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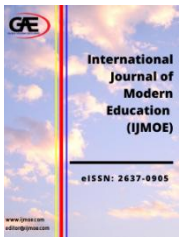

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EXPLORING EDUCATORS' PERCEPTIONS OF AI TOOLS IN SOUTHEAST ASIA: A TAM-BASED CROSS-NATIONAL STUDY

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Abstract:

As global education systems are growing digital, the effective adoption and integration of artificial intelligence (AI) among the educators have emerged as a crucial focal point. Hence, this research studied Southeast Asian educators' AI tool integration perceptions, directed by the Technology Acceptance Model (TAM) to explore Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) levels across the Southeast Asian countries and teaching levels. Quantitative data were collected from 35 educators across Southeast Asian countries via questionnaire, and descriptive statistics, comparative analyses, and Pearson correlation tests were conducted. The results revealed well-defined adoption patterns whereby Malaysia and the Philippines displayed the highest PU and PEOU, showing mature adoption phases. Timor-Leste and Brunei also recorded high PEOU scores but slightly lower PU scores than Malaysia and the Philippines, indicating good navigation on the AI platform but not utilising AI tools. Conversely, Cambodia exhibited low PU and PEOU, indicating a low level of digital readiness. Unusually, Laos has high PEOU but low PU, indicating issues between perceived accessibility and tool usability, while Singapore exhibits high PU but lower PEOU due to the complexity of the system. These findings highlight a growing readiness among educators to embrace AI yet results also reveal the need for targeted professional development, localised digital policy support, and context-sensitive pedagogical frameworks. The research results concluded that AI use is gaining momentum in Southeast Asia with its transformative potential power.

Keywords:

AI Integration, Artificial Intelligence in Education, Southeast Asian, Educators' Perception, Technology Acceptance Model

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Introduction

AI is increasingly becoming an essential and central part of our lives. Our lives seem to have evolved into a state of attachment and dependence on AI. AI technologies are changing human experiences in the way we talk, work, find information, and even engage in daily conversations, often without our conscious awareness. For instance, AI is transforming how the people talk, learn, and interact, and humans may not even realise how permanently AI has been assimilated into successions, spotlighting its unavoidable presence. The fact that AI is used in almost all succession planning may go unnoticed, which shows how inescapable it is.

Undeniably, AI is altering and revolutionising the way of nowadays' educators and students learn and teach, which is an apparent area where this paradigm-shifting effect is evident. With the assistance of AI solutions, both educators and students can be better equipped to meet the demands of modern classrooms by streamlining administration, personalising learning, and reinforcing instructional design to deliver differentiated instruction that adapts to various levels of knowledge backgrounds. Because of this, teachers today must be prepared to incorporate AI tools into their lessons to provide students with the most recent resources and instructional materials.

As Kohnke et al. (2025) agreed, the amplifying interdependence on AI has profoundly affected education practice, especially in teaching, learning, and assessment. Today, educators have access to a spectrum of AI technology like ChatGPT, DeepSeek, and Canva. Such tools have the capacity to have a significant impact on educational practices by improving creativity, efficiency, and personalisation in education (Boles, 2002; Hu et al., 2024; Zawacki-Richter et al., 2020). As acknowledged, AI is becoming a very strong force of transformation that is changing teacher-centered classrooms into more dynamic, interactive, and student-centered ones. But this shift also requires educators to go beyond adopting tools. Educators need to build critical AI awareness and understanding, not only to aid teaching with these technologies but also to interrogate them and their pedagogic and ethical implications (Farjon et al., 2019). These evolutions, in turn, are critically necessary in a context where education systems are challenged to respond to the changing needs of 21st-century learning, digital fluency, and scalable innovation (UNESCO, 2023).

Even though AI tools are increasingly becoming available in education, little is known about the way educators use and seek to integrate them into instructional practices. While preservice teachers are routinely confronted with digital technologies during their lecture lessons and training, research explicitly addressing how teacher education programs prepare to address the AI literacy issues is scarce. Already, minimum investigation has been conducted on the impact of AI awareness and understanding on impartial and effective human-AI collaboration learning environments (Kohnke et al., 2025). Even prolonged and broadened studies have tended to focus on matters of technology implementation and roll-out across larger areas (Carr, 2023), student motivation and engagement (Ching, 2015), and frameworks and policies (Feng, 2023); these studies have ordinarily neglected the primary role of teachers as the main pilot of pedagogical innovation (Nguyen, 2023; Ahmed et al., 2022). Hence, this research is intended to fill a void in digital readiness within the Southeast Asian region's educators in AI uptake and usage within everyday classroom teaching contexts.

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In attempting to fill this gap, the present study takes the TAM to understand better how the relationship between educators' attitudes and human-AI tool acceptance may be correlated. TAM, developed by Davis (1989), assesses a user's acceptance of technology based on two central constructs, the PU and PEOU. It is still a model that is broadly accepted to predict emergent use of technology in the educational system (Ahmed et al., 2022). Knowing teachers' perceptions and how widely they are implementing AI is critical for the design of effective teacher training, human capital strategy to promote digital equity, and policy on school reform. This research aims to empirically examine the relationship between educators' perceptions of AI's role in education, teaching levels, and cross-national adoption patterns and stages (early, emerging, or mature) across Southeast Asian countries. Additionally, it will explore the relationship between Perceived Ease of Use (PEOU) and Perceived Usefulness (PU), providing evidence-based insights to guide policy interventions and professional development strategies for enhancing AI adoption in education.

Hence, this research aims to answer the research question:

a) What are educators' levels of Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) regarding AI tools across different Southeast Asian countries?
b) How do Southeast Asian countries differ in their PU and PEOU patterns, and what adoption stages (e.g., early, emerging, mature) can be identified based on these differences?

Literature Review

Artificial Intelligence (AI) in Education

Over the last 10 years the use of AI-powered tools has proliferated from the adaptive tutoring systems to large-language-model (LLM) chatbots that automate mundane tasks, provide data-driven feedback, and adapt learning pathways (Bond & Buntins, 2023; Huetal, 2024; Nguyen, 2023). The banking and accounting sector has used AI to provide improved customer service experiences and identify instances of fraud across the globe (Jeong et al., 2023; Saleem et al., 2023; Tanbour and Nour, 2024). AI has appeared as a game-changer in education, unlocking the potential of the worldwide population into actual achievements and opening new avenues for exploration in teaching and learning. The integration of AI into education is a major change that will transform the way people learn and teach (Walter, 2024). AI tools are emerging to polish classroom practices across manifold socio-educational environments as the educational institutions in Southeast Asia embrace the digital shift (UNESCO, 2023). Education systems in the AI era empower transformative power and paradigm shifts beyond standard ways to create more dynamic, interactive, and student-centered learning environments (Chiu et al., 2023). AI improves the way students learn by assisting the development of thinking abilities like computational thinking and critical thinking, which are required in machine learning and robotics education. AI in education does not merely foster algorithmic thinking; it also focuses on creativity and technological fluency to encourage new ideas and critical thinking (Chiu et al., 2023).

The accelerated evolution of AI integration in education denotes educators are confronting the challenge of learning how to effectively utilise and understand the AI application as well as AI integration into various areas of curriculum and instruction, rather than resistance to its use as their only option (Alexandrowicz, 2024). To be effective in integrating AI into classroom practice, educators are required to be literate with the power and potential of a different range

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of AI tools as educational resources (Alexandrowicz, 2024). Teachers use these technologies to improve their teaching strategies rather than view AI as a replacement, enabling more individualised education and more personalised student interactions. The appropriate AI tools and resources help the educators in developing the lesson plans, interactive lesson activities, grading assignments, generating rubrics, making presentations, and writing reports by just keying in the good prompt (Langreo, Mcfarlane, & Meisler, 2023; Poth, 2023). Furthermore, the content of the lesson plan, activities, rubrics, and presentation were new, creative, and interactive in the form of texts, videos, audio, images, and simulations. This enables the evolution progress that happened in the way educators and students perceived the new knowledge (Alexandrowicz, 2024). For example, AI tools can figure out how each student learns best by looking at how they interact with and respond to things. Then, AI tools can create visual aids such as diagrams, charts, and films to assist students who learn best through visual means (Flores et al., 2023).

Teachers can use ChatGPT to look at student performance data and find out where students are having trouble understanding things (Rahman & Watanobe, 2023). According to a 2020 McKinsey & Company report, AI may first help teaching positions by lowering low-level administrative or clerical workloads. Researchers have found that AI-enabled technology should help people spend their time better, cutting the average 11 hours of weekly preparation down to only 6, which includes 5 to 10 hours for preparing lessons and resources. It will help teachers build relationships with each kid, encourage them to control themselves and keep going, and help them work together. Finley (2023) found six types of tasks where AI can help teachers do their usual work. These groups include (a) preparing lessons, (b) making materials, (c) changing the curriculum, (d) composing letters and emails for work and personal use, (e) making tests and rubrics, and (f) asking for comments on writing and content. AI tools help teachers come up with ideas for lesson plans; make and change learning materials; find useful resources; come up with fun activities and teaching methods that put students at the centre of the lesson; create assessments (like rubrics); make personalised guides and explanations; make quizzes and games; and make outlines and step-by-step presentations.

Teachers may better prepare their students for a future shaped by AI by learning about it themselves and applying it to improve educational results and provide students with the skills they need to thrive in an AI-driven environment (Alexandrowicz, 2024). More and more teachers are using tools driven by large language models (LLMs), such as ChatGPT, Canva AI, and Gemini, to help them plan lessons, make material, and give feedback in real time (Hu et al., 2024; Nguyen, 2023). Different authors have agreed on the beneficial things that AI can do for education. Fuchs (2023) acknowledged how AI helps students and teachers in a personalised and instant way by giving them different answers and explanations. For example, ChatGPT can coach students one-on-one and provide them feedback that is specific to them. The technology can offer personalised instruction and change how it teaches based on how well a student does, making its approaches engaging and adaptable (Baidoo-Anu & Owusu Ansah, 2023). Moreover, another study of 1,054 K–12 teachers and administrators found that they believed lesson plans should contain materials to assist pupils in learning about AI tools. Most K–12 teachers had heard of generative AI, but most had not used these technologies. K–12 teachers who answered the survey downplayed the effects of generative AI in the classroom, raised reservations about its use, and nevertheless thought it should be part of the curriculum. Many K–12 teachers also saw the possible benefits of utilising generative AI in the classroom, but they were most concerned about the possible problems (aiEDU, 2023).

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AI in Education in Southeast Asia Countries

Meanwhile, AI has also been a disruptive force in education. Globally, ministries of education are now framing AI as a strategic enabler of equity and innovation, highlighting the role it could potentially play in alleviating teachers' workloads, producing real-time analytics, and supporting children with diverse needs (OECD, 2021). In education, AIs were used to transfer a better teaching and learning process for learners at different levels of education (Wang et al., 2023). The rapid adoption of AI in society shows that teachers can learn to use it in many curricula and lessons instead of rejecting it as an option or their only option. Alexandrowicz, V. (2024). The gaps in AI readiness and governance in Southeast Asia are worrying.

National digital agendas, such as Malaysia's Education Blueprint 2025 and the Philippines' Digital Education Plan, in addition to Singapore's AI for Everyone initiative, have boosted the level of interest in AI in the region (UNESCO, 2023). As in the case of schools in Southeast Asia that focus on digital transformation, AI tools are starting to change teaching and learning in a variety of socio-pedagogical contexts (UNESCO, 2023). Singapore is flexing its muscles as the AI hub of Southeast Asia (Fitriani, 2024; Putra, 2024). Fitriani (2024) argues that Singapore has shown innovativeness and preparedness through its domestic regulation of artificial intelligence. In 2019, Singapore became the first ASEAN country to launch a National AI strategy, and since then, it has rapidly expanded its citizens' access to AI technology. There are also some that are still at their preliminary development stage (Isono & Prilliadi, 2023). Vietnam has recently released PhoGPT (derived from Pho, the name of Vietnamese noodle), a counterpart of ChatGPT in the Vietnamese language domain (Wang, 2024). Thailand has further exploited its AI application in the government's transportation matters, and Indonesia also has a spotlight on the country's agriculture and health sector recently (Fitriani, 2024). The ASEAN member countries are also constrained in a common understanding of AI at the regional level by having released one guide on AI governance.

Diffusion is not, however, universally smooth: high ICT infrastructure countries (e.g., Singapore) implement AI-agnostic formative assessment, while ICT-impoverished systems (e.g., Cambodia) wrestle with problems of connectivity and teacher training (Walter, 2024). This discrepancy is further compounded by concerns regarding the data privacy, fairness, and ethical governance issues that, when unattended, may stymie the large-scale deployment (Kasneci et al., 2023). Therefore, while the promise of AI is known, the need for enabling policies, investments in infrastructure, and continuous professional training fills the gap in all sectors across the region. Instead of AI being a substitute, teachers leverage these tools to enrich their teaching, leading to more individual engagement with students and helping personalise instruction. If they were to gain AI literacy, teachers would be better placed to prepare their students for life in the age of AI, making use of AI technologies to enhance learning outcomes and to provide students with necessary tools to navigate an AI-infused life (Alexandrowicz, 2024).

Educators' Perceptions and the Need for AI Literacy

With the rise in AI's presence in education, the teacher's role is also changing. To be successful in contemporary classrooms, prospective teachers need to have an adequate foundation of teaching skills as well as a sound background in AI. Nevertheless, learning analytics are difficult for many pre-service teachers to interpret and to understand how AI can further

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pedagogical methodologies (Salas-Pilco et al., 2022). Such unfamiliarity frequently leads to a necessary reluctance to use AI as a teaching tool (Backfisch et al., 2021).

The acceptance of AI by teachers is influenced by factors such as its perceived usefulness, self-efficacy, organisational culture, and access to professional development opportunities (Teo, 2021). A study of 1,054 K–12 educators in the United States revealed that, although 80% reported having heard of generative AI, only slightly more than 30% were comfortable incorporating such AI into lessons, primarily because of insufficient training and unclear application in the classroom (aiEDU, 2023). We are seeing similar patterns in Southeast Asia, where many teachers see the benefits of AI but are hesitant, expressing concerns that it may be misused or misapplied by teachers. Obstacles faced include the pace of tool evolution, lack of pedagogical worth, and quality of technical support (Alexandrowicz, 2024; Langreo, McFarlane, & Meisler, 2023). Where well supported, however, teachers are effective at using AI for formative feedback, data-driven differentiation, and creative content construction (Fuchs, 2023; Rahman & Watanobe, 2023). These findings suggest that AI literacy—a combination of technical fluency, critical judgement, and pedagogical imagination—is a requirement for meaningful AI integration (Kasneci et al., 2023). Professional development focusing on ethics, instructional design, and hands-on experience is essential so that fear is transcended and positive attitudes are translated into revolutionary teaching behaviours.

The advanced pace of GenAI technologies also makes them an appealing tool for teachers as well to offload administrative work and personalise the learning path. Pre-service teachers could benefit from such resources, which, while not replacing the teacher, can save them time grading and carrying out the daily chores of a teacher and thus give more time to student-centred teaching (Holstein & Aleven, 2022). Data-driven insights from AI can also enable novice teachers to make informed decisions, contributing to better student achievement (Cheng & Wang, 2023). But despite these positives, more work is needed on the way AI can be combined with teachers, not replace them. The complementary human–AI approach contends that AI should serve to augment humans rather than replace them—a principle that is particularly relevant for pre-service teachers needing to balance instructional expertise and complementary support offered by AI (Holstein & Aleven, 2022). When used in a purposeful manner, the integration of AI may allow for the enhancement of learning (Cukurova et al., 2019). For instance, AI technology has been demonstrated to automate feedback on lower-level writing when teaching English as a foreign language, enabling teachers to concentrate on higher-order features, such as organisation and revision (Gayed et al., 2022). This support is of particular value to preservice teachers, who are still learning classroom management skills and require help in finding the balance between instruction and paperwork.

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), proposed by Davis (1989), is one of the most extensively applied frameworks for predicting and explaining users' acceptance of technological innovations. TAM centres on two primary constructs: Perceived Usefulness (PU), which reflects the belief that technology enhances job performance, and Perceived Ease of Use (PEOU), which refers to the extent to which the technology is perceived as effortless to use. TAM is more suitable for early-stage technology adoption studies in education (Venkatesh et al., 2003). The PU and PEOU have been widely validated in educational technology research, including studies examining AI adoption (Nguyen, 2023; Ahmed et al., 2022). Meta-analyses confirmed that these constructs significantly influenced educators' adoption of digital

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learning tools (Ahmed et al., 2022). In the context of AI, recent quantitative studies show that PU and PEOU are strong predictors of teachers' behavioural intentions to adopt AI platforms, accounting for up to 60% of the variance (Ahmed et al., 2022; Hu et al., 2024). Furthermore, a 2024 study of private school teachers in Azerbaijan found that PU strongly predicted actual AI usage, while PEOU had a weaker or inconsistent effect (Davis & Granić, 2024).

TAM is particularly relevant to this study as it captures educators' perceptions of AI's potential to improve efficiency in tasks such as lesson planning, assessment design, and classroom management. In Southeast Asia, where AI adoption in education is still developing, TAM offers a sturdy structure for assessing teachers' readiness, confidence, and attitudes toward using AI within a wide scope of instructional settings (Hu, Li, & Luo, 2024). In this study, TAM serves as the lens for exploring teachers' cognitive and affective readiness to integrate AI by examining their perceptions of its usefulness in saving time and improving teaching quality, as well as their confidence in its ease of use. These constructs are operationalised through Likert-scale items and open-ended responses to gain a nuanced understanding of teachers' attitudinal readiness. Nevertheless, TAM primarily explains the 'why' behind adoption decisions but offers little insight into 'how' technologies are integrated pedagogically (Teo, 2021). Specifically, TAM does not assess the depth of instructional transformation—a crucial limitation when researching AI in education, because true value lies not in adoption alone but in the quality of integration.

Research Gap

Although global interest in AI for education is growing rapidly, empirical investigations in Southeast Asia remain scarce and fragmented. One of the most significant barriers to AI integration in classrooms is teachers' fear of using AI tools, primarily because they lack sufficient knowledge about how AI tools function and worry about using them incorrectly. The fast-paced evolution of digital technology and AI further exacerbates this concern, making it challenging for educators to keep up with new developments (Alexandrowicz, 2024). Teachers often feel overwhelmed by the lack of practical guidance on how AI can best be used to enhance instruction (Walter, 2024).

Existing research has predominantly emphasised technical feasibility or learner outcomes, often overlooking the lived experiences, decision-making processes, and professional challenges of frontline teachers (Zawacki-Richter et al., 2020). Furthermore, most quantitative surveys focus narrowly on measuring acceptance levels, offering limited insight into the quality of AI integration beyond basic substitution (Nguyen, 2023). Limited professional development opportunities also widen the gap between schools that provide systematic training and those that do not, resulting in inequitable access to AI-enhanced teaching practices (Kasneci et al., 2023). Longitudinal or mixed-methods studies that triangulate perception data with authentic instructional artefacts remain rare, leaving unanswered questions about how teachers move from adoption to meaningful pedagogical transformation. To address this, Walter (2024) recommends fostering a "culture of AI" in education—one that normalises the use of AI tools, encourages critical evaluation, and supports regular engagement with AI developments. This involves structured professional development, including workshops and collaborative meetings among teachers, supervisors, and students, focusing on ethical considerations, best practices, and emerging trends. Such initiatives are essential for embedding a more profound understanding of AI's technical, pedagogical, and social implications in educational communities.

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Methodology

Research Design

To explore how Southeast Asian educators perceived the incorporation of AI-powered tools into teaching and learning, the quantitative research design was employed. The study was based on the TAM, in which educators' PU and PEOU of AI tools were measured. This approach enabled the investigation of educators' readiness and intention to integrate AI tools, focussing on their usability and value. The study was conducted in one single quantitative phase to ensure the wide range of the analysis. Phase 1 was the quantitative study to discover trends of teacher perceptions on AI and patterns of tool usage across the country and teaching levels. The data was analysed descriptively and through correlation analysis to examine the relationship between PU and PEOU across country and teaching level to gain the data-driven understanding of AI adoption in educational contexts across Southeast Asia.

Participants

Thirty-five teachers from Southeast Asia, like Thailand, Malaysia, Brunei, Cambodia, the Philippines, Indonesia, Thailand, Laos, and Timor-Leste, responded to the study. Participants were sampled purposefully, with the sampling criteria being participants who had already attended a regional AI-focused professional learning workshop. The sample comprised teachers from different Southeast Asian countries and teaching levels (secondary, pre-university, tertiary, and others). The sample diversity allowed the researchers to gain insights on how AI is perceived and used across various educational and national settings.

Data Collection Instruments

A formal questionnaire was created on Google Forms to collect quantitative information from the participants. The questionnaire was composed of two parts. Section A included demographic data about participants, namely nationality and school type, years as teachers, and school level. Section B contained TAM Likert-scale statements to measure two main constructs: PU and PEOU. These items were rated on a 5-point scale from 1 (Strongly Disagree) to 5 (Strongly Agree). The items of TAM were drawn from Davis (1989) and informed by a prior use of the constructs from AI-in-education (Nguyen, 2023; Ahmed et al., 2022).

Data Analysis Procedures

This study utilised quantitative methodology to interpret the data. The questionnaire data were encoded and analysed using descriptive statistics in Microsoft Excel for quantitative analysis. Responses to the five-point Likert-scale items, which were then collapsed into 5-point values (1: Strongly disagree, 2: Disagree, 3: Neither agree nor disagree, 4: Agree, 5: Strongly agree), were used to generate mean scores for the TAM constructs: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). The differences were analysed between countries and levels of teaching through bar charts. Pearson correlation analysis was also performed to examine the strength and direction of the relationship between PU and PEOU.

Result and Discussion

The result and discussion were be grounded according to the TAM to evaluate educators' PU and PEOU of AI tools. The perceived value of AI by educators is reflected in PU, while usability and confidence in utilizing AI are reflected in PEOU. There were 35 of the educators' participants from 9 different Southeast Asian country involved in the study. The number of

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educators' participants from different country and teaching level were identified were analyzed and recorded in Table 1.

Table 1: Educators' Participants from 9 different Southeast Asian Country

Country	No of Participants (Country)	Teaching Level	No of Participants (Level)
Thailand	6	Secondary School	29
Cambodia	6	Pre-University / Tertiary	5
Philippines	5	Other	1
Malaysia	6		
Brunei	4		
Timor Leste	4		
Laos PDR	2		
Singapore	1		
Indonesia	1		

Source: Authors' Work

In focused on the effectiveness of AI tools integration among Southeast Asian country educators', 35 educators from Southeast Asia country who answered the PU and PEOU of AI tools' questionnaire, had the positive perception towards applying AI tools in classroom teaching. Table 2 depicted the level of educators agree and strongly agree toward the AI integration.

Table 2: Percentage of Agree and Strongly Agree of Teachers on the AI Integration

Questionnaire Item	% Agree/ Strongly Agree
AI automates tasks like grading, quiz design, and slide creation	77
AI saves significant time in lesson planning	83
AI simplifies creation of teaching materials	80
AI supports creation of more interactive and engaging resources	74
AI enables production of varied instructional resources with less effort	71
AI personalizes learning based on student needs	66

Source: Adapted from Davis (1989), (Nguyen (2023), Ahmed et al. (2022)

Among the educators, 77% agreed or strongly agreed that AI tools facilitated automating some aspects of repetitive teaching (such as grading, quiz creation, and slide preparation), as indicated in Table 2. This result is consistent with prior work that has emphasised the impact of AI in easing the burden of teachers on administration and academic workflow (Hu et al., 2024). Also, 83% agreed or strongly agreed that AI tools allowed them to save a lot of time in lesson planning, and 71% said that AI makes it easy to create educational content like worksheets and assessments. These findings mirror those of previous research that has evidenced the efficacy and additive value of intelligent agents and generative AI systems in ID (Chiquet et al., 2023; Kim & Baylor, 2016). While the responses indicated a general agreement for AI tools to assist in the administrative and pedagogical aspects of teaching in the classroom, only 66% of teachers agreed that AI tools were effective in personalising learning. This finding

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indicates that, although teachers see the extent of AI's utility, perhaps further training and exposure to AI may be required to use AI for DI (Tegos & Demetriadis, 2017).

The questionnaire items were divided into PU and PEOU factors that were consistent with the TAM model. These TAM-based Likert-scale items were determined (Table 3) and include PU items of AI tools, which reflect the belief in how useful the AI tools are for enhancing effectiveness and outcomes in supporting teaching tasks, as well as PEOU items of AI tools, which indicate how easy and effortless it is for educators to use AI tools in planning and organising lessons. This information was provided to educators to help identify their perceptions of AI and its use in their jobs.

Table 3: TAM-based Likert-scale Items

Perceived Usefulness (PU) Items	
1.	AI tools help me automate repetitive teaching tasks such as grading, generating quiz questions, or preparing presentation slides
2.	Using AI-powered tools has saved me significant time in lesson planning.
3.	AI tools support me in creating more interactive and engaging learning materials.
4.	AI-powered tools assist me in organizing and structuring my lessons more effectively
5.	AI-powered tools help me personalize the learning experience based on student needs
Perceived Ease of Use (PEOU) Items	
6.	AI-powered tools help me simplify resource creation (e.g., worksheets, assessment items, lesson materials
7.	I am able to generate a wider variety of instructional resources with less effort using AI tools

Source: Adapted from Davis (1989), (Nguyen (2023), Ahmed et al. (2022)

PU and PEOU Across Different Southeast Asia Country

Visualised in the Bar Chart Comparison by Country in PU and PEOU (Figure 1a, 1b), the final result of the study shows that it is important to notice significant differences in the way educators in the Southeast Asia region make sense of and use their AI teaching assistant tools through the measurement of PU and PEOU across nine countries (Table 4). Several interesting patterns appear that indicate regional trends and localised barriers impeding the deployment of AI solutions.

Table 4: Comparison by Country

Country	Perceived Usefulness (PU)	Perceived Ease of Use (PEOU)
Brunei	3.96	4.00
Cambodia	3.33	3.33
Indonesia	3.67	4.00
Laos	2.67	4.00
Malaysia	4.25	4.50
Philippines	4.30	4.20
Singapore	3.67	3.00
Thailand	3.81	3.50
Timor Leste	3.88	4.24

Source: Authors' Work

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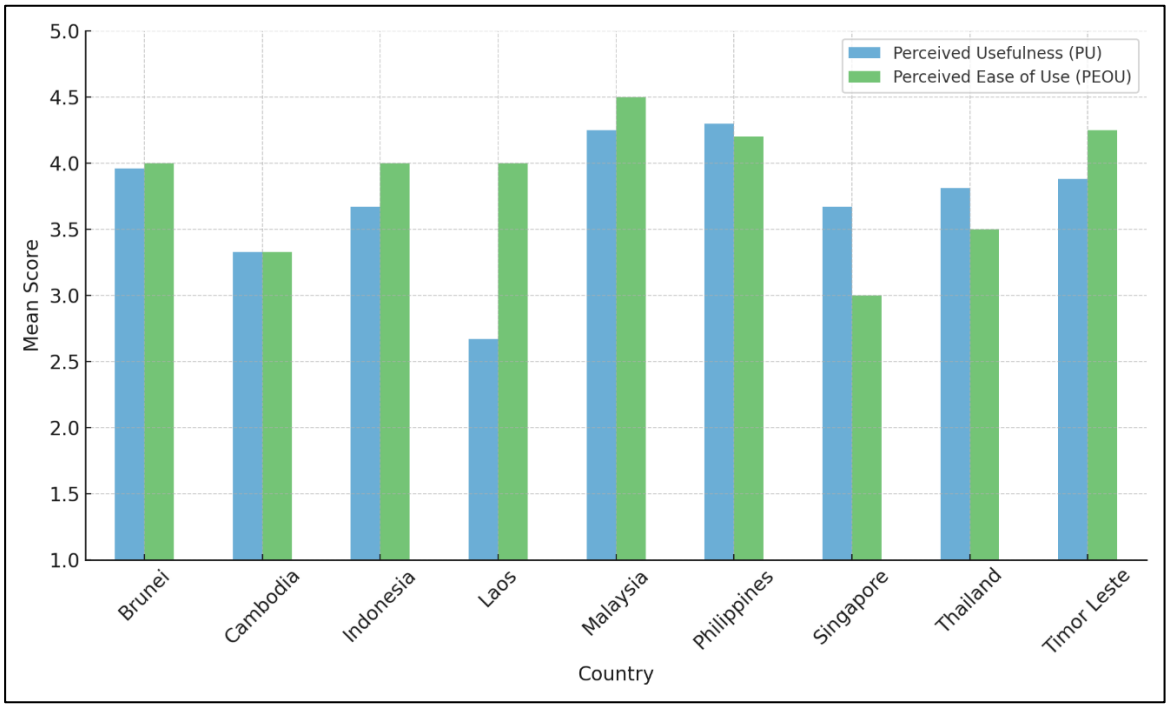

Figure 1(a): Bar Chart: Comparison by Country in PU and PEOU

Source: Authors' Work

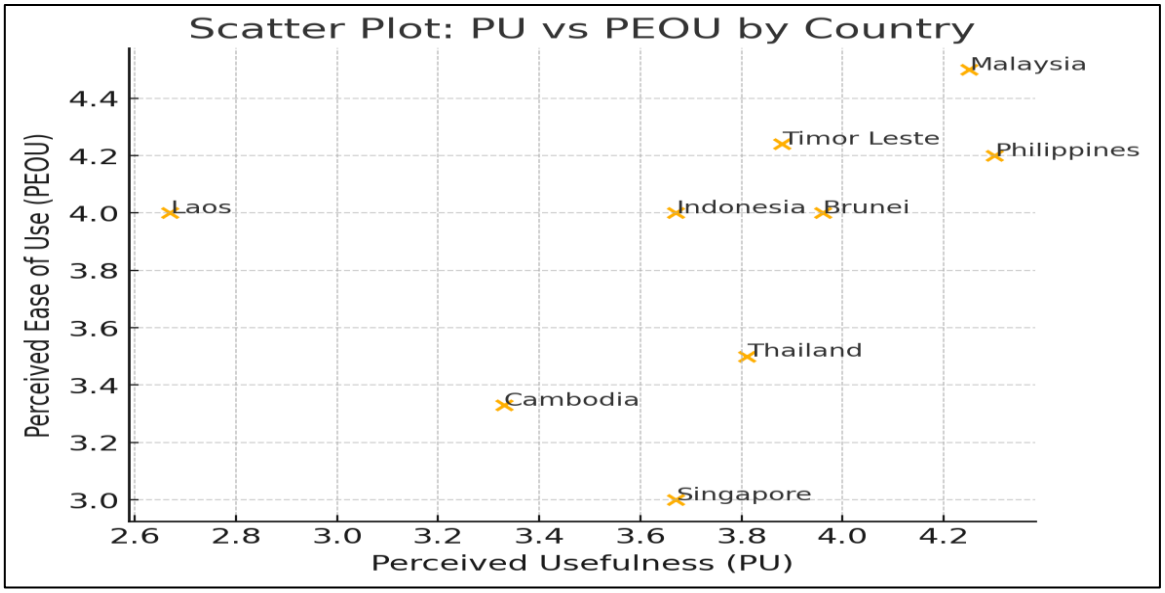

Figure 1(b): Scatter Plot: Comparison by Country in PU and PEOU

Source: Authors' Work

Educators from Malaysia and the Philippines had the highest overall ratings on both PU and PEOU measures (Figure 1a, 1b). For Malaysia and the Philippines, the PU means recordings of 4.25 and 4.30, and the PEOU means 4.50 and 4.20, respectively. These findings suggest a high perceived utility and usability of novel AI tools such as ChatGPT, Canva, and Gemini in practice with respect to lesson planning, instructional material generation, and student engagement. The research result is in line with previous studies specifying that educators are prone to integrate technology when the technology is beneficial and shows the capability of lightening the educators' workload as well as easily fitting into their current work patterns

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(Davis, 1989; Nguyen, 2023). Data had proven that Malaysia is well-positioned in this regard due to the national education that emphasizes digital transformation in education with high exposure of professional development programs in EdTech and AI to the educators. The Philippines also works hard in promoting the AI-enabled pedagogic training programs to the educators, which could explain the high positive value in AI integration and readiness to use among the Malaysian and Philippine educators in explaining the positive impression and readiness in AI integration. (UNESCO, 2023).

Educators from Timor-Leste and Brunei also recorded relatively high PEOU (4.25 and 4.00, respectively) (Figure 1a, 1b), indicating that Timor-Leste and Brunei educators also find AI tools easy to use. But Timor-Leste and Brunei recorded slightly lower PU scores than those in Malaysia and the Philippines, at 3.88 (Timor-Leste) and 3.96 (Brunei), meaning that Timor-Leste and Brunei educators are able to navigate the AI platform well, but they are not utilising the AI tools to their potential for pedagogic purposes. This finding indicated the necessity of the need for support beyond technical competency to pedagogical integration as recommended by experts, which would assure that AI is not only accessible but also related to learning objectives (Hu et al., 2024).

Thailand and Cambodia showed moderate PU (3.81; 3.33) and PEOU (3.50; 3.33) (Figure 1a, 1b), indicating a transitional phase in AI adoption. Educators from both countries also expressed a moderate desire to integrate AI. According to these findings, these countries are in a transitional stage, whereby there is widespread recognition of AI's potential, but limited institutional support, infrastructure, or localised training prevents widespread adoption. This is parallel with the finding of the study done by Ahmed et al. (2022), which recognised that insufficient AI implementation frameworks continue to be the major obstacle for the teachers' self-confidence in various education systems in Southeast Asia. It is interesting to find that Laos had a high PEOU score of 4.00 but a relatively low PU score of 2.67, which indicated a disconnect between perceiveness and the tool's accessibility. The fact that educators do not view the system as particularly helpful, even though they find it easy to use, may indicate that the technology is not applicable to their work or in line with their teaching requirements. This revealed the importance of exposed Laos educators in integrating the AI into context-relevant teaching methods besides making AI tools accessible.

Singapore scored high in PU (3.67) but low in PEOU (3.00), suggesting system complexity may hinder usability (Venkatesh & Davis, 2000). Singapore scored the lowest PEOU (3.00), while Indonesia and Singapore had moderate to high PU (3.67), which may have been caused by differences in the expectations for digital workload or teacher training in these two countries. According to the comparative TAM analysis, the infrastructure, teacher training, institutional support, and national policy alignment support the AI tool adoption across countries. While some countries are undoubtedly moving closer to implementing AI in education on a large and revolutionary scale, others are still in the early phases of adoption.

Correlation between PU and PEOU Across Different Southeast Asia Country

In proving "better usability usually makes people see more value in using," this research studied a correlation between PU and PEOU in AI integration across ASEAN countries. The findings partially support the Technology Acceptance Model's (TAM) premise that PEOU has a positive impact on PU, which in turn encourages adoption intentions (Venkatesh & Davis, 2000). A Pearson product-moment correlation was employed to examine the relationship between PU

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and PEOU in nine countries in Southeast Asia. The findings indicated a positive correlation ($r(7) = .36$, $p = .34$), but it was not statistically significant. This evidence indicates that although there is a correlation between higher PEOU and higher PU, it is not statistically significant. Disparities in things like professional development, digital infrastructure, and system relevance may be the cause of this.

Higher PU scores were associated with higher PEOU ratings in most Southeast Asian countries. This implies that teachers are more likely to believe AI technologies are beneficial for teaching and learning when they believe they are simple to use. This trend was particularly evident in Timor-Leste (PU = 3.88; PEOU = 4.24), Malaysia (PU = 4.25; PEOU = 4.50), and the Philippines (PU = 4.30; PEOU = 4.20), where investments in professional development programs and digital infrastructure probably make things easier to use and lead people to believe they are more useful for teaching (Hu, Li, & Luo, 2024). When the correlation between PU and PEOU in AI integration is high, it proves that educators have strong adoption readiness. With high mean scores in both PU and PEOU, Malaysia, the Philippines, and Timor-Leste support this association, which is in the mature adoption stage.

The Philippines and Malaysia have significantly invested in professional development and digital infrastructure, enhancing educators' views of PU and PEOU AI and associated technologies. The integration of ICT-centric teacher training with initiatives such as Malaysia's Jalinan Digital Negara (JENDELA) program and national high-speed broadband projects has enhanced internet accessibility, particularly in rural regions. Such investment has enhanced educators' views on usability and accessibility (Telecommunications in Malaysia, 2024). In the Philippines, government programs like the Department of Education's Enhanced Basic Education Information Systems (EBEIS) and university-level ICT projects have improved training opportunities for teachers, boosting their confidence and ability to use technology in teaching, even though there are differences in internet access across regions (Arante & Bascon, 2024; Department of Education, 2023). This is consistent with Venkatesh and Davis's (2000) extended Technology Acceptance Model that highlights in a matured digital market, perceived utility is largely influenced by usability. Malaysia and the Philippines emerge as frontrunners in strong adoption readiness, with high, consistent ratings in PU and PEOU, reflecting superior digital readiness and strong technology acceptance—making them targets for imitation or pilot markets.

Brunei (PU = 3.96; PEOU = 4.00), Indonesia (PU = 3.67; PEOU = 4.00), and Thailand (PU = 3.81; PEOU = 3.50) appeared to be in the emerging stage in the AI integration. PU and PEOU are moderate to high, indicating favourable adoption potential. The research finding showed a moderate to strong positive correlation relationship between PU and PEOU in AI integration across the ASEAN countries. In other words, the countries that find the technology more user-friendly also tend to think it is more beneficial in their educational tasks. Then, the educators will develop a greater ease of use when efficiency and perceived use are higher, which aligns with TAM **(**Davis, 1989). This scenario is consistent with TAM's theory that a higher PEOU can result in a higher PU, demonstrating the significance of usability in influencing perceived value (Venkatesh & Davis, 2000). The three countries exhibit moderate to high levels of acceptability, indicating that growth is probably going to continue. Continuous user involvement and feedback techniques are necessary to sustain adoption (Hu, Li, & Luo, 2024).

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However, Singapore and Laos deviate greatly from this pattern, indicating that some odd things are happening there. Laos, on the other hand, stands out because Laos educators claimed that AI tools are always simple to use (high PEOU) but not very helpful (low PU), indicating a discrepancy between their perceived usefulness for instruction and their ease of use. This result is consistent with the extended Technology Acceptance Model (TAM2), which states that perceived usefulness is influenced by factors other than ease of use (Venkatesh & Bala, 2008). When people believe that technology is simple to use but fail to see how it can be applied to their teaching tasks or how it could improve student learning, they are less likely to fully embrace or use it in their classrooms. This conclusion is further supported by a study conducted in Luang Prabang, Lao PDR. Perceived usefulness remained low because it didn't align with teachers' demands and the challenges they faced in their classrooms, even though computer self-efficacy was a strong predictor of PEOU (Poong, Tan, & Ong, 2017). According to these findings, demonstrating the true advantages of implementing AI in education and bridging the gap between perceived value and usability require targeted communication strategies and professional development that occur in an appropriate environment.

Singapore, on the other hand, is an exception to this research finding, as Singaporean educators express the opinion that AI tools are very helpful (high PU) but difficult to use (low PEOU). This result is in line with research by Venkatesh & Davis (2000), which found that people frequently believe that system complexity is beneficial but that it may make it more difficult to use. The situation in Singapore highlights the urgent need for user experience enhancements and focused training programs to support educators' adoption and continued use of AI tools, which are acknowledged for their educational benefits but have usability issues. In contrast, Cambodia scored lower on both PU and PEOU, indicating that it is still in the early stages of adopting AI and is not very digitally mature. This result supports the findings of Venkatesh, Morris, Davis, and Davis (2003), who stated that external factors such as facilitating adoption, increasing awareness, and obtaining institutional support are crucial in the early phases of adoption. Cambodia is an early-adoption market that can profit from focused awareness campaigns and capacity-building initiatives to increase educators' confidence in the perceived value of AI tools. The country has average scores for both PU and PEOU. These insights provide information on the strategic foundation for tailoring programs that will increase the use of technology among more people in diverse ASEAN contexts.

PU and PEOU in Different Teaching Level

The TAM, which holds that PEOU has a positive impact on PU and subsequently influences technology adoption (Davis, 1989; Venkatesh & Davis, 2000) across different levels of teaching. By analysing both PU and PEOU across three different teaching levels, several meaningful patterns emerge that inform both the teaching level of the educator and localised challenges in AI integration based on Table 5.

Table 5: Comparison PU and PEOU by Teaching Level

Teaching Level	Perceived Usefulness (PU)	Perceived Ease of Use (PEOU)
Other	4.00	4.00
Pre-University / Tertiary	3.20	3.20
Secondary School	3.93	4.03

Source: Authors' Work

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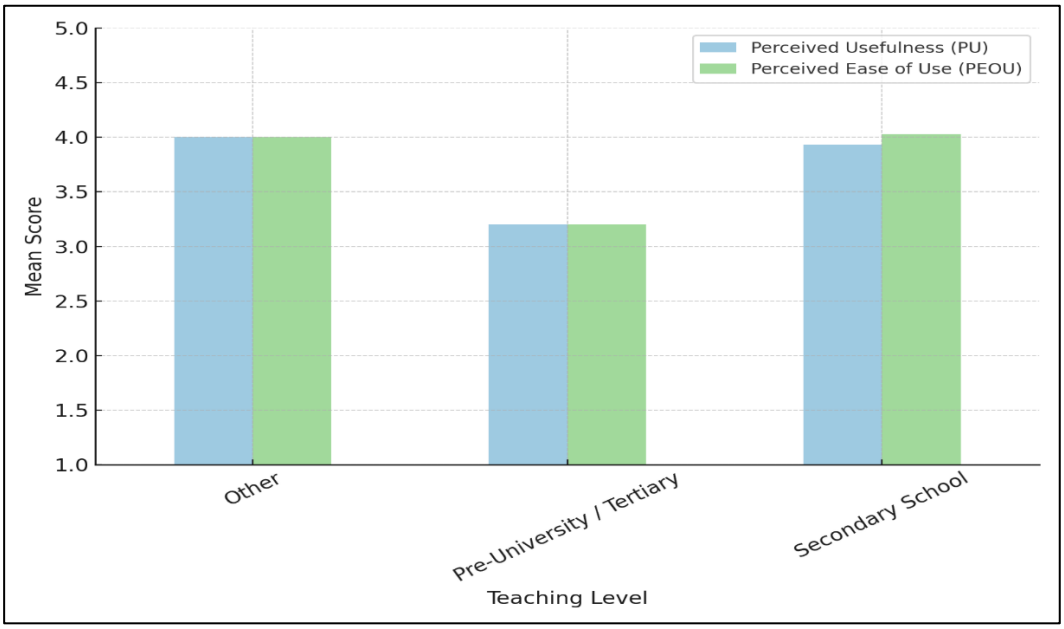

Figure 2: Comparison PU and PEOU by Teaching Level

Source: Authors' Work

Secondary school teachers had the highest ratings with an average score of 4.03 on PEOU and 3.93 on PU (Table 5). This would indicate that teachers find the AI tools useful and that a) it is easy to integrate them into their teaching tasks, such as making quizzes, preparing lessons, and designing content. As supported by the findings of Hu et al. (2024) and Koraishi (2023), teaching at the secondary level requires educators equipped with competency in communication and content analysis methods, which can be assisted by AI tools (Hu et al., 2024; Koraishi, 2023). In addition, secondary school curricula are always packed with content and extra activities that require educators to cater within the timeline, besides the administration paperwork. Hence, secondary school educators showed a high level of acceptance of AI and the use of the AI tools that help to reduce their workload and time in administration and instruction (Ahmed et al., 2022).

In contrast, pre-university and university professors had the lowest TAM scores, with an average of 3.20 for PU and PEOU. This might indicate that pre-university and university professors in college or other higher education are particularly wary of AI content because they are looking to create the original material, worry about academic integrity, and believe the AI-generated materials are not as good as they are because the ideas are so hard. Moreover, instructors at this level may be prohibited from the employment of generative tools or automated feedback systems if their school or department has a policy against it" (Zawacki-Richter et al., 2020, p. With certain consistency with other research findings, in higher education, there are occasions that people are reluctant to adopt AI, not because they are not sure how to use it but more so because of how to ethically use and secure data privacy as well as what exactly AI can do to teaching other than just providing information (Nguyen, 2023).

PU and PEOU were both at 4.00 for teachers who selected "Other" as their teaching level (such as non-formal, vocational, or multi-level settings). The results indicate that teachers in alternative education settings are generally receptive to using AI techniques, despite the small sample size for this group. This openness might result from the fact that vocational and non-

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formal education employ various innovative teaching strategies, which frequently encourage students to experiment with different learning modalities (Kasneci et al., 2023). Additionally, teachers in these circumstances usually have to manage the school and teach in multiple ways, which increases their likelihood of using technology to simplify their administrative and teaching tasks (Hu, Li, & Luo, 2024). Their preparedness is consistent with previous research showing that teachers who are more confident in their technological abilities and have experienced a range of teaching approaches are more likely to use new technologies like artificial intelligence (Nguyen, 2023).

PU and PEOU across different ASEAN Countries and Teaching Levels

PU and PEOU were compared across ASEAN countries and teaching levels to gain a deeper understanding of how prepared teachers are to use AI tools. According to TAM, PEOU positively affects PU, which predicts technology use (Davis, 1989; Venkatesh & Davis, 2000). According to the overall trend, educators strongly believe that when the AI tools are user-friendly and compatible with their teaching philosophies, the AI tools can improve student learning outcomes.

Table 6: Pearson's r for ASEAN Countries and Teaching Level

Dataset	Pearson's r	p-value
ASEAN Countries	0.36	0.34
Teaching Levels	0.99	0.07

Source: Authors' Work

Teachers' readiness to use AI tools can be observed by PU and PEOU across ASEAN countries and instructional levels. Due to their sturdy digital ecosystems, up-to-date infrastructure, and continuous professional development initiatives, Malaysia (PU = 4.25, PEOU = 4.50) and the Philippines (PU = 4.30, PEOU = 4.20) are both prepared to accept new technologies (Hu, Li, & Luo, 2024). When the educators are adaptable and knowledgeable about various teaching philosophies, teachers are more at ease experimenting with AI for both teaching and administrative tasks at the teaching level, particularly in secondary schools (PU = 3.93, PEOU = 4.03) and non-formal/vocational education (PU = 4.00, PEOU = 4.00) (Kasneci et al., 2023). These findings identified that to increase perceived value and usability, infrastructure and specialised training are critical.

At the lower end of the adoption spectrum are pre-university/tertiary educators (PU = 3.20, PEOU = 3.20) and Cambodia (PU = 3.33, PEOU = 3.33). To make things more user-friendly and practical, they require institutional support, awareness campaigns, and capacity-building programs, as they are still in the early phases of digital maturity (Venkatesh, Morris, Davis, & Davis, 2003). AI's impact on teaching and learning could be limited if these adjustments aren't made because teachers might still be hesitant to use it. There is a weak positive but non-statistically significant correlation between PU and PEOU in the ASEAN country dataset ($r(7) = .36$, $p = .34$). Thus, greater usability does not necessarily translate into greater perceived utility. Some factors influencing this variability include the implementation of policies, access to teacher training, and digital infrastructure (Kasneci et al., 2023). However, the teaching-level dataset revealed a forceful positive association ($r(1) = .99$, $p = .07$), indicating that usability significantly predicts perceived usefulness, as predicted by TAM, in classrooms with more consistent training and teaching standards.

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In TAM, the predicted PEOU post the impact on the PU route has two major issues. Singapore (PU = 3.67, PEOU = 3.00) has a high perceived value but a low ease of use, meaning that although educators are aware of the advantages of AI, they aren't utilising it because the interface is poorly designed or the system is too complex. Conversely, Laos (PU = 2.67, PEOU = 4.00) has a high usability rating but a low perceived value, most likely due to a poorly aligned curriculum and unclear learning objectives (Venkatesh & Bala, 2008). These oddities indicate how crucial it is to make changes that are appropriate for each circumstance. It's important to keep in mind that this research finding supports the model's applicability in explaining the integration of AI in Southeast Asian education. Although this relationship is influenced by factors like infrastructure, institutional readiness, perceived work relevance, and system design quality, a higher PEOU corresponds to a higher PU. To help teachers go beyond simply utilising AI to using it in a way that is relevant to teaching, policymakers should combine infrastructure investments, professional development, and curriculum-aligned AI integration.

Conclusion

The Technology Acceptance Model (TAM) was used to explain the adoption of AI by educators, as evidenced by comparing PU and PEOU among ASEAN countries educators which teaching in different educational level. Up-to-dated infrastructure, appropriate training, and adaptable teaching methods provide evidence to the AI adoption. Malaysia, the Philippines, and secondary or vocational training levels scored highly regarding PEOU and PU. Yet certain measures are necessary for enhancing the perceived value and usefulness of the lesson in higher education and early adopting contexts such as Cambodia. There were major differences where, for example, Singapore had a high PU and low PEOU and Laos had a high PEOU and low PU that indicate usefulness is not always related with usability if there are not right system designs and support. What this means is that a diverse range of methods are needed to shift from the basic acceptance of technology to revolutionary pedagogical change. Future studies should adopt a longitudinal approach to track changes in educators' AI usage over time.

This study has several limitations. It is difficult to generalize to other groups because of the small sample size (n=35) in this study. Hence, larger and more heterogeneous samples are necessary. Furthermore, participants were selected from an AI-focused workshop, which may introduce bias into the sampling process as these educators may have more favourable views on incorporating AI. Additionally, the self-reported PU and PEOU could be biased by socially desirable responses (Hersey et al., 2008) and cannot necessarily be seen as a reflection of people's behavior. Hence, lesson plan analysis via classroom observation or AI-use itself needs to be part of future research. Secondary-analytic sources informed on the institutional culture and policy support and suggested the multi-level and mixed methods nature of the study. To explore the transition from elementary adoption to transformative AI usage (especially in Cambodia and Laos), TAM and SAMR should be integrated.

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