportunity to provide a casual response, each of which is associated with a specific sensory style (Fleming & Baume, *Learning Styles Again: VARKing up the right tree!*, 2006). This scale is a logical extension and improvement of the earlier VAK model, which did not include reading and writing as a separate sensory domain (Barbe & Swassing, 1979). Both scales are based on hypothetical everyday situations and suggested solutions to them (Leite et al., 2010). The use of such methodologies provides the educational specialist with information regarding the student's preferred style of processing stimuli from the learning environment. The teachers can use this information to tailor their teaching materials and methods so that they have the greatest possible impact and help children and students absorb new knowledge, skills, and attitudes. However, to a significant extent, this model faces serious criticism, primarily due to the lack of evidence that there is a connection between the use of teaching materials and instructional content developed based on the student's performance on them and the academic success the student demonstrates. These doubts are significant because the existence of such a view of the educational process is largely undermined by them (Nancekivell et al., 2020). On the other hand, sensory processing and its specific characteristics for each child cannot be ignored, as they significantly influence the way in which educational content is perceived. These findings suggest that it is necessary to look for different types of sensory perception characteristics, ones more closely related to the strengths of the information processing system. The influence of good coherence in sensory information processing does not end with its connection to the child's cognitive profile. These characteristics also leave their mark on, and are in turn influenced by, the child's social competence and the particularities of their interaction with the world.

The study of the social competence aspects of a student's profile in the context of a rapidly changing society is highly relevant and essential for shaping their overall future development. The social competence profile is also linked to their creativity and ability to fulfill their potential (Samašonok & Juškevičienė, 2021). The need for adequate socialization is particularly prominent in the context of modern, rapidly digitizing society. An individual's ability to collaborate, work in a team, and share their knowledge, skills, and perspectives on the world with others is part of the critically important competencies at the heart of modern education.

Apart from cognitive, social, and sensory development, there is another aspect of how a student's personality functions in an educational context: that is, their emotions. Emotional regulation can play a significant role in the educational process, not only through its influence on socialization but also through direct links to self-regulation, motivation, and academic performance (Jianhui et al., 2022; Nesayan et al., 2019). Furthermore, it can be argued that the relationship is mutual. It is not only that low academic performance can be a predictor of negative emotional states, but also the other way around. Experiencing negative emotions leads to poor academic performance among students (Reinhard et al., 2023). These

interrelationships form the core of the modern model of positive education, which aims to optimize not only academic outcomes, but also the student's personal development. It is in this context that we examine the distinctive features of student behavior in the educational setting.

A student's educational profile inevitably includes the distinctive features of their behavior. The behavioral profile is typically constructed on the basis of various characteristic, consistent behavioral tendencies, such as risk-taking, extroversion, patience, and adherence to norms. In the context of the Bulgarian education system, the behavioral profile of children and students in the educational environment is particularly important and constitutes a central part of the psychological-pedagogical assessment that the head teacher of each class prepares for each student each school year (Ministerstvo na obrazovaniето i naukata, 2016, 2017). The characteristics of the behavioral profile are of particular importance for the implementation of the pedagogical process because they can provide information about the direct relationship between pedagogical interaction in the educational environment and the child's personal development. The search and identification of these mutual relationships are particularly important and in the best interest of the child, as a key participant in the educational process and the educational outcomes. The search for coherence in the development of a competency profile based on national educational standards and the fulfilling and healthy development of the student's personality is a central issue in the analysis of the educational framework. In order to address this issue, it is essential to identify the student's strengths and use them in their professional and personal growth.

A Model for Educational Profile, Based on Student's Personal Strengths

In the contemporary paradigm, the educational profiles are viewed as a comprehensive multidimensional construct, which encompasses the various dimensions typical of the personality. The structure of a student's general educational profile can be built based on the characteristic features of the student's personality—sensory, cognitive, behavioral, emotional, and social-competence dimension (Levtterova-Gadjalova et al., 2023). These five domains allow for a comprehensive and holistic examination of the distinctive features of a child's and student's behavior; the present study seeks to confirm the existence of this five-factor model.

Table 1

Structure of the Educational Profiles Based of the Student's Strengths Questionnaire. 5 – Factor Model

N	Social competence profile	Emotional profile	Behavioral profile	Cognitive profile	Sensory profile
1	1.1 Is able to communicate positively with significant others.	2.1 Possesses the ability to adopt another person's perspective (cognitive empathy).	3.1 Demonstrates a tendency toward prosocial behavior.	4.1 Demonstrates an ability to think in perspective.	5.1 Adequate recognition and interpretation of various stimuli (e.g., smells, sounds, faces, objects, textures).
2	1.2 Demonstrates the ability to take responsibility.	2.2 Understands their own thoughts and experiences; is inclined toward self-reflection and analysis (reflective).	3.2 Has a good sense of humor.	4.2 Uses appropriate mnemonic strategies.	5.2 Demonstrates the ability to distinguish meaningful, relevant sensory information.
3	1.3 Possesses the skills to assess their strengths and weaknesses, which is the foundation of appropriate social behavior.	2.3 Is able to manage feelings of jealousy.	3.3 Is able to apply strategies to control hyperactive impulses ("stereotyped behavior," hyperactivity).	4.3 Critical thinking skills.	5.3 Precision and sensitivity to the fine details of the sensory image.
4	1.4 Has a realistic self-assessment.	2.4 Is able to anticipate and sense emotions and emotional states within a narrative (understands the emotions of characters in a story).	3.4 Is able to apply behavioral strategies to cope with everyday situations.	4.4 Understands and is aware of his/her own strengths and weaknesses.	5.4 Good semantic processing of structural elements (shapes, background, forms, objects).
5	1.5 Is able to navigate, assess, and respond appropriately in various social situations.	2.5 Is familiar with states of frustration (disappointment, etc.).	3.5 Exhibits socially appropriate nonverbal behavior (facial expressions, gestures, body posture, and appropriate nonverbal cues and signals).	4.5 Is able to formulate and convey information about his/her own thoughts through language.	5.5 Observational skills and the ability to detect changes related to transformations or modifications in sensory information

The study included 238 participants, all of whom were educational professionals. Each participant described a child or student with whom they work in their practice. The questionnaire contains 5 sub-profiles (Social Competence, Emotional, Sensory, Cognitive, and Behavioral). For each of these sub-profiles, five items have been selected to assess the student's strengths with regard to a specific personality dimension. All items contain positive statements representing potential strengths. The relevance of each item to the subject is rated on a 5-point scale (1-never, 2-very rarely, 3-sometimes, 4-often, 5-always). The data were collected through a Google Forms survey conducted between January and March 2026. All participants in the study provided their informed consent. The data were collected anonymously, without further disclosure, in accordance with national and international requirements for the ethical conduct of research involving human subjects.

Results and Discussion

All analyses were performed by using IBM SPSS Statistics 25. The results show that the mean values of all scales are relatively similar. The behavioral profile scale has the lowest mean (18.6309), while the sensory profile scale has the highest (19.9463), with a minimum score of 5 and a maximum of 25 raw points for each scale. The standard deviation for each scale varies around 3, indicating relatively stable results. As expected, the mode is highest on the sensory profile (22), but the social competence profile, which has the second-highest mean score (19.8792), shows a multiple mode ranging between 22 and 21. The mode is smallest on the behavioral profile. The behavioral and cognitive profiles demonstrate the widest variation (with a minimum score of 5 and a maximum of 25), while the sensory profile has the smallest (with a minimum score of 7 and a maximum of 25). These differences across the scales, however, remain minimal, and it cannot be claimed that any single scale yields better results than the others overall. Full results for the scales are visualized in Table 2.

Table 2
Scale Statistics

	Sum Social competence profile	Sum Emotional profile	Sum Behavioral profile	Sum Cognitive profile	Sum Sensory profile
Valid	238	238	238	238	238
Missing	0	0	0	0	0
Mean	19,8792	19,1812	18,6309	19,1409	19,9463
Median	20,0000	20,0000	19,0000	20,0000	20,0000
Mode	21,00 ^a	20,00	18,00	20,00	22,00
Std. Deviation	3,58471	3,52223	3,11133	3,52600	3,39273
Variance	12,850	12,406	9,680	12,433	11,511
Skewness	-1,077	-0,565	-0,766	-0,937	-0,737
Std. Error of Skewness	0,199	0,199	0,199	0,199	0,199
Minimum	6,00	6,00	5,00	5,00	7,00
Maximum	25,00	25,00	25,00	25,00	25,00
a. Multiple modes exist. The smallest value is shown					

Factor analysis, performed using a component matrix with VARIMAX rotation, revealed the presence of 5 factors. The 5-factor model of the questionnaire explains 66.385% of the

variance, with items' communality coefficients varying between 0.675 and 0.920. This result allows for an examination of the reliability of each of the scales. The reliability analysis shows very good results. The Cronbach's alpha method used shows the lowest value on the "Behavioral Profile" scale with 0.77 and the highest on the "Social Competence Profile" scale with 0.86. There is no item whose removal would improve this indicator on any of the five scales.

Table 3
Scales Reliability Statistics

Scale	Cronbach's Alpha	Items
Social Competence profile	0.86	5
Emotional profile	0.82	5
Behavioral profile	0.77	5
Cognitive profile	0.84	5
Sensory profile	0.84	5

These results indicate that the questionnaire has high internal consistency and that the items are relevant to the general construct researched. These findings suggest that students' educational profiles can be examined holistically by considering the various aspects of a child's strengths within the framework of the proposed five profiles.

Conclusions and Recommendations

The results of the factor analysis confirm the presence of five subscales that correspond to the proposed profiles: social competence, emotional, behavioral, cognitive, and sensory (Levterova-Gadjalova et al., 2023). Furthermore, the model demonstrates good explanatory power, and each of the scales shows significant internal consistency. The students' personal strengths proposed for assessment shape consistent profiles that are organized into a comprehensive construct. The data provide sufficient grounds to conclude that this approach possesses the qualities necessary for an innovative methodology for creating a student's educational profile based entirely on their personal strengths. In other words, it can be concluded that the creation of a profile based on the developed model largely reflects the actual functioning of the child and student in their usual work environment—the educational setting.

The educational profile prepared in accordance with this model is holistic, accurate, and allows professionals working with the student to optimize and direct their efforts toward facilitating the student's optimal personal development. A key recommendation from the study is the importance of further developing a theoretical framework for applying this methodology in order to improve working practices with students under the conditions of the educational environment. Unlocking the full potential of the proposed methodology could become essential for providing more comprehensive and effective support for students' personal and professional development in the educational setting.

Acknowledgements

This publication has been funded by the National Scientific Programme "Development of Research and Innovation in the Field of Bulgarian Pre-school and School Education." The

author bears full responsibility for the content of this document, which under no circumstances can be considered an official position of the Institute of Education.

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

The author declares that no AI or AI-assisted technologies have been used to generate, refine, or correct the content in the manuscript. The ideas, design, procedures, findings, analyses, and discussion are originally written and derived from careful and systematic conduct of the research.

References

- Barbe, W., & Swassing, R. (1979). *Teaching through modality strengths: concepts and practices*. Zaner-Blosser Inc.
- European Commission. (2025, 05 14). *The Joint Research Centre: EU Science Hub*. The Joint Research Centre: EU Science Hub: https://joint-research-centre.ec.europa.eu/projects-and-activities/education-and-training/digital-transformation-education/digital-competence-framework-citizens-digcomp/digcomp-framework_en#definition-of-digital-competence
- European Commission. (2025). *The structure of European education systems*. <https://doi.org/10.2797/7270983>
- Fleming, N. (1995). I'm different; not dumb. Modes of presentation (VARK) in the tertiary. *Proceedings of the 1995 Annual Conference of the Higher Education and Research Development Society of Australasia*, 18, 308–313.
- Fleming, N., & Baume, D. (2006). Learning Styles Again: VARKing up the right tree! *Educational Developments*, 7(4), 4–7.
- Jianhui, Y., Changqin, H., Tao, H., Xizhe, W., & Linjie, Z. (2022). Investigating students' emotional self-efficacy profiles and their relations to self-regulation, motivation, and academic performance in online learning contexts: A person-centered approach. *Education and Information Technologies*, 27, 11715–11740.
- Leite, W., Svinicki, M., & Shi, Y. (2010). Attempted Validation of the Scores of the VARK: Learning Styles Inventory With Multitrait-Multimethod Confirmatory Factor Analysis Models. *Educational and Psychological Measurement*, 70, 323–339.
- Levterova-Gadjalova, D., Atanasova, Y., Tsokov, G., Takeva, Y., Trichkov, I., Sivakova, V., & Dushkova, I. (2023). *Inclusive Education*. Plovdiv: University Press “Paisii Hilendarski”.
- Luckin, R., & Holmes, W. (2016). *Intelligence Unleashed: An argument for AI in Education*. Pearson.
- Ministry of Education and Science. (2016). Law on Preschool and School Education.
- Ministry of Education and Science [Ministry of Education and Science]. (2017). Regulation on Inclusive Education [Lawyer on Inclusive Education]. MON.
- Nancekivell, S., Shah, P., & Gelman, S. (2020). Maybe They're Born With It, or Maybe It's Experience: Toward a Deeper. *Journal of Educational Psychology*, 112(2), 21–235. <https://doi.org/http://dx.doi.org/10.1037/edu0000366>
- Nesayan, A., Amani, M., & Asadi, R. (2019). Cognitive Profile of Children and its Relationship With Academic Performance. *Basic and Clinical Neuroscience*, 10(2), 165–174. <https://doi.org/10.32598/bcn.9.10.230>

- Reinhard, P., Herbert, M., Suessenbach, F., Frenzel, A., & Goetz, T. (2023). School grades and students' emotions: Longitudinal models of within-person reciprocal effects. *Learning and Instruction*, 83, 101626. <https://doi.org/https://doi.org/10.1016/j.learninstruc.2022.101626>
- Samašonok, K., & Juškevičienė, A. (2021). Social competence-based prognostic possibilities of creativity expression among students of social profile. *Entrepreneurship and Sustainability Issues*, 8(3), 324–339. [https://doi.org/10.9770/jesi.2021.8.3\(20\)](https://doi.org/10.9770/jesi.2021.8.3(20))
- Tzouveli, P., Mylonas, P., & Kollias, S. (2008). An intelligent e-learning system based on learner profiling and learning resources adaptation. *Computers & Education*, 51(1), 224–238. <https://doi.org/https://doi.org/10.1016/j.compedu.2007.05.005>
- Wechsler, D. (2026, February 15). *Wechsler Intelligence Scale for Children. Fifth Edition*. Pearson. <https://www.pearsonassessments.com/>

AI as Pedagogy in Design Education: Can GenAI-Integrated Teaching Achieve Course Learning Goals in the Short Term?

Jinmei Huang, Guangzhou College of Commerce, China
Henry Chi Fai Ma, The Hong Kong Polytechnic University, China

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

Generative Artificial Intelligence (GenAI) is increasingly embedded in design courses, not only as a production aid but also as a pedagogical approach that can reshape how students work through creative tasks. However, it remains unclear whether GenAI-integrated teaching can help students meet core learning requirements typically associated with studio-based design education within a compressed instructional period, and which difficulties may persist. This study investigates a four-week, 32-contact-hour undergraduate design course that integrated GenAI into creative assignments, using pre- and post-course surveys supplemented by written student reflections. The surveys captured student-reported indicators of perceived efficiency and task progression, perceived improvement in creative output quality, self-efficacy and controllability when using GenAI, as well as process indicators such as iteration behaviors and actions taken after initial AI outputs; they also documented commonly encountered difficulties and coping strategies. Descriptive and comparative analyses were used to summarize changes from pre to post, and reflections were thematically reviewed to contextualize and explain observed patterns. The findings suggest partial alignment with course learning requirements over the short period: students commonly reported faster progress and more deliberate prompting and iteration practices, while persistent challenges remained in controllability, output consistency, and integrating AI results into coherent design solutions. These patterns indicate that GenAI may reduce difficulty in generating options but foreground new demands in steering, refining, and synthesizing outputs into design decisions. The study discusses implications for GenAI-integrated pedagogy, including explicitly teaching control and integration strategies and evaluating learning processes alongside final artifacts.

Keywords: Generative AI (GenAI), design education, GenAI-integrated pedagogy, pre-post survey, student reflections, iterative prompting

iafor

The International Academic Forum
www.iafor.org

Introduction

Generative Artificial Intelligence (GenAI) has rapidly entered higher education as both a practical tool and a force that reshapes teaching and learning expectations (Cotton et al., 2024; Kasneci et al., 2023; UNESCO, 2023). This shift is especially consequential in design education, where learning develops through cycles of making, critique, revision, and reflection rather than one-shot correctness (Schön, 1983). In this setting, GenAI does more than accelerate production. It can change the sequence of design decisions and the kinds of difficulty students encounter while learning.

Its educational value therefore cannot be inferred from output quantity alone. GenAI may support ideation while also introducing new constraints, including fixation and weaker originality under some conditions (Wadinambiarachchi et al., 2024). The pedagogical question is not simply whether students can produce more with AI, but what kinds of learning AI-supported teaching actually enables.

Current literature has identified both opportunities and tensions surrounding GenAI in education, including support for idea development and concerns about overreliance, integrity, and assessment redesign (Kasneci et al., 2023; UNESCO, 2023; Xia et al., 2024). However, these discussions often remain broad and do not always clarify what GenAI integration means for the learning requirements of a specific design course.

This gap is especially important in short-cycle courses. Students may report faster progress or stronger support, yet these benefits do not automatically mean that they have achieved core studio-based learning goals. A short-term GenAI-integrated course may help students generate more options while leaving unresolved the more demanding work of steering outputs, maintaining consistency, and synthesizing fragments into coherent design decisions.

Accordingly, this study asks whether GenAI-integrated teaching can help students approach course learning goals within a four-week undergraduate design course, while also identifying which difficulties remain visible from students' perspectives.

This study investigates a four-week, 32-contact-hour undergraduate design course in which GenAI was integrated into creative assignments as part of the pedagogy. Using pre- and post-course surveys supplemented by written student reflections, it examines whether students' reported experiences suggest partial alignment with core course learning requirements over a short period. The study contributes by reframing the issue from GenAI as a production aid to GenAI as pedagogy, and by combining perception-based indicators with reflections to interpret how support and difficulty were experienced in practice.

To guide the analysis, the study addresses three research questions: RQ1. In what ways do students report changes in perceived efficiency, task progression, creative quality, and self-efficacy/controllability after a short-term GenAI-integrated design course? RQ2. What process changes emerge in students' use of GenAI, particularly in prompting, iteration, and actions taken after initial AI outputs? RQ3. What persistent difficulties remain, and what do these difficulties suggest about the extent to which GenAI-integrated teaching aligns with course learning goals in the short term?

Literature Review

Studio-Based Design Learning and Course Learning Goals

In studio-based design learning, students develop through cycles of making, critique, revision, and reflection (Schön, 1983). For the purposes of this study, course learning goals are understood through five dimensions relevant to both the course design and the available data: progressing through tasks, generating creative options, controlling outputs, iterating and refining work, and integrating outputs into coherent design solutions. These dimensions do not function as direct performance criteria; they provide an interpretive framework for reading student-reported experiences of alignment and difficulty.

GenAI in Design Education: Support and Tension

GenAI may support design learning by lowering the barrier to ideation, accelerating alternatives, and helping students externalize rough concepts. At the same time, meaningful use depends on judgment, oversight, and pedagogical design (UNESCO, 2023). In higher education, concerns include superficial completion and the underassessment of process (Cotton et al., 2024; Xia et al., 2024). In design-related work, GenAI may also increase fixation and reduce variety under some conditions (Wadinambiarachchi et al., 2024). These tensions are especially relevant in short-term design teaching, where faster generation does not automatically imply stronger learning.

From Production Aid to Pedagogy

When GenAI is treated as part of pedagogy rather than only as a production aid, the focus shifts from efficiency to what students are learning through their interaction with the tool, how the tool reorganizes design work, and what kinds of instructional support become necessary (Ioannou, 2018). This study therefore approaches GenAI as a mediating element within the course's learning environment and examines how it appears to reshape students' progress, practices, and bottlenecks during a short cycle of design learning.

Analytical Lens: Partial Alignment With Course Learning Goals

The study uses partial alignment with course learning goals as its central analytical lens. The term acknowledges that the available evidence is based primarily on student-reported perceptions and process descriptions rather than artifact-based evaluation. Survey data provide proximal indicators of support and difficulty, while reflections clarify how gains and bottlenecks were experienced. The aim is to determine whether GenAI-integrated teaching appeared to support some core design course requirements over a short period and where the remaining difficulty concentrated.

Methodology

Course Context

This study was conducted in a four-week required undergraduate course, *Artificial Intelligence and Visual Communication*, totaling 32 contact hours. Students moved from identifying a communication topic and framing a concept to developing visual proposals, extending them into related design outputs, and producing a final short video. Deliverables included a logo, IP

character, static and animated stickers, static and motion posters, a short script, and an approximately 40-second video. GenAI was integrated across ideation, visual exploration, refinement, and production support rather than being used as an optional supplement.

Participants and Data Sources

Three sources of data were used: a pre-course survey, a post-course survey, and written student reflections collected at the end of the course. The pre-survey yielded 43 valid responses, the post-survey yielded 39 valid responses, and matched pre-post responses were obtained for 36 students using the last four digits of student IDs. In addition, 25 written reflections were available for qualitative analysis. The surveys tracked changes in student-reported perceptions, while the reflections provided context for how support and difficulty were experienced.

Survey Measures

The pre-course survey captured baseline experience and expectations regarding AIGC, including prior use, frequency, attitudes, expected areas of support, and concerns related to operation and controllability. The post-course survey focused on course-related experiences, including frequency of use, preferred stages of use, responses to problems, first-response behavior after initial AI outputs, number of attempts, success in realizing intended ideas, improvement in guiding AIGC, workflow formation, perceived effectiveness, and reported difficulties. These measures were mapped onto the course learning goal framework used in this paper, especially task progression, creative development, controllability, refinement, and integration.

Reflection Data

The reflection data consisted of structured written responses about frustrating or unsuccessful AIGC experiences, adjustment processes, emerging personal routines, preferred stages of use, and the perceived role of AIGC in the course. Students often described prompt revision, repeated generation, switching tools, borrowing references, or coping with unstable outputs. These reflections were thematically reviewed to contextualize the survey-based patterns.

Data Analysis

The quantitative analysis combined descriptive and comparative approaches. Paired comparisons were used for comparable pre- and post-course items, and descriptive statistics were used to summarize post-course process indicators and persistent problems. The qualitative analysis used thematic review of the written reflections, with attention to prompt adjustment, repeated generation, use of references or external help, perceived control, consistency, and integration. Overall, the study follows an explanatory mixed-methods logic in which survey data establish broad patterns and reflections clarify how those patterns were experienced in practice.

Ethical Considerations

The project was approved by the School of Design of The Hong Kong Polytechnic University (Reference Number: HSEARS20250217010). Student data were handled in anonymized form for analysis and reporting. Survey matching used only the last four digits of student IDs, and reflection materials were treated as course-related research data for interpretive analysis rather

than public personal statements. Any direct quotations used in later versions of the paper should be selected and presented in ways that protect student identity.

Results

Table 1 summarizes the quantitative pattern across the main result domains discussed in this paper: perceived progress toward course learning goals, post-course process changes, and persistent bottlenecks. Rather than reproducing every statistical detail, the table organizes findings in relation to course learning goals and short-term pedagogical alignment.

Table 1

Summary of Quantitative Findings on Short-Term Alignment With Course Learning Goals

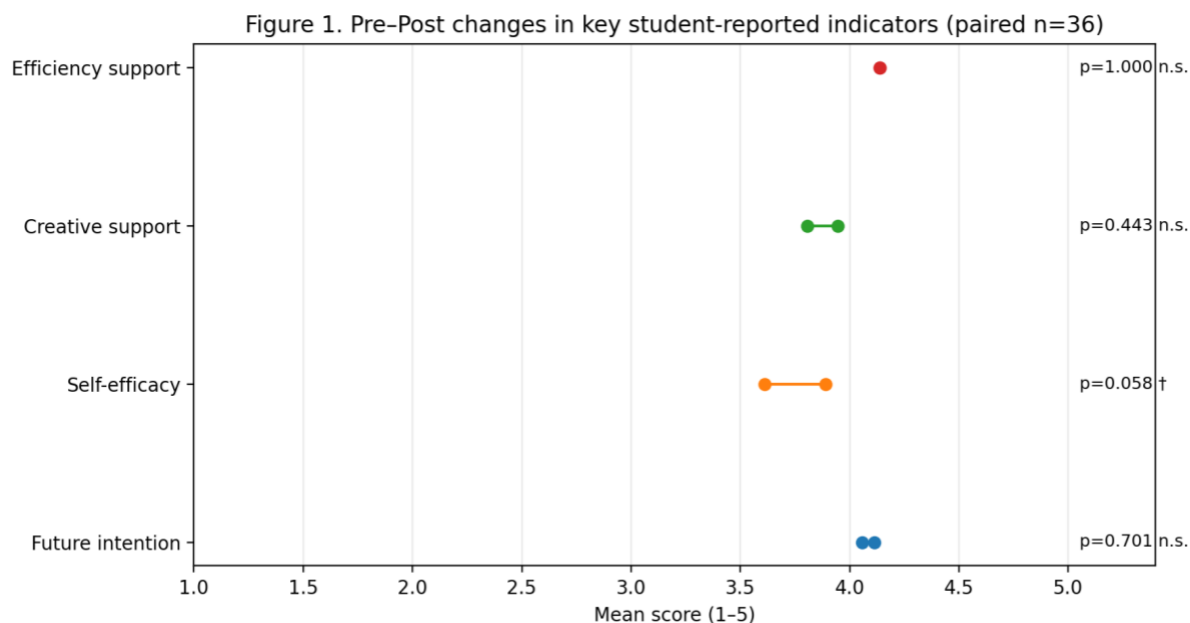
Dimension	Indicator	Key result	Interpretation
Panel A. Conceptually aligned pre-post indicators (paired n = 36)			
Task progression	Efficiency support	$4.14 \pm 0.59 \rightarrow 4.14 \pm 0.87$; n.s.	High and unchanged
Creative development	Creative support	$3.81 \pm 0.86 \rightarrow 3.94 \pm 0.95$; n.s.	Slight increase
Controllability / self-efficacy	Effective AI use	$3.61 \pm 0.77 \rightarrow 3.89 \pm 0.82$; $p = 0.058$	Clearest short-term gain
Future orientation	Future intention	$4.11 \pm 0.62 \rightarrow 4.06 \pm 0.92$; stable	Positive but unchanged
Panel B. Post-course process patterns (post n = 39)			
First-response behavior	First output	Revise prompt 14/39; accept with mismatch 24/39; use directly 1/39	First outputs were provisional
Iteration	Number of attempts	1 time 2/39; 2-3 times 14/39; 4-5 times 20/39; >5 times 3/39	Iteration was common
Guidance ability	Guiding AIGC	Clear improvement 12/39; some improvement 25/39; little/no change 2/39	Growth in directing AIGC
Workflow formation	Personal method	Clear 7/39; broad 24/39; early preference 7/39; none 1/39	Emerging personal routines
Task realization	Realizing intended ideas	Complete 1/39; basic 21/39; partial 15/39; difficult 2/39	Approximation was more common than full realization
Panel C. Persistent bottlenecks (post n = 39)			
Consistency	Unstable / hard to reproduce	24/39 (61.5%)	Most common bottleneck
Controllability	Mismatch with intention	21/39 (53.8%)	Steering remained difficult
Refinement	Aesthetic qualities hard to adjust	21/39 (53.8%)	Detail refinement remained difficult
Integration	Hard to edit or integrate outputs	16/39 (41.0%)	Integration remained difficult

Note. Pre-survey n = 43; post-survey n = 39; matched paired sample n = 36. Panel A uses conceptually aligned pre-post indicators rather than identical repeated items. Panels B and C summarize post-course process indicators and persistent bottlenecks.

The figure shows pre- and post-course mean scores for efficiency support, creative support, self-efficacy, and future intention to use GenAI. The pattern indicates modest overall change, with the clearest movement in self-efficacy.

Figure 1

Pre-Post Changes in Key Student-Reported Indicators (paired $n = 36$)



Perceived Progress Toward Course Learning Goals

The pre-post survey results suggest that students perceived meaningful, though limited, progress toward several course learning demands over the four-week period. As shown in Figure 1, perceived efficiency support remained high from pre to post (Pre 4.14 ± 0.59 ; Post 4.14 ± 0.87), creative support increased slightly but not significantly (Pre 3.81 ± 0.86 ; Post 3.94 ± 0.95), and self-efficacy showed the clearest positive movement (Pre 3.61 ± 0.77 ; Post 3.89 ± 0.82), reaching marginal significance. Future intention to use GenAI remained high and stable. These patterns indicate that students did not report a dramatic transformation in all aspects of AI-supported learning, but they did report a noticeable gain in their confidence to use AI more effectively.

The post-course distributions help clarify what this modest pre-post pattern means in practice. In the post-survey, 71.8% of students rated AIGC as contributing strongly to design efficiency, 66.7% reported strong improvement in creative quality, and 64.1% rated their self-efficacy at 4 or above on a 5-point scale. For the item asking whether AIGC improved design efficiency, 16 students selected 5 and 12 selected 4; for creative quality, 13 students selected 5 and 13 selected 4. On the item measuring overall ability to use AI effectively for design tasks, most students clustered in the upper-middle range (16 selected 4, 13 selected 3, and 9 selected 5), suggesting that perceived competence improved but did not become uniformly high.

The reflections support this interpretation of progress as real but bounded. Students often described AIGC as helping them externalize ideas, accelerate exploration, and sustain movement when they lacked direction. One student described AIGC as helping to “make the things in my mind concrete”, while another wrote that, at the ideation stage, AI could provide

cases and inspiration “when I have no inspiration” and thereby increase efficiency. A third student described AIGC as an “efficient creative collaboration assistant” because it could quickly convert design thinking into visible draft forms. These descriptions align with the quantitative pattern: students did not necessarily report full command over AI-supported design, but many did perceive that AIGC helped them move from vague concepts toward visible and workable outputs.

These findings support a cautious interpretation of short-term alignment with course learning goals. On the one hand, the data suggest that students felt more able to maintain task momentum, explore design alternatives, and make use of GenAI in producing course deliverables. On the other hand, the relatively modest size of the pre-post shifts suggests that such support should not be mistaken for full mastery. In other words, students appeared to feel more supported in progressing through course tasks, but this does not by itself indicate that the more demanding learning requirements of control, refinement, and synthesis were fully achieved.

Emerging Process Changes in Prompting, Iteration, and Post-output Action

The clearest evidence of learning-related change appears in students' reported process behaviors. First outputs were rarely accepted without revision. Only one student reported directly using the first generated result, while 14 of 39 said they would revise the prompt immediately and 24 accepted the output only with differences or partial mismatch. Iteration was also common: 20 students reported trying four to five times, 14 reported trying two to three times, and only two said the first attempt was basically enough.

The same pattern appears in reported growth in guidance and workflow formation. In the post-survey, 37 of 39 students reported at least some improvement in their ability to guide AIGC, and 31 of 39 reported having formed at least a mostly identifiable way of using it. Reflections point in the same direction. One student wrote, “I kept giving AIGC more specific generation conditions and kept generating again”, while another described “looking at the results given by AI, adjusting them step by step, and regenerating”. These responses indicate more deliberate prompting and iteration by the end of the course.

Persistent Barriers in Controllability, Consistency, and Integration

Despite these gains, several difficulties remained concentrated in areas central to studio-based design learning. The most common bottlenecks were unstable or hard-to-reproduce outputs (61.5%, 24/39), mismatch with intended goals (53.8%, 21/39), difficulty refining aesthetic qualities (53.8%, 21/39), and difficulty editing or integrating outputs into later work (41.0%, 16/39).

The reflections make these barriers visible. One student wrote that AI “could not understand what I wanted”, and another found that a unified emoji set became “different in style”. Integration problems also appeared in comments about relying on “local modifications” because outputs could not be used directly. These responses show that controllability, consistency, and integration remained unresolved for many students.

Discussion

What GenAI Supported in the Short Term

The results suggest that GenAI supported short-term design learning mainly at the level of initiation, option generation, and task momentum. Students commonly perceived that AIGC helped them move forward more efficiently, provided support when they lacked ideas, and made it easier to produce early visual or conceptual material that could be worked on further. This is broadly consistent with the wider GenAI-in-education literature on access, productivity, and new forms of learning assistance (Kasneci et al., 2023; UNESCO, 2023). In this course context, the most immediate value of GenAI was that it helped students sustain movement across multiple tasks within limited time.

The findings also suggest that GenAI supported process engagement rather than only output volume. Many students reported repeated prompt adjustment, multiple attempts, and emerging personal workflows, and this iterative engagement aligns with studio-based design learning, where progress depends on cycles of making, feedback, and revision (Milovanovic & Gero, 2020; Schön, 1983). In this sense, the short-term pedagogical contribution of GenAI may be understood as support for divergence more readily than convergence: it lowered the threshold for early exploration, but not the need for judgment, direction, and synthesis.

Why Alignment Remained Partial

Partial alignment is central to interpreting the findings responsibly. Improvements in speed, idea generation, and iterative prompting did not automatically translate into strong controllability or reliable integration. Students often felt better able to proceed, but not fully able to steer the process toward what they intended. In this paper, partial alignment can be understood in three senses: alignment at the level of momentum, emerging alignment at the level of process practice, and incomplete alignment at the level of higher-order control.

The unresolved demands also shifted upward in complexity. Students were less often stuck at the point of starting work and more often challenged by the need to steer outputs, refine details, maintain consistency across artifacts, and synthesize AI-generated materials into coherent solutions. This pattern resonates with broader educational concerns that GenAI can encourage superficial completion unless teaching and assessment foreground higher-order judgment and process evidence (UNESCO, 2023; Xia et al., 2024). It also speaks to design-specific concerns raised by Wadinambiarachchi et al. (2024): once students entered AI-supported exploration, many found it difficult to maintain authorship over direction and coherence. The findings therefore suggest that GenAI redistributes effort, lowering some thresholds while exposing students more sharply to the demands of specification, evaluation, and synthesis.

Rethinking AI as Pedagogy in Design Education

The title of this paper proposes AI as pedagogy rather than AI as tool, and the discussion supports that framing. When GenAI is embedded in a design course, it reorganizes what students must learn in order to work effectively. The central pedagogical issue becomes less about access to generation and more about how students learn to guide, evaluate, revise, and integrate what is generated. The tool changes the shape of the learning bottleneck, and pedagogy must respond accordingly.

This has direct implications for how design education understands process. Studio-based learning has long been described as a mentored form of reflective practice in which critique, feedback, and iterative reworking are central to how students learn to design (Milovanovic & Gero, 2020; Schön, 1983). Work on studio critique likewise emphasizes that design learning depends on making tacit design knowledge more explicit through dialogue, reflection, and feedback (Fleischmann, 2025). From this perspective, GenAI integration does not bypass reflective practice; it changes the material through which reflection must occur. Students still need to articulate intentions, inspect mismatches, diagnose failures, and justify revisions, but now partly through interaction with AI-generated outputs.

This is why AI as pedagogy is analytically useful here. If AI is treated only as a faster means of production, the main question becomes whether it saves time. If it is treated as part of pedagogy, the more important question becomes what kinds of reflective and evaluative practices the course enables students to develop around it. The present study suggests that GenAI can support exploratory activity, but it also makes tacit aspects of design learning newly visible: students must decide how much specificity is needed, how to preserve style across iterations, how to judge which output is worth developing, and how to convert generated fragments into a coherent visual system.

This also differentiates design education from more general GenAI-in-education discussions. In broader higher education, GenAI is often discussed in relation to integrity, authorship, assessment redesign, and AI literacy (Cotton et al., 2024; Kasneci et al., 2023; Xia et al., 2024). Those concerns remain relevant here, but the design context adds another layer: the problem is whether students can turn AI-supported production into meaningful design development. That requires iterative visual judgment, stylistic control, and integration across linked deliverables. The educational value of GenAI in design should therefore be judged less by output volume than by whether it helps students participate more effectively in reflective, iterative, and evaluative design processes.

Implications for GenAI-Integrated Pedagogy

Teaching Controllability Explicitly

Teach controllability directly. Courses should show students how to specify intent, state constraints, preserve key features, and refine prompts across iterations. Reference anchoring, style constraints, and negative instructions should be treated as part of design articulation.

Teaching Integration, Not Just Generation

Teach integration, not only generation. Students could often produce usable fragments, but had more difficulty turning them into coherent design systems. Assignments should require editing, combining, sequencing, and justifying AI-generated outputs across linked deliverables.

Evaluating Learning Processes Alongside Final Artifacts

Evaluate process alongside artifacts. If GenAI makes plausible outputs easier to produce, assessment should capture how students arrived at them, revised them, and exercised judgment throughout the process (UNESCO, 2023; Xia et al., 2024). Useful evidence includes prompt iterations, comparison sets, revision pathways, and short rationales for selection and modification.

Limitations and Future Research

This study has several limitations that should be acknowledged. First, the findings rely primarily on perception-based measures and structured reflections. These data are valuable for understanding how students experienced support, difficulty, and process change during the course, but they do not provide direct evidence that course learning outcomes were fully achieved. Students may feel more efficient, more confident, or more capable of guiding AI without demonstrating the same degree of improvement in artifact quality or design judgment under formal evaluation.

Second, the course lasted only four weeks and totaled 32 contact hours. This compressed duration is central to the study's contribution, but it also constrains what kinds of learning could reasonably be expected to emerge. Some of the observed process gains may represent early adaptation rather than stable competence, and some of the unresolved difficulties may reflect the time needed for more mature design judgment to develop. The findings should therefore be interpreted as evidence about short-term alignment, not long-term mastery.

Third, the study is based on a single undergraduate course in a specific instructional context. While this context is useful for examining GenAI-integrated pedagogy in a realistic design setting, the findings are not intended to be universally generalizable across all design disciplines, institutional conditions, or student populations. Relatedly, the reflection materials varied in depth and completeness. Some students offered detailed accounts of their prompting strategies and frustrations, while others responded more briefly. Although these reflections were sufficient to identify recurring themes, they cannot fully substitute for richer qualitative methods such as interviews, observations, or longitudinal design diaries.

These limitations point directly toward future research. A next step would be to triangulate perception-based findings with artifact-based assessment, rubric-aligned evaluation of integration quality, and instructor judgment of process development across stages of work. Future studies could also incorporate interviews, observations, or collected prompt logs to examine how design decisions unfold in more detail over time. In addition, comparative studies across longer courses or across different types of design tasks could clarify whether the shift from generation difficulty to orchestration difficulty persists, weakens, or intensifies under different pedagogical conditions. Such research would help move the field from early descriptive accounts of GenAI use toward more robust models of how GenAI integration shapes design learning.

Conclusion

This study examined whether GenAI-integrated teaching in a four-week undergraduate design course could support core course learning goals associated with studio-based design education. Drawing on pre- and post-course surveys and written student reflections, the findings suggest partial alignment rather than full achievement. Students commonly reported that AIGC helped them progress more quickly, generate options, and engage in more deliberate prompting and iteration practices. At the same time, persistent challenges remained in controllability, output consistency, and the integration of AI-generated materials into coherent design solutions.

Taken together, the findings suggest that GenAI redistributes difficulty in short-term design learning. It appears to reduce barriers to starting, visualizing, and generating alternatives, while foregrounding new demands in steering, refining, evaluating, and synthesizing outputs into

meaningful design decisions. This shift is pedagogically significant because it suggests that the central challenge of GenAI-integrated design education lies less in access to generation than in teaching students how to work critically and reflectively with what is generated.

For that reason, GenAI in design education is best understood not only as a tool of production but as a pedagogical condition that reshapes where learning effort is required. If design educators want GenAI-integrated teaching to remain aligned with course learning goals, they will need to teach control and integration strategies explicitly and evaluate learning processes alongside final artifacts. In the short term, then, GenAI may help students move faster and explore more; but whether that support becomes meaningful design learning depends on how well pedagogy addresses the higher-order work of direction, judgment, and synthesis.

Acknowledgements

The authors thank the students from a design class at a university in Southern China for their participation in this study. This work was supported by the Guangdong Higher Education Society's 14th Five-Year Plan for 2025 Higher Education Research Project (25GQN025), the Guangzhou College of Commerce's 2025 Excellent Course Project of Digital-Intelligence Integration (Artificial Intelligence + Pilot Course) (XJYXKC202534), and the Guangzhou College of Commerce's Teaching Quality and Teaching Reform Project (2024JXGG32).

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

The authors used ChatGPT during the preparation of this work to refine language and check formatting; after utilizing the tool, the authors thoroughly reviewed and edited the content as necessary and assumed full responsibility for the publication's content.

References

- Cotton, D. R. E., Cotton, P. A., & Shipway, J. R. (2024). Chatting and cheating: Ensuring academic integrity in the era of ChatGPT. *Innovations in Education and Teaching International*, 61(2), 228–239. <https://doi.org/10.1080/14703297.2023.2190148>
- Fleischmann, K. (2025). Making tacit knowledge explicit: the case for online peer feedback in the studio critique. *International Journal of Technology and Design Education*, 35, 699–721. <https://doi.org/10.1007/s10798-024-09911-8>
- Ioannou, O. (2018). Opening up design studio education using blended and networked formats. *International Journal of Educational Technology in Higher Education*, 15, Article 47. <https://doi.org/10.1186/s41239-018-0129-7>
- Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günemann, S., Hüllermeier, E., Krusche, S., Kutyniok, G., Michaeli, T., Nerdel, C., Pfeffer, J., Poquet, O., Sailer, M., Schmidt, A., Seidel, T., ... Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences*, 103, Article 102274. <https://doi.org/10.1016/j.lindif.2023.102274>
- Milovanovic, J., & Gero, J. (2020). Modeling design studio pedagogy: A mentored reflective practice. *Proceedings of the Design Society: DESIGN Conference*, 1, 1765–1774. <https://doi.org/10.1017/dsd.2020.118>
- Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. Basic Books.
- UNESCO. (2023). *Guidance for generative AI in education and research*. UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000386693>
- Wadinambiarachchi, S., Kelly, R. M., Pareek, S., Zhou, Q., & Velloso, E. (2024). The effects of generative AI on design fixation and divergent thinking. In *Proceedings of the CHI Conference on Human Factors in Computing Systems* (CHI '24, Article 380, pp. 1–18). Association for Computing Machinery. <https://doi.org/10.1145/3613904.3642919>
- Xia, Q., Weng, X., Ouyang, F., Lin, T. J., & Chiu, T. K. F. (2024). A scoping review on how generative artificial intelligence transforms assessment in higher education. *International Journal of Educational Technology in Higher Education*, 21(1), Article 40. <https://doi.org/10.1186/s41239-024-00468-z>

Contact email: jinmei.huang@connect.polyu.hk

From Theory to Classroom: Expert Evaluation and Practitioner Insights on Active Learning Models in K–12 Education

Vania Sivakova, Plovdiv University, Bulgaria
Ilitsa Daskalova, Plovdiv University, Bulgaria
Mariyana Bizova-Georgieva, Plovdiv University, Bulgaria
Galin Tsokov, Plovdiv University, Bulgaria
Plamen Miltenoff, University of Economics – Varna, Bulgaria

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

Active learning has become a central priority in contemporary education as systems shift from traditional, teacher-directed instruction toward competency-based, inquiry-driven and student-centered learning environments. Despite increasing adoption, the theoretical grounding and practical applicability of active learning models remain fragmented, and there is limited comparative evidence on how these models function across grade levels and school contexts. This study aims to systematize the field and examine how educational practitioners perceive the relevance and feasibility of selected models. A mixed-method design was applied in two phases. In stage one, a comparative analytical framework and expert evaluation rubric were developed to assess models categorized into four theoretical clusters: constructivist models (e.g., inquiry-based learning, experiential learning), project-oriented models (project- and problem-based learning), cooperative models (cooperative and peer learning), and technology-mediated models (flipped classroom, gamification, blended learning). In the second stage, a survey was conducted among experts, including teachers, principals and training specialists (N = 40), focusing on the practices, barriers and needs related to the implementation of these models. An author's survey was developed for the purposes of the study. Preliminary findings indicate strong consistency between expert evaluations and practitioner preferences, with constructivist, project-oriented and cooperative models rated as most feasible. Technology-mediated models demonstrate potential but require targeted professional development and supportive conditions for successful implementation.

Keywords: active learning, instructional models, pedagogical practices, K–12 education, teacher professional development, implementation of innovative models

iafor

The International Academic Forum
www.iafor.org

Introduction

In the context of a rapidly evolving technological reality and the reorganization of social processes that increasingly function through complex collaboration, traditional transmissive pedagogy is gradually losing its functional relevance. This shift is driven by contemporary educational demands, which no longer emphasize the passive reproduction of knowledge but instead focus on activating cognitive engagement and constructing knowledge through action. These circumstances have led to the emergence of a new educational paradigm manifested in the principles and practices of active learning. The foundational definition proposed by Bonwell and Eison (1991) describes this process as "...anything that involves students in doing things and thinking about the things they are doing." This transition should not be viewed merely as a methodological adjustment, but rather as a strategic adaptation of the educational system to the demands of developing sustainable competencies. The transformation is expressed most clearly in the reconfiguration of roles within the classroom, where the student is no longer a passive recipient of knowledge but an active constructor of it. At the same time, the teacher moves beyond the role of a sole lecturer and takes the position of a facilitator and architect of the learning environment. From the perspective of educational productivity, active learning contributes to overcoming cognitive passivity and to adapting to a technological environment that requires critical thinking. This transformation affects both participants in the educational process. On the one hand, teachers activate their creative potential by directing their influence toward designing and shaping the learning process. On the other hand, students adapt their own learning activity through efforts oriented toward construction and creation, which in both cases stimulates critical thinking, adaptability, and self-actualization.

The relevance of the topic is driven by the urgent need to renew traditional teaching methods and adapt them to the demands of a dynamic social and technological reality. The significance of the study lies in the necessity for school education to develop key competencies that extend beyond the reproduction of factual knowledge.

The main objective of this paper is to study and analyze active learning models. To achieve the main objective, we used the methods of theoretical analysis and empirical research. The main purpose of theoretical analysis is to develop a theoretical framework that identifies the main levels and domains of active learning, while also examining how this theoretical foundation is reflected and applied in contemporary school practice. Furthermore, the study seeks to determine whether different models of active learning are implemented intermittently or as a sustained pedagogical approach through empirical research.

To achieve this primary objective, the following specific research tasks were formulated:

- To develop a theoretical framework that identifies functional categories and comparative matrices of the domains of active learning, thereby contributing to overcoming the fragmentation in their conceptual understanding.
- To establish constructive links between classical theoretical approaches to active learning and actual pedagogical practices within the educational environment.
- To analyze and systematize the perspectives of teachers, school principals, and educational specialists in order to assess the effectiveness, efficiency, sustainability, and level of applicability of different active learning models, taking into account their familiarity with these methods.

- To identify specific challenges faced by professionals when implementing such approaches and to outline the types of support required, particularly in relation to technologically mediated methods.
- To provide an evidence-based conceptual framework and empirical data that can support educational practitioners in the process of renewing and adapting traditional teaching methods to active learning approaches.

For the purposes of the empirical research, we created an author's survey aimed at active learning experts. The survey contains demographic data and 10 questions related to the application of active learning methods, challenges and successes. Participants were given the opportunity to comment on the active learning methods and give their opinion on their application. The participants are active learning experts. We conducted the study in November 2025 through survey with Google Forms. To analyze the results, we used MS Excel 365. A descriptive analysis was performed, presented through frequency distribution, diagrams and analytical analysis.

Theoretical Framework

In the scholarly literature dedicated to conceptualizing and formulating educational theories – particularly those concerned with research-based approaches aimed at establishing functional models and techniques for activating students and positioning them as active participants in the learning process – the conclusions often remain fragmented and subject to multiple interpretations. If we examine some of the key definitions related to the concept of active learning, particularly those formulated after 2000, several representative perspectives can be identified. According to Prince (2004), “...active learning is generally defined as any instructional method that engages students in the learning process.” Radev (2014) defines learning as “...a change in behavior through the construction of personal experience and the individual interpretation of the world through one’s own activity.” Yustina et al. (2024) describe the active learning model as “...a teaching approach that emphasizes the active involvement of students during the learning process.” Taken together, these statements – grounded in diverse studies – demonstrate that the general understanding of active learning has evolved alongside the development of contemporary educational paradigms. Notably, while early interpretations primarily defined student activation in terms of direct participation in learning activities, later perspectives broaden this view. Activity becomes enriched with the dimensions of personal experience and individuality, eventually leading to its current interpretation as a comprehensive methodological concept that integrates teaching and learning through collaborative models of active learning.

Active Learning Models

Project-Oriented Models

This category includes three of the most influential models: problem-based learning, project-based learning, and phenomenon-based learning. According to Savery (2006), problem-based learning is “...an instructional (curricular) learner-centered approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop viable solutions to a defined problem.” Thomas (2000), in his report *A Review of Research on Project-Based Learning*, defines project-based learning as “...a model that organizes learning around projects.” Schaffar and Wolff (2024) note that “...the idea of phenomenon-based learning was introduced into the Finnish national curriculum for basic education in 2014...”

and further add that this concept “...is often associated with traditions in educational psychology, constructivism, problem-based learning, and inquiry-based learning.” What these models share is their common function: structuring large-scale learning units organized around a central problem, project, or phenomenon in order to engage learners in complex and realistic scenarios that require both the acquisition and the application of knowledge. Their differences become apparent in the primary focus of each model. In problem-based learning, the emphasis is placed on the process of inquiry and problem-solving. In project-based learning, the focus lies on the product, that is, the final outcome. In phenomenon-based learning, the central aim is the holistic understanding of a phenomenon or concept. These essential distinctions lead to variations across multiple dimensions of the learning process, including the starting point, the expected outcomes, the disciplinary structure, the guiding question, the learning objectives, the roles of teachers and students, and the approaches to assessment. Consequently, differences can also be observed in terms of the duration of learning activities and the contexts in which these models are applied.

Constructivist Models

These models essentially reflect the cognitive mechanisms through which inquiry and experience are transformed into knowledge. Their role is to structure and organize the fundamental components of learning related to questioning, investigation, and the application of acquired knowledge in various contexts. They may function both as independent pedagogical strategies and as integral components of broader and more comprehensive project-oriented models of active learning. Examples of such process-oriented or cognitive models include inquiry-based learning, experiential learning, and case-based learning. According to Pedaste et al. (2015), “...inquiry-based learning seeks to engage students in an authentic process of scientific discovery.” David Kolb (1984) defines learning as “...the process whereby knowledge is created through the transformation of experience.” Similarly, Das et al. (2021) describe case-based learning as “...an established two-way active learning method in which students acquire concepts by solving cases or problems under the guidance of a facilitator.” The main differences among these models lie in their primary focus. In inquiry-based learning, the emphasis is placed on the process of formulating questions and seeking answers. In experiential learning, the focus lies on the cognitive processes through which experience is transformed into knowledge. In case-based learning, the emphasis is directed toward the analysis of situations and the application of theoretical knowledge in practical contexts.

Cooperative Models

These models are oriented toward the social organization of the learning environment. Their primary objective is to structure interaction among students in a way that stimulates and sustains active learning. This category includes cooperative learning, reciprocal teaching, and fundamental interactive techniques. According to Johnson et al. (2013), “...cooperative learning is the instructional use of small groups so that students work together to maximize their own and each other’s learning.” The relationships among these approaches can be understood as a hierarchically organized system in which the individual components are not in opposition but rather complement each other and function in coordination. The emphasis is therefore not on distinguishing them as separate methods, but on understanding how they interact within a shared pedagogical logic. At each level of this structure a specific function can be identified: cooperative learning serves as the overarching conceptual framework; reciprocal teaching operates as a related collaborative model that applies its principles; and

fundamental interactive methods function as universal instructional tools that can be integrated into all other models.

Technologically Mediated Models

This section examines models whose primary function is associated with rethinking and reorganizing the temporal, spatial, and instrumental parameters of pedagogical practice. Unlike the previous sections, which emphasize teaching methods (Sections I and II) or the social dynamics of the classroom (Section III), the focus here is placed on the transformation of the organizational logic of learning. These models can also be described as organizational, as they aim to intentionally restructure the learning environment. At the same time, they possess a technological dimension, since such reorganization is often initiated, supported, or made possible through digital technologies. Through these models, fundamental questions concerning the conditions of learning are addressed – namely where (in the classroom, at home, or in an online environment) and when (synchronously or asynchronously) active learning takes place. Examples included in this category are the flipped classroom, gamification, collaborative learning environments, and other digitally mediated approaches. The models discussed in this section form an integrated system in which differences are not primarily typological but structural and functional. Rather than representing alternative pedagogical solutions, they constitute different levels within a unified, technologically mediated educational ecosystem. The distinctions among them arise from the scale of the intervention and the pedagogical function each performs. Blended learning can be understood as a macro-organizational framework that combines face-to-face and online components and restructures the spatial and temporal logic of the educational process. In this sense, it functions as a broad strategic category within which more specific models are implemented. The flipped classroom represents a particular configuration within this paradigm. It reorganizes instructional time by relocating lower-order, lecture-based activities outside the classroom and freeing in-class time for cognitively more complex and interactive forms of learning. In contrast, game-based learning and gamification operate at a different level. Their primary role is not to reorganize time and space, but to transform the motivational architecture of the learning process. Game-based learning uses a game environment as a comprehensive context for learning, whereas gamification integrates game mechanics into non-game educational content in order to enhance engagement and intrinsic motivation. In this way, these models can be understood as complementary layers that can be integrated into the organizational structures of blended and flipped learning environments.

The proposed typology of active learning models makes it possible to trace the different levels at which the transformation of the traditional instructional process occurs. The analysis demonstrates that active learning is not implemented through a single pedagogical approach but through a system of interconnected models that influence different components of the educational environment. Project-oriented models structure learning around complex problems and authentic tasks; constructivist models emphasize the cognitive processes of inquiry, experience, and interpretation; cooperative models reorganize social interaction within the classroom; and technologically mediated models transform the spatial, temporal, and instrumental conditions of learning. This multi-layered structure indicates that the effective implementation of active learning does not rely on the isolated use of individual methods, but rather on the integration of diverse pedagogical strategies within a coherent educational system. The interaction between cognitive, social, and technological components thus reveals the potential of active learning as a leading pedagogical paradigm in contemporary education.

Analysis of the Results of the Survey Conducted With Experts

Description of the Participants

A large part of the experts who participated in the survey were female. They are 85% while men are 15%. This can be explained by the fact that most of the experts are teachers, and this profession is chosen mainly by the female gender.

Most participants are from a large city. There are fewer of them from a small town and a village. Accordingly, those from a large city are 75%, from a small town 15% and the remaining 10% are from a village.

The participants are between 25 and 64 years old. Most experts are aged 47 to 64 – 55% or more than half. There are also quite a few young participants aged 25 to 35 – 20%. Almost as many are experts aged 36 to 46 – 25%.

The teaching experience of participants ranges from 2 and 40 years. The largest group consists of experts with under 10 years of experience, accounting for 37,5% of the total. The remaining participants are distributed almost evenly among the other categories: 20% have between 10 and 20 years of experience, 20% have 20 to 30 years and 22,5% have between 30 to 40 years.

The study was conducted in several types of schools, namely: primary school, secondary school, vocational high school and private school. Most experts are from primary schools – over half 62,5%. Next are the participants from secondary schools – 23% and 12,5% participated from vocational high schools. The least experts are from private schools – only 2,5%.

Results of the Survey

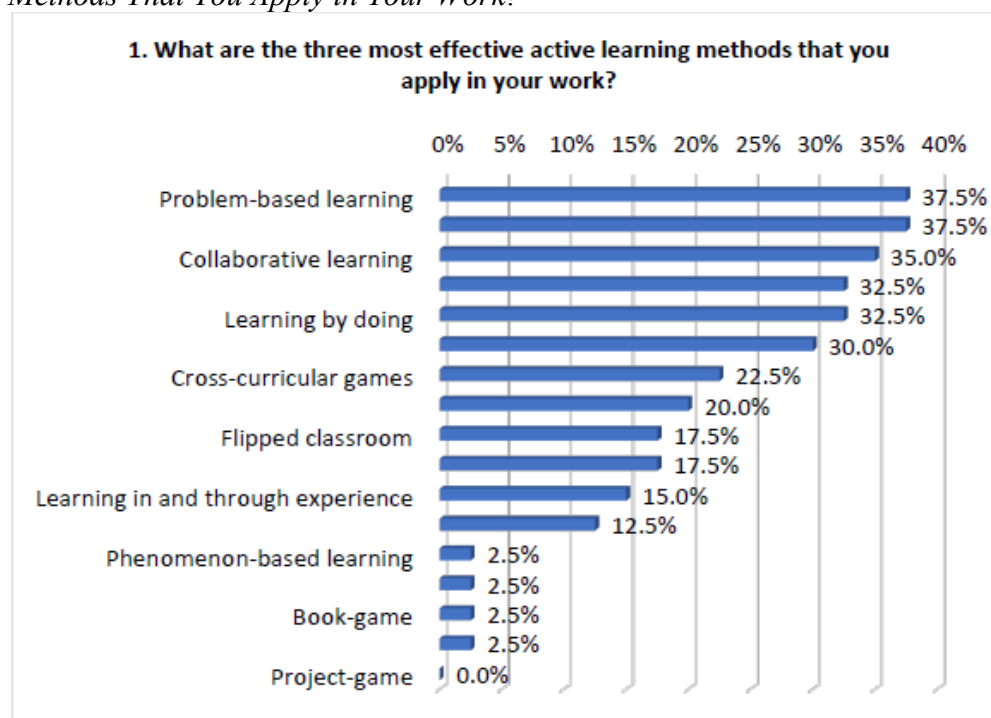
Active learning experts were asked the question: What are the three most effective active learning methods that you use in your work? Answer options were listed, and in addition to them, participants had the opportunity to add a method that was not listed among those listed. The results presented in Fig. 1 show that the most effective active learning methods according to experts in active learning, ranked in order of effectiveness, are:

- Problem-based learning – 37,5%;
- Project-based learning – 37,5%;
- Collaborative learning – 35%;
- Debates and discussions – 32,5%;
- Learning by doing – 32,5%;
- Gamification – 30%;
- Cross-curricular games – 22,5%;
- Case-based learning – 20%;
- Flipped classroom – 17,5%;
- Inquiry-based learning – 17,5%;
- Learning in and through experience – 15%;
- Creative learning – 12,5%.

The least mentioned methods by 2.5% of experts: Phenomenon-based learning, Simulations and role-playing games, Book-game, Escape room. No one mentioned the project-game method.

Figure 1

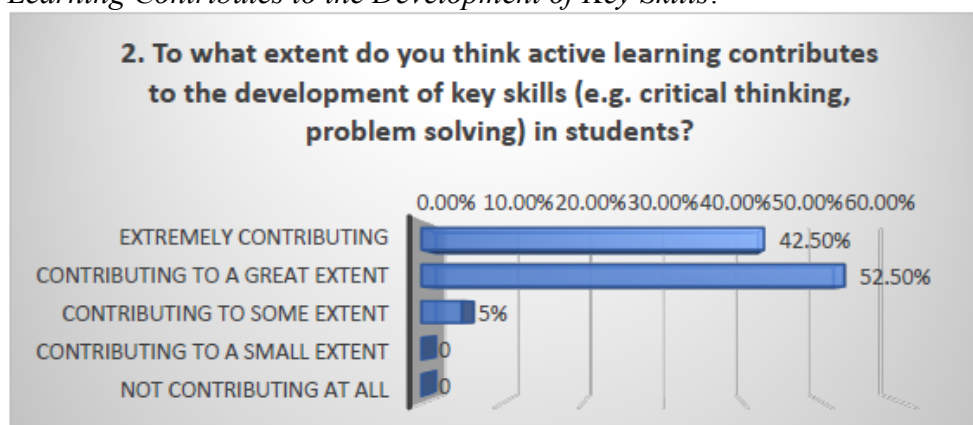
Distribution of Answers to the Question: “What Are the Three Most Effective Active Learning Methods That You Apply in Your Work?”



The experts are categorical that active learning contributes to a very large extent to the development of key skills in students (e.g. critical thinking, problem solving). Over half 52,5% indicated that it contributes to a great extent, and a large part of the rest or 42,5% chose the answer extremely contributes. The distribution of answers is given in Fig. 2. The diagram shows that no one indicated that it does not contribute or contributes to a small extent. According to only 5%, active learning contributes to some extent to the development of key skills.

Figure 2

Distribution Diagram of Responses to the Question: “To What Extent Do You Think Active Learning Contributes to the Development of Key Skills?”



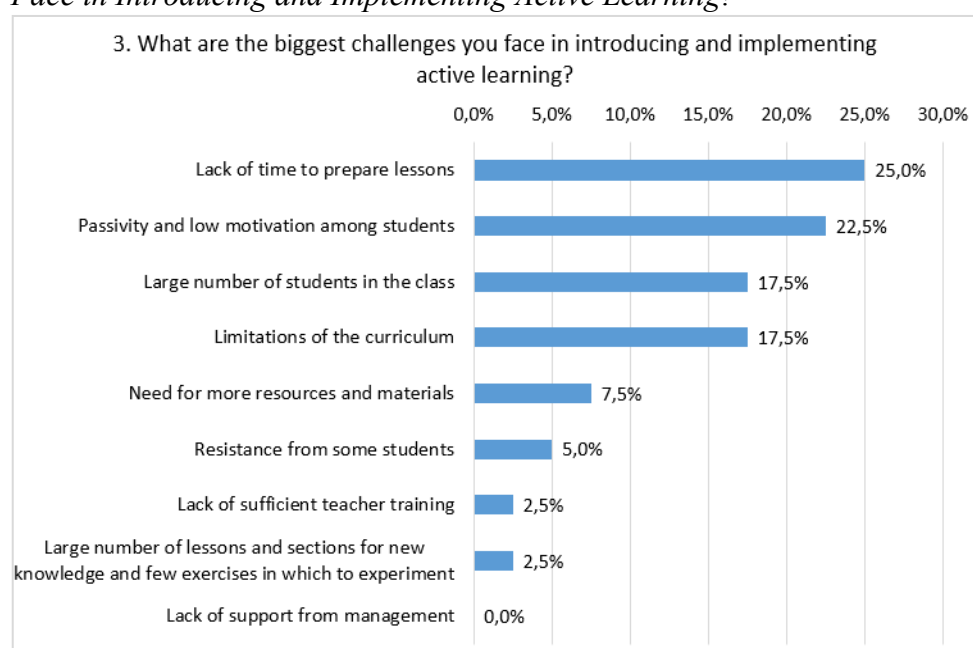
The implementation of active learning is also associated with challenges. The experts had to indicate what are the biggest challenges they face in introducing and implementing active learning. The experts ranked the challenges in order of importance as follows (Fig. 3):

- Lack of time to prepare lessons – 25%;
- Passivity and low motivation among students – 22,5%;
- Large number of students in the class – 17,5%;
- Limitations of the curriculum – 17,5%;
- Need for more resources and materials – 7,5%;
- Resistance from some students – 5%;
- Lack of sufficient training for teachers – 2,5%.

No one indicated the lack of support from the management as a challenge, which may mean that the management is more supportive of the use of active learning. Additionally, a few participants indicated that the main problem is the large number of lessons for new knowledge and few exercises in which to experiment.

Figure 3

Distribution Diagram of Responses to the Question: “What Are the Biggest Challenges You Face in Introducing and Implementing Active Learning?”



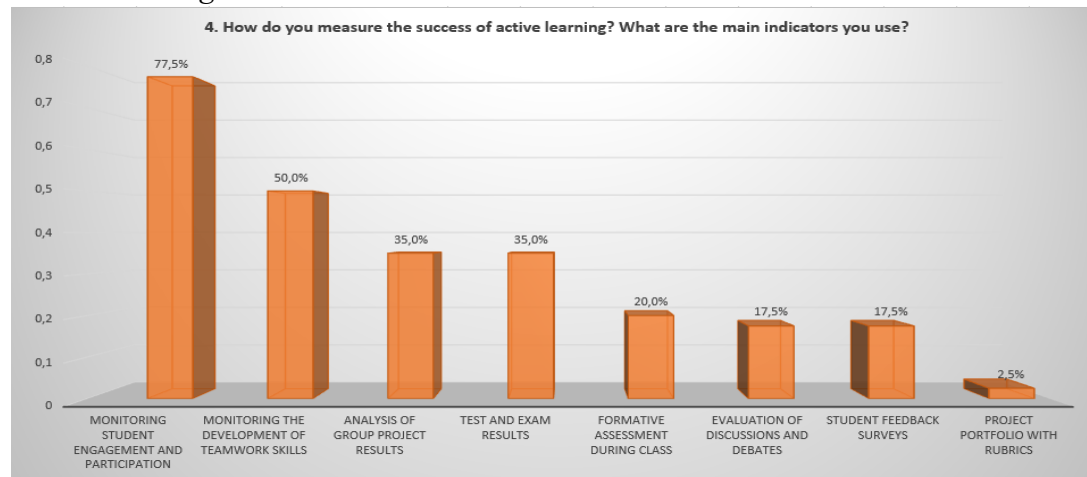
The implementation of active learning requires that its effect can be measured using various criteria, and the experts had to answer the questions: How do you measure the success of active learning? What are the main indicators that you use? The experts were offered options, but they had the opportunity to add others. Fig. 4 shows the distribution of the answers ordered by importance:

- Monitoring student engagement and participation – 77,5%;
- Monitoring the development of teamwork skills – 50%;
- Results of tests and exams – 35%;
- Analysis of the results of group projects – 35%;
- Formative assessment during class – 20%;
- Evaluation of discussions and debates – 17,5%;
- Student feedback surveys – 17,5%.

A small number of experts also indicated a project portfolio with rubrics as a way to measure the success of the application of active learning.

Figure 4

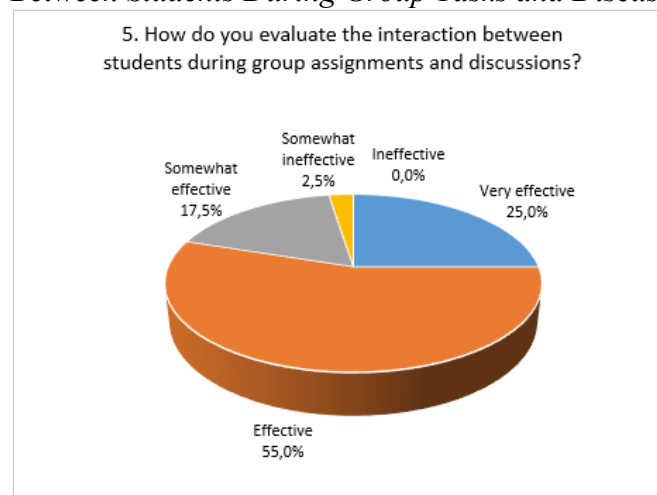
Distribution Diagram of Answers to the Question: “How Do You Measure the Success of Active Learning?” “What Are the Main Indicators You Use?”



The application of active learning has many aspects, including interaction between students, and therefore the experts were asked: “How do you assess the interaction between students during group tasks and discussions?” Fig. 5 shows the distribution of answers. The diagram shows that 80% of the participants are categorical that the interaction between students is categorically effective (including answers very effective – 25% and effective – 55%). A small part 17,5% chose the answer rather effective. No one believes that the interaction is ineffective, and very few only 2,5% indicated that it is rather ineffective.

Figure 5

Distribution Diagram of Answers to the Question: “How Do You Assess the Interaction Between Students During Group Tasks and Discussions?”

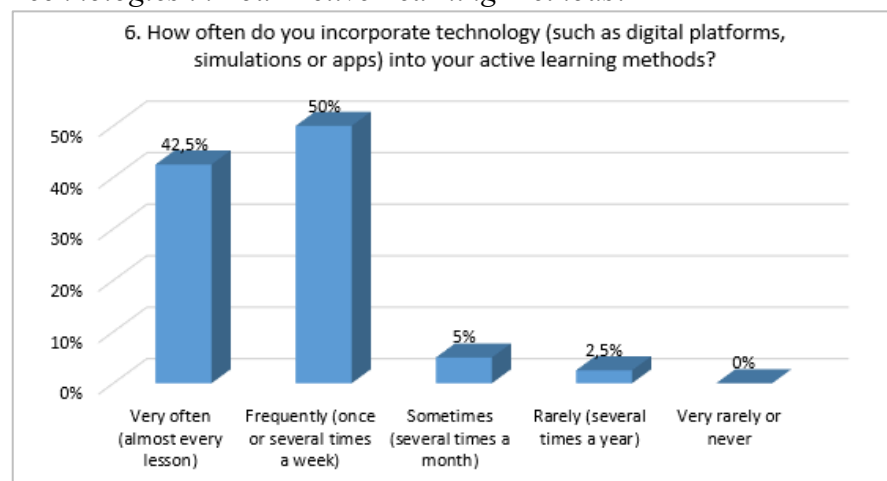


Nowadays, technologies are present not only in a large part of our daily lives, but also in the field of education. The virtual space is rich in platforms and electronic resources that are used for various purposes. Many of them can also be used in the organization of the application of active learning. The experts had to indicate whether they use digital technologies in active learning methods. When asked: “How often do you include technologies (such as digital

platforms, simulations or applications) in your active learning methods?” the participants are categorical that they use them relatively often. Almost half 42,5% indicated that they use digital technologies very often, almost in every lesson, and half use them often (once or several times a week). The rest use them rarely – 2,5% or sometimes – 5%. Fig. 6 shows the distribution of answers. There are no experts who rarely or never use digital technologies in active learning methods. This means that digital technologies are necessarily present in active learning methods.

Figure 6

Distribution Diagram of Responses to the Question: “How Often Do You Include Technologies in Your Active Learning Methods?”



In order to implement active learning methods, teachers must have knowledge about them, as well as skills and competencies on how to use them. Therefore, we also asked the experts “What role does teacher preparation play in the successful implementation of active learning?” The results show that teacher preparation is a very important factor. More than half of the participants or 64% answered “extremely important,” and the remaining 36% answered “important.” No one indicated an answer that it was not at all important or slightly important, as can be seen in Fig. 7.

Figure 7

Distribution Diagram of Responses to the Question: “What Role Does Teacher Preparation Play in the Successful Implementation of Active Learning?”

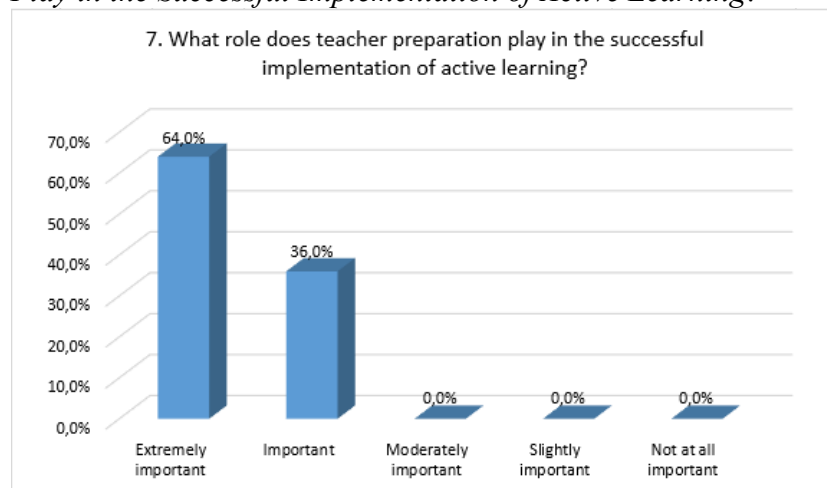
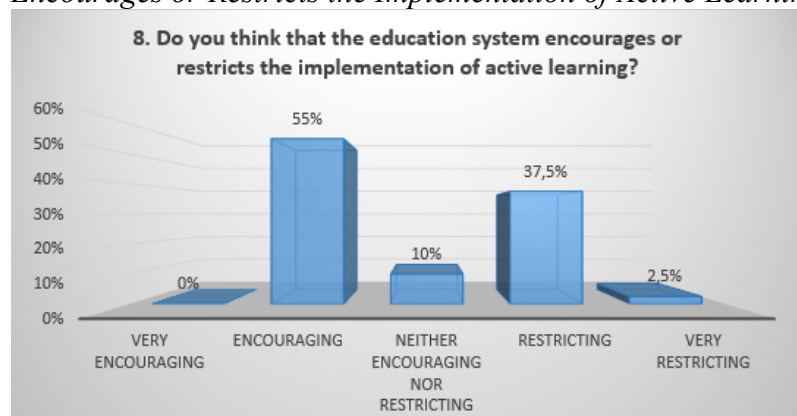


Figure 8

Distribution Diagram of Answers to the Question: “Do You Think That the Education System Encourages or Restricts the Implementation of Active Learning?”



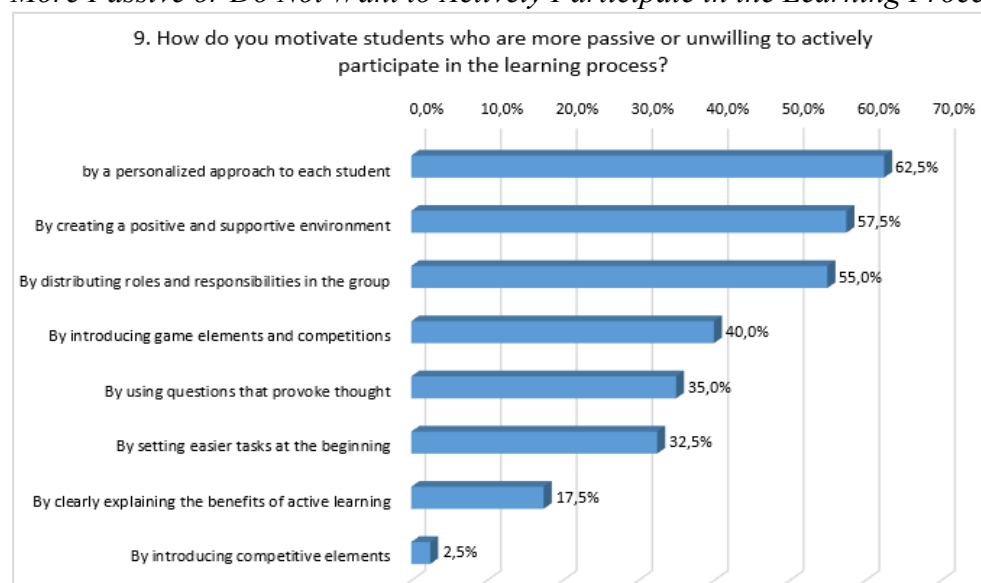
The results regarding whether the education system encourages or restricts the implementation of active learning show that the answers are particularly categorical. More than half of the experts shared that the education system encourages, although not extremely much. A significant part of 37,5% answered that it restricts, while 10% hesitated whether to encourage or restrict. Only 2,5% believe that it restricts a lot. The distribution of answers can be seen in Fig. 8.

Although active learning methods increase student engagement, some of them are still more passive. The experts had to indicate how they motivate students who are more passive or do not want to actively participate in the learning process. Several options are listed, and they can also add an answer (Fig. 9). The results show that experts try to motivate the passive students most often through:

- a personalized approach to each student – 62,5%;
- creating a positive and supportive environment – 57,5%;
- distributing roles and responsibilities in the group – 55%;
- introducing game elements and competitions – 40%;
- using questions that provoke thinking – 35%;
- setting easier tasks at the beginning – 32,5%;
- clearly explaining the benefits of active learning – 17,5%;
- introducing competitive elements – 2,5%.

Figure 9

Distribution Diagram of Answers to the Question: “How Do You Motivate Students Who Are More Passive or Do Not Want to Actively Participate in the Learning Process?”



The biggest change as a result of the implementation of active learning, which the experts observed, is increased motivation and interest in learning. Indicated by almost half of the participants – 47,5%. Students also experience greater self-confidence as a result of active learning, according to 15% of the indicated answers. Less noticeable and indicated by 12,5% of the experts are:

- Higher engagement in the learning process;
- Better critical thinking and analysis skills.

No one indicated that as a result of active learning, students have better academic results. The improved ability to work in a team is weakly expressed. The answers can be seen in the diagram in Fig. 10.

Figure 10

Distribution Diagram of Responses to the Question: “What Is the Biggest Change You Have Observed in Your Students as a Result of Implementing Active Learning?”

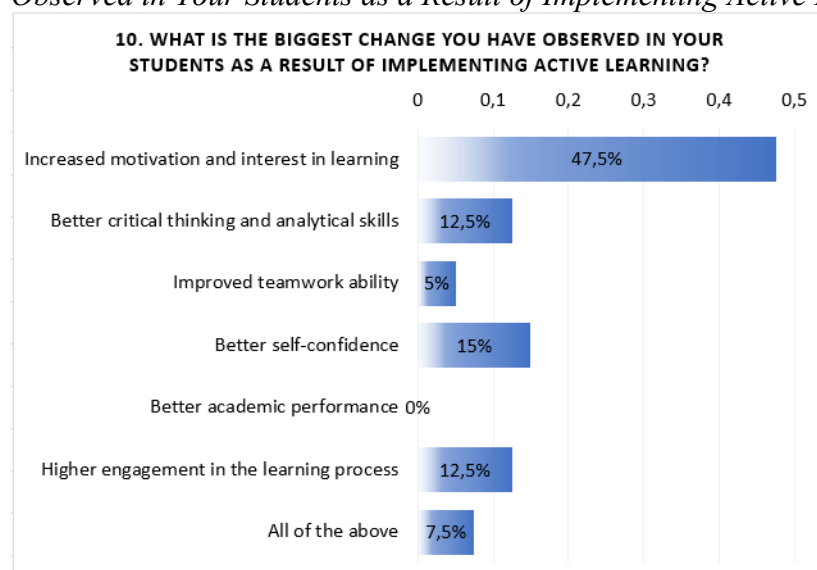
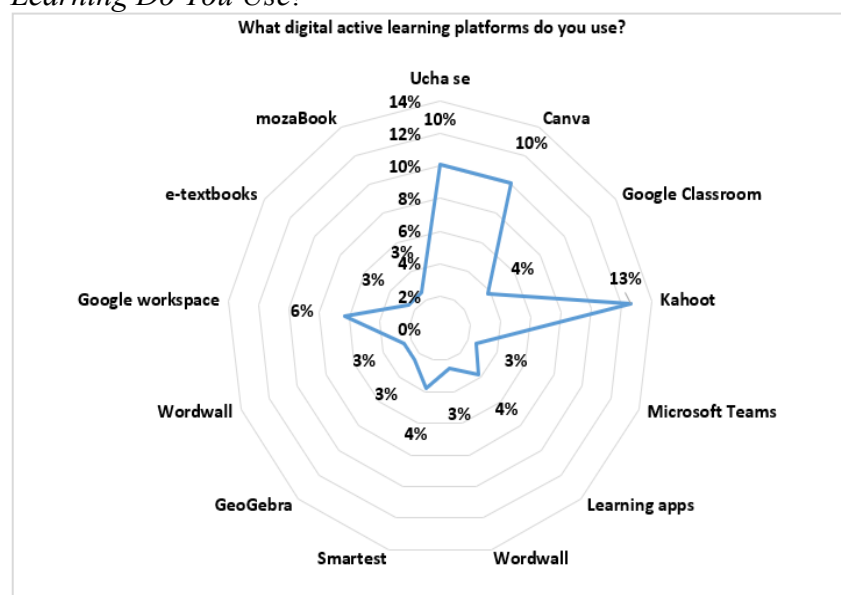


Fig. 11 shows the digital platforms that participants indicated that they use when applying active learning methods. The most used application is the Kahoot application, mentioned by 13%. Leading are the platforms of Ucha.se and Canva, which are mentioned by 10% of the experts. Then there are Google products 6% and in particular Google Classroom – 4%. Less frequently mentioned are the platforms and applications: Microsoft Teams, Learning apps, Wordwall, Smartest, GeoGebra, Wordwall, electronic resources offered by publishing houses, mozaBook. They are mentioned by 3% of the experts.

The following applications, sites and platforms are rarely used: Padlet, MindMeister, Mozaweb, Mozabook, Prepodavame.bg, Moodle, BBC Learning Hub, Digital Backpack, Educaplay, Gemini, Notebook LM, Izzi, Khan Academy, Toytheatre, Jigsaw planet, Gamma, Moodle, Quizlet, Live Worksheets, Thinkific, Knigovishte, Igrovi platforms, Code.org, Scratch.mit.edu, “Voevodi,” Epoha online, etc.

Figure 11

Distribution Diagram of Answers to the Question: “What Digital Platforms for Active Learning Do You Use?”



Conclusion

The present study presented a systematic analysis of active learning as a pedagogical concept, framework and applied practice in Bulgarian school education. The theoretical review outlined active learning as a fundamental approach that shifts the pedagogical focus from the reproduction of knowledge to its construction through activity, interaction, reflection and autonomous participation. The classification of the models into four functional areas allowed for a comprehensive understanding of their logic, pedagogical mechanisms and potential for the development of key competences in the spirit of contemporary educational policies and the European Skills Framework for the 21st Century.

The results of the survey conducted among active learning experts confirm the trends outlined at the theoretical level. The participants recognize active learning as a significant and necessary direction in the development of school education and highly evaluate it in terms of its effectiveness in engaging students, stimulating critical thinking, collaboration and real-world application of knowledge. At the same time, the data show varying degrees of

confidence and practical experience in the implementation of individual models, with socio-structural approaches being strongly established; process and framework models being used purposefully but unevenly; and emerging models, including those integrating artificial intelligence, VR/AR and heutagogical principles, remaining in an early phase of experimentation. There are also clear barriers related to assessment, content load, teachers' pedagogical security and lack of centralized methodological resources. The synthesis of critical assessments and recommendations shows that the potential for implementing active learning in the Bulgarian education system is significant, but its sustainable integration requires targeted support and strategic consistency. The most significant areas for improvement are harmonization of assessment with the competency model; optimization of curricula with an emphasis on deep learning; professional development oriented towards facilitation and pedagogical modeling; creation of national resource banks; and introducing an ethical and functional framework for the use of new technologies, including artificial intelligence.

There are a number of active learning methods, some of which are very common in practice, while others are less well known. Among the most effective methods according to active learning experts are: problem-based learning, project-based learning, collaborative learning and group work, debates and discussions, learning by doing, gamification, cross-curricular games, case-based learning, flipped classroom and inquiry-based learning. Less well-known and used active learning methods are: phenomenon-based learning, simulations and role-playing games, book-game, escape room and project-game. The important is that these methods contribute to the development of key skills. Although teachers face a number of challenges when applying them such as lack of time to prepare lessons, passivity and low motivation among students, large number of students in the class, limitations of the curriculum, this does not stop them from using them. Increased student engagement and participation is observed. Interaction between students during group tasks and discussions is clearly effective. Discussion and debate assessment and student feedback surveys are rarely used as indicators of the success of active learning.

According to experts, active learning develops socio-emotional learning, leads to understanding and longer-term memorization of new knowledge and its application in real life, increases students' motivation, interest and desire to work/study.

Virtual space is rich in platforms and electronic resources that are used for different purposes. Experts relatively often use digital technologies in active learning methods in almost every lesson (such as digital platforms, simulations or applications). The education system encourages the implementation of active learning, however funding is needed to purchase licenses for digital platforms for active learning. The results showed that the teacher's preparation that is a very important factor for the successful implementation of active learning.

In summary, it can be concluded that active learning should not be viewed as a set of methodologies or a short-term innovation, but as a strategic direction for the development of modern education, which is compatible with national priorities and global educational trends. The Bulgarian system already has proven experience, successful practices and normative prerequisites that create real conditions for its establishment as a sustainable educational philosophy. To achieve this, coordination between policy, practice, scientific support and pedagogical culture is necessary, all efforts that would allow active learning to transform from a desirable but fragmented practice into a defining principle of education.

Acknowledgements

This publication has been funded by the National Scientific Programme “Development of Research and Innovation in the Field of Bulgarian Pre-school and School Education.” The author bears full responsibility for the content of this document, which under no circumstances can be considered an official position of the Institute of Education.

References

- Bonwell, C. C., & Eison, J. A. (1991). *Active learning: Creating excitement in the classroom*. George Washington University.
- Das, S., Das, A., Rai, P., & Kumar, N. (2021). Case-based learning: Modern teaching tool meant for present curriculum. *Journal of Education and Health Promotion*, 10(1), 372. https://doi.org/10.4103/jehp.jehp_1265_20
- Johnson, D. W., Johnson, R. T., & Smith, K. A. (2013). Cooperative learning: Improving university instruction by basing practice on validated theory. *Journal on Excellence in University Teaching*, 25(3–4), 85–118.
- Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice-Hall.
- Pedaste, M., Mäeots, M., Siiman, L. A., de Jong, T., Van Riesen, S. A., Kamp, E. T., Manoli, C. C., Zacharia, Z. C., & Tsourlidaki, E. (2015). Phases of inquiry-based learning: Definitions and the inquiry cycle. *Educational Research Review*, 14, 47–61. <https://doi.org/10.1016/j.edurev.2015.02.003>
- Prince, M. (2004). Does active learning work? A review of the research. *Journal of Engineering Education*, 93(3), 223–231. <https://doi.org/10.1002/j.2168-9830.2004.tb00809.x>
- Radev, P. (2014). *Obshta didaktika* [General didactics] (in Bulgarian). FastPrintBooks.
- Savery, J. R. (2006). Overview of problem-based learning: Definitions and distinctions. *Interdisciplinary Journal of Problem-Based Learning*, 1(1), 9–20. <https://doi.org/10.7771/1541-5015.1002>
- Schaffar, B., & Wolff, L. A. (2024). Phenomenon-based learning in Finland: A critical overview of its historical and philosophical roots. *Cogent Education*, 11(1).
- Thomas, J. W. (2000). *A review of research on project-based learning*. Autodesk Foundation.
- Yustina, Y., Nasmunarti, H., & Noviq, N. (2024). Active learning model in contemporary education. *Journal of Education Research*.

Contact email: vanasivakova@uni-plovdiv.bg

Headlines in the Classroom: Media Narratives and the Selective Shifts in Teachers' AI Judgments

Jess L. Gregory, Southern Connecticut State University, United States

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

A 6-week online Learning-Theories course for 17 U.S. post-master's leadership candidates embedded critical analyses of AI's role in professional and student learning. Participants were educators seeking public school administrator certification. Grounded in Davis's Technology Acceptance Model (TAM), this study contends educator attitudes toward AI are shaped primarily by perceived usefulness (PU) and perceived ease of use (PEOU), which together predict their behavioral intention to integrate generative AI tools into instruction. A pre/post TAM-aligned survey (4-point Likert) tracked perceived usefulness (PU), ease-of-use (PEOU), and ethical-intent-to-use (EIU) measuring perceptions regarding educative tasks (e.g. AI supports differentiating lessons; AI is damaging to education; Students mostly use AI to cheat; AI supports learning). Paired t-tests revealed selective shifts: large PU gains for AI-driven lesson differentiation ($d = 0.68$, $p = .029$) and PD planning ($d = 0.47$, $p = .033$); no change in PU for time-saving ($d = 0.00$) or PEOU for implementation ($d = 0.12$). EIU declined solely on the "students will cheat" item ($d = -0.82$, $p < .001$). There was some positive, non-significant drift for several items (lesson-planning, assignment-planning, general "supports learning"). Candidates accepted utility claims that matched prior pedagogical goals and rejected those lacking concrete classroom examples. Results situate media cues as boundary conditions within TAM: headline ecological validity predicted attitude change better than technical affordances. Programs should couple AI headline critique with sustained, supported classroom practice before adoption. Classroom experiences must overcome prevailing narratives in the media to shift the ethical intention to use generative AI to support learning.

Keywords: generative artificial intelligence, AI, technology acceptance model, TAM, educator attitudes towards AI

iafor

The International Academic Forum
www.iafor.org

Introduction

Between November 2024 and May 2025, national and Connecticut-based news coverage on generative artificial intelligence (AI) in education shifted rapidly from reactive concern to systemic recalibration (Table 1). Across outlets, reporting clustered around five dominant themes: (a) academic integrity and cheating, (b) erosion of reliable AI detection, (c) pedagogical adaptation and teacher practice, (d) student normalization of AI use, and (e) emerging concerns about learning quality and equity. Together, these themes illustrate a transition from viewing AI as a disruptive external force to recognizing it as an embedded feature of contemporary learning environments.

Table 1

Headlines Published in the Six Months Prior to the Class

Date	Headline	Publication	Source
Nov 2024	The rise of AI tools forces schools to reconsider what counts as cheating	Associated Press	https://apnews.com/article/4f89a552e9093ce2180471b4d4736675
Nov 2024	Why it's so hard to tell if a piece of text was written by AI	CT Insider	https://www.ctinsider.com/news/article/why-it-s-so-hard-to-tell-if-a-piece-of-text-was-21249821.php
Dec 2024	AI is taking hold in K-12 schools — here are some ways it can improve teaching	CT Insider (via The Conversation)	https://www.ctinsider.com/news/article/ai-is-taking-hold-in-k-12-schools-here-are-21230486.php
Dec 2024	Yale student sues over accusation of improper AI use	GovTech	https://www.govtech.com/education/higher-ed/yale-student-suing-over-accusation-of-improper-ai-use
Jan 2025	Here's how Connecticut schools tackle AI in the classroom as state develops guidelines	CT Insider	https://www.ctinsider.com/news/education/article/ct-schools-districts-ai-artificial-intelligence-21265976.php
Jan 2025	Yale SOM student suspended over alleged AI use sues	CT Insider	https://www.ctinsider.com/news/article/yale-som-student-suspended-alleged-ai-use-sues-20206927.php
Feb 2025	Majority of high school students use generative AI for schoolwork, new research finds	College Board Newsroom	https://newsroom.collegeboard.org/new-research-majority-high-school-students-use-generative-ai-schoolwork
Feb 2025	AI is widespread in higher education — helping and hurting student learning	NBC Boston	https://www.nbcboston.com/news/local/artificial-intelligence-education-college-learning/3850198/
Mar 2025	40% of American students use AI on assignments without permission	Times of India (U.S. education reporting)	https://timesofindia.indiatimes.com/education/news/40-of-american-students-use-ai-on-assignments-without-permission-whats-really-happening-in-us-classrooms/articleshow/123701891.cms
Mar 2025	See which seven CT school districts are piloting a state-approved AI program	CT Insider	https://www.ctinsider.com/news/education/article/ct-ai-program-pilot-20065504.php
Apr 2025	AI use in classrooms raises new concerns about fairness, bias, and assessment	Education Week	https://www.edweek.org/technology
May 2025	Rising use of AI in schools comes with big downsides for students	Education Week	https://www.edweek.org/technology/rising-use-of-ai-in-schools-comes-with-big-downsides-for-students

Early coverage framed generative AI primarily as an academic integrity crisis. For example, the Associated Press documented how schools were struggling to redefine misconduct as AI tools became widespread, noting that existing honor codes were ill-equipped to address AI-

assisted work (Barrow, 2024). This concern was echoed locally in Connecticut through high-profile legal cases involving alleged AI misuse at Yale University. Coverage of lawsuits filed by students accused of improper AI use highlighted due process concerns and the fragility of disciplinary systems reliant on contested detection methods (Pappas, 2025; Zahn, 2025). These stories framed AI not only as a technological challenge, but as a legal and ethical one with significant implications for institutional governance. Connecticut-based reporting explicitly addressed the unreliability of AI-detection tools, emphasizing false positives and the lack of scientific consensus supporting their use (Haigh, 2024).

As concerns about academic integrity and detection failures intensified, reporting between December 2024 and February 2025 began to foreground teachers as active agents of pedagogical adaptation rather than passive recipients of technological disruption. This shift marked an important reframing: generative AI was increasingly discussed not solely as a threat to instructional control, but as a catalyst forcing educators to reconsider long-standing assumptions about task design, assessment, and instructional labor (Güner et al., 2024; Kulesa et al., 2025). Media narratives increasingly positioned teachers as instructional designers adapting pedagogy in response to AI, rather than as enforcers of prohibitive policies—signaling a shift toward professional agency and instructional experimentation.

Connecticut-based reporting provides a particularly clear illustration of this trend. Coverage emphasized that, in the absence of comprehensive state-level guidance, districts and individual educators were independently experimenting with how generative AI might support instructional goals such as lesson planning, differentiation, and feedback (Miller, 2024; Pappas, 2025). Rather than portraying teachers as overwhelmed or resistant, these articles framed them as navigating AI pragmatically—testing boundaries, setting classroom norms, and selectively integrating tools aligned with curricular objectives.

Importantly, this reporting highlighted pedagogical labor that often remains invisible in policy debates. Teachers described using AI to streamline administrative and preparatory tasks (e.g., drafting lesson outlines or generating multiple examples), thereby reallocating time toward student interaction and instructional decision-making (Miller, 2024). This narrative contrasts sharply with earlier media framings that positioned AI as either replacing teachers or undermining instructional authority.

By early 2025, reporting moved decisively beyond speculative debates about whether students might use generative AI to empirical documentation that AI use had become normalized within student learning practices. National research coverage confirmed that a majority of high school students were already using generative AI for schoolwork, including brainstorming, summarization, and drafting (College Board, 2025; Kulesa et al., 2025). This normalization reframed AI not as an external disruption, but as a routine component of students' cognitive and academic workflows.

Crucially, media narratives began to interrogate how students were using AI rather than simply whether they were using it. NBC Boston's reporting captured a growing tension between efficiency and learning depth, noting that while students often perceived AI as helpful for productivity, educators expressed concern that reliance on AI could bypass essential cognitive processes such as retrieval, synthesis, and self-monitoring (NBC Boston, 2025). These concerns echoed earlier academic integrity debates but were now reframed through the lens of learning quality rather than misconduct.

Across the November 2024 to May 2025 period, the six months before this class, media coverage of generative artificial intelligence in education traced a gradual shift from institutional disruption toward pedagogical recalibration. By early 2025, student use of generative AI was widely normalized in media narratives, redirecting attention from rule violations to questions of learning quality, cognitive engagement, and equity.

The MIT Media Lab Preprint Makes News, A Watershed Moment

This trajectory set the stage for a critical watershed moment in late spring 2025, largely during this summer class: the public dissemination of an MIT Media Lab study examining neural engagement during AI-assisted writing (Kosmyna et al., 2025). Whereas late 2024 and early 2025 coverage highlighted educators' adaptive use of AI to support planning, differentiation, and student access, June–July reporting (Table 2) foregrounded claims that AI use may actively diminish critical thinking and neural engagement.

Table 2

Headlines Published During the Six Weeks of the Class

Date	Headline	Publication	Source
Jun 17, 2025	<i>ChatGPT May Be Eroding Critical Thinking Skills, According to a New MIT Study</i>	Time	https://time.com/7295195/ai-chatgpt-google-learning-school/ (TIME)
Jun 26, 2025	<i>Brain Activity Is Lower for Writers Who Use AI. What That Means for Students</i>	Education Week	https://www.edweek.org/technology/brain-activity-is-lower-for-writers-who-use-ai-what-that-means-for-students/2025/06 (Education Week)
Jun 25, 2025	<i>Educators warn that AI shortcuts are already making kids lazy: “Critical thinking and attention spans have been demolished”</i>	New York Post	https://nypost.com/2025/06/25/tech/educators-warn-that-ai-shortcuts-are-already-making-kids-lazy/ (New York Post)

This shift was catalyzed by widespread coverage of a Massachusetts Institute of Technology Media Lab preprint examining brain activity during AI-assisted writing tasks, which was rapidly framed in popular press as evidence that tools such as ChatGPT “erode” or “weaken” thinking (Chow, 2025; Schwartz, 2025). Unlike prior reporting, which largely inferred cognitive implications from classroom behavior, the MIT study introduced empirical claims about brain activity and learning processes, catalyzing a marked shift in national discourse. Education-focused outlets amplified these concerns by translating neuroimaging findings into classroom implications, often positioning AI as a shortcut that bypasses productive cognitive effort (Dobre, 2025; Gerlich, 2025; Schwartz, 2025).

At the same time, the speed and scale of this coverage prompted backlash within academic and journalistic communities, with multiple commentators noting that the MIT study had not yet undergone peer review and cautioning against extrapolating short-term neural activation differences to claims about long-term learning or cognitive decline (D’Aurizio, 2025; Kosmyna et al., 2025). This tension—between compelling neuroscientific narratives and unresolved methodological questions—represents a significant discursive turn: media attention shifts from how teachers and students might use AI well to whether AI use itself is fundamentally incompatible with sustained learning. The June–July corpus thus reframes earlier pedagogical debates into a broader public concern about cognition and the brain, while simultaneously revealing the risks of allowing preprint research to function as de facto evidence in high-stakes educational discourse.

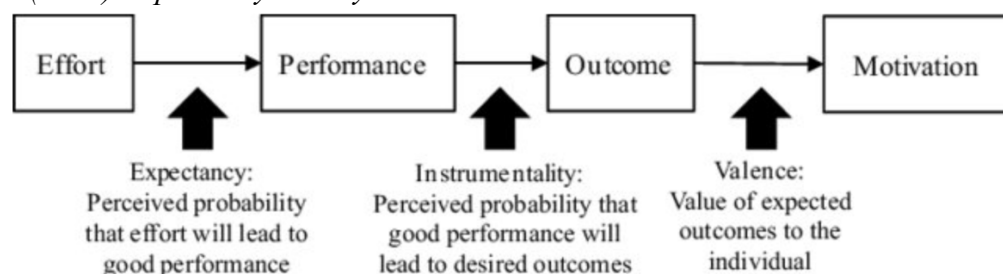
The shifting media discourse surrounding generative artificial intelligence in education provides a critical contextual backdrop for examining educator attitudes toward classroom AI use. To systematically examine these attitudinal dynamics, the present study draws on established psychological and technology-adoption frameworks that conceptualize attitudes as multidimensional and expectancy-driven. Expectancy theory offers a lens for understanding how educators' anticipated outcomes—such as improved efficiency or potential harm to student learning—inform motivation and willingness to engage with AI tools. Complementing this perspective, the triadic model of attitudes articulated by Fishbein and Ajzen conceptualizes attitudes as comprising cognitive beliefs, affective evaluations, and behavioral intentions, a structure that closely mirrors educators' responses to emerging technologies under conditions of uncertainty. Building on these foundations, Davis's (1989) Technology Acceptance Model operationalizes these attitudinal components within technological contexts, positing perceived usefulness and perceived ease of use as primary determinants of adoption. Together, these frameworks provide a theoretically robust basis for interpreting how exposure to shifting media narratives may influence educators' pre- and post-intervention attitudes toward AI integration in the classroom.

Expectancy Theory Grounds Attitudinal Measures

Expectancy theory, first articulated by Vroom (1964), provides a foundational motivational framework for understanding how individuals' behavioral choices are shaped by expected outcomes and their evaluations of those outcomes. At its core, the theory posits that motivation is a function of three components: *expectancy* (the belief that effort will lead to a certain level of performance), *instrumentality* (the belief that performance will lead to specific outcomes), and *valence* (the value placed on those outcomes; Figure 1).

Figure 1

Vroom's (1964) Expectancy Theory



Source: Adapted from <http://faculty.css.edu/dswenson/web/OB/VIetheory.html>

This cognitive–evaluative structure foregrounds how individuals weigh anticipated rewards and costs when deciding whether to engage in particular behaviors—a conceptual lens that has been widely applied across organizational psychology, education, and technology adoption research. For example, expectancy-based models have been used to explain teachers' engagement with professional development technologies (Holden & Rada, 2011) and students' motivation to use educational software (Sánchez & Hueros, 2010). Studies exploring generative AI adoption in educational and workplace contexts also implicitly reflect expectancy logic, showing that users are more likely to embrace AI tools when they anticipate tangible performance benefits and positive learning outcomes.

By foregrounding individuals' expectations about performance outcomes and their subjective valuations of those outcomes, expectancy theory sets an important conceptual precedent for

later attitudinal models—such as the triadic model of attitudes and the Technology Acceptance Model (TAM)—which formalize how beliefs, affective evaluations, and intention coalesce into technology use decisions. In this way, expectancy theory not only establishes a broad motivational foundation but also helps bridge classic motivational constructs and modern technology acceptance research.

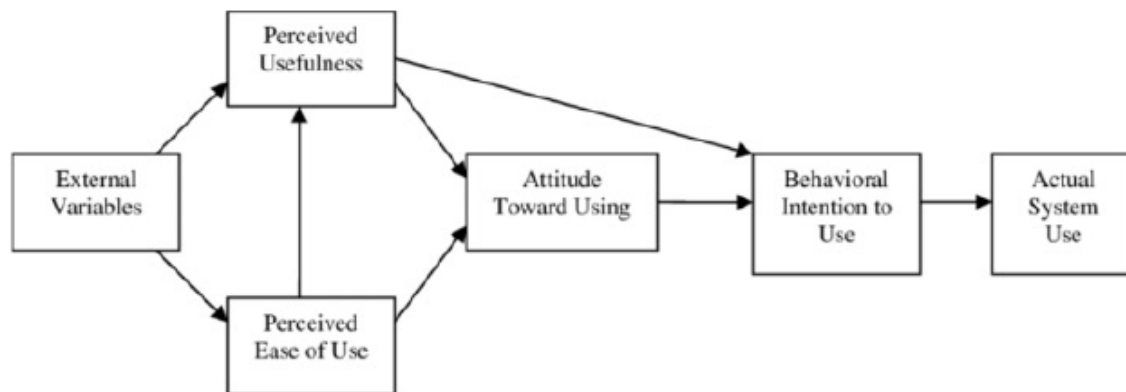
Building directly on the expectancy-based emphasis on anticipated outcomes and subjective valuation, the triadic model of attitudes articulated by Fishbein and Ajzen provides a complementary framework for understanding how such expectations are organized into stable evaluative orientations that guide behavior. Within this model, attitudes are conceptualized as comprising three interrelated components: cognitive beliefs about an object or behavior, affective evaluations of those beliefs, and behavioral intentions that reflect readiness to act (Fishbein & Ajzen, 1975). This structure mirrors the expectancy logic outlined by Vroom (1964), wherein individuals first form beliefs about likely performance outcomes (cognitive), assign value to those outcomes (affective/valence), and subsequently decide whether to engage in a behavior (intentional).

Importantly, the triadic model formalizes these processes into a coherent attitudinal system, making explicit how expectancy-driven beliefs are translated into intention. Ajzen's later extension of this framework through the Theory of Planned Behavior further situates attitudes within a broader decision-making context by incorporating perceived behavioral control and social norms, acknowledging that intentions are shaped not only by expected outcomes but also by perceived feasibility and contextual constraints (Ajzen, 1991). Together, these models clarify how expectancy-based evaluations become embedded within attitudinal structures that precede action. This conceptual progression provides a critical bridge to the Technology Acceptance Model, which operationalizes these attitudinal components in technology contexts by specifying how beliefs about usefulness and ease of use shape affective judgments and behavioral intention toward adoption (Davis, 1989). In this way, the triadic model functions as an essential intermediary between foundational motivational theory and contemporary models of technology acceptance.

Attitudes and Technology Acceptance

The Technology Acceptance Model (TAM; Figure 2) conceptualizes technology acceptance as a sequential process in which external variables influence users' beliefs, attitudes, intentions, and ultimately behavior (Davis, 1989). Perceived usefulness refers to the degree to which an individual believes that using a system will enhance performance, while perceived ease of use reflects the degree to which the system is perceived as free of effort. TAM posits a direct relationship between PEOU and PU, such that technologies perceived as easier to use are more likely to be judged as useful.

Figure 2
Technology Acceptance Model (TAM)



Source: Davis, 1989

These belief structures jointly inform an individual's attitude toward using the technology, which represents an affective evaluation of technology use. Attitude, in turn, predicts behavioral intention to use, which serves as the immediate antecedent of actual system use. This belief–attitude–intention pathway reflects TAM's grounding in expectancy theory and attitude–behavior models, translating expectancy-driven evaluations into measurable acceptance outcomes. Although later extensions of TAM have deemphasized the role of attitude under certain conditions, the original model remains particularly well suited for examining contexts—such as emerging educational technologies—where beliefs and affective evaluations are still forming and adoption norms are unsettled (Davis, 1989; Venkatesh & Davis, 2000).

Over subsequent decades, TAM has been subjected to extensive empirical validation across domains, including education and information systems research, where meta-analytic evidence affirms the centrality of PU and PEOU in explaining technology (Davis & Granić, 2024; King & He, 2006; Ma & Liu, 2004; Marangunić & Granić, 2015). More recent applications extend TAM to emergent technologies by incorporating external variables such as self-efficacy, subjective norms, and facilitating conditions, demonstrating that the core TAM constructs retain explanatory power even in complex adoption contexts (Kong et al., 2024; Venkatesh & Davis, 2000). In educational research specifically, TAM has been applied to examine teachers' intentions to integrate generative artificial intelligence tools, revealing that educators' beliefs about AI's instructional benefits and ease of integration predict their willingness to adopt these tools in practice (Kong et al., 2024). When interpreted through the lens of expectancy theory and the triadic model of attitudes, TAM operationalizes how expectancy-driven beliefs (about performance outcomes and effort) coalesce into affective judgments and intentions, making it an especially useful framework for examining pre/post changes in educator attitudes toward AI use.

The present investigation examines educator attitudes during a time of rapid narrative fluctuation, when beliefs about generative AI were actively forming and competing messages about instructional benefit and cognitive harm were simultaneously salient. Under such conditions, TAM's parsimonious focus on perceived usefulness, perceived ease of use, and attitude toward using offers a more precise analytic lens for isolating expectancy-driven belief change without conflating these shifts with social pressure, habit formation, or infrastructural constraints. Moreover, TAM's conceptual lineage from expectancy theory and the triadic

model of attitudes aligns directly with the study's pre/post design, which seeks to capture changes in cognitive beliefs and affective evaluations rather than predict long-term adoption behavior. Accordingly, TAM provides the most theoretically coherent and methodologically appropriate framework for examining how evolving external narratives shape educators' attitudes and intentions toward AI use in the classroom.

Peer Pressure is Real

Although TAM emphasizes individual beliefs about usefulness and ease of use, its attitudinal foundations—derived from the triadic model of attitudes—also accommodate the socially situated nature of behavioral intention. Within this framework, the conative component of attitude reflects not merely a private readiness to act, but an intention formed in relation to anticipated social evaluation and normative judgment (Fishbein & Ajzen, 1975). In educational contexts, where professional identity and peer perception are salient, intentions to adopt instructional technologies are often shaped by how educators believe their actions will be interpreted by colleagues, administrators, students, and the broader public.

This dynamic is particularly relevant in the case of generative AI, where shifting media narratives have alternately framed AI use as innovative pedagogy, professional shortcut, or ethical risk. As a result, educators' intentions to use AI may reflect not only expectancy-driven beliefs about instructional benefit, but also concerns about reputational legitimacy and alignment with perceived professional norms. By situating behavioral intention within this conative–social space, the present study acknowledges that educators' acceptance of AI is shaped by how media discourse constructs the meaning of AI use, thereby linking individual attitude formation to broader cultural and informational environments.

Methods

To examine how educators' attitudes toward the use of generative artificial intelligence in the classroom evolved over time, this study employed a pre/post survey design grounded in expectancy theory, the triadic model of attitudes, and the Technology Acceptance Model (TAM). The design was intentionally selected to capture changes in participants' beliefs, affective evaluations, and behavioral intentions in response to a shifting informational environment surrounding AI in education. The survey instrument combined Likert-style rating scales and ten-point rating scales with open-ended items to allow for both quantitative measurement of key acceptance constructs and qualitative insight into participants' reasoning. Consistent with TAM, the instrument included items assessing perceived usefulness and perceived ease of use, alongside broader attitudinal statements addressing educators' perceptions of AI's instructional value, ethical implications, and impact on student learning and behavior.

Setting and Participants

This IRB-approved study (Southern Connecticut State University IRB Protocol #1324) was conducted during a six-week, fully online, synchronous summer session course on learning theory offered between May 27 and July 1, 2025. The course was situated within a graduate-level educational leadership program and was not designed as an artificial intelligence–focused course. Rather, AI-related content was incorporated as a supplementary enhancement to support discussion and application of core learning theory concepts. When addressed, generative AI was framed as a potential instructional and professional tool—for example, in

lesson planning, classroom differentiation, and professional development—without serving as a central or organizing focus of the curriculum.

Participants were practicing educators who had all previously earned a master's degree and possessed a minimum of three years of experience working in public schools as certified teachers. At the time of the study, participants were enrolled in either a doctoral program in educational leadership or a sixth-year certificate program in educational leadership and were seeking administrative certification to serve as public school leaders in the state of Connecticut. This population was selected intentionally, as participants occupied dual roles as experienced practitioners and emerging instructional leaders, positioning them to evaluate both the pedagogical and organizational implications of AI use in educational settings.

Research Questions

Given the exploratory nature of this pre/post survey design and the rapidly evolving discourse surrounding generative artificial intelligence in education, the present study was guided by research questions that focus on patterns of change and stability in educators' perceptions rather than on causal claims. Grounded in the Technology Acceptance Model (TAM), the research questions center on educators' beliefs about the perceived usefulness and perceived ease of use of AI, as well as their broader attitudes toward AI use in educational contexts.

These constructs were selected to align with the study's analytic approach and to allow for the examination of directional shifts in perceptions across time, regardless of whether changes reached statistical significance. Accordingly, the following research questions were developed to examine pre- to post-survey differences using paired-samples analyses while remaining attentive to both meaningful trends and observed stability in participant responses.

Specifically, this research sought to answer the following questions:

1. To what extent do educators' perceptions of the perceived usefulness of generative artificial intelligence for instructional purposes change from pre- to post-survey?
2. To what extent do educators' perceptions of the perceived ease of use of generative artificial intelligence for instructional purposes change from pre- to post-survey?
3. How do educators' overall attitudes toward the use of generative artificial intelligence in educational contexts shift from pre- to post-survey?

Taken together, the study design, participant context, and analytic approach were intentionally aligned with the Technology Acceptance Model to examine how educators' beliefs about the perceived usefulness (PU) and perceived ease of use (PEOU) of generative artificial intelligence relate to their ethical intention to use (EIU) AI in educational settings. By employing a pre/post survey design with paired-samples analyses, the study was structured to capture shifts—or stability—in these expectancy-driven constructs over time, without presuming causal effects or normative adoption trajectories. Positioning ethical intention as an extension of behavioral intention allowed the study to account for the professional, pedagogical, and reputational considerations that may shape educators' willingness to engage with AI, particularly within a contested and evolving informational environment. With this methodological framework established, the following section presents the results of the pre- and post-survey analyses, reporting patterns across PU, PEOU, and attitudinal measures that inform subsequent discussion of educators' ethical intentions toward AI use.

Results and Discussion

Paired-samples *t*-tests revealed a pattern of selective change in educators' perceptions of generative artificial intelligence rather than uniform shifts across constructs. At the scale level, participants demonstrated a statistically significant increase in perceived usefulness (PU) from pre-survey ($M = 6.71$) to post-survey ($M = 7.71$), $t(16) = -2.38$, $p = .030$, indicating a more favorable evaluation of AI's instructional value over time. In contrast, although mean ratings of perceived ease of use (PEOU) increased modestly from pre-survey ($M = 6.59$) to post-survey ($M = 7.18$), this change did not reach statistical significance, $t(16) = -1.27$, $p = .221$, suggesting relative stability in perceptions of usability and implementation effort.

Item-level analyses further clarified this pattern, revealing that gains in perceived usefulness were concentrated in specific pedagogical domains. Significant increases were observed for items related to AI-supported lesson differentiation ($d = 0.68$, $p = .029$) and professional development planning ($d = 0.47$, $p = .033$), whereas no change was detected for perceived usefulness associated with time-saving ($d = 0.00$) or for PEOU related to implementation demands ($d = 0.12$). With respect to ethical intention to use (EIU), a significant decline emerged on a single item reflecting concern that students primarily use AI to cheat ($d = -0.82$, $p < .001$), while no other EIU-related items demonstrated statistically significant change. Several additional items—including those addressing lesson planning, assignment planning, and general support for learning—exhibited positive but nonsignificant directional drift, suggesting modest attitudinal movement that did not meet conventional thresholds for statistical significance. Given the relatively small sample size, these findings should be interpreted with caution; however, the consistency of directional trends across related items suggests meaningful differentiation in how educators evaluated AI's pedagogical value, usability, and ethical implications over time.

Timing Matters

The findings of this study must be interpreted in light of the specific temporal and informational context in which data were collected. The six-week study period (May 27–July 1, 2025) coincided with a marked shift in national and regional media discourse about generative artificial intelligence in education, most notably following the widespread circulation of a Massachusetts Institute of Technology Media Lab preprint that framed AI-assisted writing as associated with reduced neural engagement. As documented in the preceding media analysis, coverage during this period moved decisively away from earlier narratives emphasizing teacher agency, instructional efficiency, and pedagogical innovation, toward more cautionary and at times alarmist claims about cognitive harm, cheating, and the erosion of critical thinking. This discursive inflection provides a critical lens for understanding the selective and differentiated attitudinal patterns observed in the present study.

Within the Technology Acceptance Model (TAM), the observed increase in perceived usefulness (PU)—particularly for AI-supported lesson differentiation and professional development planning—suggests that educators continued to recognize the pedagogical value of AI even as public narratives grew more skeptical. Importantly, these PU gains were concentrated in domains aligned with educator-facing uses, rather than efficiency-oriented or time-saving functions. This pattern is consistent with earlier media framing, prevalent in late 2024 and early 2025, that positioned AI as a tool for enhancing instructional planning and professional learning when used judiciously by teachers. The persistence of these usefulness beliefs during a period of intensified critique suggests that educators were able to differentiate

between AI's potential as a professional support tool and its more controversial applications, rather than adopting wholesale rejection in response to negative coverage.

In contrast, perceptions of perceived ease of use (PEOU) remained largely stable across the study period, despite modest, nonsignificant increases. This stability may reflect participants' existing familiarity with digital tools and leadership-oriented technologies, but it may also indicate that usability perceptions were less susceptible than usefulness beliefs to media influence. Notably, the dominant headlines during the study window focused on ethical and cognitive consequences rather than on technical complexity or accessibility, potentially limiting the salience of ease-of-use considerations. From a TAM perspective, this pattern reinforces the notion that PEOU stabilizes earlier in the acceptance process, while PU remains more responsive to evolving contextual narratives.

The most pronounced shift occurred within ethical intention to use (EIU), where concern that students primarily use AI to cheat increased significantly on a single item. This finding aligns closely with the dominant media framing during the latter half of the study period, which increasingly emphasized academic dishonesty, shortcutting, and the moral risks of student AI use. Headlines during this time frequently foregrounded cheating, cognitive offloading, and institutional loss of control, often invoking the MIT preprint as evidence despite its pre-peer review status. The specificity of this ethical shift—emerging for student-facing use but not for educator-facing applications—suggests that participants were responding not to AI in general, but to socially mediated concerns about legitimacy, accountability, and public scrutiny. Within TAM, this pattern illustrates how expectancy-driven beliefs about usefulness can coexist with heightened ethical hesitation, particularly when external narratives amplify reputational and professional risk.

Taken together, these findings suggest that educator attitudes toward AI during this six-week period were shaped by an ongoing negotiation between pedagogical opportunity and ethical constraint, rather than by a linear trajectory toward acceptance or rejection. Media discourse appears to have functioned as a powerful external variable, not by uniformly diminishing perceived usefulness, but by reframing the conditions under which AI use is viewed as professionally defensible. The timing of the study—embedded within a moment of heightened public attention and methodological controversy—underscores the importance of situating technology acceptance research within its broader informational environment. Future research should further examine how media-driven expectancy shifts interact with ethical intention to shape sustained and context-sensitive AI use in educational leadership and practice.

Recommendations for Practice

The findings of this study carry important implications for the preparation of educational leaders who must make instructional, ethical, and policy decisions in a professional landscape increasingly shaped by rapidly shifting media narratives about technology. The six-week study window—coinciding with heightened media attention to generative AI following the dissemination of a high-profile but non-peer-reviewed MIT preprint—illustrates the conditions under which school leaders are now expected to evaluate evidence, respond to public concern, and guide practice. Leadership preparation programs can no longer assume a stable informational environment in which policy decisions follow settled research consensus; instead, they must prepare leaders to operate amid discursive volatility, where headlines, preprints, and social media commentary often outpace formal scholarly review.

Within this context, the observed pattern of increased perceived usefulness alongside heightened ethical concern—particularly regarding student misuse—suggests that emerging leaders are capable of nuanced differentiation rather than binary acceptance or rejection of AI. Rather than positioning AI as either a threat to be controlled or an innovation to be universally embraced, preparation programs should foreground the role of leaders as translators between research, media discourse, and school practice, capable of contextualizing emerging findings and resisting reactionary policy shifts driven by headline cycles.

The findings also underscore the importance of preparing leaders to attend to the ethical and reputational dimensions of technology use, particularly in relation to student-facing applications. The selective decline in ethical intention around concerns of cheating highlights how media narratives can amplify professional risk perceptions, shaping leaders' willingness to endorse or constrain classroom practices. Leadership preparation should therefore integrate explicit opportunities to examine how ethical intention is formed not only through personal belief, but through anticipated public scrutiny and professional norms. Engaging candidates in structured analysis of media coverage, policy statements, and contested research can help future leaders develop the capacity to respond thoughtfully rather than defensively when new technologies become the focus of public concern.

Finally, these findings suggest that leadership preparation programs should model adaptive, evidence-informed decision-making by incorporating emerging technologies—such as generative AI—as contextual tools rather than curricular centers. Embedding AI discussions within courses on learning theory, assessment, or professional development, as was done in this study, mirrors the conditions leaders will encounter in practice: AI will rarely arrive as a discrete initiative, but rather as an overlay on existing pedagogical and organizational systems. Preparing leaders to evaluate AI's usefulness, usability, and ethical implications within these broader systems may better equip them to lead schools through future cycles of technological enthusiasm and skepticism alike. In a media-saturated educational environment, leadership preparation must therefore prioritize not only technical knowledge, but the cultivation of discernment, professional judgment, and resilience to narrative swings.

Conclusion

This study examined educators' evolving attitudes toward generative artificial intelligence within a uniquely dynamic informational context, leveraging the Technology Acceptance Model to interpret belief formation, attitudinal change, and ethical intention during a period of heightened media attention. The findings suggest that educators' responses to AI were neither uniform nor reactionary; instead, participants demonstrated selective recalibration, maintaining or increasing perceptions of AI's pedagogical usefulness while simultaneously expressing heightened ethical concern about student misuse. Importantly, these patterns unfolded during a six-week window marked by a pronounced shift in media narratives—particularly following the widespread dissemination of a non-peer-reviewed MIT Media Lab preprint—underscoring the role of public discourse as a salient external variable shaping technology acceptance.

Interpreted through TAM, the results highlight the differential sensitivity of core constructs to contextual influence. Perceived usefulness proved responsive to instructional framing and professional application, while perceived ease of use remained comparatively stable. Ethical intention, conceptualized as an extension of behavioral intention, emerged as especially vulnerable to media-amplified concerns around legitimacy, cheating, and professional risk. Together, these findings reinforce the value of TAM for examining attitudinal differentiation

in contested adoption contexts, particularly when acceptance is negotiated at the intersection of expectancy-driven beliefs, professional identity, and public narrative.

For educational leadership preparation, the study underscores the necessity of preparing leaders not only to evaluate emerging technologies, but to do so amid discursive volatility. As AI and other innovations continue to enter schools through cycles of enthusiasm, skepticism, and moral panic, leaders must be equipped to interpret evolving evidence, contextualize media claims, and guide practice with discernment rather than reaction. Embedding AI as a contextual tool within foundational coursework—rather than as an isolated initiative—mirrors the realities leaders will face and supports the development of adaptive, ethically grounded decision-making. Ultimately, this study suggests that preparing educational leaders for a media-saturated future requires attention not only to what technologies can do, but to how beliefs about those technologies are formed, challenged, and reshaped in public view.

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

The author declares that no generative AI or generative AI-assisted technologies have been used to generate, refine, or correct the content in the manuscript. The exceptions are AI supported embedded tools in Microsoft Word, such as the spelling check and grammar suggestions (red and blue underline) that are a native part of that word processing tool. References were managed using Mendeley and the Mendeley plug in in Microsoft Word. The ideas, design, procedures, findings, analyses, and discussion are originally written and derived from careful and systematic conduct of the research.

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Barrow, B. (2024, November 18). *The rise of AI tools forces schools to reconsider what counts as cheating*. Associated Press. <https://apnews.com/article/ai-cheating-school-chatgpt-4f89a552e9093ce2180471b4d4736675>
- Chow, A. R. (2025, June 23). *ChatGPT May Be Eroding Critical Thinking Skills, According to a New MIT Study*. Time. <https://time.com/7295195/ai-chatgpt-google-learning-school/>
- College Board. (2025, October 6). *New Research: Majority of High School Students Use Generative AI for Schoolwork*. College Board. <https://newsroom.collegeboard.org/new-research-majority-high-school-students-use-generative-ai-schoolwork>
- D'Aurizio, S. (2025, August 11). *The Cognitive Costs of ChatGPT: Understanding MIT's Viral Study*. The Center for Brain, Mind and Society, Columbia University. <https://brainmindsociety.org/posts/the-cognitive-costs-of-chatgpt-understanding-mits-viral-study>
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly: Management Information Systems*, 13(3), 319–339. <https://doi.org/10.2307/249008>
- Davis, F. D., & Granić, A. (2024). Revolution of TAM. In *The Technology Acceptance Model. Human–Computer Interaction Series* (pp. 59–101). Springer, Cham. https://doi.org/10.1007/978-3-030-45274-2_3
- Dobre, J. (2025, February 3). *Designing AI for Human Expertise: Preventing Cognitive Shortcuts*. UXMatters. <https://www.uxmatters.com/mt/archives/2025/02/designing-ai-for-human-expertise-preventing-cognitive-shortcuts.php>
- Fishbein, M. A., & Ajzen, I. (1975). *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*. Addison-Wesley.
- Gerlich, M. (2025). AI Tools in Society: Impacts on Cognitive Offloading and the Future of Critical Thinking. *Societies*, 15(1). <https://doi.org/10.3390/SOC15010006>
- Haigh, S. (2024, November 29). *Why it's so hard to tell if a piece of text was written by AI*. CT Insider. <https://www.ctinsider.com/news/article/why-it-s-so-hard-to-tell-if-a-piece-of-text-was-21249821.php>
- Holden, H., & Rada, R. (2011). Journal of Research on Technology in Education | 343 Understanding the Influence of Perceived Usability and Technology Self-Efficacy on Teachers. In *Technology Acceptance JRTE* | (Vol. 43, Number 4).

- King, W. R., & He, J. (2006). A meta-analysis of the technology acceptance model. *Information and Management*, 43(6), 740–755.
<https://doi.org/10.1016/j.im.2006.05.003>
- Kong, S. C., Yang, Y., & Hou, C. (2024). Examining teachers' behavioural intention of using generative artificial intelligence tools for teaching and learning based on the extended technology acceptance model. *Computers and Education: Artificial Intelligence*, 7.
<https://doi.org/10.1016/j.caeai.2024.100328>
- Kosmyna, N., Hauptmann, E., Yuan, Y. T., Situ, J., Liao, X.-H., Beresnitzky, A. V., Braunstein, I., & Maes, P. (2025). *Your Brain on ChatGPT: Accumulation of Cognitive Debt when Using an AI Assistant for Essay Writing Task*.
<https://www.media.mit.edu/publications/your-brain-on-chatgpt/>
- Kulesa, A. C., Mission, M., Croft, M., & Wells, M. K. (2025). *Productive Struggle How Artificial Intelligence Is Changing Learning, Effort, and Youth Development in Education*.
- Ma, Q., & Liu, L. (2004). The technology acceptance model: A meta-analysis of empirical findings. *Journal of Organizational and End User Computing*, 1(16), 59–72.
<https://doi.org/10.1108/GKMC-09-2023-0360>
- Marangunić, N., & Granić, A. (2015). Technology acceptance model: a literature review from 1986 to 2013. *Universal Access in the Information Society*, 14(1), 81–95.
<https://doi.org/10.1007/s10209-014-0348-1>
- Miller, K. (2024, December 15). *AI is taking hold in K–12 schools — Here are some ways it can improve teaching*. CT Insider. <https://www.ctinsider.com/news/article/ai-is-taking-hold-in-k-12-schools-here-are-21230486.php>
- NBC Boston. (2025, February 20). *Is AI helping or hurting higher education and student learning*. NBC Boston. <https://www.nbcboston.com/news/local/artificial-intelligence-education-college-learning/3850198/>
- Pappas, A. (2025, January). *Here's how Connecticut schools tackle AI in the classroom as state develops guidelines*. CT Insider.
<https://www.ctinsider.com/news/education/article/ct-schools-districts-ai-artificial-intelligence-21265976.php>
- Sánchez, R. A., & Hueros, A. D. (2010). Motivational factors that influence the acceptance of Moodle using TAM. *Computers in Human Behavior*, 26(6), 1632–1640.
<https://doi.org/10.1016/j.chb.2010.06.011>
- Schwartz, S. (2025, June 26). *Brain Activity Is Lower for Writers Who Use AI. What That Means for Students*. EdWeek. <https://www.edweek.org/technology/brain-activity-is-lower-for-writers-who-use-ai-what-that-means-for-students/2025/06>

- Venkatesh, V., Brown, S. A., & Bala, H. (2013). Bridging the qualitative-quantitative divide: Guidelines for conducting mixed methods research in information systems. *MIS Quarterly: Management Information Systems*, 37(1), 21–54.
<https://doi.org/10.25300/MISQ/2013/37.1.02>
- Venkatesh, V., & Davis, F. D. (2000). *A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies* (Vol. 46, Number 2).
<https://about.jstor.org/terms>
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*, 27(3), 425–478.
- Vroom, V. H. (1964). *Work and Motivation* (1st ed.). John Wiley & Sons.
- Zahn, B. (2025, March 10). *Yale Student Suing Over Accusation of Improper AI Use*. New Haven Register. https://www.govtech.com/education/higher-ed/yale-student-suing-over-accusation-of-improper-ai-use?utm_source=chatgpt.com

Stakeholder Needs for the Development of the Sports Science and Recreation for Health Program at Phuket Rajabhat University

Parichat Pragobmas, Phuket Rajabhat University, Thailand
Thawatchai Thoomthong, Phuket Rajabhat University, Thailand
Kampanat Paditsaeree, Phuket Rajabhat University, Thailand
Komkrit Krainara, Phuket Rajabhat University, Thailand
Somthad Satjit, Phuket Rajabhat University, Thailand

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This research aimed to investigate the stakeholder needs for the development of the Sports Science and Recreation for Health Program at Phuket Rajabhat University. The study employed a mixed-method research design, integrating both quantitative and qualitative approaches. Data were collected through questionnaires and semi-structured interviews with a sample of 310 stakeholders. Data analysis included percentages, means, standard deviations, and content analysis. The findings revealed that stakeholder needs were at a high level across all dimensions, with the Character dimension receiving the highest mean score, followed by Ethics, Knowledge, and Skills, respectively. Furthermore, the stakeholder needs for program development encompassed four essential dimensions: Knowledge, comprising both theoretical and practical knowledge in the field as specified by the curriculum; Skills, including both soft skills and hard skills relevant to the discipline; Ethics, encompassing moral and ethical values, integrity, positive professional attitudes, and demonstration of good social conduct; and Character, comprising good personality, physical appearance, robust health, self-confidence, leadership qualities, and assertiveness. Additionally, the findings suggest that program management must be aligned with current situations and keep pace with advancements in sports science and recreation for health.

Keywords: needs, stakeholder, sports science and recreation for health program

iafor

The International Academic Forum
www.iafor.org

Introduction

Thailand's sports industry is undergoing a significant transformation driven by the "Sport as Lifestyle & Community" concept. The successful hosting of major events, such as the SEA Games 2025, generated economic circulation of approximately 14 billion baht, with further momentum anticipated from the Moto GP 2026 in Buriram Province. Beyond the competitive dimension, a notable shift in consumer behavior toward mind-body balance has emerged, with meditation-related activities growing by 148 percent. Social phenomena such as Run Club and Soft Clubbing have transformed public parks and commercial spaces into new forms of social and economic communities. Although the overall fitness market has expanded remarkably to a value of over 12 billion baht, a key challenge remains the equitable distribution of this growth across regions, as approximately 80 percent of market activity is still concentrated in Bangkok. Accordingly, the strategic direction forward requires a coordinated effort between the public and private sectors to manage infrastructure investment and tax incentive policies systematically, with the ultimate goal of positioning Thailand as a sustainable Global Sports and Wellness Hub (Economics Tourism and Sports Division, 2026).

Curriculum development is a critical process that impacts the quality of graduates and the generation of new knowledge for the nation. Particularly in an era where society and technology are rapidly evolving, higher education institutions must develop curricula that are contemporary and aligned with labor market demands at both national and international levels. Furthermore, curriculum development must adhere to the Thai Qualifications Framework for Higher Education (TQF) to ensure academic quality and produce qualified graduates who can respond to national development strategies across various dimensions, including economy, society, and sustainable development. Curriculum development must therefore undergo a comprehensive process of research, contextual analysis, environmental assessment, and multifaceted stakeholder engagement (Wongpanit, 2025).

A popular approach to curriculum development in Thailand is Outcome-Based Education (OBE), which focuses on learning outcomes that graduates should possess upon completion of their studies. These learning outcomes serve as the framework and direction for all teaching and learning management within the curriculum (Katawazai, 2021). This approach aims to develop graduates with quality and competencies ready for employment, capable of effectively adapting to changes in economy, society, and culture. OBE is thus a learner-centered teaching approach that emphasizes systematic curriculum planning and assessment to achieve predetermined objectives and outcomes. This educational model stresses accountability in the teaching process and learner achievement, aiming to enable all learners to reach established educational goals. OBE differs distinctly from traditional teacher-centered education by shifting to learner-centered learning, promoting the effective development of skills and knowledge appropriate to real-life and workplace needs (Thepsaeng et al., 2023).

Phuket Rajabhat University is the sole comprehensive higher education institution on Thailand's Andaman coast. According to Section 7 of the Rajabhat University Act 2004, the university's mission focuses on local development, strengthening national intellectual capacity, revitalizing learning systems, celebrating local wisdom, and cultivating arts and sciences for sustainable advancement. In 2021, following a self-assessment based on the Ministerial Regulation on Higher Education Institution Grouping 2021, the Ministry of Higher Education, Science, Research and Innovation officially designated Phuket Rajabhat University as a Group 3 institution: Area-based and Community Engagement. This classification positions the university as an institution with missions focused on developing local communities, serving as

a learning center for knowledge and technology transfer, and providing lifelong learning opportunities that lead to sustainable development (Phuket Rajabhat University, 2024).

Therefore, in developing the Bachelor of Science curriculum in Sports Science and Recreation for Health, stakeholder needs are utilized as primary data for analysis to establish appropriate learning outcomes and guide curriculum development approaches, such as determining curriculum structure, course specifications, course-level and year-level learning outcomes, organizing teaching and learning activities, and implementing effective assessment methods that align with the genuine needs of the labor market and the constantly evolving professional landscape. A quality curriculum should be developed to respond maximally to the needs of learners, stakeholders, and societal demands.

Objective of the Study

To investigate the stakeholder needs for the development of the Sports Science and Recreation for Health Program at Phuket Rajabhat University.

Methodology

The study employed a mixed-method research design, integrating both quantitative and qualitative approaches. The sample consisted of 310 stakeholders, comprising 150 prospective upper-secondary students, 30 employers and industry representatives, 120 alumni and current students, and 10 instructors. Data were collected through questionnaires and semi-structured interviews. The questionnaire was validated by three experts and demonstrated satisfactory reliability. Data analysis included percentages, means, standard deviations, and content analysis.

Conclusions

This section presents the findings of the study on stakeholder needs for the development of the Sports Science and Recreation for Health Program at Phuket Rajabhat University. The results are organized into two sections: Section 1 reports the quantitative findings derived from questionnaire data, while Section 2 presents the qualitative findings obtained through semi-structured interviews. Together, these findings provide a comprehensive understanding of stakeholder expectations across four key domains: Knowledge, Skills, Ethics, and Character.

Section 1: Stakeholder Needs for the Development of the Sports Science and Recreation for Health Program Based on Questionnaire Results

Table 1

Stakeholder Needs in Knowledge

Knowledge Domain	Mean	SD	Level
1. Knowledge of basic sciences, including physics, chemistry, biology, mathematics, and technology	4.00	0.80	High
2. Knowledge of sports science and recreation, such as health care principles, physical fitness training principles, sports psychology, first aid, rehabilitation principles, sports management, sports tourism, and recreation for health	4.16	0.89	High

Knowledge Domain	Mean	SD	Level
3. Knowledge of modern equipment and its application in sports science and recreation, such as exercise equipment and physical fitness testing devices	4.50	0.91	Highest
4. Knowledge of foreign languages in sports science and recreation, such as basic terminology in anatomy and physiology, basic terminology related to movement/exercise postures	4.22	0.73	High
5. Knowledge of physical activities and sports, such as the importance of physical activity, types of physical activities appropriate for each age group, consequences of physical inactivity, and basic health maintenance	4.10	0.86	High
6. Knowledge of leadership principles in sports science and recreation, such as leading aerobic dance sessions and coaching exercise and sports	4.02	0.80	High
Overall Knowledge Domain	4.17	0.83	High

The overall stakeholder needs in the knowledge domain were rated at a high level ($M = 4.17$). Among the six specific areas, knowledge of modern equipment and its application in sports science and recreation received the highest rating ($M = 4.50$), followed by knowledge of foreign languages in sports science and recreation ($M = 4.22$), knowledge of sports science and recreation principles ($M = 4.16$), knowledge of physical activities and sports ($M = 4.10$), knowledge of leadership principles in sports science and recreation ($M = 4.02$), and knowledge of basic sciences ($M = 4.00$).

Table 2
Stakeholder Needs in Skills

Skills Domain	Mean	SD	Level
1. Critical thinking, problem analysis, and problem-solving skills in sports science and recreation work	4.10	0.80	High
2. Skills in using computer software, electronic mail communication, and applications for communication and creative work	4.00	0.79	High
3. Skills in collecting, analyzing, and presenting physical fitness data, such as using testing/training equipment and evaluating physical fitness results	4.08	0.83	High
4. Foreign language proficiency in sports science and recreation profession, including listening, speaking, reading, and writing skills in foreign languages used in professional practice	4.02	0.85	High
5. Exercise skills for developing health and physical fitness of oneself and others	4.14	0.94	High
6. Skills in using exercise equipment to develop health and physical fitness of oneself and others	4.05	0.76	High
7. Leadership skills in sports science and recreation	4.12	0.86	High
8. Teamwork skills in sports science and recreation	4.40	0.83	Highest
Overall Skills Domain	4.11	0.85	High

The overall stakeholder needs in the skills domain were rated at a high level ($M = 4.11$). Among the eight specific areas, teamwork skills in sports science and recreation received the highest

rating ($M = 4.40$), followed by exercise skills for developing health and physical fitness ($M = 4.14$), leadership skills in sports science and recreation ($M = 4.12$), critical thinking and problem-solving skills ($M = 4.10$), skills in collecting and analyzing physical fitness data ($M = 4.08$), skills in using exercise equipment ($M = 4.05$), foreign language proficiency ($M = 4.02$), and skills in using computer software and applications ($M = 4.00$).

Table 3*Stakeholder Needs in Ethics*

Ethics Domain	Mean	SD	Level
1. Possess morality, ethics, honesty, and integrity	4.50	0.72	Highest
2. Demonstrate discipline, punctuality, and responsibility toward oneself and society	4.25	0.70	High
3. Show generosity, compassion, and kindness toward oneself and society	4.30	0.68	High
4. Possess Thai consciousness and participate in environmental conservation	4.20	0.74	High
5. Demonstrate public consciousness, respect for rights, openness to others' opinions, sacrifice for the common good, and participation in sports	4.29	0.71	High
6. Demonstrate courage in academic and research ethics	4.16	0.73	High
7. Ability to comply with rules, regulations, and policies, and adapt to living in society	4.27	0.76	High
Overall Ethics Domain	4.28	0.74	High

The overall stakeholder needs in the ethics domain were rated at a high level ($M = 4.28$). Among the seven specific areas, possessing morality, ethics, honesty, and integrity received the highest rating ($M = 4.50$), followed by showing generosity and compassion ($M = 4.30$), demonstrating public consciousness and participation in sports ($M = 4.29$), ability to comply with rules and adapt to society ($M = 4.27$), demonstrating discipline and punctuality ($M = 4.25$), possessing Thai consciousness and environmental conservation ($M = 4.20$), and demonstrating courage in academic and research ethics ($M = 4.16$).

Table 4*Stakeholder Needs in Character*

Character Domain	Mean	SD	Level
1. Possess good interpersonal skills	4.60	0.72	Highest
2. Demonstrate intellectual curiosity, eagerness to learn, observational skills, and critical thinking	4.30	0.55	High
3. Show humility, politeness, and proper manners	4.43	0.74	Highest
4. Ability to coordinate with people at various levels and work effectively in teams	4.18	0.81	High
5. Possess good personality and well-proportioned physique	4.15	0.63	High
6. Demonstrate leadership in sports science and recreation, such as confidence, self-expression, and attention to health	4.10	0.75	High
7. Ability to play sports, love exercise, and maintain good physical and mental health	4.33	0.80	High
Overall Character Domain	4.30	0.80	High

The overall stakeholder needs in the character domain were rated at a high level ($M = 4.30$). Among the seven specific areas, possessing good interpersonal skills received the highest rating ($M = 4.60$), followed by showing humility and proper manners ($M = 4.43$), ability to play sports and maintain good health ($M = 4.33$), demonstrating intellectual curiosity and critical thinking ($M = 4.30$), ability to coordinate and work in teams ($M = 4.18$), possessing good personality and well-proportioned physique ($M = 4.15$), and demonstrating leadership in sports science and recreation ($M = 4.10$).

Section 2: Stakeholder Needs for the Development of the Sports Science and Recreation for Health Program Based on Interview Results

In the knowledge domain, it was found that students should possess knowledge in sports science, both theoretical and practical, including exercise leadership, sports coaching, exercise program design, sports physiology, sports biomechanics, sports nutrition, sports technology, sports psychology, sports medicine, fitness testing, fitness training, sports management, sports tourism, and recreation for health. The majority of respondents indicated that students in the Sports Science and Recreation for Health program should possess diverse and comprehensive knowledge with a genuine understanding of sports science fundamentals. Students should be able to apply this knowledge practically in concrete ways, such as utilizing sports science knowledge to develop athletes' physical fitness and prevent sports injuries. This diverse and comprehensive knowledge base will provide students with a strong foundation in sports science and exercise, contributing to their academic and professional development in the future.

In the skills domain, findings indicated that students should develop both soft skills and hard skills. Soft skills include communication, teaching, interpersonal relationships, emotional stability, emotional intelligence, and problem-solving abilities. Hard skills encompass concrete competencies such as exercise leadership, sports technology utilization, exercise program design, athlete consultation and basic injury care, and fitness testing and evaluation. Students should be able to apply sports science knowledge practically in real contexts. The majority of respondents further emphasized the importance of learning and innovation skills, creative thinking, effective communication, teamwork, information and media technology literacy, and life and career skills. Students should demonstrate leadership, responsibility, continuous self-development, and the ability to analyze and distinguish between correct and incorrect practices efficiently.

In the ethics domain, it was found that students should demonstrate commitment to correctness and professional ethics, possess discipline, sacrifice, honesty, positive attitudes toward the profession, morality and ethics, responsibility toward themselves and others, punctuality, maintenance of clients' interests and confidentiality, and provision of truthful information. Regarding ethical needs, actions or behaviors reflecting moral and ethical character are crucial for the sports science and exercise profession. As the majority of respondents indicated in their description of graduate qualities, these include honesty, discipline, punctuality, responsibility, and sacrifice.

In the character domain, it was found that students should possess good personality, self-confidence, leadership qualities, courage in self-expression, good physical and mental health, humility, trustworthiness, and intellectual curiosity in seeking new professional knowledge. External characteristics, such as having a good physique, fit body, and robust health appropriate to the profession, serve as an important foundation for establishing credibility. Therefore, it is essential to maintain an appropriate and age-suitable physique at all times.

The findings derived from four stakeholder groups — comprising 150 prospective students at the upper secondary level, 30 employers and organizations from the tourism, hotel, fitness, sports club, and health industries, 120 alumni and current students, and 10 instructors across general education, specialized, and elective course categories — were synthesized to identify key needs for establishing the Program Learning Outcomes (PLOs). These outcomes are organized into four domains: (1) Knowledge — the ability to explain knowledge in sports science and recreation for health; (2) Skills — the ability to apply sports science and recreation knowledge in professional practice in the digital era; (3) Ethics — the ability to practice in accordance with professional ethics and integrity in sports, and to adhere to social norms; and (4) Character — demonstrating leadership, assertiveness, effective communication, and the ability to work collaboratively with others.

In conclusion, stakeholder needs for the development of the Sports Science and Recreation for Health Program at Phuket Rajabhat University can be summarized into four essential domains. First, the knowledge domain encompasses both theoretical and practical knowledge in the field as specified by the curriculum. Second, the skills domain includes both soft skills and hard skills relevant to the discipline. Third, the ethics domain emphasizes morality, ethics, honesty, positive professional attitudes, and demonstration of good social conduct. Fourth, the character domain comprises good personality, physical appearance, robust health, self-confidence, leadership qualities, and courage in self-expression.

The findings of this study have several practical implications for curriculum development in higher education. The Bachelor of Science Program in Sports Science and Recreation for Health is well-aligned with national and regional policy directions across multiple dimensions. At the national level, the program supports the 13th National Economic and Social Development Plan (2023–2027), the Higher Education Plan for Workforce Production and Development (2021–2027), the New S-Curve target industries policy, and the 7th National Sports Development Plan (2023–2027), all of which emphasize the development of a skilled workforce in health, sports science, and wellness tourism. The program further aligns with the government's Soft Power policy by integrating Thai local wisdom with modern sports science. At the provincial level, the program is consistent with the Phuket 20-Year Master Plan (2023–2042), known as GEMMMSSSSFFFT, which encompasses pillars of Tourism, Health, Sport, and Education, thereby preparing graduates to drive sustainable development across the Phuket and Andaman region.

This study has several limitations that should be acknowledged. First, the sample was limited to 310 stakeholders affiliated with Phuket Rajabhat University and its surrounding community, which may limit the generalizability of the findings to other regional or national contexts. Second, the reliance on self-reported questionnaire data may introduce response bias, as participants may have rated all items favorably. Third, the cross-sectional design of the study captures stakeholder needs at a single point in time and may not reflect changes in industry demands over time. Future research should consider longitudinal approaches and broader sampling strategies to validate and extend these findings.

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

The authors declare that AI-assisted technologies were used solely for grammatical review and sentence refinement. The ideas, design, procedures, findings, analyses, and discussion are originally written and derived from careful and systematic conduct of the research.

References

- Economics Tourism and Sports Division. (2026). *Sport Economy Review 1/2026*. Economics Tourism and Sports Division.
- Katawazai, R. (2021). Implementing outcome-based education and student-centered learning in Afghan public universities: the current practices and challenges. *Heliyon*, 7(5), 1–16.
- Phuket Rajabhat University. (2024). *Strategic Plan 2023-2027 of Phuket Rajabhat University, Revised Edition for Implementation in 2025*. Phuket Rajabhat University.
- Thepsaeng, S., Naruekhoskittikirati, K., & Thepsaeng, A. (2023). Outcome-Based Education (OBE): Important Key in Student-Centered Learning Management. *Journal of Interdisciplinary Research and Educational Innovation*, 2(1), 39–52.
- Wongpanit, W. (2025). Survey on the needs to develop a curriculum for the Master of Public Administration Program at Sisaket Rajabhat University. *Journal of Interdisciplinary Innovation Review*, 8(3), 166–180.

Contact email: parichart.g@pkru.ac.th

Effects of a Growth Mindset Inquiry Learning Model on Kindergarten Children's English Self-Development in Thai-English Bilingual Context

Aungsiya Krataytong, Srinakharinwirot University, Thailand
Panitta Wongphanich, Srinakharinwirot University, Thailand
Suwicha Wansudon, Srinakharinwirot University, Thailand
Phatcharida Inthama, Srinakharinwirot University, Thailand

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This study examined the effects of a growth mindset-based inquiry learning model on self-development in English language learning among kindergarten children aged 5–6 in a Thai–English bilingual school. It aimed to identify appropriate growth mindset characteristics for early childhood learners and evaluate the effectiveness of integrating growth mindset principles with inquiry-based learning. A one-group pretest–posttest design was employed with 25 students selected through purposive sampling during Semester 1 of the 2024 academic year. The eight-week intervention integrated inquiry-based activities to develop listening, speaking, reading, and writing skills. The model emphasized effort, perseverance, learning from peers, embracing challenges, and responding positively to feedback and learning processes. Research instruments included lesson plans, pre- and post-tests, a student satisfaction questionnaire, and an observation checklist assessing self-development across five dimensions. All instruments were validated and demonstrated high reliability. The findings indicated that students' self-development in English learning significantly improved after the intervention at the .05 level. Observations showed increased confidence, active participation, greater willingness to express ideas, and enjoyment in learning activities. Additionally, 88% of students reported increased confidence and engagement. Overall, integrating growth mindset principles with inquiry-based learning proved to be an effective approach for enhancing young learners' self-development in English language learning.

Keywords: growth mindset, self-development, teaching English language in bilingual context

iafor

The International Academic Forum
www.iafor.org

Introduction

Early childhood education plays a critical role in laying the foundation for children's lifelong learning and holistic development. In recent years, educational research has emphasized that learning outcomes in early childhood should not be limited to academic achievement but should also include children's self-development, such as confidence, motivation, persistence, and positive attitudes toward learning (Noklang et al., 2023; OECD, 2020). In Thailand, early childhood education is guided by the national curriculum, which emphasizes holistic development and child-centered learning approaches (Office of the Basic Education Commission [OBEC], 2017). These aspects of self-development are particularly important in early English language learning, where young learners may experience anxiety, fear of making mistakes, or low self-efficacy (Sabti et al., 2019).

One influential concept that addresses learners' beliefs about their abilities is Growth Mindset, proposed by Dweck (2006). Growth mindset refers to the belief that abilities and intelligence can be developed through effort, effective strategies, and support from others. Research has shown that children who develop a growth mindset tend to demonstrate higher levels of motivation, resilience, and engagement in learning tasks (Yeager & Dweck, 2012). In early childhood settings, fostering a growth mindset has been found to support children's self-confidence, willingness to try new tasks, and positive responses to challenges, which are essential components of self-development. Research has shown that children who develop a growth mindset tend to demonstrate higher levels of motivation and engagement (Yeager & Dweck, 2012) including in Thai educational contexts (Sukklang & Wilang, 2025).

In parallel, Inquiry-Based Learning (IBL) has been widely recognized as an effective instructional approach for young children. Inquiry-based learning emphasizes active exploration, questioning, and meaning-making through hands-on experiences rather than passive reception of knowledge (Hmelo-Silver et al., 2007). For kindergarten children, inquiry-based activities provide meaningful contexts for language use, allowing learners to communicate ideas, express curiosity, (Worth & Grollman, 2003) and reflect on their learning experiences. Previous studies have indicated that inquiry-based learning promotes deeper understanding and engagement particularly in early childhood classrooms (Eshach & Fried, 2005; Noklang, 2019).

Within Thai-English bilingual learning contexts, young children often encounter challenges in English learning due to limited exposure to the language outside the classroom and fear of making errors (Prapaisit de Segovia & Hardison, 2009; Promata et al., 2024). Research in bilingual education suggests that effective bilingual instruction should create emotionally safe learning environments, encourage risk-taking, and emphasize meaningful interaction rather than rote memorization (Cummins, 2000). Integrating growth mindset principles into inquiry-based learning may help children perceive English learning as a gradual and achievable process, thereby enhancing their self-development and reducing learning anxiety (Piwlueang et al., 2025). Although previous studies have examined growth mindset and inquiry-based learning independently, there remains a lack of empirical research that integrates growth mindset principles within inquiry-based learning models for kindergarten English learning, particularly in Thai-English bilingual contexts. Furthermore, limited research has focused specifically on children's self-development as a key outcome of such instructional models. Therefore, there is a need to investigate whether an inquiry-based learning model that promotes a growth mindset can positively influence kindergarten children's self-development in English learning (Krataytong & Saleemad, 2023).

In response to this gap, the present study aims to examine the effects of a Growth Mindset–Based Inquiry Learning Model on kindergarten children’s self-development in English learning within a Thai–English bilingual context. Additionally, the study seeks to compare children’s self-development before and after the implementation of the instructional model. The findings are expected to contribute to early childhood pedagogy, bilingual education practices, and the development of instructional approaches that support both language learning and holistic child development.

Research Objectives

1. To examine the effects of a Growth Mindset–Based Inquiry Learning Model on kindergarten children’s self-development in English learning Within a Thai-English Context Bilingual.
2. To compare kindergarten children’s self-development in English learning before and after the implementation of the learning model.

Methodology

This study employed a quasi-experimental design using a one-group pretest–posttest approach to examine the effects of a Growth Mindset–Based Inquiry Learning Model on kindergarten children’s self-development in English learning within a Thai–English bilingual context. This design enabled comparison of learning outcomes before and after the intervention.

Population and Sample

The population consisted of kindergarten children aged 5–6 years who were enrolled in schools implementing Thai–English bilingual instruction.

Sample

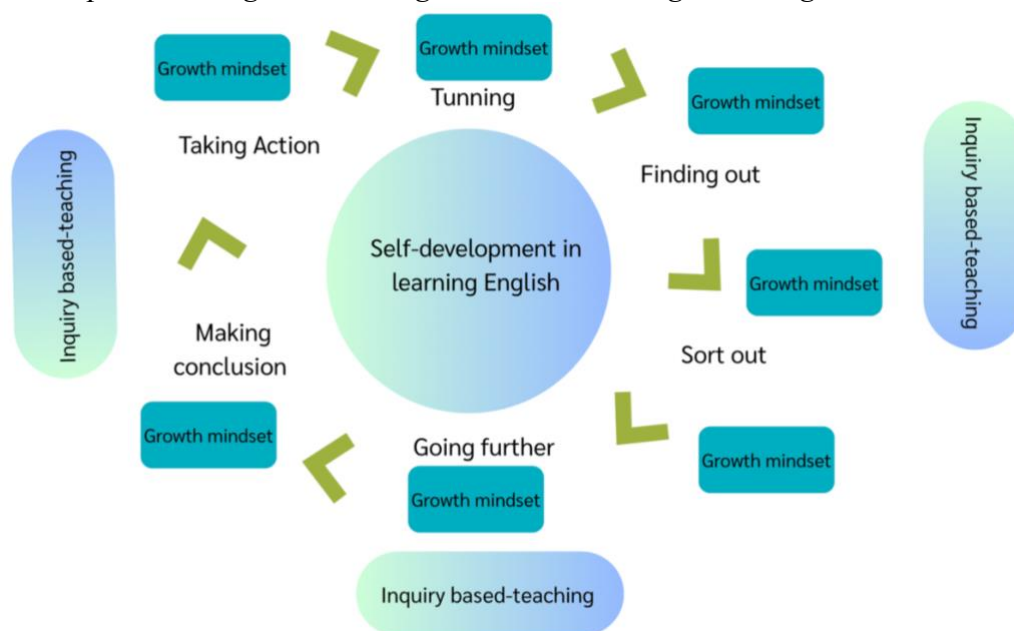
The sample comprised two Kindergarten 3 classrooms, with approximately 25 children per classroom, resulting in a total of about 50 participants. The sample was selected using purposive sampling based on the following criteria:

1. The school provided Thai–English bilingual instruction.
2. Children were enrolled in Kindergarten 3 (ages 5–6).
3. Parental consent for participation in the research was obtained.

Learning Model

Figure 1

Growth Mindset–Based Inquiry Learning Model on Kindergarten Children’s Self-Development in English Learning Within a Thai–English Bilingual Context



Results and Discussion

Table 1

Effectiveness Index of a Growth Mindset–Based Inquiry Learning Model on Kindergarten Children’s Self-Development in English Learning Within a Thai-English Context Bilingual

Posttest Score	Effectiveness Index	Number of Students	Full Score	Pretest Score
481	0.8127	25	36	585

Table 1 shows that a Growth Mindset–Based Inquiry Learning Model on Kindergarten Children’s Self-Development in English Learning Within a Thai-English Context Bilingual had an effectiveness index of 0.8127, indicating that kindergarten children’s growth mindset characteristics improved by 81.27 percent.

Table 2

Comparison of Kindergarten Children's Growth Mindset Characteristics Before and After the Implementation of Growth Mindset-Based Inquiry Learning Model

Growth Mindset Characteristics	Pre-test			Post-test		
	$\bar{X}$	SD	Level	$\bar{X}$	SD	Level
1.Effort	2.04	0.73	Moderate	2.62	0.49	Good
I can try to say new English words, even if they are hard.	1.96	0.73	Moderate	2.68	0.48	Good
I can try new English activities or games.	2.12	0.73	Moderate	2.56	0.51	Good
2.Perseverance	1.48	0.62	Need Improvement	2.74	0.45	Good
I can keep trying when English feels difficult.	1.52	0.65	Moderate	2.72	0.46	Good
I can try a different way when I make a mistake in English.	1.44	0.58	Need Improvement	2.56	0.54	Good

Table 3

Comparison of Kindergarten Children's Growth Mindset Characteristics Before and After the Implementation of Growth Mindset-Based Inquiry Learning Model

Growth Mindset Characteristics	Pre-test			Post-test		
	$\bar{X}$	SD	Level	$\bar{X}$	SD	Level
3. Learning from peers	1.32	0.48	Need Improvement	2.56	0.54	Good
I can feel happy when my friends do well in English.	1.32	0.48	Need Improvement	2.56	0.54	Good
I can learn by listening to how my friends speak English	1.24	0.44	Need Improvement	2.56	0.54	Good

4. Facing challenges	1.32	0.48	Need Improvement	2.56	0.54	Good
I can try to say new English words, even if they are hard.	1.32	0.48	Need Improvement	2.56	0.54	Good
I can try new English activities or games.	1.24	0.44	Need Improvement	2.48	0.51	Good
5. Valuing the Learning Process	1.48	0.58	Need Improvement	2.64	0.49	Good
I can feel proud when I try my best in English.	1.48	0.59	Need Improvement	2.64	0.50	Good
I can say, "I can do it better now!" when I improve.	1.44	0.58	Need Improvement	2.64	0.49	Good

Table 4

Comparison of Kindergarten Children's Growth Mindset Characteristics Before and After the Implementation of Growth Mindset-Based Inquiry Learning Model

Growth Mindset Characteristics	Pre-test			Post-test		
	$\bar{X}$	SD	Level	$\bar{X}$	SD	Level
6. Learning Goals	1.30	0.47	Need Improvement	2.52	0.50	Good
I can talk about what I learned in English today.	1.28	0.46	Need Improvement	2.52	0.50	Good
I can set a small goal, like saying one full sentence in English.	1.32	0.48	Need Improvement	2.44	0.51	Good
Total	1.50	0.57	Need Improvement	2.61	0.51	Good

The Comparison of Growth Mindset Characteristics of Preschool Children Before and After the Experiment (Overall)

Table 4 presents a comparison of preschool children's growth mindset characteristics before and after the experiment. The results show that the mean scores of all six characteristics increased after the experiment.

Before the experiment, the overall mean scores of the characteristics were relatively low, ranging from 1.28 to 2.04. After the experiment, the mean scores increased significantly, ranging from 2.52 to 2.74, indicating improvement in children's growth mindset characteristics.

Among the six characteristics, effort showed the highest improvement (Mean difference = 1.28, $t = 9.94$, $p < .05$), followed by persistence (Mean difference = 1.26, $t = 8.34$, $p < .05$) and setting learning goals (Mean difference = 1.22, $t = 8.78$, $p < .05$). Other characteristics such as valuing others' success, valuing work, and challenge also showed significant improvement.

The results of the paired-sample t-test indicated that all differences between the pre-test and post-test scores were statistically significant at the .05 level (Sig. = .00). This suggests that the learning activities implemented in the experiment were effective in enhancing the growth mindset characteristics of preschool children.

Overall, the findings indicate that the educational intervention contributed positively to improving children's willingness to face challenges, persistence, effort, appreciation of work and others' success, and their ability to set learning goals.

Discussion

This study examined the impact of a growth mindset-based inquiry learning model on young children's self-development in English language learning. The findings indicate that fostering a growth mindset significantly promoted persistence among kindergarten learners. When children were encouraged to view challenges as opportunities for learning, they became more willing to attempt tasks, practice continuously, and sustain effort despite difficulties. This finding is consistent with Dweck (2006) & (Saleemad & Krataytong, 2018), who emphasised that learners' beliefs about effort and ability influence motivation and achievement. In addition, the integration of inquiry-based learning activities enhanced students' engagement and confidence. Through questioning, exploration, and collaborative interactions, learners became active participants rather than passive recipients of knowledge. This supports constructivist perspectives on learning, particularly Vygotsky and Cole's (1978) social constructivist theory, which highlights the importance of social interaction in cognitive development.

Furthermore, the Thai-English bilingual learning environment supported meaningful language use (Heepjantree et al., 2026). By embedding English within authentic classroom interactions, children were able to practice language naturally, thereby strengthening their communication skills. This aligns with Krashen's (1982) input hypothesis, which suggests that language acquisition occurs most effectively when learners are exposed to meaningful and comprehensible input in context. As a result, students demonstrated more positive learning dispositions, including increased motivation, persistence, and confidence in English learning. These findings are also consistent with early childhood learning theories, which emphasise

active learning, social interaction, and supportive environments as essential for young learners' development (Piaget, 1952; Vygotsky & Cole, 1978).

Overall, the integration of growth mindset principles with inquiry-based learning provides an effective approach for enhancing young learners' self-development in English language learning, particularly in the context of contemporary educational transformations (Sinlapakitjanon et al., 2026). to enhancing young learners' self-development in English language learning.

Conclusion

This study demonstrates that the Growth Mindset–Based Inquiry Learning Model significantly improved young children's self-development, engagement in English learning, and key learning dispositions, including effort, persistence, and confidence. These findings support the view that fostering a growth mindset enhances learners' motivation and resilience, particularly in early childhood contexts. Furthermore, the integration of inquiry-based learning contributed to increased engagement and active participation, enabling children to construct knowledge through exploration and interaction. This is consistent with constructivist learning theories, which emphasise the role of active learning and social interaction in cognitive development. Active learning approaches have also been shown to enhance self-directed learning and engagement among Thai learners. In addition, the bilingual learning environment provided meaningful opportunities for authentic language use, supporting children's communication skills and confidence in English learning.

Overall, the findings suggest that the integration of growth mindset principles with inquiry-based learning is an effective instructional approach for supporting young learners' self-development in bilingual kindergarten education.

References

- Cummins, J. (2000). *Language, power, and pedagogy: Bilingual children in the crossfire*. Multilingual Matters.
- Dweck, C. S. (2006). *Mindset: The new psychology of success*. Random House.
- Eshach, H., & Fried, M. N. (2005). Should science be taught in early childhood? *Journal of Science Education and Technology*, 14(3), 315–336. <https://doi.org/10.1007/s10956-005-7198-9>
- Heepjantree, J., Noklang, S., & Dudsdeemaytha, J. (2026). Impact of Americanization on French language education in the Thai educational system. *Kasetsart Journal of Social Sciences*, 47(1), Article 470116. <https://doi.org/10.34044/j.kjss.2026.47.1.16>
- Hmelo-Silver, C. E., Duncan, R. G., & Chinn, C. A. (2007). Scaffolding and achievement in problem-based and inquiry learning: A response to Kirschner et al. *Educational Psychologist*, 42(2), 99–107. <https://doi.org/10.1080/00461520701263368>
- Krashen, S. D. (1982). *Principles and practice in second language acquisition*. Pergamon Press.
- Krataytong, A., & Saleemad, K. (2023). Growth mindset teaching model in Primary Years Programme (PYP) context for supporting self-development in learning language. *Journal of Namibian Studies*, 33. <https://doi.org/10.59670/jns.v33i.785>
- Noklang, S. (2019). The participatory action research for local wisdom knowledge management about utilization of nipa palm in Yong-Star Island community, Trang province. *Journal of Public Administration and Politics*, 7(1), 180–208. [in Thai]
- Noklang, S., Prakongpan, P., Meehan, W., Dechawatsinsiri, N., & Niyomdech, A. (2023). Critical participatory action research for development of private school teachers' work approaches in Bangkok. *Journal of Research and Curriculum Development*, 13(2), 39–52.
- OECD. (2020). *Early learning and child well-being: A study of five-year-olds in England, Estonia, and the United States*. OECD Publishing.
- Office of the Basic Education Commission. (2017). *Early childhood education curriculum B.E. 2560 (2017)*. Ministry of Education. [in Thai]
- Piaget, J. (1952). *The origins of intelligence in children*. International Universities Press.
- Piwlueang, C., Noklang, S., & Prakongpan, P. (2025). Learning management techniques as a cultural mechanism to pass on characteristics of a gentleman to pre-cadet students at Armed Forces Academies Preparatory School. *Dhammathas Academic Journal*, 25(1), 279–294. [in Thai]

- Prapaisit de Segovia, L., & Hardison, D. M. (2009). Implementing education reform: EFL teachers' perspectives. *ELT Journal*, 63(2), 154–162. <https://doi.org/10.1093/elt/ccn024>
- Promata, S., Noklang, S., & Saleemad, K. (2024). Rural teachers: Meaning from mainstream development discourse on teachers' self-stigma in rural areas. *Journal of Arts and Thai Studies*, 46(3), E3679. <https://doi.org/10.69598/artssu.2024.3679>
- Sabti, A. A., Md Rashid, S., Nimehchisalem, V., & Darmi, R. (2019). The impact of writing anxiety, writing achievement motivation, and writing self-efficacy on writing performance: A correlational study of Iraqi tertiary EFL learners. *SAGE Open*, 9(4). <https://doi.org/10.1177/2158244019894289>
- Saleemad, K., & Krataytong, A. (2018). Development of a short course training program to enhance Thai teaching ability to use visible thinking approach for Thai teachers in international schools. *Journal of Research and Curriculum Development*, 8(1), 128–136. <https://so03.tci-thaijo.org/index.php/jrcd/article/view/131707>. [in Thai]
- Sinlapakitjanon, P., Noklang, S., & Prakongpan, P. (2026). AI for social responsibility: Critical reflections on the marketization of education. *Social Sciences*, 15(2), 68. <https://doi.org/10.3390/socsci15020068>
- Sukklang, N., & Wilang, J. (2025). Decoding speaking mindsets of Thai undergraduates using Q-methodology. *Journal of Studies in the English Language*, 20(2), 131–158. <https://doi.org/10.64731/jsel.v20i2.280254>
- Vygotsky, L. S., & Cole, M. (1978). *Mind in society: Development of higher psychological processes*. Harvard University Press.
- Worth, K., & Grollman, S. (2003). *Worms, shadows, and whirlpools: Science in the early childhood classroom*. Heinemann.
- Yeager, D. S., & Dweck, C. S. (2012). Mindsets that promote resilience: When students believe that personal characteristics can be developed. *Educational Psychologist*, 47(4), 302–314. <https://doi.org/10.1080/00461520.2012.722805>

School Dropouts in Brazilian High Schools: The Impact of the Pandemic

Rafael Altoé Frossard, Federal University of Espírito Santo, Brazil

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This study aims to examine the impact of the COVID-19 pandemic on school dropout rates in Brazilian high schools. Data from the Anísio Teixeira National Institute for Educational Studies and Research (INEP), covering the period from 2015 to 2023, were analyzed using multiple regression with dummy variables and the Chow test. This approach allowed for the control of variables such as school location (rural or urban), administrative dependency (public or private), geographic regions (Central-West, Northeast, North, South, and Southeast), and the pandemic (specifically the year 2020, when social distancing measures were implemented). The findings indicate that dropout rates in urban and rural schools are similar; however, public schools consistently showed higher dropout rates compared to private schools across all models. Furthermore, during the pandemic period, the Northeast region exhibited dropout levels comparable to those of the North, while the South showed higher dropout rates than the North. Additionally, the pandemic led to changes in both the linear and angular coefficients of the dependent variable (school dropout), suggesting that the health crisis contributed to an increase in dropout rates in the country.

Keywords: high school, pandemic, quantitative, school dropout

iafor

The International Academic Forum
www.iafor.org

Introduction

School abandonment is a global phenomenon that has challenged educational systems over the decades; however, the meaning of the term varies by country and generally refers to individuals who interrupted formal schooling before the expected age (Profiroiu et al., 2024). In Brazil, the term school abandonment refers to students who stop attending school partially or permanently but return the following year. Young people who abandon school are more likely to face a series of difficulties throughout life, including fewer employment opportunities and higher rates of involvement in risky behaviors, as noted by Rumberger and Rotermund (2012). It is a process that occurs silently and gradually; indeed, the school itself often acts as an active agent in school abandonment (Azevedo, 2023).

Recent studies indicate that school abandonment affects millions of young people around the world. Projections suggest that the COVID-19 pandemic may have worsened this situation, leading about 23.8 million children in an emerging country to potentially discontinue their education, as highlighted by Ozdemir et al. (2024). In Brazil, the risk of school dropout among elementary and high school students rose from 10% to 35% because of the pandemic, as reported by Lichand et al. (2022).

Several factors contribute to school abandonment, and these are multifactorial and influenced by students' socioeconomic, family, and cultural conditions. Among the main reasons are financial difficulties, lack of family involvement, a history of abuse, antisocial behaviors, and weak teacher-student relationships, according to the review by Gubbels et al. (2019). Internal factors, such as disinterest in the school environment and mental health problems, also play an important role in this process. There is also a classification of school abandonment according to the in-school, student, and family dimensions (Soares et al., 2015).

In addition to traditional factors, the pandemic exacerbated other challenges, such as inequality in access to technology and the lack of infrastructure for remote teaching (Anderete Schwal, 2024), especially in emerging countries. Studies such as Joulai and Kalateh Sadati (2020) point out that poverty and the economic destruction resulting from the pandemic, combined with inadequate technological infrastructure, increased school abandonment rates. In Pakistan, the loss of family income during the pandemic led to child labor, forcing school abandonment, according to Khan and Ahmed (2021).

School closures, social isolation, and the forced adaptation to remote teaching caused profound impacts on the routine of millions of students and their families. Educational inequalities were widened, and many students were unable to keep up with the changes in the teaching model, as reported by Shuja et al. (2022).

In Brazil, the school abandonment rate had been progressively declining; however, the phenomenon never ceased to occur and was amplified by the COVID-19 pandemic. Lacruz et al. (2024) emphasize that, in Brazil, the pandemic represented a break in the downward trend of dropout rates, with public schools being more affected than private schools.

Although these measures were important for reducing the spread of COVID-19, it is undeniable that social isolation measures amplified inequalities among students, especially in the unequal access to technological devices and the internet (Joulai & Kalateh Sadati, 2020; Khan & Ahmed, 2021).

In addition, it is reasonable to consider the possibility that the pandemic affected urban and rural areas differently, as well as public and private schools. Based on these issues, this article aims to answer three questions regarding Brazilian high school classes: (1) what was the impact of the pandemic on school abandonment rates?; (2) was abandonment the same between public and private schools?; and (3) was abandonment the same between urban and rural areas?

As for the justification, school abandonment in high school has not been studied as extensively, since much of the literature cited in this article refers to primary and secondary education in Brazil and other countries. However, data from the 2023 School Census show that the dropout rate in high school is the highest among the stages of education (5.9%). When we consider school abandonment, since dropout represents the final stage, the number is probably higher than 5.9%. Therefore, it is necessary to understand the impacts of the pandemic on school abandonment in high schools.

It should be noted that this study does not seek to understand the reasons for school abandonment or to advocate for any type of public policy, but only to understand the effects of the pandemic on school abandonment in Brazilian high schools.

Literature Review

Gubbels et al. (2019) conducted a meta-analytic review of the risk factors for school abandonment, identifying antisocial behavior, substance abuse, limited parental involvement, and poor relationships with teachers as determining factors. They suggest that an effective solution requires a multidimensional approach that takes into account both individual and contextual factors, such as families, communities, and peers.

Since the causes of school abandonment are already known in the literature, it is reasonable to assume that the COVID-19 pandemic raised concerns regarding school abandonment, especially in emerging countries, where educational infrastructure was already facing prior challenges. The study by Joulai and Kalateh Sadati (2020) highlights that inequality in access to technology for virtual classes increased the risk of school abandonment, particularly in countries with deficient technological infrastructure. Poverty and economic destruction, intensified by school closures, are factors that contribute to this phenomenon, leading to a decline in economic growth and in working conditions and equitable access to the labor market.

The pandemic also affected the mental health of students and their families. According to Ozdemir et al. (2024), social isolation and the difficulty of adapting to remote learning are factors that intensified school abandonment. The research reveals that students who abandon school are predisposed to physical and mental health problems, such as depression, anxiety disorders, and suicidal tendencies.

In Pakistan, the loss of family income had a direct impact on the school dropout rate (Khan & Ahmed, 2021). A 10% loss in family income led 1.659 million children to abandon school, while a 50% loss resulted in 7.2 million abandonments. The increase in child labor was another negative consequence. In addition, Shuja et al. (2022) emphasize that policies for distributing laptops and providing internet access could reduce abandonment rates.

In Iran, the phenomenon of hidden abandonment is evident, in which students are physically present in schools but are neglected in the learning process (Sadati & Saboohi Golkar, 2023). The authors identify that the unfair educational system, the decline in teachers' authority, and the informalization of school rituals contributed to this problem. In addition, the pandemic reduced the social dimension of learning, an important part of the educational experience.

Flor et al. (2022) explore the gender disparities caused by the pandemic. Their study shows that girls were more negatively affected by the economic crisis, especially in regions such as Central Europe and South Asia. The increase in domestic responsibilities and difficulties in access to technology exacerbated school abandonment among girls. This impact was more pronounced in poor countries, where girls had to help with domestic work, as also illustrated in the study by Bayley et al. (2023), which highlights the impact of early marriage and pregnancy on the increase in school abandonment.

In Brazil, more specifically in the state of São Paulo, Lichand et al. (2022) studied the impact of remote learning during the pandemic, observing that the risk of school abandonment grew significantly where remote learning was adopted. The study indicates that school abandonment in elementary and high school may have reached 35% in 2021, representing a 365% increase in the risk of abandonment under the remote regime. On the other hand, the analysis by Lacruz et al. (2024), focused on secondary education in Espírito Santo (Brazil), highlighted that the pandemic broke the downward trend in school abandonment, especially in public schools and in urban areas.

It should be noted that school abandonment represents a cost to society, especially when a pandemic event intensifies this phenomenon. According to Rumberger and Rotermund (2012), who highlight the relationship between school engagement and abandonment, students who abandon school are more likely to face unemployment, earn less throughout life, and have poorer health. In addition, they are more likely to engage in criminal behavior and to require public assistance. Reducing school abandonment, according to the authors, could generate significant savings for the government, since it is cheaper to invest in education than to promote social assistance measures to deal with the consequences of school abandonment.

Given the complexity of the issue of school abandonment in emerging countries, which already faced problems in the universalization of free, quality public education, this literature review aimed to show the different nuances faced, in Brazil and worldwide, regarding the increase in school abandonment as a result of the pandemic.

One part of this review sought to understand the causes that led to school abandonment during the pandemic, including the adoption of remote learning (Lichand et al., 2022), the reduction in family income (Khan & Ahmed, 2021), and the lack of access to technological equipment (Shuja et al., 2022). However, Lacruz et al. (2024) assessed how the presence of an external variable (the pandemic) affected the trend of school abandonment in elementary schools in Espírito Santo; that is, it involves assessing whether or not the pandemic was a cause of school abandonment.

Knowing that this study aims to contribute to the literature by expanding the findings of Lacruz et al. (2024), the following section presents the procedures adopted to estimate whether the advent of the pandemic caused a trend break in the high school abandonment rate in Espírito Santo and in Brazil. Therefore, with the exception of the external variable

“pandemic,” we cannot make inferences about the internal and external variables that lead to school abandonment. However, we can estimate the impact of the pandemic according to the school’s location and administrative dependency, both internal variables.

These internal variables are included in the model as control variables. Regarding administrative dependency, one year before the pandemic, in 2019, 98.9% of students aged 15 to 17 in the private school system had internet access and a computer or notebook at home; in contrast, this figure was 48.6% for public school students in the same age group. In addition, public schools remained closed longer than private schools (Inep, 2022) and had greater difficulty offering remote learning to students during the pandemic (Anderete Schwal, 2024). On the other hand, regarding location, only half of rural households have internet access, whereas in urban areas this figure is 83.8% (IBGE, 2020). In this way, these variables are expected to reduce result bias and avoid heterogeneity problems.

Methodology

The data were collected from the website of the National Institute for Educational Studies and Research Anísio Teixeira (Inep), through the section “School Performance Rates” (which provides information on promotion, retention, and abandonment), at the “School” level, from 2015 to 2023. As shown below, the abandonment rate variable was transformed into its natural logarithm in order to linearize the model.

Table 1
Study Variables

Variables	Instrumentalization
Dropout Rate	$\ln(1 + \textit{Dropout Rate})$
Year	Original Format
Localization	<i>Dummy</i> 0 = Rural 1 = Urban
Dependency	<i>Dummy</i> 0 = Private 1 = Public
<i>Dummy Region</i>	0 = North 1 = Midwest, Northeast, Southeast and South
Pandemic Event	<i>Dummy</i> 0 = Years before the pandemic (2015 to 2019) 1 = Years after the pandemic (2020 to 2023)
Interaction Between Year and Pandemic	Event Multiplication between the two variables (interactive term).

Source: Prepared by the author

With regard to Table 1, it is known that the number of dummy variables is always equal to the number of categories minus one; in this sense, the Region Dummy variable uses the North as the reference category (0), while the other regions are coded as 1.

The database contains data referring to schools from all Brazilian states, totaling 1,203,928 observations. However, we removed from the sample the observations that were empty in the database; therefore, the partial sample consisted of 257,786 observations.

It is important to mention that, by excluding the missing data, we assumed that the absence of data occurred randomly with respect to the variables Abandonment Rate, Administrative Dependency, and Location, as well as due to their nonexistence for the years from 2015 to 2023, according to Lacruz et al. (2024).

Although the literature shows that abandonment is caused by factors external and internal to the school, this article was not able to consider the external variables, since the Basic Education Assessment System (SAEB) database does not provide information for the years 2016, 2018, 2020, and 2022. Therefore, the only external variable is the occurrence of the pandemic, controlled by location, administrative dependency, and region.

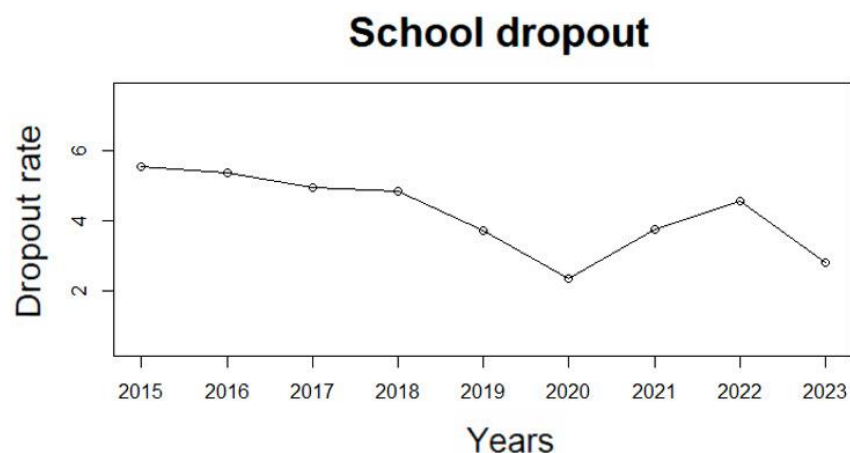
In order to measure the impact of the pandemic on school abandonment in Brazilian high schools, using Location (school located in a rural or urban setting) and Administrative Dependency (public or private school) as moderating variables, we created three multiple regression models: Model 1 (2015 to 2023), Model 2 (2015 to 2019), and Model 3 (2020 to 2023). Given these variables, we used the Chow test (1960) to understand whether or not there was a structural break in the regression models of school abandonment as a result of the pandemic.

In order to clarify the terms used here, the Chow test (1960) provides for two types of break: linear and angular. When there is a break in the linear coefficient (intercept), we understand that the point at which the regression line crosses the Y-axis changed between the periods analyzed, whereas a break in the angular coefficient (slope) implies a change in the relationship between the dependent and independent variables, represented by a change in the slope between X and Y.

Additionally, the five regression assumptions were employed (Levine et al., 2017): multicollinearity (Variance Inflation Factor – VIF), independence of errors or residuals (Breusch-Godfrey), absence of influential values (Cook's Distance), normality of residuals (Anderson-Darling), and equality of variances or homoscedasticity (Breusch-Pagan). In addition, all assumptions, as well as the regressions themselves, were tested at the 5% significance level.

Results

As shown in Figure 1, between 2015 and 2020 the high school abandonment rate decreased from 5.54% to 2.36%. Subsequently, between 2020 and 2022, there was an increase in abandonment, from 2.36% to 4.56%. However, in 2023 the rate fell to 2.80%, the second lowest level among the data presented here.

Figure 1*Evolution of School Dropout Rates: High School (Brazil)*

Note/Source: Prepared by the author based on educational indicators from INEP (2015 to 2023).

With regard to the regression assumptions, all models showed a non-normal distribution ($p\text{-value} < 0.05$), heteroscedastic errors ($p\text{-value} < 0.05$), autocorrelation ($p\text{-value} < 0.05$), and absence of multicollinearity. Due to the rejection of three regression assumptions (normal distribution, homoscedasticity, and absence of autocorrelation), we used robust regression with cluster correction (school code), whose purpose is to adjust the standard errors of the coefficients so that they are not affected by heteroscedasticity and autocorrelation.

With respect to the trend break in the linear coefficient, the Chow test shows that the pandemic caused a break in the downward trend of school abandonment in Brazilian high schools. When comparing the regression lines of Models 2 and 3, the $p\text{-value}$ was lower than 0.05, indicating a break between the models. This means that school abandonment was abruptly shifted because of the pandemic, showing a lower level than before the health crisis.

With regard to the angular coefficient, the Year variable (Models 2 and 3) indicates that the effect of time on the dependent variable (abandonment) increased considerably; therefore, it can be stated that the angular coefficient changed. Thus, it is understood that the advent of the pandemic considerably increased school abandonment.

Table 2
Results From Model Estimation

Variables	Model 1 (2015–2023)	Model 2 (2015–2019)	Model 3 (2020–2023)
Intercept	6.652**	−11.754***	−159.154***
Year	−0.003*	0.006***	0.079***
Localization	−0.014	−0.023	−0.010
Dependency	1.067***	1.235***	0.899***
Sotheast Region	−0.427***	−0.637***	−0.183***
Northeast Region	−0.152***	−0.278***	−0.011
South Region	−0.170***	−0.356***	0.045***
Central-West Region	−0.470***	−0.499***	−0.440***
Pandemic Event	−164.806***		
Interactive Term Between Year and Pandemic Event	0.081***		

Note. *, **, and *** are statistically significant at levels of 0.01, 0.001, and 0, respectively.

Next, the average school abandonment of urban and rural schools in Brazil was equivalent, since Models 1, 2, and 3 did not show statistical significance. Therefore, it is possible to infer that there is no difference in abandonment between urban and rural schools, indicating that location is not the best variable for understanding the phenomenon of school abandonment. Additionally, the Administrative Dependency dummy indicates that public schools had abandonment levels about 106% higher than private schools, with statistical significance in the three models described above.

Through the Southeast Region, Northeast Region, South Region, and Central-West Region dummies, it is possible to compare the average difference in school abandonment between each of these regions and the North Region, controlling for the other variables. In Model 2, it is observed that schools in the Southeast, Northeast, South, and Central-West had lower abandonment rates in relation to the North Region. However, in Model 3, only the Southeast and Central-West maintained this trend, while schools in the South Region began to show higher abandonment and those in the Northeast showed rates equal to the reference category (that is, there was no statistical significance).

Discussion and Conclusion

This article investigated the effects of the pandemic on high school abandonment rates in Brazilian schools, using Inep data from 2015 to 2023. The analysis focused on estimating the impact of the pandemic on school abandonment, considering variables such as location, administrative dependency, region, and the interaction term (year multiplied by the pandemic dummy).

Through the Chow test, we can answer the first question of this study (what was the impact of the pandemic on school abandonment rates?), in which we observed a break in the linear and angular coefficients of school abandonment rates. These results are consistent with Lacruz et al. (2024), since the researchers found a break in both coefficients. This indicates that both elementary schools and high schools had the rates of variation in school abandonment altered as a result of the pandemic.

When we observe the Pandemic Event dummy variable, it seems counterintuitive to claim that the pandemic reduced school abandonment in Brazilian high schools; after all, many countries, whether developed or not, showed an increase in abandonment as a result of the pandemic. Would Brazil be an exception? To overcome this issue, we used the interaction term, which multiplies the Year and Pandemic Event variables and, therefore, shows that the pandemic increased school abandonment in high schools.

As for the second question (was abandonment the same between public and private schools?), we found evidence that Brazilian public schools experienced a sharp increase in abandonment rates, with an increase of 110.6% (Brazil) in relation to private schools. This intensification may be explained by the speed with which measures related to education during the pandemic were adopted by public and private institutions. As an example of comparison, principals of public schools are, on some occasions, constrained by municipal, state, and federal bureaucracy. In contrast, private schools can make decisions at a speed that state bureaucracy cannot match. Thus, it is assumed that private schools were able to adapt teaching to the pandemic according to the local needs of their students, as well as monitor school abandonment among these students.

With regard to the third question (was abandonment the same between urban and rural areas?), in the comparative analysis between urban and rural schools in Brazil, none of the models showed statistical significance, which is evidence that there is no difference between students from urban and rural areas with respect to abandonment; however, it is important to note the specificities of this issue. In Brazil, classification is made according to the criteria of the Brazilian Institute of Geography and Statistics (IBGE): schools located in areas with high population density are considered urban, while those located outside metropolitan areas or in areas with low population density are considered rural. This classification differs, for example, from that of the United States, where there are four classifications, including rural schools, which are divided into “rural close to urban areas” and “rural distant from urban areas.”

These differences in the classification of urban and rural environments may affect the results when school abandonment is taken into account: are rural schools really so different from urban ones? The answer to this question requires a deeper analysis of the socioeconomic conditions, infrastructure, and access to resources available to each type of school. In addition, rural schools often face difficulties in internet access and precarious infrastructure.

With respect to the difference in abandonment among the different regions of Brazil, it was expected that most regions would have lower abandonment than the North; however, after the pandemic, the South region showed higher school abandonment.

The negative and significant coefficients for the Southeast and Central-West dummies indicate that these regions had school abandonment rates lower than the North Region even through 2023, reflecting the economic, social, and educational disparities among these regions. However, the reversal observed in the South region during the pandemic period, with a positive coefficient in Model 3, suggests that, despite having the best social indicators, this region suffered more from abandonment. In turn, the equalization of abandonment rates in the Northeast with the reference category reflects the social conditions shared by the states in the North and Northeast.

It is important to mention that this study is limited to the variables available in the Inep database; therefore, considering factors external to the school (such as socioeconomic conditions, access to technology, restrictive measures adopted by the different states of the federation, among others), in addition to considering the predictors and consequences of school abandonment, may enrich the results. Thus, it is expected that the information presented here will be useful for public managers, contributing to the formulation of public policies capable of reducing school abandonment in high school.

Acknowledgements

I would like to thank the Espírito Santo Research and Innovation Support Foundation (FAPES) for its financial support. I also thank my advisor, Adonai José Lacruz, for his help with the research.

References

- Anderete Schwal, M. (2024). Años luz de distancia educativa: las desigualdades tecnológicas entre escuelas primarias públicas y privadas después de la pandemia [Light years of educational gap: the technological inequalities between public and private primary schools after the pandemic]. *Población y sociedad*, 31(1), 3–26.
- Azevedo, J. (2023). School participation in marginalization and students leaving school: The case of Portugal. *Education Policy Analysis Archives*, 31.
- Bayley, S., Wole Meshesha, D., Rose, P., Woldehanna, T., Yorke, L., & Ramchandani, P. (2023). Ruptured school trajectories: understanding the impact of COVID-19 on school dropout, socio-emotional and academic learning using a longitudinal design. *Longitudinal and Life Course Studies*, 14(2), 203–239.
- Brazilian Institute of Geography and Statistics. (2020, April 29). *Rendimento impacta acesso da população a bens tecnológicos e internet* [Income impacts the population's access to technological goods and the internet]. Agência IBGE Notícias. <https://agenciadenoticias.ibge.gov.br/agencia-noticias/2012-agencia-de-noticias/noticias/27522-rendimento-impacta-meio-de-acesso-da-populacao-a-bens-tecnologicos-e-internet>
- Chow, G. C. (1960). Tests of equality between sets of coefficients in two linear regressions. *Econometrica: Journal of the Econometric Society*, 591–605.
- Flor, L. S., Friedman, J., Spencer, C. N., Cagney, J., Arrieta, A., Herbert, M. E., Stein, C., Mullany, E. C., Hon, J., Patwardhan, V., Barber, R. M., Collins, J. K., Hay, S. I., Lim, S. S., Lozano, R., Mokdad, A. H., Murray, C. J. L., Reiner, R. C., Jr., Sorensen, R. J. D., ... Gakidou, E. (2022). Quantifying the effects of the COVID-19 pandemic on gender equality on health, social, and economic indicators: A comprehensive review of data from March, 2020, to September, 2021.
- Gubbels, J., van der Put, C. E., & Assink, M. (2019). Risk factors for school absenteeism and dropout: A meta-analytic review. *Journal of youth and adolescence*, 48, 1637–1667.
- Joulaei, H., & Kalateh Sadati, A. (2020). COVID-19 outbreak and school dropout; A worldwide challenge for an equitable future. *International Journal of School Health*, 7(4), 1–2.
- Khan, M. J., & Ahmed, J. (2021). Child education in the time of pandemic: Learning loss and dropout. *Children and Youth Services Review*, 127, 106065.
- Lacruz, A. J., Carniel, F., Pezzin, C., & Lemos, K. R. (2024). Efeitos da Pandemia sobre o Abandono Escolar. *Navus-Revista de Gestão e Tecnologia* [Effects of the Pandemic on School Dropout], 14, 1–15.
- Levine, D. M., Stephan, D. F., & Szabat, K. A. (2017). *Estatística: teoria e aplicações usando o Microsoft Excel em português* [Statistics: theory and applications using microsoft excel in portuguese] (T. C. P. de Souza, Trad. e rev. técn.; 7ª ed.). LTC.

- Lichand, G., Doria, C. A., Leal-Neto, O., & Fernandes, J. P. C. (2022). The impacts of remote learning in secondary education during the pandemic in Brazil. *Nature Human Behaviour*, 6(8), 1079–1086.
- National Institute of Educational Studies and Research Anísio Teixeira. (n.d.). *Indicadores educacionais* [Educational indicators]. Gov.br. <https://www.gov.br/inep/pt-br/acesso-a-informacao/dados-abertos/indicadores-educacionais>
- National Institute of Educational Studies and Research Anísio Teixeira. (2022, July 18). *Pesquisa revela resposta educacional à pandemia em 2021* [Study reveals the educational response to the pandemic in 2021]. Gov.br. <https://www.gov.br/inep/pt-br/centrais-de-conteudo/noticias/censo-escolar/pesquisa-revela-resposta-educacional-a-pandemia-em-2021>
- Ozdemir, N. K., Kemer, F. N. A., Arslan, A., & Tuna, B. (2024). A Qualitative Study of Unveiling School Dropout Complexity in Türkiye. *Child Indicators Research*, 17(3), 1001–1021.
- Profiroi, C. M., Cibu, B., Delcea, C., & Cotfas, L. A. (2024). *Charting the Course of School Dropout Research: A Bibliometric Exploration*. IEEE Access.
- Rumberger, R. W., & Rotermund, S. (2012). *The relationship between engagement and high school dropout*. In *Handbook of research on student engagement* (pp. 491–513). Springer US.
- Sadati, A., & Saboohi Golkar, Z. (2023). Hidden Dropout during the COVID-19 Pandemic: A Qualitative Study in Tabas, Iran. *International Journal of School Health*, 10(1), 41–48.
- Shuja, A., Ali, A., Khan, S. S. A., Burki, S. B., & Bilal, S. (2022). Perspectives on the factors affecting students' dropout rate during COVID-19: A case study from Pakistan. *Sage Open*, 12(2), 21582440221097378.

Contact email: rafa10altoe@gmail.com

Learning Without Walls: A Capability Approach to VR Schooling and Educational Equity in Japan

Seri Yoon, Waseda University, Japan

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

In recent years, Japan has implemented VR-based schooling as an alternative for students. Government-accredited schools like N High School enable students to attend classes, interact via avatars, and join digital campuses simulating real-life learning. This model has expanded in response to social isolation, such as bullying, school refusal, or geographic barriers, offering a pathway for those unable or unwilling to attend traditional schools. While praised for its innovation, VR schooling must be meaningfully assessed for its contribution to educational equity. Without attention to how it expands real opportunities and freedoms, digital transformation risks replicating existing inequalities. Through a qualitative method grounded in Amartya Sen's Capability Framework, this research evaluates how Japan's VR schooling enhances students' substantive freedoms, particularly in relation to learning access and life choices. Using document analysis and a review of institutional policies, the study explores how such education systems foster not only access to learning, but also sustained engagement and expanded opportunities for students to pursue educational and career pathways. This offers an important model for other countries grappling with educational exclusion, especially in Southeast Asia, where remote communities, disaster-prone areas, and limited school infrastructure persist. The study suggests that VR-based education, when integrated into national systems and supported through ICT cooperation, can contribute to SDG 4 by restoring educational capabilities to those excluded from mainstream pathways. By framing technology not as an end in itself but as a means to expand freedom and inclusion, this research provides policy-relevant insights into sustainable, student-centered digital transformation.

Keywords: VR schooling, Japan, educational equity, SDG 4

iafor

The International Academic Forum
www.iafor.org

Introduction

Education has long been regarded as a fundamental condition for human dignity, social participation, and sustainable development. It enables individuals to acquire knowledge, imagine future possibilities, participate in society, and develop the capacity to judge, choose, and act within changing social environments. Educational development therefore involves more than the expansion of formal schooling. It requires the creation of learning opportunities through which individuals can build confidence, pursue life goals, and participate more fully in their communities. This perspective is closely connected to the global commitment to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all under Sustainable Development Goal 4 (United Nations, 2015).

The global education agenda has shifted significantly from the Millennium Development Goals to the Sustainable Development Goals. While the MDGs largely emphasized access to primary education and enrollment, SDG 4 places stronger emphasis on quality, equity, inclusion, and lifelong learning across different levels and forms of education. Educational exclusion can occur even when students remain formally enrolled in school, particularly when they lack safe, meaningful, and sustained learning environments due to social, psychological, geographic, or institutional barriers. The contemporary challenge of educational development is therefore to create flexible and inclusive systems that allow diverse learners to continue learning under different life conditions (UNESCO, 2000; United Nations, 2015).

In this context, information and communication technology has become increasingly relevant to debates on educational development and inclusion. Rather than functioning only as a set of digital tools, ICT in education can support communication, connectivity, flexible participation, and access to learning beyond conventional classroom boundaries. Online platforms, digital materials, distance learning systems, and interactive learning environments are especially significant when students face geographic, economic, or social barriers to schooling. From this perspective, the educational value of ICT lies in its ability to connect learners to institutions, teachers, peers, and learning resources in ways that conventional school structures may not always allow (Asian Development Bank, 2003; UNESCO Institute for Statistics, 2009; World Bank Group, 2003).

The importance of ICT has become more apparent as the digital divide increasingly overlaps with broader forms of educational and social inequality. Earlier development debates often placed greater emphasis on physical infrastructure such as roads, hospitals, or clean water. Contemporary education systems, however, show that digital access is closely tied to learning continuity, educational quality, and social participation. ICT has been recognized as a tool for expanding educational access, improving learning quality, and reducing development gaps by connecting learners to information, communication, and educational resources (UNESCO Institute for Statistics, 2009; World Bank Group, 2003). Unequal access to digital tools can also reinforce wider social and economic inequalities, making digital inclusion a central issue in contemporary development (World Economic Forum, 2024).

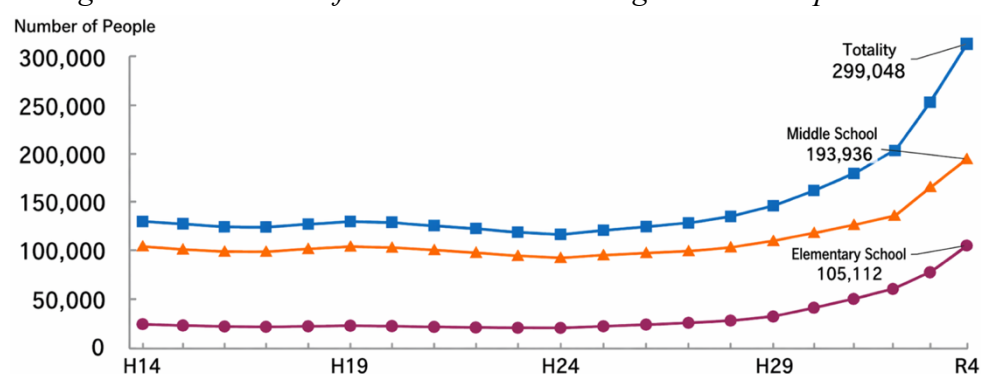
Japan provides a significant case for examining the relationship between ICT, alternative schooling, and educational equity. The country has developed advanced digital education policies, including the GIGA School Program, which aims to provide digital devices and online learning environments for students as part of preparing them for a digital society (The Japan Times, 2021). Japan has also developed remote learning systems in response to natural disasters and educational disruptions, including the 2011 Great East Japan Earthquake and the COVID-

19 pandemic. These experiences have positioned ICT-based education as part of a broader strategy for maintaining educational continuity under crisis conditions.

Japan also faces serious educational challenges related to school refusal, bullying, and social isolation. Official MEXT data show that school non-attendance and bullying have become urgent issues in the Japanese education system, with approximately 299,000 elementary and junior high school students categorized as not attending school and approximately 682,000 recognized cases of bullying reported across schools (MEXT, 2023). These figures indicate that educational exclusion in Japan extends beyond physical access to schools. It is also shaped by social experiences within schooling itself, including bullying, anxiety, isolation, and the inability of some students to remain in conventional educational environments. Alternative forms of education have consequently become important institutional pathways for protecting the right to learn.

Figure 1

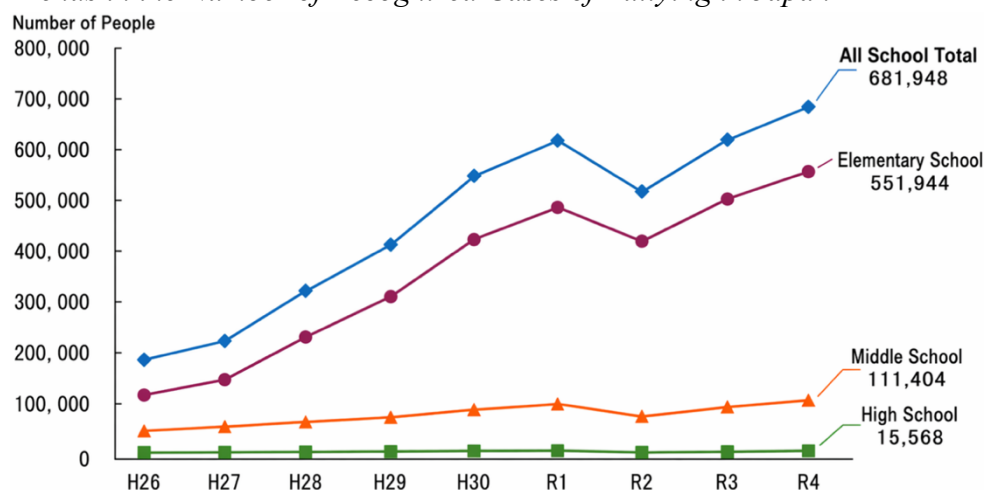
Changes in the Number of Students Not Attending School in Japan



Note. From MEXT, 2023

Figure 2

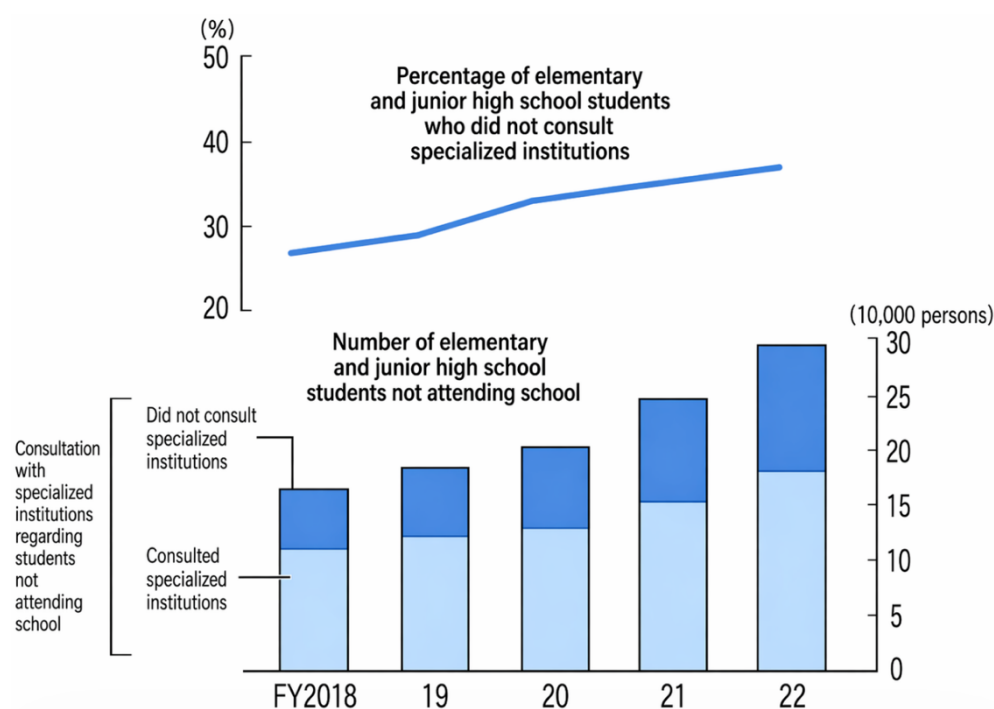
Trends in the Number of Recognized Cases of Bullying in Japan



Note. From MEXT, 2023

Figure 3

Number of Elementary and Junior High School Students Not Attending School and Percentage Who Did Not Consult Specialized Institutions in Japan



Note. From MEXT, 2023

VR-based schooling has emerged as one such alternative pathway. Government-accredited distance learning and virtual schooling models such as N High School provide online and ICT-based learning environments where students can attend classes, complete coursework, and participate in school life through digital tools. Recent discussions of Japan's alternative schooling system show that correspondence and online high schools have expanded as students increasingly struggle to attend conventional schools, while policy attention has grown around the institutional maintenance of such systems (Park, 2023). Reports on VR and metaverse-based learning further suggest that virtual spaces are increasingly used as environments for class participation, communication, and school life, rather than only as supplementary educational tools (Ko, 2020; Shin, 2022). The case of virtual schooling for students who refuse to attend school illustrates how these digital environments are being positioned as alternative educational spaces in Japan (KBS World News, 2024). VR schooling in Japan can therefore be understood as part of a broader institutional effort to create flexible educational pathways for students who may not fit into traditional school structures.

The educational value of VR schooling requires careful assessment. Although VR-based education is often praised for innovation, digital transformation can reproduce existing inequalities when it provides technical access without expanding students' real opportunities. A student may have access to an online platform but still lack meaningful participation, recognition, continuity, or future pathways. The central question of this study therefore concerns whether VR schooling expands the substantive freedoms of students who have been excluded from mainstream education. This question is examined through Amartya Sen's Capability Approach, which evaluates development in terms of what people are actually able to do and be, rather than only in terms of resources, institutions, or formal opportunities (Sen, 1999).

Through this framework, VR schooling can be examined as a potential means of restoring educational capabilities. For students affected by bullying, school refusal, social isolation, or geographic barriers, VR-based schooling may provide safer spaces for participation, sustained engagement with learning, and alternative educational and career pathways. VR schooling thus connects ICT, educational equity, and human freedom through a student-centered form of digital transformation. This paper examines how Japan's VR-based schooling contributes to educational equity by expanding learning access, continuity, and life choices for marginalized students. By analyzing this case through document analysis and a review of institutional policies, the study explores how technology can become a means of inclusion when it is embedded in recognized education systems and guided by equity-centered principles.

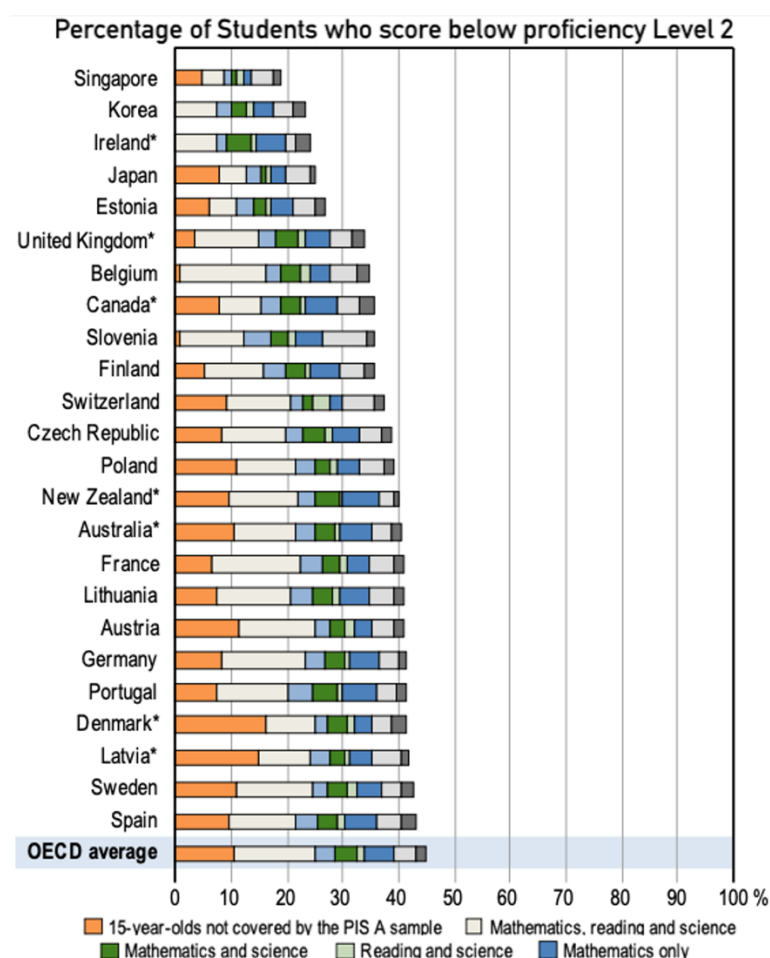
The implications of this study extend beyond the Japanese context. Many countries, particularly in Southeast Asia, continue to face educational exclusion caused by remote geography, disaster-prone environments, and limited school infrastructure. Japan's VR schooling model offers a useful reference for designing ICT-based alternative education that can restore learning opportunities for excluded students. Direct replication across borders is impractical, but the Japanese case shows how virtual learning environments may contribute to SDG 4 when they are integrated into recognized national education systems and supported through ICT cooperation. By conceptualizing technology as a means of expanding freedom and inclusion, this research positions VR-based education as a policy-relevant approach for dismantling educational barriers and building more inclusive futures for marginalized learners.

Methodology

This study employs a qualitative case study design to examine Japan's VR-based schooling as an alternative educational pathway for students experiencing educational exclusion. The focus is not on measuring the statistical effects of VR education, but on interpreting how a specific institutional model operates within a broader social, policy, and educational context. Case study research is particularly useful for examining contemporary phenomena embedded in real-world settings, especially when the boundaries between the phenomenon and its surrounding context are closely connected (Yin, 2018).

The case selected for this study is Japan's VR-based schooling model, with particular attention to N High School and related virtual schooling initiatives. Japan offers a distinctive context in which advanced ICT-based educational infrastructure coexists with persistent challenges such as school refusal, bullying, social isolation, and geographic barriers. This combination allows the study to examine whether digital schooling can function as a meaningful response to educational inequality rather than remain a form of technological innovation alone. N High School is treated as a representative case because it has become part of Japan's expanding alternative and virtual schooling landscape for students who refuse or struggle to attend conventional schools (KBS World News, 2024; Park, 2023).

Japan's relevance as a case is further supported by its position in international educational comparisons. OECD PISA 2022 data show that Japan belongs to a group of education systems with relatively strong academic performance, while still having a measurable share of students who fall below proficiency Level 2 in mathematics, reading, and science. The case is therefore analytically significant because it illustrates how even high-performing education systems may contain vulnerable learners who require alternative pathways to sustain educational participation (OECD, 2023).

Figure 4*Overlap of Low Performers in Mathematics, Reading, and Science Among 15-Year-Olds*

Note. From OECD, 2023

This study relies on document analysis and a review of institutional policies. The analysis focuses on official policies, institutional models, public reports, and educational programs related to ICT-based education, VR schooling, school refusal, bullying, and alternative education in Japan. Rather than using interviews or survey data, the study examines how public documents and institutional materials frame VR-based schooling as a response to educational exclusion. Document analysis is appropriate for this purpose because documents reveal policy intentions, institutional language, program design, and the social meanings attached to educational practices (Bowen, 2009).

The data sources include public reports and policy discussions related to school refusal and bullying in Japan, materials on N High School and virtual schooling, international education policy documents related to SDG 4, and institutional materials on ICT-based education. These sources are read together to trace the relationship between educational exclusion, digital schooling, and recognized alternative pathways. Materials on school absenteeism and bullying provide the social and policy background of exclusion, while sources on virtual schooling show how VR-based and online learning environments are positioned as institutional responses. International policy documents connect the Japanese case to broader debates on inclusive and equitable quality education under SDG 4 (High School Graduation Support Association, 2023; MEXT, 2023; Tatsuya, 2024; UNESCO, 2000; United Nations, 2015).

The analytical framework is grounded in Amartya Sen's Capability Approach. This framework allows VR schooling to be evaluated in terms of students' real opportunities to learn, participate, and pursue future educational and life pathways. Sen's approach understands development as the expansion of substantive freedoms, or what individuals are actually able to do and become in their lives (Sen, 1999). In this study, the Capability Approach serves as the evaluative lens for assessing whether VR schooling expands educational capabilities beyond formal access to schooling.

This framework is operationalized through several interrelated dimensions of educational capability. The analysis examines whether VR schooling expands access to learning, supports continuity of education, enables safer participation, encourages social inclusion, provides institutional recognition, and opens future educational or career pathways. These dimensions are treated not as isolated categories, but as connected elements of students' substantive freedom. Access and continuity address whether students can begin and sustain learning despite social or geographic barriers. Safety and inclusion address whether students can participate without fear of bullying, anxiety, or stigma. Institutional recognition and future pathways address whether alternative learning leads to legitimate educational status and broader opportunities for social participation.

This methodology decenters VR technology as a standalone artifact and instead examines how VR becomes educationally meaningful within an institutional system that recognizes students' right to learn. The study therefore focuses on the relationship between technology, recognition, participation, and educational freedom. This distinction is important because digital transformation can reproduce existing inequalities when technology is introduced without attention to equity, access, and real opportunity. In this study, VR schooling is analyzed as an educational arrangement that may restore capabilities for students excluded from traditional schooling.

SDG 4 is used as a policy-oriented interpretive frame throughout the analysis. Its emphasis on inclusive and equitable quality education and lifelong learning opportunities for all is directly relevant to students who are unable or unwilling to attend traditional schools. By situating Japan's VR schooling model within SDG 4, the study examines how ICT-based alternative education may contribute to global educational goals by expanding access, reducing exclusion, and supporting sustained learning. This connection allows the Japanese case to be interpreted within broader international discussions on digital education, equity, and sustainable development (UNESCO, 2000; United Nations, 2015).

The study does not claim to measure students' learning outcomes, emotional experiences, or long-term transitions into higher education and employment. Its purpose is to interpret the policy and institutional significance of VR-based schooling as an emerging educational model. The findings should therefore be understood as an analytical interpretation of how VR schooling is framed, justified, and positioned within Japan's education system. Future research could extend this analysis through interviews with students, teachers, school administrators, and policymakers in order to examine how these institutional claims are experienced in practice.

Taken together, the methodology integrates case study analysis, document analysis, and the Capability Approach into a single interpretive framework. The Japanese case provides the institutional focus, the documents provide the empirical basis, and the Capability Approach provides the normative lens for evaluating educational freedom. Through this combined approach, the study examines whether VR schooling in Japan can be understood as a student-

centered form of digital transformation that expands educational capabilities for marginalized learners.

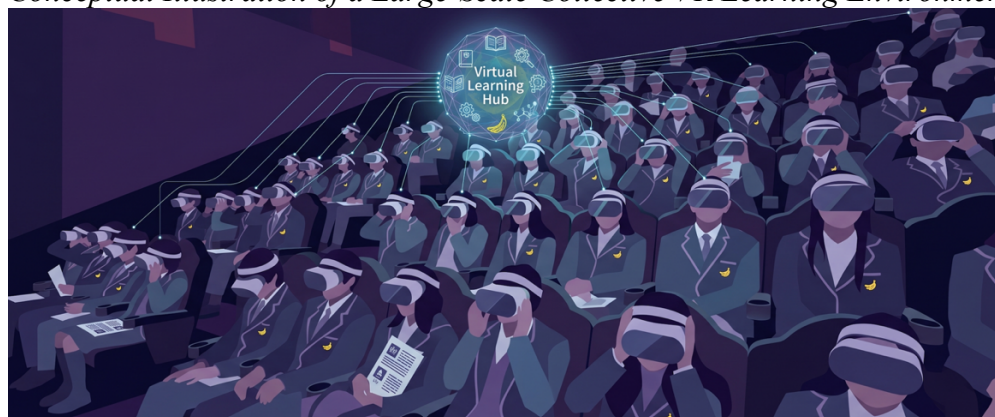
Results and Findings

Japan's VR-based schooling model responds to educational exclusion by creating an alternative institutional pathway for students who experience difficulty remaining in conventional schools. In the Japanese case, exclusion is shaped by multiple and overlapping barriers, including school refusal, bullying, social isolation, and geographic limitations. Recent Japanese education policy discussions and reports identify school absenteeism and bullying as urgent issues in the education system, particularly as increasing numbers of students struggle to remain in conventional schooling (High School Graduation Support Association, 2023; MEXT, 2023; Tatsuya, 2024). These developments reveal a central problem in educational equity, as access to school enrollment does not necessarily guarantee safe, continuous, or meaningful participation in learning environments.

VR-based schooling first redefines access to learning for students who are unable or unwilling to attend traditional schools. In conventional schooling, access is often equated with physical attendance in classrooms. The Japanese case broadens this understanding by showing how learning from home, participation through digital platforms, and formal educational status through recognized distance learning systems can become part of educational access. Reports on Japan's expansion of correspondence high schools indicate that alternative schooling has become increasingly relevant as more students refuse or struggle to attend conventional schools (Park, 2023). Access to education is therefore shifting from physical presence in school toward participation in a flexible and institutionally recognized learning environment.

Building on this expanded access, VR schooling contributes to educational continuity. Japan has long recognized the importance of remote education in response to natural disasters, school closures, and other forms of disruption. The GIGA School Program reflects this national policy direction by promoting digital learning environments and preparing students for a digital society (The Japan Times, 2021). Within this policy environment, VR-based schooling extends Japan's broader effort to maintain learning beyond the limits of physical classrooms. Digital education in this context functions as part of a long-term strategy for sustaining learning continuity, rather than as a temporary emergency response.

Beyond access and continuity, VR-based environments may reduce the social risks associated with conventional schooling. For students affected by bullying, school refusal, or social anxiety, the physical school environment itself may become a source of exclusion. Avatar-based participation and virtual campuses can reduce the pressure of direct face-to-face interaction while still allowing students to attend classes, communicate with others, and participate in school life. Reports on VR and metaverse-based learning suggest that virtual spaces are increasingly being used as environments for participation, communication, and educational experience rather than merely as supplementary technologies (Ko, 2020; Shin, 2022). From a capability perspective, the value of education rests on students' ability to participate without fear, stigma, or exclusion, as well as on their formal enrollment status (Sen, 1999).

Figure 5*Conceptual Illustration of a Large-Scale Collective VR Learning Environment*

Crucially, VR schooling strengthens the institutional recognition of alternative forms of learning. Many forms of online learning provide informal access to educational content, yet they do not necessarily lead to recognized educational pathways. Japan's correspondence and virtual schooling models are discussed as part of an expanding alternative schooling system for students who cannot remain in conventional schools (KBS World News, 2024; Park, 2023). This institutional recognition is crucial for educational equity because students require learning pathways that are acknowledged by schools, employers, universities, and society. VR-based education becomes more meaningful when it is embedded in official schooling structures rather than positioned as a detached digital supplement.

In tandem with this, institutional recognition expands educational agency for marginalized learners. In the Capability Approach, agency is closely connected to the ability to make meaningful choices and pursue valued life paths (Sen, 1999). For students who cannot attend traditional schools because of bullying, social isolation, or geographic barriers, VR schooling widens the range of educational choices available to them. Instead of forcing students to either return to conventional classrooms or leave education entirely, VR-based schooling creates a third pathway by allowing continued participation through a flexible digital environment. This does not eliminate all forms of inequality, but it expands the real options available to students who previously had limited choices.

The Japanese case further demonstrates how ICT-based education can support sustained engagement beyond initial access. Many digital education initiatives provide materials or platforms without ensuring long-term participation. VR-based schooling combines online learning, communication tools, virtual spaces, and institutional structure. This combination allows students to remain connected to teachers, peers, and school activities even when they are physically distant from school. In this sense, VR schooling addresses a key limitation of access-centered digital education by shifting the focus from "Can students access content?" to "Can students continue learning in a socially and institutionally meaningful way?"

The promise of VR schooling must simultaneously be understood alongside the risks of digital transformation. On the positive side, technology can reconstruct educational participation for students excluded from traditional systems. Previous development discussions, however, have emphasized that digital inclusion is not automatic and that unequal access to ICT can deepen existing social and educational divides (Pedrelli, 2001; World Economic Forum, 2024). If VR schooling is available only to students with sufficient digital access, family support, or institutional awareness, it may reproduce new forms of inequality. Its contribution to

educational equity therefore depends on the extent to which the system is designed to support inclusion, affordability, accessibility, and continuity for diverse learners.

Moreover, VR schooling aligns deeply with the broader aims of SDG 4. SDG 4 emphasizes inclusive and equitable quality education and lifelong learning opportunities for all, which directly relates to students who are excluded from mainstream schooling (United Nations, 2015). Japan's VR-based schooling model contributes to this agenda by expanding access to recognized education, supporting learning continuity, and offering alternative pathways for students facing social or geographic barriers. SDG 4 should therefore be interpreted beyond the expansion of enrollment. It also requires educational systems to create flexible forms of learning that respond to the actual conditions of vulnerable and marginalized students (UNESCO, 2000; United Nations, 2015).

The Japanese case may similarly serve as a useful reference for Southeast Asian countries facing educational exclusion caused by remote geography, natural disasters, and limited school infrastructure. The model should not be transferred mechanically, since VR education depends on institutional recognition, digital infrastructure, teacher capacity, and a policy commitment to educational equity. For countries seeking to adapt similar models, the key lesson is not simply to import VR technology, but to build an educational ecosystem in which technology supports students' substantive freedoms and recognized learning pathways.

Synthesizing these dimensions, Japan's VR-based schooling can be understood as a capability-expanding model of digital education. Its significance lies in the way it combines flexible access, learning continuity, safer participation, institutional recognition, and future-oriented educational engagement. These findings support the central argument of this paper that VR schooling should not be evaluated only as technological innovation, but as a possible means of restoring educational capabilities for students who have been excluded from mainstream pathways. Japan's case demonstrates that ICT-based alternative education can contribute to educational equity when technology is embedded within inclusive institutional design.

Implications & Conclusion

The findings of this study suggest that Japan's VR-based schooling carries important implications for educational equity by reframing digital education as an institutional pathway rather than a simple extension of online content delivery. In this case, VR schooling functions as an alternative route for students excluded from traditional schooling because of bullying, school refusal, social isolation, or geographic barriers. Educational inequality is therefore revealed as a problem of participation as well as access. Students may remain formally located within an education system while still being unable to participate safely, continuously, or meaningfully in conventional learning environments. From this perspective, educational equity requires flexible learning environments that allow students to remain connected to education in ways that reflect their actual social and personal conditions (High School Graduation Support Association, 2023; MEXT, 2023; Sen, 1999; Tatsuya, 2024).

A primary implication concerns the formal status of alternative education. VR schooling gains educational significance when it is recognized as part of the official education system and connected to legitimate learning pathways. N High School and similar ICT-based schooling models demonstrate that students who cannot attend traditional schools may still continue their education through institutionally recognized digital environments. Informal online learning can provide access to knowledge, but recognized schooling provides qualifications, social

legitimacy, and future academic or career opportunities. The value of VR schooling therefore lies in its ability to connect technological flexibility with institutional recognition and the protection of students' right to learn (KBS World News, 2024; Park, 2023).

Evaluated through the Capability Approach, ICT-based education should be assessed according to the substantive freedoms it creates for learners. A narrow evaluation of VR schooling as a digital tool risks overstating technological novelty while overlooking students' real opportunities. The more important question concerns whether VR schooling expands what students are actually able to do and become. For marginalized students, this includes the ability to continue learning, participate without fear of bullying or stigma, maintain educational status, and pursue future pathways. VR schooling can therefore be interpreted as a capability-expanding model when it gives students real alternatives to educational withdrawal (Sen, 1999).

This capability-expanding potential depends on the equity conditions under which digital transformation is implemented. Previous discussions on ICT and development show that digital technologies can widen existing development gaps when access to infrastructure, skills, and institutional support is uneven (Pedrelli, 2001; World Economic Forum, 2024). This warning is particularly relevant to VR schooling. While VR-based education can create new opportunities, it may also generate new forms of exclusion if students lack digital devices, stable internet access, family support, or knowledge about alternative schooling options. The success of VR schooling depends on adequate infrastructure, affordability, teacher support, digital literacy, and clear pathways for recognition. Technology itself is not neutral because its educational meaning is shaped by the institutional and social conditions under which it is implemented.

The Japanese case also extends the meaning of educational resilience. Japan's experience with remote education has been shaped by natural disasters, school disruptions, and the broader digitalization of education through initiatives such as the GIGA School Program. These policy developments show that ICT can support learning continuity when conventional classrooms are disrupted by social, geographic, or environmental conditions (The Japan Times, 2021). VR schooling applies this logic to students whose everyday educational lives are disrupted by bullying, social isolation, or school refusal. Educational continuity, in this sense, is not limited to emergency response. It becomes a long-term condition for protecting the right to learn.

Japan's VR schooling model may offer useful lessons for Southeast Asian countries facing educational exclusion caused by remote geography, disaster-prone environments, and limited school infrastructure. In such contexts, ICT-based alternative education can expand learning opportunities for students who cannot consistently attend physical schools. The Japanese model, however, requires adaptation rather than replication. Each country must consider its own infrastructure, cultural context, school governance, teacher capacity, and students' needs before adopting VR-based education. The main lesson from Japan is that digital education becomes meaningful when it is embedded in a recognized and inclusive educational system.

International ICT cooperation can further support this form of inclusive education. In many developing contexts, digital education requires devices and platforms alongside institutional capacity, teacher training, technical support, and sustainable governance. Japan has emphasized technical cooperation and human resource development through ODA, including the transfer of ICT-related knowledge and support for capacity building in partner countries (Ministry of Foreign Affairs of Japan, 1999, 2022; Miyake, 2015). Japan's VR schooling case can therefore contribute to broader discussions of ICT cooperation by showing how digital

tools may support educational development when they are connected to equity, institutional recognition, and long-term learning continuity.

The findings also contribute to the interpretation of SDG 4. SDG 4 calls for inclusive, equitable, and quality learning opportunities for diverse learners, including those excluded by social, psychological, geographic, or institutional barriers (United Nations, 2015). Japan's VR schooling model demonstrates one way of responding to this broader interpretation of educational inclusion. By offering recognized alternative pathways, supporting continued learning, and reducing the risks associated with conventional school participation, VR-based schooling contributes to the goal of leaving no learner behind (UNESCO, 2000; United Nations, 2015).

This study has several limitations. Since it is based on document analysis and policy review, it does not directly measure students' learning outcomes, emotional experiences, or long-term transitions into higher education and employment. The analysis focuses on the policy and institutional meaning of VR schooling rather than its direct empirical effects on individual students. Future research should include interviews with students, teachers, parents, and school administrators to examine how VR schooling is experienced in practice. Further studies could also compare Japan's model with other ICT-based alternative education systems in Southeast Asia to identify which elements are transferable and which require local adaptation.

This study argues that Japan's VR-based schooling should be understood as a meaningful case of student-centered digital transformation. Its significance lies in its potential to restore educational capabilities for students excluded from mainstream schooling. Through the Capability Approach, the study shows that VR schooling can expand access, support continuity, reduce social risk, strengthen institutional recognition, and open future educational and career pathways. These elements suggest that technology can contribute to educational equity when it is designed as a means of expanding human freedom rather than as an end in itself.

The paradigm of "learning without walls" captures the central argument of this paper. The walls that prevent students from learning are physical, social, psychological, geographic, institutional, and digital. Japan's VR schooling model shows that ICT-based education can help dismantle some of these barriers when supported by inclusive policy design and formal recognition. For Japan and for other countries seeking to achieve SDG 4, the challenge is to ensure that digital transformation expands real opportunities for learners who have been left outside conventional pathways. In this sense, VR-based education can become a tool for building more inclusive, sustainable, and capability-centered education systems.

References

- Asian Development Bank. (2003). *Toward e-development in Asia and the Pacific: A strategic approach for information and communication technology*. Asian Development Bank. <https://www.adb.org/documents/toward-e-development-asia-and-pacific-strategic-approach-information-and-communication>
- Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2), 27–40. <https://doi.org/10.3316/QRJ0902027>
- High School Graduation Support Association. (2023). *Elementary and junior high school non-attendance reaches a record 290,000: Full picture of the MEXT survey revealed*. <https://kousotsu.jp/14456/>
- The Japan Times. (2021, March 22). *Japan's GIGA School Program equips students for digital society*. The Japan Times. <https://www.japantimes.co.jp/2021/03/22/special-supplements/japans-giga-school-program-equips-students-digital-society/>
- KBS World News. (2024). *Japan, virtual school for students who refuse to attend school*. Korean Broadcasting System. <https://news.kbs.co.kr/news/pc/view/view.do?ncd=7963060>
- Ko, K. (2020, August 19). *Classroom revolution fueled by Corona: Enjoy VR virtual reality*. Seoul Economic News. <https://m.sedaily.com/amparticle/12799171>
- MEXT. (2023). *Emergency response package for school non-attendance and bullying and message from the Minister of Education, Culture, Sports, Science and Technology*. Ministry of Education, Culture, Sports, Science and Technology. https://www.mext.go.jp/a_menu/shotou/seitoshidou/1397802_00006.htm
- Ministry of Foreign Affairs of Japan. (1999). *Japan's official development assistance annual report 1999*. Ministry of Foreign Affairs of Japan. https://www.mofa.go.jp/policy/oda/summary/1999/d_g4_02.html
- Ministry of Foreign Affairs of Japan. (2022). *White paper on development cooperation 2022: Japan's international cooperation*. Ministry of Foreign Affairs of Japan. https://www.mofa.go.jp/policy/oda/white/2022/html/honbun/b2/s1_3.html
- Miyake, S. (2015). *JICA's activities in the ICT sector*. The ITU Association of Japan. https://www.ituaj.jp/wp-content/uploads/2015/01/nb27-1_web-13_do1.pdf
- OECD. (2023). *PISA 2022 results: The state of learning and equity in education (Vol. I)*. OECD Publishing. <https://doi.org/10.1787/53f23881-en>
- Park, Y. (2023, September 25). *Broadcast communication high schools increase rapidly in Japan, where students are refusing to go to school one after another: System maintenance has also begun*. Kyunghyang News. <https://www.khan.co.kr/article/202309251437001>

- Pedrelli, M. (2001). *Developing countries and the ICT revolution: Final study: Working document for the STOA Panel*. European Parliament, Directorate General for Research.
[https://www.europarl.europa.eu/RegData/etudes/etudes/join/2001/296692/DG-4-JOIN_ET\(2001\)296692_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/etudes/join/2001/296692/DG-4-JOIN_ET(2001)296692_EN.pdf)
- Sen, A. (1999). *Development as freedom*. Alfred A. Knopf.
- Shin, S. (2022, March 13). *How to use the emerging metaverse: You can also tour the Federal Assembly while sitting*. Aju Business Daily.
<https://www.ajunews.com/view/20220312222815058>
- Tatsuya, K. (2024). *Major issues in the field of education, culture, sports, science and technology: Focusing on the current situation and response to school absenteeism and bullying*. House of Councillors Standing Committee Research Office/Special Research Office.
- UNESCO. (2000). *The Dakar framework for action: Education for all: Meeting our collective commitments*. UNESCO.
<https://unesdoc.unesco.org/ark:/48223/pf0000121147>
- UNESCO Institute for Statistics. (2009). *Guide to measuring information and communication technologies (ICT) in education*. UNESCO.
https://uis.unesco.org/sites/default/files/documents/guide-to-measuring-information-and-communication-technologies-ict-in-education-en_0.pdf
- United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. United Nations. <https://sdgs.un.org/2030agenda>
- World Bank Group. (2003). *ICT and MDGs: A World Bank Group perspective*. World Bank.
<https://documents.worldbank.org/en/publication/documents-reports/documentdetail/538451468762925037/ict-and-mdgs-a-world-bank-group-perspective>
- World Economic Forum. (2024). *Accelerating digital inclusion for 1 billion people by 2025*. World Economic Forum. <https://www.weforum.org/impact/digital-inclusion>
- Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). SAGE Publications.

Reviewing Access in Internationalized Higher Education: A Scalar Investigation of the Chinese and Turkish Higher Education System

Victor Tan Chee Shien, University of Stirling, United Kingdom

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

The paper presents the key findings of the quantitative research into international student's perspective of education in China and Türkiye. Adopting a scalar investigation, the research deconstructs education into three levels: students, institutions, and higher education, to explore the dynamics and interactions of four key domains: environment, economics, academics, and interaction. Utilizing a quantitative research survey adapted from the two most employed student surveys in the world, a total of 387 surveys were collected from international students studying in higher education in China and Türkiye. The research reveals how students are active participants in educational choice within the country-respective unique field of internationalization. Key finding notes consistent ratings for *Content Satisfaction* and *Developmental Expectations* with different elements of push and pull profiles for China and Türkiye respectively. Other significant findings include different in scoring distribution due to home region of international students, how help provided for language was noted for high correlation with *Content Satisfaction* and *Developmental Expectations*, and the effects of *Likelihood of Unforeseen Cost* on orientation of staying in the hosting country post education. Research findings reveal the interaction dynamics of how domains trade-off between each other in education choice abroad.

Keywords: internationalization, higher education, education mobility, China, Türkiye

iafor

The International Academic Forum
www.iafor.org

Introduction

Education is very much a social process within the context of a society. It serves as a foundation upon which different capitals are built (social, economic, human etc). What presents with the value of these capitals are that demands follow. From an anthropologic perspective, institutions are regionally driven in the sense of knowledge production and applied principles, due to the functional nature of education as a tool to understand and solve problems (Altbach and Knight 2007; Goldstein 1984; Roeder 2001). Research on internationalization however, notes how reality seems to continuously stray away from the initial understanding and purpose of education (Kemp, 2016; Knight 2015; Yemini & Sagie 2015). Criticism of the current stage of international education revolves around the understanding of degree mills, visa factories, branding, quality assurance and brain-drain, to name a few (Knight, 2013). A trend observed with internationalized education is that it couples economic and social policies in the possibility of employment and settlement, which also corresponds to the demands for these capitals. These capitals are resources that many different entities often seek, thus the development of policies to attract international students to stay in the hosting countries (Ballantine et al. 2017; Blessinger & Bliss, 2016). Internationalization of education has elevated from a regional concern to an international endeavour steeped in complex relations of market orientation and economic and social policies.

Two different tiers of human movements can be observed in this context: individual (agent) and national level. At the individual level, the opportunity for an improved livelihood that comes with educational advancement is often a factor in choosing the location for education endeavours (Marginson, 2019). Individuals often select host countries with more mature industries for higher education. The purpose of education in this context, serves as a means to improve socioeconomic status, both in terms of educational levels and environment (hosting country) (Ballantine et al., 2017). Education choice thus becomes an increasingly complex decision involving complex domains of consideration for an individual. The second tier of human movement at the national level has often been associated negatively with the notion of “brain drain” (Leask, 2015). The concept of brain drain was used in the 1960s to denote the permanent knowledge and welfare loss suffered by sending countries due to the movement of British scientists to the US. Around the same time, Schultz and Becker also drew an association between the role of education to human capital formation in economic development (Cañibano & Woolley, 2012). At both economic and social policies levels, countries are both attracting international students as different forms of capitals.

Evidence of the evolution of higher education could be observed from China and Türkiye where their success heralds another significant change for internationalization where South-South and even North-South movements are being observed. De Wit (2014) drew upon the work of Altbach and noted how international education used to primarily focus on south-north and north-north movements as broad concepts but current trends see the rise of new economies of southern countries in China, India and Brazil. Altbach and De Wit constantly highlighted the shifting dynamics and the need to consider them and their implication in the larger context of global education where changing student demographic challenges not only the understanding of spaces and scholarships but also the outcomes which are linked in an intricate fashion. China and Türkiye demonstrated significantly different engagement to the larger structural elements of the global system despite how significantly different they both are historically and infrastructurally. While exist some level of criticism of their education systems, their success at drawing international students demonstrates that they system is working. Despite their

achievements, little literature readily acknowledges or celebrates their status as the respective first and second largest hosting destination for international students in the global south.

Research Methodology

The research adopts a quantitative approach from a field theory paradigm. In their understanding of stability and changes, Fligstein and Mcadam (2015) notes how stability does not refer to a static structure in that any changes are not possible but are rather, managed in an iterative dance of strategies and tactics responses to actors, that which maintains stability (pg. 84). Their proposition suggests that there is some form of equilibrium in mechanics in stability, and that change is triggered in the event that these mechanics did not or could not predict or manage the impending crisis. While prior research has established that rather than any individual distinct constructs exerting force singularly, there display an interactional trait of decision-making regarding education pursues (Kirachi & Canan, 2021; Plourde et al., 2013), many such as Edgerton and Roberts (2014) and Nash (2002) noted the importance of disentangling different domains for better investigation of phenomenon. Hilgers (2009) and Akram (2012) noted that interactions are important mechanics to investigate as they capture the ever-growing and changing variety of principles of both structural and agency elements. While a vast range of literature concurs on the key domains of environment, economics, and academics affecting education decision (de Haas, 2021; Edgerton & Roberts, 2014; Kirachi & Canan, 2021; Kruuse, 2022; Mok, 2018; Plourde et al., 2013; Shchegolev et al., 2016), a fourth domain of Interaction was made distinct to capture additional elements of broader interaction that are products of the initial three domains.

Research Question

Global development sees the shifts in the traditional understanding of the South-North movement to trends of South-South or even North-South movements, challenging the otherwise dominance by the North. The emergence of such highlights the realities and pragmatics that current society functions in, that both students and institutions are engaged in an ebb and flow of power exchange, that which is not adequately understood. Adopting a field theory approach, the research seeks to investigate the interaction of established domains consideration in education choice and the profile of development of international education in China and Türkiye from the international student perspective. Two research questions present in: (1) What interaction dynamics can be observed between domains of consideration to education access abroad? and (2) How can the dynamics inform the process of internationalization?

Research Design

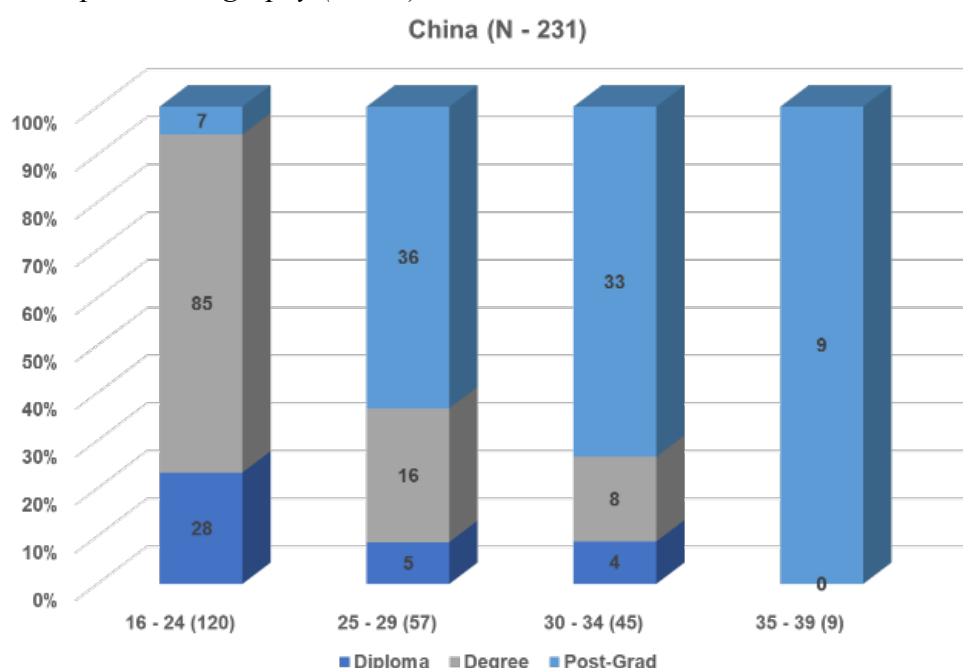
The research design adapts from the most widely employed student surveys in the world in the National Survey of Student Engagement (NSSE) from the United States and the National Student Survey (NSS) from the United Kingdom. To compliment the consideration of access properties, an additional toolkit of the Toolkit for Access and Participation Evaluation (TAPE) by Horton (2023) was employed in question phrasing and domain consideration. The questionnaire consists of 15 questions of which three are short answer questions (8, 9, and 15) for respondent responses. Scaling scores of 1 being the least and 10 being the most will be used for students to rate each question for either knowledge or importance. A Likert of 1–10 scale was employed as the broader spread of results that can be generated for more substantive analysis.

Participants

Recruitment of student participants were done via participating universities in China and Türkiye.¹ A total of two universities were recruited from China and four were recruited from Türkiye. Both universities from China rank within the top 50 in China and the top 500 globally and host over twenty thousand students with over two thousand international students on-site and are noted to be Comprehensive (综合类) type universities. Of the four participating universities from Türkiye, three universities were noted as public universities and one was noted as a foundation university. All four universities rank within the top 30 in Türkiye and between the top 1000–1500 globally and host over twenty thousand students with over one thousand international students.

A total of 231 questionnaires were collected for international students studying in China. Gender distribution was noted at 105 females, 122 males, 3 not disclosed, and 1 others. Distribution by age groups sees 120 for students aged 16–24, 57 for 25–29, 45 for 30–34, and 5 for 35–39. Program distribution sees 37 students in Diploma programs, 109 in Degree programs, and 85 in Postgraduate programs. Cohort distribution based on home region noted: Africa 24, Central and East Asia 53, Europe 15, Middle East 9, North Americas 2, and Southeast Asia 127.

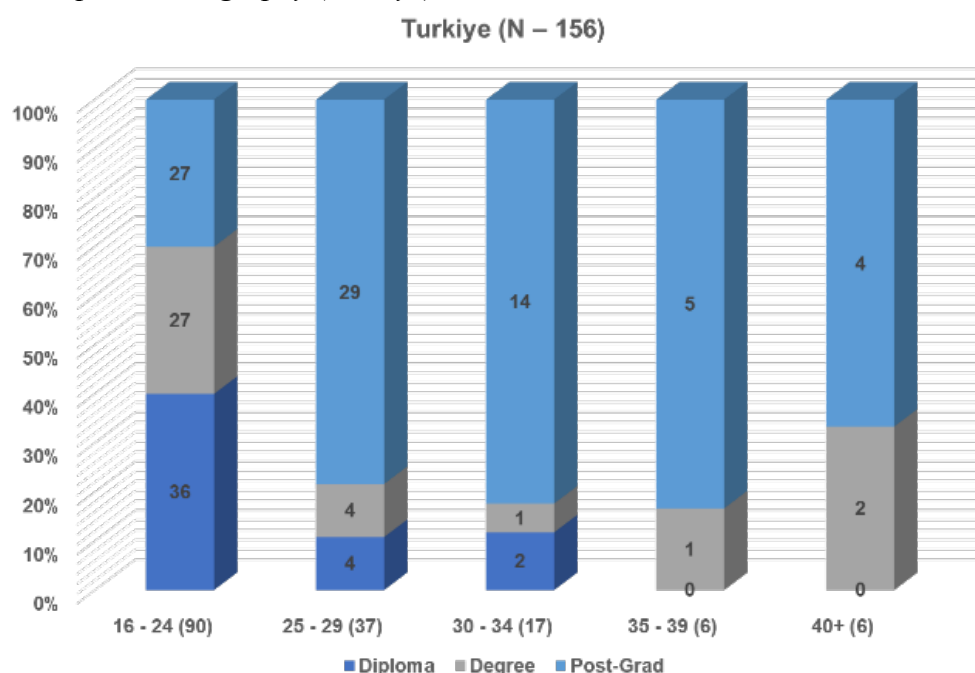
Figure 1
Participant Demography (China)



A total of 156 questionnaires were collected for international students studying in Türkiye. Gender distribution was noted at 80 females and 76 males. Distribution by age groups sees 90 for students aged 16–24, 37 for 25–29, 17 for 30–34, 6 for 35–39, and 6 for 40+. Program distribution sees 42 students in Diploma programs, 35 in Degree programs, and 79 in Postgraduate programs. Cohort distribution based on home region noted: Africa 20, Central and East Asia 41, Europe 21, Middle East 45, South Americas 2, and Southeast Asia 27.

¹ While some universities gave consent to be named, others did not. All universities were not named to retain consistency

Figure 2
Participant Demography (Türkiye)

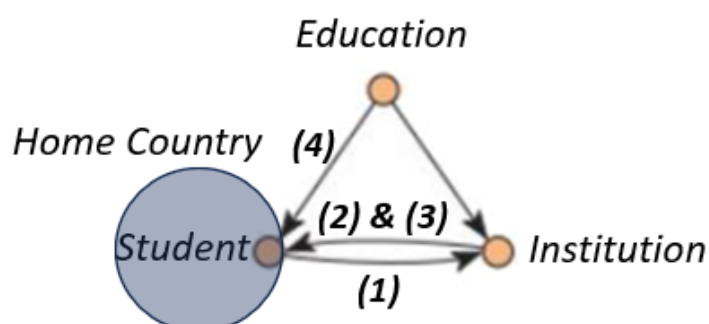


Analysis

The research seeks to create an agential scaler field that is representative of international students to facilitate investigation into the development of internationalized higher education. The mean score of each investigated parameter was aligned to constructs of *Environment*, *Economic*, *Interaction*, and *Academic* identified earlier in the chapter for the scale construction.

Another aspect used for scale construct was the actors and interaction dynamics observed in the mechanics of interaction:

Figure 3
Relationship Triad



Four relationship dynamics were observed in (1) *Student-Institution (Host)*, (2) *Institution (Host)–Student*, (3) *Institution (Host)–Student (Home)*, and (4) *Education (Host)–Student (Home)*. An interaction anomaly that is observed specifically in the context of international education would be that the trait of a home country overlaps that of a student. While this type of interaction would traditionally be separated to address a separate actor, the anomaly presents in that the separate actor would not exist without the *Student-Agent* as the extension of the

home country. Interactions of *Education (Host)–Institution (Host)* would also not be observable to students because any interaction would be observed as a type (4) relation as the interactions are directly applied to all students from their respective countries. Particularly in the context of state-controlled education enterprises where studentship is controlled at national level. International students are unable to operate outside of the context of nation-to-nation interactions but are rather subjected to decisions made at a higher scaler level.

Findings

The following findings noted presents as subset of a broader dataset collected and analysed for the research. Each domain that questions asked in the survey were attributed to a domain with an additional consideration of the interaction type that the question context presents. While each domain was initially already attributed with primary and secondary factors, they were reflectively adjusted upon consultation with respective universities (two base universities from China and four from Türkiye). Key findings highlighted in this paper includes the scaled model constructed from the secondary factors weighted against the means of means of primary contributing factors. The following illustrates the scaled model of international education from the international student's perspective and key findings of *Language* and *Cost due to Unforeseen Circumstances*.

China

The analysis conducted noted the specific difference for *China* in terms of relationship types and contributing factors. *Knowledge of Nations* was found to be largely attributed to the acceptance of institutions in the home country, thus changing the relationship type to (3). The timeframe was also noted to be decided by education policy determined by China thus the relationship type was adjusted to (4). Other changes and realigned factors for scaling due to relation found include *Acceptance of Certificate at Home* duplicated in *Institution*; *Future in Home Country* duplicated in *Pathway* and *Knowledge of Institution*; *Choice due to Economic Development* duplicated in *Likelihood of Unforeseen Cost*; *Choice due to Professional Identity Development* in *Knowledge of Institution*.

Table 1

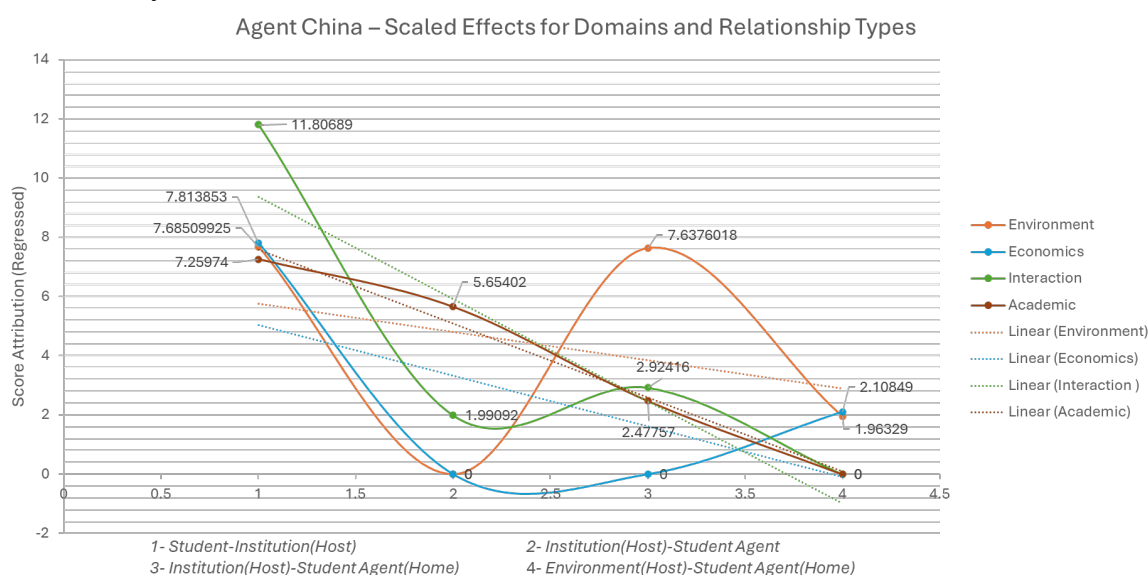
Adjusted Primary and Secondary Factors Regressed for Effects (China)

Environment					
R-Type	Primary contributing factor		R-Type	Secondary contributing variables	
*3	*Nation	7.277056	4 1 *4 *4	Choice_Econ Choice_Lif *Pre_Time *Pre_Imm	7.588745 7.722944 7.30303 7.510823
1	Choice_Unf~t	7.294372	3 1 *4	Home_Fut Host_Fut *Choice_Econ	7.424242 7.311688 7.588745
Economic					
1	Choice_Cost	7.813853	4 4 4	Edu_Cost Acc_cost Living cost	7.69697 7.796537 7.645022

Interaction					
1	Pathway	7.835498	3	Dev_Exp	7.588745
			*3	*Home_Ac	7.714286
			*3	*Home_Fut	7.424242
1	Con_satis	7.077922	1	Cope_skill	7.354978
			1	Cope_Lan	7.437229
			2	Help_skill	7.151515
			2	Help_Lan	7.199134
Academic					
1	Institution	7.25974	2	Pre_Cont	7.030303
			2	Pre_Ass	7.060606
			*3	*Home_Ac	7.714286
			2	Pre_Know	7.406926
			*3	*Choice_Piden	7.761905
			*3	*Home_Fut	7.424242

The following presents the scaled model for the context of China when influence of factors were weighted for.

Figure 4
Scaled Model for China



At the agential scale, one type of dynamics was observed for significant dynamics in *student-institution* interaction type. This was particularly noted for in the *Interaction* domain where contributing factors included different influence from *Language demands*, *skill demands*, economic, motivations, and future orientation. Another dynamic noted for some effect was noted in the *Environment* domain where influence was observed from factor of *Acceptance of Certification at Home*. The *Acceptance of Certification at Home* was similarly observed to exert influence on the *Academics* domain though with less significance. The dynamics reflects the effective of political relation and affiliation noted for in how different degrees of exerted influence. The profile suggest that the *Interaction* domain needs to be addressed to increase stability of international education in China.

Other Notable Findings

When initial findings were tabulated for *Programs*, and it was found that there were generally high scoring for *Content Satisfaction* and Developmental Expectations for international students studying in China. However, when the scoring was adjusted for *Home Region*, asymmetry in scoring was observed for the regions of *Middle East* and *Europe* (Southeast Asia included for comparison).

Table 2
Content Satisfaction and Developmental Expectations

<i>Adjusted Scoring for Program</i>				<i>Adjusted Scoring for Home Region</i>			
-> Country = China, Program = Degree				-> Country = China, Region = Middle East			
Variable	Obs	Mean	Std. dev.	Variable	Obs	Mean	Std. dev.
Pathway	109	7.59633	2.095495	Pathway	9	6.666667	3.391165
Con_satis	109	6.844037	1.958714	Con_satis	9	7.222222	2.166667
Dev_Exp	109	7.376147	1.989738	Dev_Exp	9	7.222222	2.333333
-> Country = China, Program = Diploma				-> Country = China, Region = Europe			
Variable	Obs	Mean	Std. dev.	Variable	Obs	Mean	Std. dev.
Pathway	37	7.567568	2.619802	Pathway	15	6.933333	2.051712
Con_satis	37	6.972973	2.315245	Con_satis	15	5.933333	2.153624
Dev_Exp	37	7.027027	2.217186	Dev_Exp	15	6.466667	1.355764
-> Country = China, Program = Postgraduate				-> Country = China, Region = Southeast Asia			
Variable	Obs	Mean	Std. dev.	Variable	Obs	Mean	Std. dev.
Pathway	85	8.258824	1.884479	Pathway	127	7.858268	2.030421
Con_satis	85	7.423529	2.117818	Con_satis	127	6.92126	2.064847
Dev_Exp	85	8.105882	1.927394	Dev_Exp	127	7.771654	1.936242

When *Content Satisfaction* was regressed with coping with skills and language demands and the help provided, it was observed that being able to cope with the skills demands was a significant indicator for China. *Coping with Skills Demands* and *Help Provided for Skills* were noted for consistency across all program levels. Language demands and help provided were found to varied widely.

Table 3*Regressing Scores for Skills and Language Coping and Help Provided*

-> Country = China, Program = Degree

Source	SS	df	MS	Number of obs	=	109
Model	215.646669	4	53.9116673	F(4, 104)	=	28.22
Residual	198.701955	104	1.91059572	Prob > F	=	0.0000
				R-squared	=	0.5204
				Adj R-squared	=	0.5020
Total	414.348624	108	3.83656133	Root MSE	=	1.3822

Con_satis	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
Cope_skill	.4810206	.1224475	3.93	0.000	.2382027	.7238385
Cope_Lan	.1930476	.0759935	2.54	0.013	.0423496	.3437456
Help_skill	.2209934	.1024329	2.16	0.033	.017865	.4241217
Help_Lan	.0254463	.0868156	0.29	0.770	-.1467124	.197605
_cons	.2544611	.6491357	0.39	0.696	-1.032799	1.541721

-> Country = China, Program = Diploma

Source	SS	df	MS	Number of obs	=	37
Model	144.604312	4	36.151078	F(4, 32)	=	23.92
Residual	48.3686612	32	1.51152066	Prob > F	=	0.0000
				R-squared	=	0.7494
				Adj R-squared	=	0.7180
Total	192.972973	36	5.36036036	Root MSE	=	1.2294

Con_satis	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
Cope_skill	.4168302	.1462983	2.85	0.008	.1188302	.7148301
Cope_Lan	.2319301	.1504725	1.54	0.133	-.0745724	.5384326
Help_skill	.0637422	.1320972	0.48	0.633	-.205331	.3328154
Help_Lan	.3049536	.1392461	2.19	0.036	.0213185	.5885887
_cons	-.0891063	.7696243	-0.12	0.909	-1.65678	1.478567

-> Country = China, Program = Postgraduate

Source	SS	df	MS	Number of obs	=	85
Model	166.882898	4	41.7207245	F(4, 80)	=	15.90
Residual	209.870043	80	2.62337554	Prob > F	=	0.0000
				R-squared	=	0.4430
				Adj R-squared	=	0.4151
Total	376.752941	84	4.48515406	Root MSE	=	1.6197

Con_satis	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
Cope_skill	.248208	.1088601	2.28	0.025	.0315695	.4648465
Cope_Lan	.357645	.0956862	3.74	0.000	.1672234	.5480667
Help_skill	.3218066	.1175992	2.74	0.008	.0877766	.5558365
Help_Lan	.0407911	.1302795	0.31	0.755	-.2184733	.3000555
_cons	.085995	1.005407	0.09	0.932	-1.91483	2.08682

When *Motivation* was accounted for, specific effects were observed for *Employment Abroad* and *Personal Development*.

It was found that at some significance ($R\text{-square} = 0.2867$) for *Employment Abroad* that *Choice due to Economic Development* displayed a negative correlation at -0.401 while *Life Course* and *Cost of Education* were found to display correlation at 0.474 and 0.444 respectively. This suggests that the economic development in China had little to inverse effect for students choosing to study in China but rather the life stage progress and general cost of education.

For *Personal Development*, moderate significance was found ($R\text{-square} = 0.4640$) for *Choice due to Economic Development* at 0.217 , *Life Course* at 0.332 , *Cost of Education* at 0.246 , and *Likelihood of Unforeseen Cost* at -0.208 . This indicates that when personal development serves as the main motivation to choose China, factors of economic development, life stage progression, and cost of education all play significant role. The negative correlation of the likelihood of unforeseen cost serves as an affirmation of the predictability of the cost involved.

Table 4
Motivation and Choice

-> Country = China, Motivation = Employment abroad

Source	SS	df	MS	Number of obs	=	59
Model	69.1482859	5	13.8296572	F(5, 53)	=	4.26
Residual	172.038155	53	3.24600292	Prob > F	=	0.0025
				R-squared	=	0.2867
				Adj R-squared	=	0.2194
Total	241.186441	58	4.15838691	Root MSE	=	1.8017

Pathway	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
Choice_Econ	-.4014188	.1963473	-2.04	0.046	-.7952417	-.007596
Choice_Piden	.2193312	.1851751	1.18	0.242	-.1520831	.5907455
Choice_Lif	.4739322	.1861933	2.55	0.014	.1004758	.8473886
Choice_Cost	.4443356	.1727438	2.57	0.013	.0978554	.7908158
Choice_Unf_cost	-.0554925	.1946113	-0.29	0.777	-.4458334	.3348483
_cons	2.301431	1.433246	1.61	0.114	-.5732968	5.176159

-> Country = China, Motivation = Personal Development

Source	SS	df	MS	Number of obs	=	87
Model	180.65663	5	36.1313259	F(5, 81)	=	14.02
Residual	208.676704	81	2.5762556	Prob > F	=	0.0000
				R-squared	=	0.4640
				Adj R-squared	=	0.4309
Total	389.333333	86	4.52713178	Root MSE	=	1.6051

Pathway	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
Choice_Econ	.2173982	.1115532	1.95	0.055	-.0045577	.439354
Choice_Piden	.1146967	.1335008	0.86	0.393	-.150928	.3803215
Choice_Lif	.3320183	.1339367	2.48	0.015	.0655263	.5985102
Choice_Cost	.2463438	.132453	1.86	0.067	-.0171961	.5098836
Choice_Unf_cost	-.2084831	.1112637	-1.87	0.065	-.429863	.0128967
_cons	2.474257	.7671364	3.23	0.002	.9478965	4.000618

Türkiye

The analysis conducted noted the specific difference for Türkiye in terms of relationship types and contributing factors. Both *Futures in Home and Host Nation* were noted to contribute to *Knowledge of Nation* thus relationship type was adjusted to (4). *Coping with Language* was adjusted to (4) due to a requirement of language for all international students studying in Türkiye. *Knowledge of Institution* was adjusted to (4) as acceptance and recognition of certification is determined by regional agreements. *Likelihood of Unforeseen Cost* was noted to contribute more significantly as an economic decision as indicative from the analysis. *Acceptance of Certificate at Home* was noted to contribute only to the institution and thus relationship type was adjusted to (1). Other changes and repositioned factors for scaling due to relation found include *Futures in Home Country* duplicated in *Knowledge of Institution*; *Developmental Expectation* duplicated in *Knowledge of Nations*; *Choice due to Economic Development* duplicated in *Likelihood of Unforeseen Cost*; *Prior Knowledge of Content* in *Knowledge of Nations*; *Futures in Host Country* in *Pathway*.

Table 5

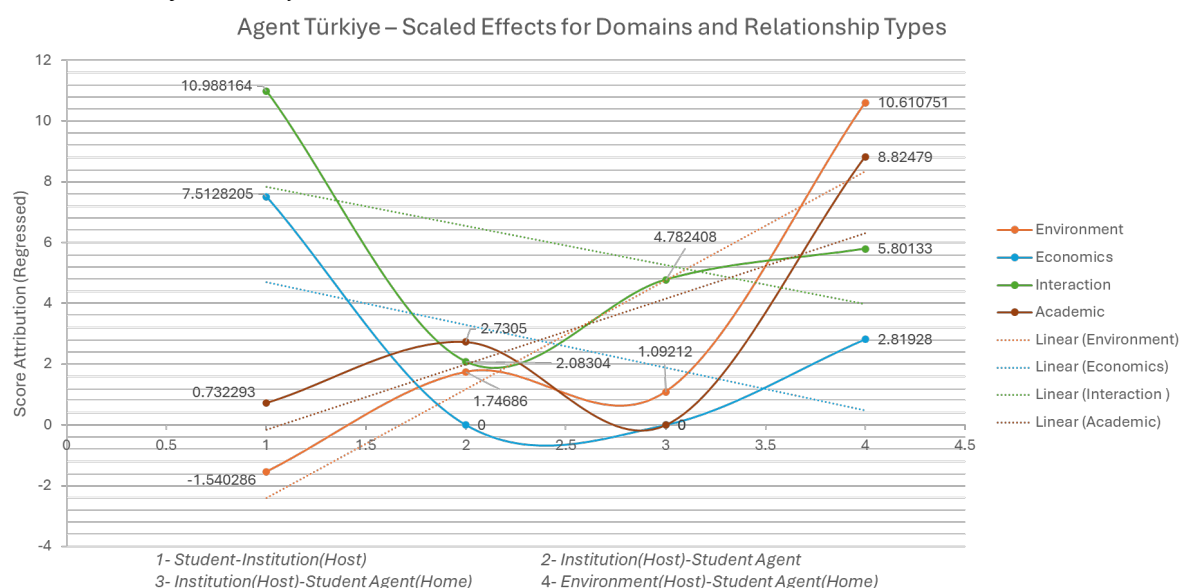
Adjusted Primary and Secondary Factors Regressed for Effects (Türkiye)

Environment					
R-Type	Primary contributing factor		R-Type	Secondary contributing variables	
*4	*Nation	7.032051	4	Choice_Econ	7.294872
			4	Choice_Piden	7.339744
			1	Choice_Lif	6.826923
			2	Pre_Time	7.621795
			4	Pre_Imm	7.416667
			*4	*Host_Fut	7.185897
			*3	*Dev_Exp	7.49359
			*2	*Pre_Cont	7.198718
Economic					
1	Choice_Cost	7.705128	4	Edu_Cost	7.429487
			4	Acc_cost	7.089744
			4	Living_cost	7.275641
*1	*Choice_Unf~t	7.442308	4	*Home_Fut	7.346154
			4	*Choice_Econ	7.294872
Interaction					
1	Pathway	8.288462	3	Dev_Exp	7.49359
			*4	*Host_Fut	7.185897
1	Con_satis	7.160256	1	Cope_skill	7.314103
			*4	*Cope_Lan	7.570513
			2	Help_skill	6.384615
			2	Help_Lan	6.852564
Academic					
*3	*Institution	6.621795	2	Pre_Ass	7.019231
			*1	*Home_Ac	7.583333
			2	Pre_Know	7.717949
			*4	*Home_Fut	7.346154

The following presents the scaled model for the context of Türkiye when influence of factors were weighted for.

Figure 5

Scaled Model for Türkiye



At the agential scale, two types of dynamics were noted for spikes in *student-institution* and *Environment-student*. In the *Interaction* domain, influence was observed from the *Language help/demand*, *Skill help/demand*, as well as the influence from the *Future Orientation*. The influence on the *Economics* domain was noted to be due to influence from *Cost of Education*. In the *Environment* domain, the main influence was observed from the Nation being the main influence on choice of education abroad and *Future Orientation* while the *Academic* domain draws from *Acceptance of Certification at Home* and *Future Orientation*. The profile suggests that international education may be an unstable enterprise that would need much calibration for stability.

Other Notable Findings

When initial findings were tabulated for *Programs*, and it was found that there were generally high scoring for *Content Satisfaction* and Developmental Expectations for international students studying in Türkiye. However, when the scoring was adjusted for *Home Region*, asymmetry in scoring was observed for the regions of *Middle East* and *Europe* (Southeast Asia included for comparison). The effects found were directly inverse of China.

Table 6
Content Satisfaction and Developmental Expectations

<i>Adjusted Scoring for Program</i>				<i>Adjusted Scoring for Home Region</i>			
-> Country = Turkiye, Program = Degree				-> Country = Turkiye, Region = Middle East			
Variable	Obs	Mean	Std. dev.	Variable	Obs	Mean	Std. dev.
Pathway	35	8.114286	2.458735	Pathway	45	8.2	2.684975
Con_satis	35	7.371429	2.450519	Con_satis	45	6.888889	2.451551
Dev_Exp	35	7.628571	2.544726	Dev_Exp	45	7	2.099784
-> Country = Turkiye, Program = Diploma				-> Country = Turkiye, Region = Europe			
Variable	Obs	Mean	Std. dev.	Variable	Obs	Mean	Std. dev.
Pathway	42	7.666667	2.405955	Pathway	21	8.285714	1.764734
Con_satis	42	6.761905	2.818143	Con_satis	21	7.285714	2.472708
Dev_Exp	42	7.047619	2.537066	Dev_Exp	21	7.761905	2.624972
-> Country = Turkiye, Program = Postgraduate				-> Country = Turkiye, Region = Southeast Asia			
Variable	Obs	Mean	Std. dev.	Variable	Obs	Mean	Std. dev.
Pathway	79	8.696203	1.254269	Pathway	27	8.111111	1.671787
Con_satis	79	7.278481	1.701709	Con_satis	27	7	1.88108
Dev_Exp	79	7.670886	1.465164	Dev_Exp	27	7.740741	2.363059

When *Content Satisfaction* was regressed with coping with skills and language demands and the help provided, it was observed that being able to cope with the language demand was correlated with moderate significance for Diploma and Postgraduate programs. Help with language proved to be very highly correlated at the Degree program level at high significance.

Table 7
Regressing Scores for Skills and Language Coping and Help Provided

-> Country = Turkiye, Program = Degree						
Source	SS	df	MS	Number of obs	=	35
Model	164.443335	4	41.1108336	F(4, 30)	=	31.04
Residual	39.728094	30	1.3242698	Prob > F	=	0.0000
Total	204.171429	34	6.00504202	R-squared	=	0.8054
				Adj R-squared	=	0.7795
				Root MSE	=	1.1508

Con_satis	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
Cope_skill	.7701743	.1996436	3.86	0.001	.3624477	1.177901
Cope_Lan	.1480134	.1623981	0.91	0.369	-.1836478	.4796746
Help_skill	-.6393914	.2670772	-2.39	0.023	-1.184836	-.0939469
Help_Lan	.8149333	.2516615	3.24	0.003	.300972	1.328895
_cons	-1.03886	.8130574	-1.28	0.211	-2.699345	.6216243

-> Country = Turkiye, Program = Diploma

Source	SS	df	MS	Number of obs	=	42
Model	182.04384	4	45.5109599	F(4, 37)	=	11.73
Residual	143.575208	37	3.88041103	Prob > F	=	0.0000
				R-squared	=	0.5591
				Adj R-squared	=	0.5114
Total	325.619048	41	7.94192799	Root MSE	=	1.9699

Con_satis	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
Cope_skill	.4902397	.15439	3.18	0.003	.1774158	.8030636
Cope_Lan	.2869264	.1412861	2.03	0.050	.0006535	.5731993
Help_skill	.2507207	.1763191	1.42	0.163	-.1065357	.6079771
Help_Lan	.165482	.2161986	0.77	0.449	-.2725779	.6035419
_cons	-1.222194	1.387959	-0.88	0.384	-4.034466	1.590078

-> Country = Turkiye, Program = Postgraduate

Source	SS	df	MS	Number of obs	=	79
Model	83.4947588	4	20.8736897	F(4, 74)	=	10.85
Residual	142.378659	74	1.92403593	Prob > F	=	0.0000
				R-squared	=	0.3697
				Adj R-squared	=	0.3356
Total	225.873418	78	2.89581305	Root MSE	=	1.3871

Con_satis	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
Cope_skill	.0147471	.1313088	0.11	0.911	-.2468914	.2763856
Cope_Lan	.3659165	.1115547	3.28	0.002	.1436389	.5881941
Help_skill	.3328714	.1116089	2.98	0.004	.1104857	.555257
Help_Lan	-.0484068	.0982803	-0.49	0.624	-.2442345	.147421
_cons	2.442739	.7962997	3.07	0.003	.8560768	4.0294

When *Motivation* was accounted for, specific effects were observed for *Personal Development* and *Professional Development*.

It was found that at high significance ($R\text{-square} = 0.6274$) for *Personal Development* that only *Choice due to Life Course* was found to display a correlation at 0.255. Notably, the correlation of *Likelihood of Unforeseen Cost* serves as concern that was not observed from China.

It was found that at moderate significance ($R\text{-square} = 0.4044$) for *Professional Development* that *Choice due to Economic Development* and *Choice due to Life Course* were noted for positive correlation at 0.342 and 0.238 respectively.

Table 8
Motivation and Choice

-> Country = Turkiye, Motivation = Personal Development

Source	SS	df	MS	Number of obs	=	47
Model	119.127084	5	23.8254169	F(5, 41)	=	13.81
Residual	70.7452559	41	1.72549405	Prob > F	=	0.0000
				R-squared	=	0.6274
				Adj R-squared	=	0.5820
Total	189.87234	46	4.12765957	Root MSE	=	1.3136

Pathway	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
Choice_Econ	-.1319395	.1342991	-0.98	0.332	-.4031621	.1392832
Choice_Piden	-.0095959	.1433079	-0.07	0.947	-.2990121	.2798203
Choice_Lif	.2549725	.1172656	2.17	0.036	.0181498	.4917951
Choice_Cost	.1145093	.1223872	0.94	0.355	-.1326568	.3616753
Choice_Unf_cost	.4966583	.1155187	4.30	0.000	.2633635	.729953
_cons	3.005518	.6431114	4.67	0.000	1.706729	4.304308

-> Country = Turkiye, Motivation = Professional Development

Source	SS	df	MS	Number of obs	=	62
Model	114.926477	5	22.9852955	F(5, 56)	=	7.60
Residual	169.267071	56	3.02262627	Prob > F	=	0.0000
				R-squared	=	0.4044
				Adj R-squared	=	0.3512
Total	284.193548	61	4.65891063	Root MSE	=	1.7386

Pathway	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
Choice_Econ	.3418441	.1511005	2.26	0.028	.0391534	.6445347
Choice_Piden	.1424144	.1750354	0.81	0.419	-.2082238	.4930525
Choice_Lif	.2375241	.1160225	2.05	0.045	.005103	.4699451
Choice_Cost	-.0719225	.2533293	-0.28	0.778	-.579402	.4355571
Choice_Unf_cost	-.2402978	.2707433	-0.89	0.379	-.7826619	.3020663
_cons	5.337592	1.135704	4.70	0.000	3.062503	7.612681

The context of *Likelihood of Unforeseen Cost* was further investigated for Türkiye as it displayed a different dynamic from China. It was found at high significance ($R\text{-square} = 0.8678$) for students from Europe that when the *Institution* highly correlated (1.583) to the education choice, the future orientation of students were observed to display negative correlation at -0.582 . It was observed for the region of *Middle East* with moderate significance ($R\text{-square} = 0.5785$) that the *Likelihood of Unforeseen Cost* correlated with *Choice due to Economic Development* (0.331) and *Future in Host Country* (0.376). similar effects were observed for China for international students from *Central and East Asia* at moderate significant ($R\text{-square} = 0.5197$) at 0.251 and 0.441 respectively.

Table 9
Effects of Likelihood of Unforeseen Cost

-> Region = Europe, Country = Turkiye

Source	SS	df	MS	Number of obs	=	21
Model	157.200443	4	39.3001108	F(4, 16)	=	26.26
Residual	23.9424141	16	1.49640088	Prob > F	=	0.0000
				R-squared	=	0.8678
				Adj R-squared	=	0.8348
Total	181.142857	20	9.05714286	Root MSE	=	1.2233

Choice_Unf~t	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
Institution	1.582754	.3862956	4.10	0.001	.7638443	2.401664
Nation	-.3931366	.1937285	-2.03	0.059	-.8038226	.0175494
Host_Fut	-.5822672	.2112541	-2.76	0.014	-1.030106	-.1344286
Choice_Econ	.4355414	.1108002	3.93	0.001	.2006556	.6704273
_cons	-.1715365	.864226	-0.20	0.845	-2.003614	1.660541

-> Region = Middle East, Country = Turkiye

Source	SS	df	MS	Number of obs	=	45
Model	137.255975	4	34.3139938	F(4, 40)	=	13.73
Residual	99.9884691	40	2.49971173	Prob > F	=	0.0000
				R-squared	=	0.5785
				Adj R-squared	=	0.5364
Total	237.244444	44	5.39191919	Root MSE	=	1.581

Choice_Unf~t	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
Institution	.2727333	.1659227	1.64	0.108	-.062609	.6080757
Nation	.0800911	.1800036	0.44	0.659	-.2837097	.4438918
Host_Fut	.3308935	.1100381	3.01	0.005	.1084983	.5532887
Choice_Econ	.3760816	.1035468	3.63	0.001	.1668058	.5853574
_cons	-.0223132	1.040796	-0.02	0.983	-2.12584	2.081214

Table 10
Effects of Likelihood of Unforeseen Cost (China)

-> Region = Central and East Asia, Country = China

Source	SS	df	MS	Number of obs	=	53
Model	127.410151	4	31.8525377	F(4, 48)	=	12.98
Residual	117.759661	48	2.45332626	Prob > F	=	0.0000
				R-squared	=	0.5197
				Adj R-squared	=	0.4797
Total	245.169811	52	4.71480406	Root MSE	=	1.5663

Choice_Unf~t	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
Institution	.0549831	.2373428	0.23	0.818	-.4222266	.5321929
Nation	.2328107	.2398572	0.97	0.337	-.2494545	.7150759
Host_Fut	.251485	.1209988	2.08	0.043	.0082006	.4947694
Choice_Econ	.4409262	.1268956	3.47	0.001	.1857855	.696067
_cons	-.2094333	1.108346	-0.19	0.851	-2.437913	2.019046

Discussion

The findings of the research indicated generally high scores across different key measures of pathway choices, content, and developmental expectations. The findings support how international education in both China and Türkiye is developing and maturing in its own ways. Referring to similar themes noted in the NSS results for 2025 indicates positivity measures of 78% to 88% for undergraduates (all), while undergraduates with postgraduate (all) indicated positivity measures of 74.5% to 87.5%. Scores for themes in China, adjusted to the four domains, indicates values between 72.6% and 78.1%. Scores for Türkiye indicates values between 66.2% and 82.8%. A notable point is the dependency on the Environmental domain, particularly for Türkiye, which suggests the importance of international and political assemblies in education. Relatively, factors suggest that international students studying in Türkiye demonstrate greater dependency on political and international factors in their educational decisions, as observed in how the country itself serves as the main attraction for education. This is similarly indicated in the significant effects of Environment and Academics that are exerted on students' home countries. Where the four domains are unevenly distributed for Education (Academic)–Institution (Host), the effects observed for Environment and Academics are likewise subject to agreements at the political level. It is important to note that these types of interaction dynamics cannot trade-off when accounting for actors and principles of directional force exertion in field theory, as proposed by Fligstein and McAdam (2015). When compared across regions of origin, differences become more distinct, in that international students from Europe scored education in China significantly lower compared to Türkiye, with differences of approximately ± 1.30 – 1.35 across all investigated parameters. Scores from international students from the Middle East are also found to be distinct between China and Türkiye, with differences of approximately ± 0.34 – 1.53 . Both developed and developing regions of international education should acknowledge and be aware of how international policies and assemblies exert significant influence on education, even at the agential level of students.

Two particularly aspects of difference found was with language and skill demands/help provided and the *Cost of Education*. When *Content Satisfaction* was weighted with coping with skills and language demands and the help provided, it was observed that being able to cope with the skills demands was a significant indicator for both countries. While coping with skills demands are to an extent homogenous across different programs, coping with language demands, and the providence of help provided varied widely. Contextually, it should be noted that if the medium of instructions for the program could be conducted in another language, Chinese would not be a requirement for enrolment in China. This is different for Türkiye where even when the program is conducted in another language (e.g. English), Turkish is a mandatory requirement for enrolment. The effect of help provided for language contributing to content and developmental expectations are however, noted for consistency even when Chinese is not a requirement when Turkish is. The significance of the role that language plays in the context of international education is therefore evident not only in language requirements, but in the provision of support. Operationally, providing first-language support (e.g., *Putonghua* for China and *Turkish* for Türkiye) also opens possibilities for other forms of social engagement, such as remaining in the country after education.

The second aspect found to have significant influence was the *Cost of Education*, which, as initially predicted, exhibited high predictability for *Developmental Expectations* across both countries. When analysed further, China and Türkiye were found to display very different profiles when factoring in motivations for education and future orientation. While the

Likelihood of Unforeseen Cost was noted for a negative correlation when different motivations were controlled for, positive correlations were observed for some regions when regions were controlled for respective countries. This proved to be consistent for both Türkiye and China, where correlations with future prospects in host countries were noted, with the only exception being the region of Europe. This suggests that both the relative economic development between the home and host regions, as well as the political relationship and affiliation between the home and host countries, exert significant influence on education choices abroad.

Conclusions

In summary, the research revealed findings of different domains of influence on education choices abroad. While macro factors would reveal different models of international education development for respective countries of China and Türkiye, some micro considerations displayed similar effects. At the macro level, international education China would appear to be more stable compared to Türkiye which appears to be less stable according to stability principles as proposed by Fligstein and Mcadam (2015). More research into how different factors further understand the influences of factors such as *Acceptance of Certification*, *Help provided for Language*, and *Help provided for Skills*.

Further research is needed to better understand how factors such as Acceptance of Certification, Help provided for Language, and Skills influence outcomes.

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

Grammarly was used in proofreading and refining the language used in the manuscript. The usage was limited to correcting grammatical and spelling errors and rephrasing statements for accuracy and clarity *only*. No other AI or AI-assisted technologies have been used for any part of the manuscript.

References

- Akram, S. (2012). Fully Unconscious and Prone to Habit: The Characteristics of Agency in the Structure and Agency Dialectic. *Journal for the Theory of Social Behaviour*, 43(1), 45–65. <https://doi.org/10.1111/jtsb.12002>
- Altbach, P. G., & Knight, J. (2007). The Internationalization of Higher Education: Motivations and Realities. *Journal of Studies in International Education*, 11(3–4), 290–305. <https://doi.org/10.1177/1028315307303542>
- Ballantine, J. H., Hammack, F. M., & Stuber, J. M. (2017). *The sociology of education : a systematic analysis* (p. Chapter 1, 2, 3, 9). Routledge Taylor Et Francis Group.
- Cañibano, C., & Woolley, R. (2012). Towards a Socio-Economics of the Brain Drain and Distributed Human Capital. *International Migration*, 53(1), 115–130. <https://doi.org/10.1111/imig.12020>
- de Haas, H. (2021). A theory of migration: the aspirations capabilities framework. *Comparative Migration Studies*, 9(1), 8. <https://doi.org/10.1186/s40878020002104>
- De Wit, H. (2014). The Different Faces and Phases of Internationalisation of Higher Education. In A. MaldonadoMaldonado & R. M. Bassett (Eds.), *The Forefront of International Higher Education: A Festschrift in Honor of Philip G. Altbach* (pp. 89–99). Springer Netherlands. https://doi.org/10.1007/9789400770850_6
- Edgerton, J. D., & Roberts, L. W. (2014). Cultural capital or habitus? Bourdieu and beyond in the explanation of enduring educational inequality. *School Field*, 12(2), 193–220. <https://doi.org/10.1177/1477878514530231>
- European Training Foundation. (2021). *NATIONAL QUALIFICATIONS FRAMEWORK - TURKEY*. <https://www.etf.europa.eu/sites/default/files/document/Turkey.pdf>
- Fligstein, N., & Mcadam, D. (2015). *A theory of fields*. Oxford University Press.
- Goldstein, J. (1984). Foucault among the Sociologists: The “Disciplines” and the History of the Professions. *History and Theory*, 23(2), 170. <https://doi.org/10.2307/2505005>
- Hilgers, M. (2009). Habitus, Freedom, and Reflexivity. *Theory & Psychology*, 19(6), 728–755. <https://doi.org/10.1177/0959354309345892>
- Kirachi, A., & Canan, S. (2021). Econometric Analysis of Effective Socio-Economic and Educational Variables in Migration. *Eurasian Journal of Educational Research*, 21(91). <https://doi.org/10.14689/ejer.2020.90.2>
- Knight, J. (2013). The changing landscape of higher education internationalisation – For better or worse? *Perspectives: Policy and Practice in Higher Education*, 17(3), 84–90. <https://doi.org/10.1080/13603108.2012.753957>
- Knight, J. (2015). International Universities. *Journal of Studies in International Education*, 19(2), 107–121. <https://doi.org/10.1177/1028315315572899>

- Kruise, M. B. (2022). Student mobility of Colombian residents in Rennes, France: profile of migrants and reasons for such choice (2018–2019). *Colombian Journal of Sociology*. <https://doi.org/10.15446/rcs.v45n2/92708>
- Leask, B. (2015). *Internationalizing the Curriculum*. Routledge.
- Marginson, S. (2019). Limitations of human capital theory. *Studies in Higher Education*, 44(2), 287–301. <https://doi.org/10.1080/03075079.2017.1359823>
- Nash, R. (2002). A Realist Framework for the Sociology of Education: thinking with Bourdieu. *Educational Philosophy and Theory*, 34(3), 273–288. <https://doi.org/10.1111/j.1469-5812.2002.tb00304.x>
- Plourde, Y., Parker, S. C., & Schaan, J.-L. (2013). Expatriation and its effect on headquarters' attention in the multinational enterprise. *Strategic Management Journal*, 35(6), 938–947. <https://doi.org/10.1002/smj.2125>
- Roeder, P. (2001). History of educational institutions. In *International Encyclopedia of the Social & Behavioral Sciences* (pp. 4266–4272). <https://doi.org/10.1016/B978-0-08-097086-8.92063-4>
- Shchegolev, V., Lasseben, H., & Martinez, A. (2016). Employment Opportunities and Barriers on the Russian and German Labor Market for International Graduates with Domestic Degrees. *Business Perspectives and Research*, 4(2), 93–110. <https://doi.org/10.1177/2278533716644873>
- StudyinTurkiye.com. (2025, May 21). *Credit System*. Study in Turkiye. <https://studyinturkiye.com/credit-system/>

Contact email: victortcs87@gmail.com

Empowering Critical Thinking and Research Skills Through Mini Research: An Outcome-Based Education Approach in the Master of Elementary Education Program at Universitas Terbuka

Sri Dewi Nirmala, Universitas Terbuka, Indonesia

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

The ability to conduct research is a key competence that must be mastered by students, particularly in the Integration of Theory and Practice in Learning course (MPDR5102) in the Master's Program of Elementary Education at Universitas Terbuka, an open and distance learning institution. Research-based learning through mini-research assignments serves as a strategic vehicle for developing critical thinking, scientific literacy, and the integration of theory with professional practice. This study analyzes the implementation of mini research assignments within the Outcome-Based Education (OBE) framework, which emphasizes student-centered learning and measurable competency outcomes. A descriptive quantitative method was employed with 230 student respondents selected through total sampling. The instrument consisted of a 42-item Likert-scale questionnaire (validity: $r = 0.641-0.925$; reliability: $\alpha = 0.987$), supplemented by in-depth interviews with 23 purposively selected students. Results showed that overall implementation scores were in the high to very high category (mean = 3.27–3.76), with strong performance in project-based learning comprehension, research application, and guideline understanding. The highest-scoring indicator was task usefulness (mean = 3.73), reflecting students' direct perception of mini-research benefits for professional development. Topic selection and report writing recorded relatively lower scores, indicating areas requiring further support. The main challenges identified were time management, limited access to quality references, academic writing difficulties, and restricted mentoring. The study recommends strengthening guidance systems, improving digital library access, and providing academic writing and publication mentoring to support the sustainable success of OBE implementation in distance education.

Keywords: mini research, outcome-based education, critical thinking, integration of theory and practice, master's program in elementary education

iafor

The International Academic Forum
www.iafor.org

Introduction

Higher education in the 21st century faces increasingly complex challenges. Universities are now required not only to produce graduates who master theory, but also to think critically, analytically, and creatively in accordance with the needs of a rapidly changing world of work (Gómez et al., 2025; Zhao et al., 2025). Globally, the fourth Sustainable Development Goal (SDG 4) emphasizes quality education focused on learning outcomes and process effectiveness (Mahrishi et al., 2025). In Indonesia, Law Number 12 of 2012 concerning Higher Education stipulates that research activities must be integral to the learning process, enabling students to become creators of new knowledge. Universitas Terbuka, as an open and distance learning institution, plays an important role in expanding educational access to the wider community (Najjar et al., 2025).

In the Master of Primary Education Program, research competence is a primary requirement for graduates who are expected to become reflective and innovative educators. The Ministry of Education, Culture, Research, and Technology (2020) in the National Higher Education Standards emphasizes that master's program students must be able to develop and apply knowledge through research to solve real-world problems in their field. In other words, research is not merely an academic task but also a means of developing educators' professionalism. Previous studies confirm that mini-research-based assignments improve students' critical thinking and academic writing skills (Susilo, 2022; Widiantie et al., 2025), while also helping students understand the practical implementation of scientific research methods.

Distance learning presents unique challenges in realizing these goals. In the context of Universitas Terbuka, common obstacles include high assignment loads, limited direct interaction with lecturers, and variations in students' digital literacy skills. These conditions call for learning design innovations that encourage active inquiry while fostering independent learning. The Outcome-Based Education (OBE) approach provides a relevant framework by orienting the entire learning process toward measurable learning outcomes, shifting from lecturer-centered to student-centered learning (Keo et al., 2025; Li et al., 2025). In this approach, students become the primary actors responsible for their own learning, while lecturers act as facilitators who guide students toward the achievement of specific competencies (Sun & Lee, 2020).

Research evidence strongly supports the effectiveness of active learning methodologies within the OBE framework. Innovative approaches such as problem-based learning, project-based learning (PBL), and inquiry-based learning (IBL) have been shown to significantly improve academic performance and develop higher-order thinking skills, including creative thinking, critical thinking, and problem-solving (Luchang & Nasri, 2023; Sam, 2024). A systematic review of PBL indicates positive impacts on collaboration, self-regulated learning, and interdisciplinary skills at various educational levels (Almazroui, 2023; Birdman et al., 2022). The mini-research implementation strategy integrates research steps into the learning process, enabling students to address authentic problems from formulation through communication of research findings (Karogal et al., 2025).

Despite growing evidence on OBE and research-based learning, several knowledge gaps remain. Research on critical thinking development in postgraduate distance learning is still limited, with a recognized need for studies that assess the adaptability of OBE frameworks outside technical fields (Hu, 2023; Reilly & Reeves, 2023). Previous studies tend to examine

general student perceptions without analyzing specific implementation dimensions such as guideline comprehension, the topic selection process, and research report writing. Moreover, comprehensive evaluations of mini-research as a learning strategy in elementary education master's programs, particularly in distance education institutions, are still rare.

This study was designed to address these gaps by analyzing the implementation of mini research assignments in the MPDR5102 Theory and Practice of Learning Integration course at Universitas Terbuka's Master of Primary Education Program. The main objectives are to evaluate the level of mini-research implementation based on OBE principles, identify supporting and inhibiting factors in that implementation, and formulate strategic recommendations to improve the effectiveness of student research activities. The findings are expected to contribute both theoretically to the development of research-based learning models in distance education and practically to the strengthening of meaningful, sustainable learning practices at Universitas Terbuka.

Method

This study employs a quantitative descriptive approach to describe and analyze the implementation of mini-research assignments in the MPDR5102 Integration of Theory and Practice in Learning course at Universitas Terbuka's Master of Primary Education Program. This approach was selected because it is well-suited for obtaining a comprehensive picture of mini-research implementation levels based on students' perceptions, which can be measured systematically and objectively (Creswell & Creswell, 2017; Huyler & McGill, 2019). Qualitative data from in-depth interviews and open-ended questionnaire items complemented the quantitative findings by identifying obstacles and development suggestions in greater depth.

Participants

The research was conducted during the odd and even semesters of the 2024/2025 academic year. The population comprised all first-semester students enrolled in the MPDR5102 course during that period. Using total sampling, whereby all enrolled students were included as respondents, a total of 230 students completed the questionnaire. The total sampling technique was chosen to ensure that all relevant student experiences were captured, given that the entire population had direct experience with the mini-research assignment being evaluated. Additionally, 23 students were purposively selected for in-depth interviews based on the variety of experiences and obstacles they reported, to enrich and contextualize the quantitative data.

Instruments

The research instrument was a structured questionnaire of 42 statement items using a four-point Likert scale (1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree). The even-point scale was deliberately chosen to avoid central tendency bias and encourage respondents to express clear positions on each statement (Chyung et al., 2017; Hartley, 2014). The questionnaire measured four main aspects of mini-research implementation: (1) understanding of material (6 items covering module comprehension and relevance to daily professional tasks); (2) understanding of project-based tasks (14 items covering understanding of project-based learning, research application, and general and specific provisions); (3) implementation of project-based tasks or mini research (12 items covering topic selection, title determination,

research steps, and theoretical review); and (4) report writing (10 items covering writing accuracy and task usefulness).

The instrument was validated through Pearson's Product-Moment correlation analysis, with items declared valid if the correlation coefficient (r) was ≥ 0.30 (Pallant, 2020). Validity testing was conducted using initial respondent data prior to the main data collection. All 42 items met the validity criterion, with r values ranging from 0.641 to 0.925. Instrument reliability was tested using Cronbach's Alpha, yielding a coefficient of 0.987, indicating very high internal consistency ($\alpha > 0.90$) (George & Mallery, 2024; Tavakol & Dennick, 2011). These psychometric properties confirm that the instrument is both valid and highly reliable for measuring mini-research implementation. Semi-structured interview guidelines were subsequently developed based on preliminary patterns identified in the questionnaire data.

Data Analysis

Quantitative data were analyzed using descriptive statistics, mean, standard deviation, and frequency distribution with SPSS version 25 (Field, 2024; Pallant, 2020). Implementation levels were interpreted using the category criteria in Table 1, adapted from a class range formula with equal intervals for four categories.

Table 1
Likert Scale Score Range

No.	Score Range	Category
1	1.00–1.75	Low / Poor
2	1.76–2.50	Moderate / Poor
3	2.51–3.25	High / Good
4	3.26–4.00	Very High / Very Good

Note. Adapted from the class range formula with equal intervals for four categories.

Qualitative data from open-ended questionnaire responses and interview transcripts were analyzed using thematic content analysis following Braun and Clarke's (2022) six-stage process: familiarization with the data, initial coding, theme generation, theme review, theme definition and naming, and report compilation. This qualitative component served to enrich, clarify, and contextualize the quantitative findings, particularly regarding the specific obstacles students encountered and practical suggestions for improvement. Data collection procedures included submitting a research permit application to the program head, uploading the questionnaire to the course Learning Management System (LMS) via Microsoft Forms, obtaining informed consent from all participants, conducting questionnaire data collection within a specified period, and following up with in-depth interviews lasting 30 to 45 minutes with the 23 selected students. Ethical principles were upheld throughout: participation was voluntary, data were kept confidential, respondent identities were anonymized, and participation had no bearing on students' academic assessments.

Results and Discussion

Results

The implementation of mini-research in the MPDR5102 course achieved high to very high scores across all assessed aspects, with an overall average score between 3.27 and 3.76 on a four-point scale. This result confirms that students have a solid understanding of theory, the ability to apply simple research methods, and the skills to compile research reports in accordance with OBE principles. Table 2 summarizes the average scores for the four main aspects of mini-research implementation.

Table 2

Aspects and Average Scores of Mini Research Implementation

No.	Aspect Assessed	Mean	Interpretation
1	Understanding of Material	3.67	Very High
2	Understanding of Project-Based Tasks	3.68	Very High
3	Implementation of Project-Based Tasks/Mini Research	3.68	Very High
4	Report Writing	3.67	Very High

Note. Primary data from student questionnaires, 2025.

All four aspects were rated in the very high category, reflecting that students adequately understood the concepts, objectives, and research steps integrated into this course. More granular analysis of twelve indicators revealed nuanced findings. The indicator with the highest average score was Task Usefulness (mean = 3.73), covering students' perceptions of mini-research contributions to improving learning quality, broadening knowledge of learning practices, supporting research skills, and assisting in thesis topic determination. High scores on this indicator confirm that students directly perceive the practical benefits of mini-research in developing their professional competencies.

The Simple Research Steps Determination indicator ranked second (mean = 3.72), indicating that students could plan, implement, and follow research stages according to the provided guidelines. The Theory Study indicator (mean = 3.70) showed that students were able to examine theories relevant to their research topics and utilize books and scientific articles as reference sources. The Project-Based Learning Understanding indicator (mean = 3.69) confirmed that the concept of project-based learning as a pedagogical approach was well understood and considered aligned with national higher education standards. The Understanding of Research (mean = 3.68), Title Determination (mean = 3.68), Understanding of General Provisions (mean = 3.68), Usefulness of Material in Daily Tasks (mean = 3.67), Understanding of Modules (mean = 3.66), and Understanding of Specific Requirements (mean = 3.66) indicators all demonstrated solid implementation across multiple learning dimensions.

Two indicators recorded relatively lower scores compared to the others. The Topic Selection indicator obtained a mean of 3.62, indicating challenges in the process of identifying research topics appropriate to students' specific learning contexts. The Understanding and Accuracy of Report Writing indicator recorded the lowest average score at 3.60, suggesting that the process of compiling research reports remains an area requiring additional attention and targeted support. These two lower-scoring indicators align with the qualitative findings regarding

student obstacles, which are elaborated further in the discussion. The psychometric quality of the instrument is presented in Table 3.

Table 3
Validity and Reliability Test Results

Analysis	Value Range	Criteria	Description
Pearson Correlation (42 items)	0.641–0.925	≥ 0.30	All items valid
Cronbach's Alpha	0.987	≥ 0.90	Very high reliability

Note. SPSS test results, 2025.

Qualitative analysis of open-ended questionnaire responses and in-depth interviews with 23 students identified ten main categories of obstacles students encountered in conducting mini-research. These are presented in Table 4.

Table 4
Student Challenges in Mini Research Implementation

No.	Challenge Category	Brief Description	Frequency (n)
1	Time Management	Difficulty balancing work, family, and studies	130
2	Reference Access	Difficulty obtaining scientific journals and relevant literature	75
3	Paraphrasing and Plagiarism	Difficulty reducing similarity levels on Turnitin	60
4	Scientific Writing	Not yet accustomed to academic language and structure	55
5	Research Methodology	Lack of understanding of appropriate data analysis techniques	45
6	Collaboration and Discussion	Limited academic interaction with fellow students	40
7	Technical Support	Internet access and statistical application constraints	32
8	Learning Motivation	Some students lose motivation during the process	28
9	Academic Supervision	Limited direct feedback from supervisors	23
10	Psychological	Lack of confidence in conducting research	15

Discussion

The findings confirm that the OBE approach, realized through mini-research assignments, effectively facilitates the achievement of expected learning outcomes in a distance education

setting. The overall high average scores across the four main aspects indicate that the learning design and implementation guidelines have been coherently constructed to support holistic competency development. These results are consistent with Katawazai (2021), who confirms that OBE with an emphasis on student-centered learning and demonstration of real competencies increases learning effectiveness in higher education, and with Rachael (2024), who underscores that successful OBE implementation requires alignment between learning outcomes, learning strategies, and authentic assessment.

The consistent achievement across all four aspects, understanding of material (3.67), understanding of project-based tasks (3.68), project-based task implementation (3.68), and report writing (3.67), demonstrates that mini-research does not merely develop one dimension of competence but fosters conceptual understanding, procedural skills, and comprehensive application abilities simultaneously. High scores on indicators of project-based learning understanding (mean = 3.69) and research steps implementation (mean = 3.72) indicate that students not only understand the concept of project-based learning theoretically but are also able to apply it in practice by identifying real learning problems in their classrooms, designing appropriate research methodologies, collecting and analyzing data, and drawing actionable conclusions (Hursen, 2021; Zakwandi & Istiyono, 2023).

The highest-scoring indicator, Task Usefulness (mean = 3.73), is particularly noteworthy. Items in this indicator related to mini-research improving learning quality, broadening knowledge of learning practices, serving as evidence of professional teaching, and supporting research skill development all received very high scores. This confirms the direct and significant perceived benefits of mini-research in developing professional competencies. This finding is consistent with Susilo (2022), who found that mini-research projects not only improve writing and problem analysis skills but also accelerate thesis writing by accustoming students to the scientific research process. In the context of the Master of Elementary Education Program, where graduates are expected to become agents of change and research-capable professional educators, the ability to conduct classroom action research is a fundamental competency that distinguishes professional teachers (Johannesson & Olin, 2024).

High scores on items related to the application of theory in practice, specifically that project-based learning combines theory and practice in real life, that mini-research is conducted in actual classroom contexts, and that theoretical study aligns with research topics, confirm that mini-research successfully bridges the gap between theoretical knowledge and teaching practice. This is particularly important in a master's program where students are practicing educators who require competence in integrating theory with their professional context (Resch & Schrittemser, 2023). In the distance learning context, this finding has special significance because it demonstrates that, with the right learning design, distance education can facilitate meaningful and contextualized learning even without frequent face-to-face interaction (Yunus & Bachtiar, 2025).

The most prevalent obstacle was time management, experienced by 56.5% of respondents. This finding reflects the double burden carried by master's program students who are simultaneously full-time education practitioners. These students must balance professional responsibilities as educators teaching, administrative duties, and extracurricular activities with academic responsibilities including lectures, assignments, and literature reading, as well as personal and family obligations. In this situation, mini-research assignments requiring a full sequence of activities from planning through report writing demand a substantial allocation of time. Glazkova et al. (2025) identify increasing demands on students, limited remote

communication, and varying home learning conditions as inherent challenges in distance education requiring specific strategies to overcome. Students' suggestions to extend deadlines, provide clear stage-by-stage timelines from the beginning of the semester, and avoid overlap with other courses reflect the need for more mature learning planning that accounts for students' holistic workloads and provides adequate scaffolding (Hrastinski et al., 2025).

The second most significant obstacle was limited access to quality references, experienced by 32.6% of respondents. Students faced difficulties in accessing scientific journals, limited library collections, obstacles in accessing the Universitas Terbuka digital library, and unfamiliarity with reference management applications such as Mendeley. In an era where information access should be facilitated by technology, this finding highlights the persistent digital divide in the context of distance learning in Indonesia. Brew and Saunders (2020) emphasize that research-based learning requires students to review prior theories and research as a foundation for their own inquiry; limited reference access can lead to superficial literature reviews, weak theoretical frameworks, and shallow interpretations of findings, ultimately affecting the quality of both mini-research outputs and thesis work.

Academic writing challenges were reported by 23.9% of respondents, while plagiarism and paraphrasing difficulties affected 26.1%. These findings reflect the broader challenge of transitioning from knowledge consumption to original knowledge production in academic writing. Teng and Yue (2023) identified that transforming critical thinking into coherent academic writing is a significant challenge in online learning environments, particularly for students who have not engaged in formal academic writing for extended periods. Item X35, which asked whether report writing was free of obstacles, recorded the lowest average score (mean = 3.27) with the highest standard deviation (SD = 0.770), indicating both the most significant challenge and the widest variation in student experience. This variation suggests that while some students navigate academic writing with relative ease, others face substantial difficulties requiring targeted intervention.

Research methodology challenges were experienced by 19.6% of respondents, who reported difficulties in selecting appropriate theories, determining suitable research methods, and analyzing data comprehensively. These findings are consistent with studies on postgraduate distance learning that identify methodological competency development as requiring more than written guidelines; it necessitates dialogic interaction between students and supervisors (Kovalova, 2025). Although only 13% of respondents explicitly mentioned limited guidance as an obstacle, this finding carries significant implications. Students need intensive mentoring covering research methodology, scientific writing techniques, instrument validity, data analysis, and feedback on research drafts. The concept of scaffolding in Vygotsky's social constructivism, where optimal learning occurs in the Zone of Proximal Development through mediation from more experienced individuals, provides the theoretical basis for understanding why such guidance is essential. Manousou (2025) confirms that in developing critical thinking through online learning, the instructor's role as a facilitator and provider of constructive feedback is crucial for helping students develop analytical, evaluative, and synthetic abilities.

Despite these challenges, approximately 50 respondents (21.7%) reported no significant obstacles, indicating that they were well-supported by clear guidelines, provided templates, or prior research experience. This underscores the differential impact of scaffolding on student experience: adequate support mechanisms can substantially reduce anxiety and build confidence, as evidenced by findings on self-efficacy in OBE frameworks (Al Hadi et al., 2025). Students also provided constructive suggestions that extend beyond individual support

to systemic change. The most frequently suggested improvement was more intensive technical and substantive guidance from lecturers or tutors, covering research methodology, scientific writing, instrument validity, and data analysis. Students also emphasized the need for completed examples of mini-research reports, more detailed technical instructions, writing templates aligned with scientific journal standards, and tutorials on supporting applications, including Mendeley, SPSS, and plagiarism checking tools. Follow-up toward scientific publication was another notable aspiration, reflecting students' desire to contribute to knowledge dissemination through SINTA-indexed journals, a direction consistent with the concept of Scholarship of Teaching and Learning (Johannesson, 2022; Yeo et al., 2023).

This study also extends the literature on project-based learning at the postgraduate level in distance education contexts. While Owens and Hite (2022) demonstrate that project-based learning effectively develops various postgraduate competencies, most existing studies were conducted in face-to-face programs in developed countries. This study demonstrates that in the context of distance education in Indonesia, with its unique student profiles as full-time working educators, limited infrastructure access, and geographically dispersed student populations, project-based learning through mini-research can still achieve consistently positive results when supported by coherent learning design and responsive institutional support (Gu et al., 2025; Naseer et al., 2025).

From an institutional policy perspective, the findings suggest several strategic priorities. First, learning infrastructure must be strengthened, including institutional subscriptions to international journal databases and institutional accounts for applications such as Turnitin and Mendeley (Yu & Cai, 2025). Second, lecturer and tutor capacity in online research mentoring needs systematic development, including training on effective feedback strategies in virtual environments. Third, course workload policies should be reviewed to prevent simultaneous heavy assignment deadlines across different courses. Fourth, developing communities of practice among students and alumni can provide peer support, shared problem-solving, and collaborative publication opportunities, an effective strategy for sustaining a research-oriented learning culture. Ali (2024) adds that in OBE implementation, continuous formative feedback is a key element in ensuring that students achieve expected learning outcomes, reinforcing the need for structured, ongoing mentoring rather than one-time orientation activities.

The study has several limitations worth acknowledging. First, the descriptive design without a control group precludes causal conclusions about the effectiveness of mini-research relative to other learning approaches. Second, self-reported data through questionnaires and interviews may contain social desirability bias. Third, the study does not examine differences in experience based on student characteristics such as teaching experience level, prior educational background, geographical location, or gender. Fourth, the study's focus on a single course in one program limits direct generalizability to other contexts. Fifth, the long-term impact of mini-research experience on students' professional practices and thesis completion was not examined. These limitations suggest directions for future research, including longitudinal studies, comparative designs, and investigations of specific student subgroups.

Conclusion

This study confirms that the implementation of mini-research in the MPDR5102 Integration of Learning Theory and Practice course at Universitas Terbuka's Master of Primary Education Program has been successful and positively impactful. Implementation levels across all four assessed aspects, understanding of material, understanding of project-based tasks, research

implementation, and report writing, were classified as high to very high, demonstrating that the OBE-based research approach effectively bridges the gap between theory and practice in distance education. Through active participation in research, students develop critical thinking, reflective abilities, and scientific literacy, which are core OBE learning outcomes.

Despite this achievement, significant barriers remain. Time management challenges, compounded by students' dual roles as educators and learners, affect more than half of all respondents. Limited access to quality references, academic writing difficulties, and restricted mentoring access further challenge successful implementation. These barriers are not merely individual limitations but reflect systemic conditions requiring institutional intervention.

To strengthen sustainable OBE implementation through mini-research, this study recommends: (1) developing clear, stage-by-stage research timelines provided at the start of the semester to support time management and reduce workload overlap with other courses; (2) establishing systematic mentoring models including regular virtual consultations, peer-to-peer study groups, structured milestone feedback, and assessment rubrics for each research stage; (3) improving digital library infrastructure through international journal database subscriptions, enhanced LMS functionality, and information literacy training; (4) conducting academic writing workshops covering research report structure, effective paraphrasing, citation and referencing conventions, and plagiarism prevention; and (5) optimizing the use of educational technology through digital repositories of exemplary mini-research, tutorial videos, and student progress dashboards. Implementing these recommendations will strengthen students' competencies as professional, research-capable educators and contribute to the broader development of research-based learning models in distance education at the postgraduate level.

Acknowledgements

The author expresses sincere gratitude to Universitas Terbuka for the full financial support provided for all activities related to participation in the 12th Asian Conference on Education & International Development (ACEID2026) in Japan, including conference registration, travel, accommodation, and related research activities. This support has been instrumental in enabling the dissemination of this research to the international academic community.

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

The author declares that an AI-assisted writing tool was used to improve the language clarity and readability of the manuscript. Its use was limited to rephrasing and refining sentences for grammatical accuracy and clarity of expression. The author further declares that no AI or AI-assisted technologies were used to generate, fabricate, or substitute the intellectual content of this manuscript. The ideas, research design, data collection, analysis, interpretation, and discussion are the original work of the author and are derived from the systematic conduct of the research.

References

- Al Hadi, A. F. M. Q., Anggraini, F. N. A., Asmara, L., Murni, L. I. M., & Salim, M. F. (2025). Optimization Strategies for Student Scientific Publications in Islamic Higher Education Institutions to Enhance Academic Competence Based on Outcome-Based Education (OBE). *Suhuf: International Journal of Islamic Studies*, 37(1). <https://doi.org/10.23917/suhuf.v37i1.10020>
- Ali, Q. I. (2024). Towards more effective summative assessment in OBE: a new framework integrating direct measurements and technology. *Discover Education*, 3(1), 107. <https://doi.org/10.1007/s44217-024-00208-5>
- Almazroui, K. M. (2023). Project-based learning for 21st-century skills: An overview and case study of moral education in the UAE. *The Social Studies*, 114(3), 125–136. <https://doi.org/10.1080/00377996.2022.2134281>
- Birdman, J., Wiek, A., & Lang, D. J. (2022). Developing key competencies in sustainability through project-based learning in graduate sustainability programs. *International Journal of Sustainability in Higher Education*, 23(5), 1139–1157. <https://doi.org/10.1108/IJSHE-12-2020-0506>
- Braun, V., & Clarke, V. (2022). *Thematic analysis: A practical guide*. SAGE Publications.
- Brew, A., & Saunders, C. (2020). Making sense of research-based learning in teacher education. *Teaching and Teacher Education*, 87, 102935. <https://doi.org/10.1016/j.tate.2019.102935>
- Chyung, S. Y., Roberts, K., Swanson, I., & Hankinson, A. (2017). Evidence-based survey design: The use of a midpoint on the Likert scale. *Performance Improvement*, 56(10), 15–23. <https://doi.org/10.1002/pfi.21727>
- Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. SAGE Publications.
- Creswell, J. W., & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches*. SAGE Publications.
- Field, A. (2024). *Discovering statistics using IBM SPSS statistics*. SAGE Publications.
- George, D., & Mallery, P. (2024). *IBM SPSS statistics 29 step by step: A simple guide and reference*. Routledge. <https://doi.org/10.4324/9781032622156>
- Glazkova, I., Falko, N., Khomenko, O., Khatuntseva, S., Rula, N., Shulzhenko, A., & Tatarin, V. (2025). Barriers in online education for displaced universities: Insights from faculty and students. *Problems and Perspectives in Management*, 23(2), 136–150. [https://doi.org/10.21511/ppm.23\(2-si\).2025.10](https://doi.org/10.21511/ppm.23(2-si).2025.10)

- Gómez, D. L., Álvarez Maestre, A. J., Parada Trujillo, A. E., Pérez Fuentes, C. A., Bedoya Ortiz, D. H., & Sanabria Alarcón, R. K. (2025). Determining factors for the development of critical thinking in higher education. *Journal of Intelligence*, 13(6), 59. <https://doi.org/10.3390/jintelligence13060059>
- Gu, P., Cheng, Z., Miaoting, C., Poggio, J., & Dong, Y. (2025). Integrating project-based learning with self-regulated learning to enhance programming learning motivation. *Journal of Computer Assisted Learning*, 41(2), e70011. <https://doi.org/10.1111/jcal.70011>
- Hartley, J. (2014). Some thoughts on Likert-type scales. *International Journal of Clinical and Health Psychology*, 14(1), 83–86. [https://doi.org/10.1016/S1697-2600\(14\)70040-7](https://doi.org/10.1016/S1697-2600(14)70040-7)
- Hrastinski, S., Paul, E., & Åkerfeldt, A. (2025). Temporal-spatial and pedagogical flexibility in distance education. *Distance Education*, 46(3), 435–451. <https://doi.org/10.1080/01587919.2024.2380370>
- Hu, S. (2023). An investigative study of factors affecting talent development systems in higher education management programs under the OBE philosophy. *International Journal of New Developments in Education*, 5(24), 174–179. <https://doi.org/10.25236/IJNDE.2023.052428>
- Hursen, C. (2021). The effect of the problem-based learning method supported by Web 2.0 tools on academic achievement and critical thinking skills in teacher education. *Technology, Knowledge and Learning*, 26(3), 515–533. <https://doi.org/10.1007/s10758-020-09458-2>
- Huyler, D., & McGill, C. M. (2019). *Book Review: Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. <https://doi.org/10.1002/nha3.20258>
- Johannesson, P. (2022). Development of professional learning communities through action research. *Educational Action Research*, 30(3), 411–426. <https://doi.org/10.1080/09650792.2020.1854100>
- Johannesson, P., & Olin, A. (2024). Teachers' action research as a case of social learning. *Scandinavian Journal of Educational Research*, 68(4), 735–749. <https://doi.org/10.1080/00313831.2023.2175253>
- Karogal, S., Hegade, P., & Shettar, A. (2025). Creating mini-research spaces in problem based learning curriculum using abstraction. *Journal of Engineering Education Transformations*, 38, 276–284. <https://doi.org/10.16920/jeet/2025/v38is2/25033>
- Katawazai, R. (2021). Implementing outcome-based education and student-centered learning in Afghan public universities: the current practices and challenges. *Heliyon*, 7(5).
- Kementerian Pendidikan, Kebudayaan, Riset dan Teknologi. (2020). *Regulation of the Minister of Education and Culture Number 3 of 2020 concerning National Standards for Higher Education*.

- Keo, V., Hak, C., Lan, B., Khong, R., Neang, S., & Hoeurn, S. (2025). Implementing Outcome-Based Education in Higher Education: Challenges and Benefits. *International Journal of Educational and Psychological Sciences*, 3(5), 511–530. <https://doi.org/10.59890/ijeps.v3i5.138>
- Kovalova, Y. (2025). Project-based learning in online education: Experience of real cases as a means of developing professional skills. *European Journal of Interdisciplinary Issues*, 2(1), 9–15. <https://doi.org/10.5281/zenodo.15090375>
- Li, J., Feng, L., Song, Q., Zhang, Y., & Guo, X. (2025). The construction of a talent cultivation system for the robot engineering major based on the OBE concept. *IJLAI Transactions on Science and Engineering*, 3(3), 67–73.
- Luchang, A. L., & Nasri, N. M. (2023). Project-based learning (PBL) in enhancing students' higher-order thinking skills (HOTS): Systematic literature review. *International Journal of Academic Research in Progressive Education and Development*, 12(4), 1651–1679.
- Mahrishi, M., Ramakrishna, S., Hosseini, S., & Abbas, A. (2025). A systematic literature review of the global trends of outcome-based education (OBE) in higher education with an SDG perspective related to engineering education. *Discover Sustainability*, 6(1), 1–21. <https://doi.org/10.1007/s43621-025-01496-z>
- Manousou, E. (2025). Critical thinking in distance education: The challenges in a decade (2016–2025) and the role of artificial intelligence. *Education Sciences*, 15(6), 757. <https://doi.org/10.3390/educsci15060757>
- Najjar, N., Roupheal, M., Bitar, T., & Hleihel, W. (2025). The rise and drop of online learning: adaptability and future prospects. *Frontiers in Education*, 10, 1522905. <https://doi.org/10.3389/feduc.2025.1522905>
- Naseer, F., Tariq, R., Alshahrani, H. M., Alruwais, N., & Al-Wesabi, F. N. (2025). Project based learning framework integrating industry collaboration to enhance student future readiness in higher education. *Scientific Reports*, 15(1), 24985. <https://doi.org/10.1038/s41598-025-10385-4>
- Owens, A. D., & Hite, R. L. (2022). Enhancing student communication competencies in STEM using virtual global collaboration project based learning. *Research in Science & Technological Education*, 40(1), 76–102. <https://doi.org/10.1080/02635143.2020.1778663>
- Pallant, J. (2020). *SPSS survival manual: A step by step guide to data analysis using IBM SPSS*. Routledge. <https://doi.org/10.4324/9781003117452>
- Rachael, O. (2024). *Aligning learning outcomes with teaching practices: Evaluating the effectiveness of outcome-based education (OBE) frameworks*. <https://www.researchgate.net/publication/396291980>

- Reilly, C., & Reeves, T. C. (2023). Tracking transdisciplinary skills in the design of online courses: A design-based research study. *Computers & Education*, 204, 104867. <https://doi.org/10.1016/j.compedu.2023.104867>
- Resch, K., & Schritteser, I. (2023). Using the service-learning approach to bridge the gap between theory and practice in teacher education. *International Journal of Inclusive Education*, 27(10), 1118–1132. <https://doi.org/10.1080/13603116.2021.1882053>
- Sam, R. (2024). Systematic review of inquiry-based learning: Assessing impact and best practices in education. *F1000Research*, 13, 1045. <https://doi.org/10.12688/f1000research.155367.1>
- Sun, P. H., & Lee, S. Y. (2020). The importance and challenges of outcome-based education—a case study in a private higher education institution. *Malaysian Journal of Learning and Instruction*, 17(2), 253–278.
- Susilo, M. J. (2022). The importance of mini research projects for accelerating thesis writing. *Anatolian Journal of Education*, 7(2), 193–200. <https://doi.org/10.29333/aje.2022.7215a>
- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53–55. <https://doi.org/10.5116/ijme.4dfb.8dfd>
- Teng, M. F., & Yue, M. (2023). Metacognitive writing strategies, critical thinking skills, and academic writing performance: A structural equation modeling approach. *Metacognition and Learning*, 18(1), 237–260. <https://doi.org/10.1007/s11409-022-09328-5>
- Widiantie, R., Junaedi, E., & Amanah, S. P. (2025). Development of 21st century skills integrated mini research e-assessment for prospective teacher. *Jurnal Penelitian Pendidikan IPA*, 11(4), 104–112. <https://doi.org/10.29303/jppipa.v11i4.10512>
- Yeo, M., Miller-Young, J., & Manarin, K. (2023). *SoTL research methodologies: A guide to conceptualizing and conducting the Scholarship of Teaching and Learning*. Routledge. <https://doi.org/10.4324/9781003447054>
- Yu, L., & Cai, L. (2025). Contemporary American literature in distance learning: Creating reading motivation and student engagement. *Reading Research Quarterly*, 60(2), e609. <https://doi.org/10.1002/rrq.609>
- Yunus, M., & Bachtiar, B. (2025). Exploring the complexities of thesis writing in the distance mode: Postgraduate students' perspectives, challenges and strategies. *Asian Association of Open Universities Journal*, 20(1), 68–81. <https://doi.org/10.1108/AAOUJ-07-2024-0099>
- Zakwandi, R., & Istiyono, E. (2023). A framework for assessing computational thinking skills in the physics classroom. *SN Social Sciences*, 3(3), 46. <https://doi.org/10.1007/s43545-023-00633-7>

- Zhang, M., He, Q., Du, J., Liu, F., & Huang, B. (2022). Learners' perceived advantages and social-affective dispositions toward online peer feedback in academic writing. *Frontiers*
- Zhao, G., Sheng, H., Wang, Y., Cai, X., & Long, T. (2025). Generative artificial intelligence amplifies the role of critical thinking skills and reduces reliance on prior knowledge while promoting in-depth learning. *Education Sciences*, 15(5), 554. <https://doi.org/10.3390/educsci15050554>

Integrating Technology to Promote Learning and Teaching Management Through Coaching Process for Teachers in Bangkok Metropolitan Administration

Chutiwat Suwatthipong, Sukhothai Thammathirat Open University, Thailand
Pimprapa Phanphai, Sukhothai Thammathirat Open University, Thailand

The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

This research aimed to (1) investigate technology usage behaviors for enhancing student learning within the Bangkok Metropolitan Administration (BMA) and (2) examine teachers' perceptions of technology utilization in instructional activities. The population included 13,331 BMA teachers and 127,854 upper elementary and lower secondary students. The sample comprised 52 teachers and 332 students. Data were collected over four months through a coaching process where teachers designed activities using Google Classroom, with coaches observing and providing feedback. Instruments included the Google Classroom system and questionnaires on students' technology experiences and teachers' opinions on Google Solutions (GS). Findings revealed that 34.04% of students frequently used technology for learning, favoring desktop computers (49.10%) and educational games (53.92%). Students most often used technology 1–2 times per week outside class (28.01%) and perceived technology as beneficial in practical contexts (52.41%). Desktop computers were primarily used in class (54.51%), while smartphones were preferred for out-of-class learning (59.33%). YouTube was the most used tool (60.54%), followed by Gmail and Google Search. Students also recognized meaningful teacher feedback (mean = 4.05, SD = 1.01). Most teachers reported GS saved time in grading, teaching, administration, consultation, and lesson planning, with 44.85% saving 1-5 hours weekly. Teachers strongly agreed GS helped students access information (mean = 4.38, SD = 0.60) and increased student engagement and enthusiasm (mean = 4.38, SD = 0.77). This study highlights the positive impact of integrating Google Solutions in enhancing teaching and learning within BMA schools.

Keywords: coaching process for teachers, technology integration, enhancing learning, teaching management

iafor

The International Academic Forum
www.iafor.org

Introduction

The Bangkok Metropolitan Administration (BMA) is a special form of local government possessing autonomy in managing basic education under the supervision of the Office of Education. As of 2025, there are 437 schools under the BMA, with more than 14,000 teachers and educational personnel, and over 250,000 students enrolled across early childhood, primary, and secondary levels throughout the 50 districts of Bangkok (Bangkok Metropolitan Administration, Office of Education, 2025). Schools under the BMA are characterized by distinctive urban educational contexts that reflect the diversity of Bangkok's socioeconomic and cultural landscape, together with spatial limitations and disparities in educational resources. Consequently, educational administration within the BMA must operate amid a complex and rapidly changing environment to address the dynamic needs of urban citizens in the digital era. The continuous development of BMA schools to meet international educational standards therefore requires the integration of digital technology into learning processes, school management, and teacher professional development.

Recently, the Bangkok Metropolitan Administration (BMA) has launched the “Digital School Development Policy” to promote the integration of digital technologies into school management and classroom instruction. Teachers are encouraged to utilize tools such as Google Classroom, Google Drive, Google Forms, and YouTube to support lesson management and reduce administrative workloads. Research by Changkham and Chaemchoi (2023) revealed that most BMA teachers possess moderate levels of digital literacy, indicating a need for further development in technology-based instructional innovation. Similarly, Bungsi and Silanookit (2023) emphasized the crucial role of school administrators in fostering the effective use of information technology for teaching and learning within BMA schools. In the same vein, Mankhong and Detbumrung (2024) proposed strategic guidelines for information technology administration within the Bangkok school cluster to ensure efficient and sustainable use of digital resources. These studies collectively underscore that the integration of technology into Bangkok's educational system is not merely optional but essential, aligning with the overarching goals of modern education in the digital era.

However, the advancement of instructional technology can only be effective when teachers are supported by a sustainable professional learning system that enables continuous self-development. The Coaching Process serves as a key mechanism to enhance teachers' competencies, empowering them to design learning experiences that meet the needs of digital-age learners. Naudom and Niyamajan (2024) indicated that coaching fosters collaborative learning among teachers through reflection, critical questioning, and the cultivation of academic leadership within schools. Therefore, this study aims to (1) investigate students' technology usage behaviors for enhancing learning within schools under the Bangkok Metropolitan Administration, and (2) examine teachers' perceptions and attitudes toward the utilization of technology in instructional activities. The findings are expected to provide insights and directions for enhancing the quality of both teachers and students in Bangkok's education system through the systematic integration of educational technology and the coaching process.

The Role of Google Tools in Education

At present, one of the most widely adopted digital platforms in educational institutions is Google Workspace for Education, which comprises a variety of tools such as Google Classroom, Google Drive, Google Docs, Google Forms, Google Slides, Gmail, and YouTube. These tools support both teaching and administrative tasks, providing an effective online

learning environment that connects all stakeholders teachers, students, parents, and administrators enabling seamless collaboration and communication within the school ecosystem (Ministry of Education, 2025).

Google Classroom is a Learning Management System (LMS) developed by Google to facilitate online classroom creation, course organization, assignment distribution and collection, as well as paperless grading and feedback. It enables teachers to manage classes efficiently and serves as an effective medium of communication between teachers and students in an online learning environment (Chaiyasat, 2022). Furthermore, research has shown that teachers are able to provide more individualized attention to their students through Google Classroom, as the system systematically compiles student work and learning data in one centralized platform (Deep et al., 2025).

Google Drive is a cloud-based storage platform that allows teachers and students to access teaching materials, lesson documents, and learning resources anytime and anywhere. Google Docs, an online word-processing application, enables multiple users to collaborate on the same document in real time. Students can easily work in groups, co-write reports, or develop projects together through Docs, while teachers can review and provide instant feedback online. This collaborative feature promotes cooperative learning and enhances students' teamwork skills.

Google Forms is an online tool for creating surveys, quizzes, and assessment forms. Teachers can use Forms to design online tests or evaluations, where the system automatically checks responses and provides scores, significantly reducing teachers' grading workload. Additionally, Google Forms facilitates efficient and systematic data collection from students and parents, enabling quick analysis and feedback.

Google Slides functions as an online presentation tool similar to PowerPoint but features real-time collaboration capabilities. Students can collaboratively design and create presentation slides from any location, while teachers can monitor progress, offer guidance, and provide immediate feedback. The use of Slides fosters students' creativity by enabling them to design multimedia presentations that integrate text, images, videos, and other media.

In the educational context, Gmail serves as a formal communication channel among teachers, students, and parents. Teachers can quickly send announcements, reminders, or assignments via email, while students can contact teachers for inquiries or submit assignments directly. Moreover, Gmail is seamlessly integrated with other Google Workspace tools, such as Google Classroom and Google Calendar, facilitating smooth and efficient communication across the school's digital ecosystem.

YouTube is an online video-sharing platform widely used by teachers and students for accessing various educational resources. Teachers can create and upload instructional videos for students to review anytime, or they may select high-quality educational content available on YouTube to supplement lessons. Using video-based media enhances student engagement, diversifies learning materials, and simplifies complex concepts. Furthermore, YouTube supports self-paced learning, allowing students to revisit videos as needed aligning with the principles of personalized learning and lifelong learning in the digital era.

Reducing Teachers' Workload Through Digital Platforms

Digital technology not only enhances teaching and learning but also plays a crucial role in reducing teachers' administrative workload. In the past, teachers spent a significant amount of time on clerical tasks such as distributing and collecting assignments, grading papers, recording scores, and sending emails for coordination. The adoption of online platforms has streamlined these processes, significantly reducing the time and effort required for such tasks.

For instance, using shared folders on Google Drive instead of sending individual email attachments allows teachers to upload instructional materials or worksheets in one centralized location, enabling students to access and submit their work instantly. This eliminates the need for teachers to send emails one by one (Lin, 2025). Furthermore, preparing lesson plans or instructional documents on Google Docs or Drive and updating them from existing templates saves considerable time compared to rewriting lesson materials from scratch each semester.

Moreover, Google Classroom significantly reduces teachers' paperwork. All tasks from assignment submissions and grading to providing feedback are stored digitally, making them easier to track and minimizing paper usage. Overall, studies have reported that the adoption of such online classroom management systems enables teachers to manage their time more efficiently and reduces stress caused by repetitive administrative tasks.

The Thai Ministry of Education and several educational agencies have also recognized the potential of technology to alleviate teachers' workload. For instance, the collaboration between the Ministry of Education and Google for Education promotes the use of Chromebooks and digital platforms in schools. One of its primary goals is to "enhance learning efficiency and enjoyment while reducing teachers' workload in classroom management" (Ministry of Education, 2025). Results from pilot projects in special education schools demonstrated that the use of digital tools allowed teachers to manage classes more flexibly, engage students more actively, and spend less time on post-class paperwork. All these findings illustrate that the effective application of educational technology enables teachers to focus more on teaching and supporting students, rather than being burdened by administrative or non-instructional duties.

Related Research

Online learning platforms have been shown to increase student engagement through more interactive and flexible learning formats. For example, live video lessons and real-time online activities conducted via Google Classroom or Zoom enable students to interact, ask questions, and collaborate with teachers and peers even in remote settings (Deep et al., 2025). Several studies have reported that students demonstrate higher concentration and motivation when digital media or game-based learning is incorporated into instruction. Furthermore, research in Thailand by Khuntong (2023) found that teaching through Google Classroom significantly enhanced students' interest and learning motivation, indicating that learner engagement is heightened when learning occurs through diverse digital media and interactive online activities.

Digital technology has made collaborative learning more accessible and convenient for students through various tools and platforms, such as discussion forums, group projects on Google Docs and Google Slides, or online community platforms that allow for idea sharing and peer interaction. A higher education study by Gupta and Pathania (2021) revealed that

pre-service teachers learning through Google Classroom felt more comfortable collaborating in groups and experienced a stronger sense of classroom community compared to traditional learning environments. Collaboration through online tools enables students to learn from their peers, support one another, and develop interpersonal communication skills simultaneously. Moreover, digital learning environments provide opportunities for shy or less confident students who may hesitate to express themselves in traditional classrooms to participate by posting comments or co-editing online projects. This inclusive approach fosters engagement from all learners, ensuring that every student has a voice in the learning process.

Digital media and online platforms have opened up new spaces for creative expression among learners. Tools such as Google Slides, Canva, and even YouTube video production allow students to showcase their imagination and innovative ideas in diverse formats. A systematic literature review by Pikhart, Al-Obaydi, and Klimova (2024) revealed that digital learning has a positive impact on students' creativity. Activities such as game-based learning, interactive technologies, digital storytelling, and collaborative learning environments were all found to significantly enhance creative thinking among learners. Furthermore, assigning students to create projects or multimedia presentations through online platforms helps them practice out-of-the-box thinking, develop flexible problem-solving skills, and gain the confidence to present their work in diverse and innovative formats. These approaches highlight the role of digital platforms not only as tools for information delivery but also as catalysts for creativity, innovation, and student empowerment in the learning process.

Personalized learning allows flexibility in education by tailoring learning experiences to meet individual learners' needs. Digital platforms support this by enabling students to set their own learning pace through on-demand access to instructional media and recorded lessons. This flexibility ensures that both fast and slow learners can learn at their full potential. Moreover, teachers can use online tools to track students' progress individually and provide personalized feedback or supplementary exercises to those who need additional support.

Research has shown that both students and teachers agree that Google Classroom is user-friendly and "requires less effort compared to other platforms," allowing teachers to spend more time focusing on each student's learning needs. This leads to a more productive and responsive learning environment (Deep et al., 2025). Additionally, some modern platforms particularly AI-powered learning systems are capable of analyzing learner data to automatically adjust lesson content or practice activities according to each student's ability level and interests. This innovation bridges the gap left by traditional "one-size-fits-all" teaching approaches, helping ensure that every learner has an equitable opportunity to succeed in their educational journey.

The digital transformation in education represents both a challenge and an opportunity for the academic community. Research conducted over the past five years, both in Thailand and abroad, clearly demonstrates that digital technologies and online platforms can enhance teaching effectiveness and learning outcomes when appropriately implemented. Tools such as Google Classroom, Drive, Docs, Forms, Slides, Gmail, and YouTube have proven instrumental in reducing teachers' administrative workload while fostering collaborative, creative, and flexible learning environments that align with each learner's potential. The reviewed studies collectively affirm that the "digital transformation of education" is not merely about adopting new tools it is about creating new opportunities for both teachers and students to realize their full potential in the evolving world of future learning.

Methodology

The study entitled “Integrating Technology to Promote Learning and Teaching Management Through the Coaching Process for Teachers in Bangkok Metropolitan Administration” was implemented through a systematic series of steps designed to ensure accuracy, reliability, and practical applicability. The procedures were structured as follows:

Coaching Orientation and Initial Consultation

The research process commenced with an orientation session, during which the coach provided participating teachers with guidance and consultation on the development of lesson plans that integrate digital technologies into classroom practices. The session also included follow-up discussions on instructional design and classroom management through the use of Google Classroom.

Design and Development of Online Learning Modules

Based on the coach’s recommendations, each teacher developed three online learning modules using Google Classroom. Each module included the following components: (1) a module title, (2) learning objectives, (3) instructional procedures, and (4) rubric-based assessments aligned with 21st-century learning skills. Additionally, each lesson incorporated a four-option multiple-choice test to assess student learning achievement.

Weekly Coaching Sessions and Reflective Practice

The coach facilitated weekly online meetings with the participating teachers two hours per session, for a total of 16 sessions over a four-month period. These sessions focused on collaborative reflection, encouragement, and problem-solving related to technology integration in teaching and learning. Teachers were also encouraged to exchange their experiences and share best practices to strengthen their instructional design and delivery.

Classroom Observation and Performance Evaluation

Each teacher was observed twice by the coach during live classroom instruction. The observations employed the Teacher Learning Management Behavior Assessment Form for BMA Teachers, based on rubric criteria. Evidence was collected from both in-class teaching and online instruction via Google Classroom. Observation logs were documented, including targeted feedback and specific recommendations for improvement.

Support for Innovation Presentation

During weeks 13–16, the coach provided additional mentoring and technical support to help teachers prepare their work for submission to a teaching innovation contest. This phase emphasized the application of technological integration in learning management. Teachers refined their work by applying insights gained from reflective practices, peer learning, and coaching feedback accumulated throughout the program.

Data Collection From Students and Teachers

To evaluate the impact of the intervention, data were collected from both students and teachers. Students completed a questionnaire on their experiences with technology-supported learning, while teachers responded to an assessment form measuring their use of digital tools in instructional practices.

The instruments used in this study included two questionnaires: one on students' experiences with technology, and another on teachers' opinions toward Google Solutions (GS) after completing the coaching and instructional activities.

Population

The study's population consisted of 13,331 teachers teaching at the primary and lower secondary levels under the Office of Education, Bangkok Metropolitan Administration (BMA), according to the official website of the BMA Office of Education for the academic year 2023.

Sample Group

The sample included 332 students and 56 teachers who taught Primary Grades 2, 4, and 6, and Lower Secondary Grades 7 and 8 (Matthayom 1–2) in schools under the BMA Office of Education. The participants were selected through purposive sampling, consisting of teachers who voluntarily participated and demonstrated the ability to use technology in their instructional practices.

Data Analysis

The collected data were analyzed using frequency, percentage, mean, and standard deviation to interpret the results from both the student and teacher questionnaires.

Results

Table 1

Students' Background Information and Technology Usage Behaviors After Participating in the Program (n = 332)

Background Information of Students	N	Percentage
Gender 1) Male	149	44.88
2) Female	183	55.12
Frequency of Technology Use for Learning after Participation		
1) Very rarely	9	2.71
2) Rarely	17	5.12
3) Moderately	98	29.52
4) Often	95	28.61
5) Very often	113	34.04
Preferred Devices for Learning Activities		
1) Chromebook	1	0.30
2) Laptop	17	5.12
3) Desktop computer	163	49.10
4) Android smartphone	65	19.58
5) iPhone	50	15.06

Background Information of Students	N	Percentage
6) Android tablet	11	3.31
7) iPad	25	7.53
Most Preferred Subject		
1) Mathematics	25	7.53
2) Science	26	7.83
3) Computer/ICT	78	23.49
4) Social Studies	16	4.82
5) Thai Language	29	8.73
6) English	35	10.54
7) Arts and Music	70	21.09
8) Occupation and Technology	10	3.01
9) Guidance and Student Development Activities	14	4.22
10) Others (e.g., Health Education, Physical Education)	29	8.74
Preferred Learning Activities (multiple responses allowed)		
1) Listening to lectures	121	36.45
2) Inquiry-based learning	96	28.92
3) Project-based learning	90	27.11
4) Practice and experimentation	152	45.78
5) Story-based learning	86	25.90
6) Field study/learning resources	120	36.14
7) Problem-based learning (teacher-assigned scenarios)	81	24.40
8) Educational games	179	53.92
Level of Preference for Using Technology in Learning		
1) Very low	7	2.11
2) Low	22	6.62
3) Moderate	105	31.63
4) High	83	25.00
5) Very high	115	34.64
Frequency of Technology Use for Learning (in class)		
1) Never	15	4.52
2) 1–2 times per month	55	16.56
3) 1–2 times per week	117	35.24
4) 3 or more times per week	78	23.50
5) Every day	67	20.18
Frequency of Technology Use for Learning (outside class)		
1) Never	26	7.82
2) 1–2 times per month	65	19.58
3) 1–2 times per week	93	28.01
4) 3 or more times per week	77	23.20
5) Every day	71	21.39
Students' Attitudes toward Using Technology in Classroom Learning		
Technology causes harm	17	5.12
No benefit from technology	26	7.83
Indifferent toward technology	20	6.02
Technology is useful but has obstacles	95	28.62
Technology is beneficial and I try to use it when possible	174	52.41
Devices Frequently Used for Learning in Class (multiple responses allowed)		
1) Chromebook	12	3.61
2) Smartphone	133	40.06
3) Tablet	56	16.87
4) Laptop	45	13.55
5) Desktop computer	181	54.51
6) Others	0	0

Background Information of Students	N	Percentage
Devices Frequently Used for Learning outside Class (multiple responses allowed)		
1) Chromebook	17	5.12
2) Smartphone	197	59.33
3) Tablet	74	22.29
4) Laptop	51	15.36
5) Personal computer	79	23.8
6) Others	0	0

From the survey results, it was found that the majority of students were female (183 students, 55.12%). After participating in the instructional activities, students reported the highest frequency of technology use for learning at the “very often” level (113 students, 34.04%), followed by “moderate” (98 students, 29.52%) and “often” (95 students, 28.61%). Regarding preferred devices, students most frequently engaged in learning activities using desktop computers (163 students, 49.10%), followed by Android smartphones (65 students, 19.58%) and iPhones (50 students, 15.06%). The most preferred subject was Computer/ICT (78 students, 23.49%), followed by Arts and Music (70 students, 21.09%) and English (35 students, 10.54%). For preferred learning activities (multiple responses allowed), educational games were ranked highest (179 students, 53.92%), followed by practice and experimentation (152 students, 45.78%) and listening to lectures (121 students, 36.45%). In terms of preference for technology use in learning, the largest proportion of students reported the “very high” level (115 students, 34.64%). With respect to frequency of technology use, students most often reported using technology for in-class learning 1–2 times per week (117 students, 35.24%), while for out-of-class learning, the highest frequency was also 1–2 times per week (93 students, 28.01%). In terms of attitudes, the majority of students agreed that technology is beneficial and attempted to use it in applicable contexts (174 students, 52.41%). For devices used regularly in class, desktop computers were most common (181 students, 54.51%), followed by smartphones (133 students, 40.06%) and tablets (56 students, 16.87%). In contrast, for out-of-class learning, students primarily used smartphones (197 students, 59.33%), followed by personal computers (79 students, 23.80%) and tablets (74 students, 22.29%).

From the analysis of students’ opinions, several key factors influencing the choice of digital devices for learning were identified. Students reported that these devices enhanced learning engagement, making them feel more knowledgeable, entertained, and actively involved. In addition, the devices were valued for their convenience, portability, and sufficiently large screen size that ensured comfortable use. Some students also highlighted that digital devices improved learning efficiency, information retrieval, and task performance. Moreover, a portion of students indicated that their device choice was influenced by availability through school provisions or support from computer laboratories, which facilitated smoother access and usage.

Table 2

Students' Attitudes and Experiences Toward the Use of Technology in Classroom Learning (n = 332)

Tools Used by Students for Classroom Learning	Levels of Students' Attitudes and Experiences Toward the Use of Technology in Classroom Learning									
	Not comfortable at all, would not try		Uncomfortable, but would try		Comfortable, able to use		Very confident, familiar with all tools		Highly confident, well-trained	
	n	%	n	%	n	%	n	%	n	%
Google Solutions (GS)	13	3.91	31	9.34	164	49.40	50	15.06	74	22.29
Chromebook	49	14.76	45	13.55	151	45.48	37	11.14	50	15.06
Google Classroom	17	5.12	41	12.35	90	27.11	63	18.98	121	36.45
Google Drive	29	8.73	78	23.49	94	28.31	53	15.96	78	23.49
Google Documents	23	6.93	76	22.89	111	33.43	68	20.48	54	16.27
Google Sheets	39	11.75	69	20.78	76	22.89	48	14.46	100	30.12
Google Forms	21	6.33	60	18.07	91	27.41	51	15.36	109	32.83
Google Slides	17	5.12	58	17.47	106	31.93	45	13.55	106	31.93
Google Search	15	4.52	54	16.27	79	23.80	52	15.66	132	39.76
Gmail	14	4.22	36	10.84	81	24.40	58	17.47	143	43.07
Calendar	44	13.25	62	18.67	85	25.60	75	22.59	66	19.88
YouTube	9	2.71	17	5.12	65	19.58	40	12.05	201	60.54
Google Maps	26	7.83	37	11.14	88	26.51	63	18.98	118	35.54

From the table 2, it was found that students felt comfortable using digital tools for classroom learning. Students reported being highly confident and well-trained in tools familiar to their daily lives, more so than in specialized tools. The most frequently cited tool was YouTube (201 students, 60.54%), followed by Gmail (143 students, 43.07%) and Google Search (132 students, 39.76%). In contrast, tools such as Chromebook, Google Docs, and Google Calendar were used by a relatively smaller proportion of students. This reflects the need for additional training and promotion of these tools in order to enhance students' confidence and convenience in their use.

Table 3

Students' Perceptions of Comfort in Using Google Solutions (GS) for Classroom (n = 332)

Students' Perceptions of Comfort in Using Google Solutions (GS) for Classroom Learning		
No participation at all	10	3.00
Slight participation	36	10.80
Moderate participation	110	33.10
High participation	76	22.90
Very high participation	100	30.10

The findings revealed that most students reported moderate to very high participation when using Google Solutions (GS) for classroom learning, with 33.10% indicating moderate participation, 22.90% high participation, and 30.10% very high participation. In contrast, only a small proportion of students expressed little or no participation (10.80% and 3.00%, respectively). These results suggest that GS effectively encouraged student engagement in classroom activities, supporting its role as a practical tool for enhancing active learning.

Table 4

Students' Attitudes and Experiences Toward the Use of Technology in Classroom Learning: Questions on Timetables and the Outcomes of Using Google Solutions (GS) (n = 332)

Students' Attitudes and Experiences Toward the Use of Technology in Classroom Learning	Mean	SD	Level of Agreement
1. I was able to manage all of my own tasks more effectively.	3.76	0.96	Agree
2. I was able to better identify my specific needs.	3.75	0.92	Agree
3. The instructor provided feedback that was meaningful and significant to my work.	4.05	1.01	Agree
4. I was able to better learn the fundamental content.	3.89	0.93	Agree
5. I was more deeply engaged with the subject content.	3.88	0.96	Agree
6. I participated and became more enthusiastic.	3.74	1.03	Agree
7. I gained a better understanding of my own capabilities through the use of Google Solutions (GS).	3.81	1.07	Agree
8. I was able to communicate more effectively with others involved in my learning.	3.79	1.00	Agree
9. The use of Chromebook or desktop computers effectively met my learning needs.	3.81	1.04	Agree

From the table 4, it was found that the majority of students agreed most strongly that instructors provided feedback that was meaningful and significant to their work, with the highest mean score of 4.05 and a standard deviation of 1.01. The next highest items were that technology helped students better learn fundamental content (mean = 3.89, SD = 0.93) and become more deeply engaged with the subject content (mean = 3.88, SD = 0.96).

Table 5

Students' Technology Usage and Device Preferences for Learning With Google Solutions (n = 332)

Technology Usage and Device Preferences for Learning With Google Solutions	n	%
Students' Comfort in Using Google Solutions (GS) for Classroom Learning		
No participation at all	10	3.01
Slight participation	36	10.84
Moderate participation	110	33.13
High participation	76	22.89
Very high participation	100	30.12
Time Spent on Online Activities during Class (hours per day)		
1) 1–2 hours	155	46.69
2) 2–4 hours	83	25.00
3) 4–6 hours	76	22.89
4) 6–8 hours	8	2.41
5) More than 8 hours	10	3.01
Time Spent on Online Activities outside Class (hours per day)		
1) 1–2 hours	150	45.18
2) 2–4 hours	78	23.49
3) 4–6 hours	59	17.77
4) 6–8 hours	26	7.83
5) More than 8 hours	19	5.72

Technology Usage and Device Preferences for Learning With Google Solutions	n	%
Devices Used by Students to Complete Teacher-Assigned Tasks		
1) Chromebook	12	3.61
2) School computer	179	53.92
3) Personal computer/laptop	31	9.34
4) Personal tablet	17	5.12
5) Personal smartphone	69	20.78
6) Rarely used:	24	7.23

From the table 5, it was found that students were most comfortable using Google Solutions (GS) for classroom learning at the “moderate participation” level (110 students, 33.13%), followed by “very high participation” (100 students, 30.12%). Most students spent 1–2 hours per day on online activities during class (155 students, 46.69%) and similarly 1–2 hours per day on online activities outside class (150 students, 45.18%). In completing teacher-assigned tasks, the majority of students relied on school computers (179 students, 53.92%), followed by personal smartphones (69 students, 20.78%) and personal computers/laptops (31 students, 9.34%).

In addition, students’ opinions regarding instruction supported by technology were generally positive. Many students reported that the lessons were enjoyable and exciting, reflecting increased engagement as well as emphasizing clarity and knowledge acquisition, particularly in technology-related aspects. Students also valued the convenience and modernity of using technology in the classroom. At the same time, some comments highlighted the role of teachers as highly supportive and kind instructors, which demonstrated positive teacher–student relationships in the context of technology-enhanced learning.

Table 6

Average Weekly Hours Teachers Spend on Various Professional Activities (OECD Data)

Activities	Average Weekly Hours (OECD)
Teaching	19
Lesson planning or preparing instructional materials	7
Correcting student work	5
General administration (communication, paperwork)	3
Teamwork and discussions with colleagues	3
Providing student guidance/counseling	2.1
Conducting extracurricular activities (clubs, sports)	2.1
Communication and collaboration with parents/guardians	1.5
School management tasks (e.g., department head responsibilities)	1.5
Other (e.g., supervising students during breaks, peer consultation, collaborative projects, professional development)	1.5

According to OECD data, teachers spend the largest portion of their weekly working hours on teaching (19 hours), followed by lesson planning or preparing instructional materials (7 hours) and correcting student work (5 hours). Considerably less time is devoted to general administration and teamwork with colleagues (3 hours each). Activities such as providing student guidance or counseling (2.1 hours), conducting extracurricular activities (2.1 hours), and communication with parents (1.5 hours) take even fewer hours. Similarly, school

management responsibilities and other duties such as supervision, peer consultation, and professional development also average only 1.5 hours per week. Overall, the findings highlight that direct teaching and lesson preparation occupy the majority of teachers' time, while administrative, extracurricular, and management-related tasks require significantly fewer hours.

Table 7

Effects of Using Google Solutions (GS) on Teachers' Working Time After Participating in the Project

Effects of Using Google Solutions (GS) on Teachers' Working Time	Reduced my personal time		No effect		Helped save time	
	n	%	n	%	n	%
Teaching	7	13.46	9	17.31	36	69.23
Lesson planning or preparing instructional materials	11	21.15	12	23.08	29	55.77
Correcting student work	3	5.77	6	11.54	43	82.69
General administration (communication, paperwork)	5	9.62	13	25.00	34	65.38
Teamwork and discussions with colleagues	2	3.85	24	46.15	26	50.00
Providing student guidance/counseling	2	3.85	18	34.62	32	61.54
Conducting extracurricular activities (clubs, sports)	3	5.77	24	46.15	25	48.08
Communication and collaboration with parents/guardians	3	5.77	25	48.08	24	46.15
School management tasks (e.g., department head responsibilities)	3	5.77	21	40.38	28	53.85
Other (e.g., supervising students during breaks, peer consultation, collaborative projects, professional development)	5	9.62	18	34.62	29	55.77
After participating in the project) Overall, did the use of Google Solutions (GS) help save your time in performing main activities?					n	%
1) No, the use of Google Solutions (GS) increased my workload and did not help save time					4	7.69
2) The use of Google Solutions (GS) had no effect on my time					5	9.61
3 The use of Google Solutions (GS) helped save a little time (less than 1 hour per week)					15	28.85
4) The use of Google Solutions (GS) helped save considerable time (1–5 hours per week)					23	44.23
5) The use of Google Solutions (GS) helped save a great deal of time (more than 5 hours per week)					5	9.62

From the table 7, it was found that the majority of teachers agreed that the use of Google Solutions (GS) helped save time in the following tasks: correcting student work (43 teachers, 82.69%), teaching (36 teachers, 69.23%), general administration such as communication and paperwork (34 teachers, 65.38%), providing student guidance (32 teachers, 61.54%), lesson planning or preparing instructional materials (29 teachers, 55.77%), and other activities such as supervising during breaks, peer consultation, and professional development (29 teachers, 55.77%). Furthermore, most teachers reported that the use of GS helped save considerable time, particularly between 1–5 hours per week (23 teachers, 44.85%).

Table 8

Teachers' and Students' Perceptions of the Effects of Using Google Solutions (GS) on Learning and Teaching

List	Mean	SD	Level of Agreement
Effects of Using Google Solutions (GS) on Learning and Teaching			
GS provided opportunities for students to use creativity and imagination in their work.	4.31	0.73	Strongly agree
GS helped students present ideas and express opinions more effectively.	4.25	0.62	Strongly agree
GS enabled students to seek knowledge and search for relevant information to support their learning.	4.38	0.60	Strongly agree
GS supported greater student collaboration.	4.04	0.84	Agree
GS encouraged more student communication.	3.96	0.86	Agree
GS increased students' confidence in actively participating in classroom activities.	4.31	0.67	Strongly agree
GS enabled students to learn more effectively.	4.21	0.61	Strongly agree
GS helped improve students' skills, particularly reading and writing.	3.90	0.89	Agree
GS enhanced students' potential, especially in STEM subjects (Science, Technology, Engineering, and Mathematics).	4.21	0.75	Strongly agree
GS contributed to better student behavior.	3.63	1.01	Agree
Average	4.12	0.76	Agree
Effects on Teaching			
Teachers were able to manage classroom tasks more effectively.	4.06	0.87	Agree
Teachers were better able to identify the specific needs of each student.	3.94	0.80	Agree
Teachers provided more meaningful and significant feedback on students' work.	4.08	0.71	Agree
Teachers were able to teach fundamental content more effectively.	4.10	0.75	Agree
Students engaged more deeply with the subject content.	4.17	0.71	Agree
Students participated more actively and enthusiastically in learning.	4.38	0.77	Strongly agree
Teachers gained a better understanding of each student's capabilities through the use of GS.	4.15	0.72	Agree
Teachers communicated more effectively with stakeholders (parents, other teachers, and staff).	3.87	0.79	Agree
Average	4.09	0.77	Agree

From the table 8, it was found that teachers agreed on average that Google Solutions (GS) positively affected student learning ($M = 4.12$, $SD = 0.76$). In detail, the highest-rated item was that GS enabled students to seek knowledge and search for relevant information to support their learning, rated at the level of *strongly agree* ($M = 4.38$, $SD = 0.60$). This was followed by two items also rated at the *strongly agree* level: GS provided opportunities for students to use creativity and imagination in their work ($M = 4.31$, $SD = 0.73$), and GS increased students' confidence in actively participating in classroom activities ($M = 4.31$, $SD = 0.60$).

Furthermore, after using Google Solutions (GS), teachers also agreed on average that GS had a positive effect on their instructional practices ($M = 4.09$, $SD = 0.77$). In particular, the highest-rated item was that students participated more actively and enthusiastically in learning, rated at the *strongly agree* level ($M = 4.38$, $SD = 0.77$). The next highest items were that students engaged more deeply with the subject content ($M = 4.17$, $SD = 0.71$) and that teachers gained a better understanding of each student's capabilities ($M = 4.15$, $SD = 0.72$), both rated at the *agree* level.

Discussion

The results clearly demonstrate that Google Solutions (GS) played a vital role in improving both teaching and learning efficiency within Bangkok Metropolitan Administration (BMA) schools. Teachers reported that GS tools such as Google Classroom, Drive, and Forms significantly reduced their workload, particularly in grading and lesson preparation, allowing them to focus more on meaningful teaching interactions, consistent with Lin (2025) and Deep et al. (2025). Students also showed higher engagement, motivation, and creativity when using GS, supporting Khuntong's (2023) and Gupta and Pathania's (2021) findings that digital learning environments enhance participation and collaboration. Moreover, the integration of multimedia tools like YouTube encouraged active and self-directed learning, aligning with Pikhart, Al-Obaydi, and Klimova's (2024) view that digital platforms stimulate creativity and innovation. Altogether, the evidence suggests that when technology integration is supported through structured coaching, it not only streamlines teachers' tasks but also cultivates a more interactive, creative, and student-centered learning culture, an essential foundation for sustainable digital education in the 21st century.

Conclusion

In conclusion, this study confirms that the integration of Google Solutions (GS) through the coaching process effectively enhanced both teaching management and student learning within Bangkok Metropolitan Administration (BMA) schools. The use of GS tools, particularly Google Classroom, Drive, Forms, and YouTube, helped teachers reduce administrative workload, improve instructional efficiency, and provide more meaningful feedback to students. At the same time, students demonstrated greater engagement, creativity, and confidence in using technology for learning. These outcomes align with the BMA's digital transformation goals and previous research emphasizing that well-supported technology integration can transform classroom practices. Overall, the findings highlight that combining digital tools with continuous professional coaching creates a powerful model for fostering active, innovative, and sustainable learning environments in the digital era.

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

The author declares that ChatGPT and Gemini were used solely for language proofreading, including grammar checking and improving clarity of expression. These tools were not used to generate any academic content. All content presented in this manuscript, including data collection, analysis, and synthesis, was conducted independently and systematically by the author.

References

- Bangkok Metropolitan Administration, Office of Education. (2025). *Educational Statistics Report of Bangkok Metropolitan Administration Schools, Academic Year 2025*. Bangkok Metropolitan Administration.
- Bungsri, K., & Silanookit, C. (2023). The roles of administrators in promoting the use of information technology for learning management from the opinions of teachers under Khlong Sam Wa District Office, Bangkok. *Journal of Education, Loei Rajabhat University*, 17(1), 1–10.
- Chaiyasat, W. (2022). Online Teaching Management Through the Google Classroom Program During the Epidemic Situation of the Coronavirus Disease 2019 (COVID-19). *Journal of Management Science Review*, 24(1), 213–222.
- Changkham, W., & Chaemchoi, S. (2023). The study level of teachers' digital skills of schools under Bangkok Metropolitan in Pathumwan District. *Journal of Educational Administration*, 10(3), 340–350.
- Deep, P. D., Chen, Y., Ghosh, N., & Rahaman, M. S. (2025). The Influence of Student–Instructor Communication Methods on Student Engagement and Motivation in Higher Education Online Courses During and After the COVID-19 Pandemic. *Education Sciences*, 15(1), 33. <https://doi.org/10.3390/educsci15010033>
- Gupta, A., & Pathania, P. (2021). To study the impact of Google Classroom as a platform of learning and collaboration at the teacher education level. *Education and Information Technologies*, 26(1), 843–857. <https://doi.org/10.1007/s10639-020-10294-1>
- Khuntong, R. (2023). Development of Students' Achievement and Satisfaction towards Online Learning with the Google Classroom Application Using the T5 Model. *Journal of Information and Learning*, 34(1), 111–119. <https://doi.org/10.14456/jil.2023.10>
- Lin, N. (2025). *3 ways to reduce teacher workload using technology*. eLearning Industry. <https://elearningindustry.com/reduce-teacher-workload-using-technology-3-ways>
- Mankhong, S., & Detbunrung, S. (2024). Administration of information technology under the 23rd cluster school, Bangkapi District, Bangkok Metropolitan Administration. *Journal of the Graduate Arts Club*, 2(4), 54–64.
- Ministry of Education. (2025). *MOE X Google for Education: Partnership to transform Thai education and reimagine the future of learning — Launching the world's first student curriculum*. <https://www.moe.go.th/moe-googleforeducation/>
- Naudom, T., & Niyamajan, R. (2024). A study of professional teacher competency development guidelines according to the concept of coaching principles of the School Network 11, Yannawa District Office, Bangkok Metropolitan Administration. *Education Journal of Nakhonratchasima College*, 3(1), 49–64.

Pikhart, M., Habeb Al-Obaydi, L., & Klimova, B. (2024). Does digital learning stimulate creativity? *Cogent Arts & Humanities*, 11(1).
<https://doi.org/10.1080/23311983.2024.2407103>



©The International Academic Forum 2026
The International Academic Forum (IAFOR)
Sakae 1-16-26-201
Naka Ward, Nagoya, Aichi
Japan 460-0008
www.iafor.org