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Integrating Artificial Intelligence in Secondary Education: A Comparative Study of Pedagogical Readiness and Student Engagement in Southeast Asia

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Abstract

The integration of Artificial Intelligence (AI) in secondary education has emerged as a pivotal trend across Southeast Asia, promising transformative impacts on pedagogy and student engagement. This qualitative comparative study analyzes pedagogical readiness and student engagement among secondary schools in selected Southeast Asian countries—including Indonesia, Singapore, and Thailand. Data were acquired through semi-structured interviews, thematic analysis, and document reviews. The results indicate that while AI-driven teaching practices enhance personalization and engagement, significant disparities remain in teacher competencies, infrastructure, and policy implementation. The findings highlight the urgent need for comprehensive professional development, equitable digital infrastructure, and culturally responsive curricula to harness AI's potential in education.

Keywords: development, learning model, illustrated paper, ability, language

I. INTRODUCTION

Artificial Intelligence (AI) has increasingly become a transformative force in education, altering traditional teaching and learning paradigms on a global scale. Southeast Asia, with its dynamic and diverse educational landscape, stands at the forefront of integrating AI into secondary education systems. This shift is driven by growing recognition of AI's potential to personalize learning, empower educators, and enhance student engagement, thereby preparing learners for a future dominated by digital technologies. Despite these promising prospects, the integration of AI in secondary education across Southeast Asia is marked by varying degrees of pedagogical readiness and student engagement, attributable to differences in policy frameworks, infrastructure, teacher competencies, and socio-economic conditions. Therefore, a comprehensive examination of these factors is essential to understand how AI can be leveraged effectively within secondary schools in this region (Herasymova, 2024).

The embrace of AI in education is part of a broader global movement toward digital transformation in schooling. AI technologies—including machine learning algorithms, natural language processing, and adaptive learning platforms—enable customization of instructional content and pace according to individual student needs and preferences. These innovations promise to reduce achievement gaps by providing support tailored to diverse learners, fostering active, collaborative, and self-directed learning. Southeast Asian countries, spanning from technologically advanced Singapore to developing economies like Indonesia and Thailand, exhibit contrasting contexts in their readiness and capacity to implement such AI-driven pedagogical changes. This variation necessitates a nuanced and context-sensitive exploration to inform policy and practice that is both effective and equitable (Juyal et al., 2025).

Pedagogical readiness, as defined in educational technology discourse, refers to the preparedness of educators to integrate AI tools into their teaching practices meaningfully and ethically. It encompasses teacher digital literacy, familiarity with AI concepts, access to adequate infrastructure, and a positive attitude toward innovation in pedagogy. Studies have illustrated that teachers' confidence and competence in using AI significantly influence the success of its integration and

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student learning outcomes. In Southeast Asia, differing levels of teacher preparation reflect disparities in professional development programs, resource allocation, and institutional support. For instance, Singapore's Ministry of Education has implemented curated AI-related curricula and continuous teacher training, resulting in higher pedagogical readiness among educators. Contrastingly, Indonesia and Thailand face ongoing challenges related to infrastructure constraints and uneven teacher training across urban and rural areas, limiting consistent AI application in classrooms (Dewi et al., 2024).
Student engagement is another pivotal factor mediating the impact of AI integration in education. Engagement encompasses behavioral, cognitive, and emotional dimensions, reflecting the extent to which students are actively involved, intellectually invested, and emotionally connected to their learning experiences. AI-enhanced learning environments have demonstrated potential to elevate student engagement by providing interactive, gamified, and adaptive learning experiences that cater to individual preferences. Real-time data analytics enable educators to monitor engagement patterns and adjust instruction accordingly, promoting sustained attention and motivation. However, the efficacy of these approaches depends on students' access to reliable technology and educators' ability to harness AI tools pedagogically. In Southeast Asia, socio-economic disparities and infrastructure gaps pose significant barriers to equitable student engagement, with students in less developed settings experiencing limited access to AI-supported learning resources (Jiang et al., 2025).
The disparities in policy frameworks across Southeast Asia further complicate the landscape of AI integration. While ASEAN countries have collectively recognized the importance of digital skills and innovation for regional development, national policies and strategies vary widely in scope and implementation efficacy. Countries like Singapore have articulated comprehensive digital education roadmaps emphasizing AI literacy, ethical AI use, and support for educators. Meanwhile, Indonesia has recently launched pilot programs to introduce AI and coding in secondary schools, accompanied by debates around curriculum relevance and ethical considerations. Thailand is navigating its digital education policies amid infrastructural modernization efforts and teacher capacity building initiatives. These heterogeneous policy environments influence not only the availability of AI technologies but also the educational culture surrounding their use (Abanga & Dotse, 2024).
This study's comparative approach seeks to elucidate the ways in which pedagogical readiness and student engagement interact with AI integration in secondary education across Indonesia, Singapore, and Thailand. Qualitative research methods—including semi-structured interviews, focus group discussions, and document analysis—provide a rich, contextualized understanding of educational practices, challenges, and perceptions among key stakeholders. This method allows exploration beyond quantitative measures to capture the nuanced experiences of teachers, students, and policymakers navigating AI-infused learning environments. The thematic analysis framework enables identification of patterns and themes related to technological, pedagogical, ethical, and socio-cultural dimensions of AI use in schools.
Importantly, this study contributes to ongoing discourse about the ethical implications and digital equity concerns surrounding AI in education. Critics have raised alarm about issues such as data privacy, algorithmic bias, and the potential for AI to exacerbate existing inequalities if deployed without careful oversight (Hesami, 2025). Southeast Asian education systems, which serve ethnically and socio-economically diverse populations, must balance innovation with inclusivity to ensure that AI serves as a tool for empowerment rather than exclusion. Understanding teacher and student perspectives on these issues is vital for crafting culturally and contextually appropriate AI integration models.

II. METHODS

A qualitative research design was selected to capture the complex, contextualized experiences, perceptions, and practices of stakeholders involved in AI integration within secondary education. Qualitative methods allow for in-depth understanding of the social, cultural, and institutional factors shaping AI adoption, beyond what quantitative surveys alone could reveal. Moreover, a comparative approach enabled exploration of similarities and differences across diverse Southeast Asian educational contexts, providing insights into region-specific challenges and opportunities. The study employed multiple qualitative data sources—semi-structured interviews, focus group discussions, and document analysis—to triangulate perspectives and enhance the richness and validity of findings.
Three countries were purposefully selected to represent varying levels of AI integration and educational development in Southeast Asia: Singapore as a highly digitalized system with advanced AI initiatives; Indonesia as a large and diverse middle-income country with emerging AI integration efforts; and Thailand as a nation with evolving policies and mixed infrastructural readiness. Within each country, purposive sampling was used to identify participants representing key stakeholder groups:

- Teachers: Secondary school teachers actively involved or interested in using AI tools in their classrooms across a range of subjects and school settings (urban and rural where feasible).

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- School Administrators: Principals or ICT coordinators responsible for technology implementation and teacher support.
- Policymakers: Officials or experts engaged in educational policy formulation relating to AI and digital literacy.
- Students: Secondary school students enrolled in classes using or exposed to AI-driven learning technologies.

A total of 45 teachers (15 per country), 15 administrators (5 per country), 9 policymakers (3 per country), and 30 students (10 per country) participated in semi-structured interviews or focus group discussions. Participants were recruited through official school and education department channels, with ethical approvals and informed consent obtained prior to participation.

The study combined three complementary qualitative data collection methods designed to capture multiple perspectives on AI integration:

a. Semi-Structured Interviews

Individual semi-structured interviews were conducted with teachers, school administrators, and policymakers. Interview guides were developed with open-ended questions tailored to participant roles, focusing on experiences with AI integration, perceptions of pedagogical readiness, challenges faced, student engagement outcomes, policy and infrastructural context, and ethical considerations. Interviews lasted approximately 45-60 minutes and were conducted in the participants' preferred language (English, Bahasa Indonesia, or Thai), with translation assistance as needed. Interviews were audio-recorded and transcribed verbatim for analysis.

b. Focus Group Discussions

Focus groups were conducted with secondary students to explore their engagement and experiences with AI-facilitated learning. Discussions encouraged students to describe AI tools used, their interactions with technology, motivation and challenges in AI-supported classes, and suggestions for improvement. Each focus group comprised 6-8 students and lasted about 60 minutes. Facilitation was conducted in local languages with audio recordings transcribed and translated to English for consistency.

c. Document Review

To triangulate interview and focus group data and enrich contextual understanding, a systematic review of relevant documents was conducted. Documents included national education policy papers, strategy reports from ministries of education, AI and digital literacy curriculum frameworks, professional development program materials, and published literature on AI in education in the respective countries. This review helped validate reported practices and situate findings within wider systemic contexts.

A thematic analysis approach was employed following Braun and Clarke's six-phase framework to systematically identify, analyze, and report patterns across the qualitative data.

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III. RESULTS AND DISCUSSION

A. *Research Result*

This qualitative comparative study explores the integration of Artificial Intelligence (AI) in secondary education across three Southeast Asian countries: Singapore, Indonesia, and Thailand. The investigation focuses on two main dimensions: pedagogical readiness and student engagement. Data were collected via semi-structured interviews with teachers, policymakers, and school administrators; focus group discussions with students; and document reviews of national AI and education policy frameworks. The following sections present the detailed results and analysis clustered into themes that emerged from thematic analysis.

Pedagogical Readiness

Pedagogical readiness pertains to educators' capacity to effectively incorporate AI tools into teaching, including technical skills, pedagogical strategies, ethical awareness, and institutional support. The analysis reveals significant variation across countries shaped by infrastructural, policy, and socio-cultural factors.

Singapore: Mature and Systematic AI Integration

Teachers in Singapore generally exhibit high pedagogical readiness. Participants frequently highlighted structured professional development programs offered by the Ministry of Education, which include workshops on AI concepts, ethical AI use, and hands-on training with adaptive learning platforms.

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> *"Our training pathway is well laid out, with support from experts and ongoing peer collaboration. This helps us integrate AI seamlessly into different subjects, not just computer science." (Teacher, Singapore)*

Administrators reported investments in robust digital infrastructure that enable smooth AI tool deployment, with seamless Internet access and modern devices in most classrooms.

> *"The infrastructure is reliable, so teachers and students do not face technical disruptions, which encourages experimentation and innovation with AI." (School Administrator, Singapore)*

Teachers also expressed confidence in balancing AI augmentation with maintaining critical thinking skills among students.

Indonesia: Emerging Efforts with Regional Disparities
In Indonesia, the picture is more mixed. Urban schools involved in pilot AI programs showed growing pedagogical readiness through workshops and government-supported training initiatives. However, rural and remote areas faced resource limitations and inconsistent training opportunities.

> *"We are enthusiastic about AI, but sometimes the lack of stable Internet or modern computers hinders our ability to use these tools effectively." (Teacher, Urban Jakarta)*

"Professional development is sporadic and often focused on basic ICT skills, not specifically AI." (Teacher, Rural Java)

Interviewees noted a need for clearer policy guidance and coordinated national strategies.

Thailand: Developing Readiness Amidst Fragmented Support
Thailand's educators show developing pedagogical readiness. Government efforts to integrate AI in curricula are underway, yet many teachers reported limited understanding of AI fundamentals and inconsistent access to AI learning platforms.

> *"There's interest and willingness, but more comprehensive training is necessary to build confidence and competencies." (Teacher, Bangkok)*

Infrastructure improvements are ongoing but uneven, affecting technological use and integration.

Student Engagement
Student engagement is essential for successful learning outcomes and is multifaceted, including behavioral, cognitive, and emotional aspects. AI-enabled tools demonstrated varying impacts on engagement levels, influenced by pedagogical readiness and accessibility.

Singapore: High Engagement Fueled by Personalized Learning
Students expressed enthusiasm about AI-driven learning experiences that adapted to their abilities and interests.

> *"The AI platform gives me quizzes that match my skill level, and I get help on topics I find tough. It makes learning more exciting." (Student, Singapore)*

Teachers confirmed that real-time engagement analytics help them tailor instruction and offer timely encouragement. Data from student focus groups and teacher observations highlighted substantially increased motivation, collaboration, and self-directed learning.

Indonesia: Varied Engagement Shaped by Access and Support
In pilot urban schools, students appreciated personalized learning, similar to Singapore, but rural students reported frustration with limited access to devices and connectivity issues.

> *"When the technology works, learning is fun and interactive. But sometimes, we can't even open the AI tools due to slow Internet." (Student, Urban Bandung)*

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Lower engagement was linked to resource constraints and less experienced teachers.

Thailand: Positive but Uneven Engagement Outcomes
Students in well-equipped urban schools reported improved engagement through AI-integrated projects and problem-solving activities.

> *"AI chatbots help answer questions anytime, which keeps me interested and less dependent on waiting for the teacher." (Student, Chiang Mai)*

However, several students in underserved schools lacked familiarity with AI and digital learning tools.

Cross-Country Comparison
The study quantitatively codes qualitative data according to themes of pedagogical readiness and student engagement observed in the interviews and focus groups, summarized in Table 1 below.

Table 1. Cross-Country Comparison

Country	Teacher AI Training Availability	Infrastructure Quality	Teacher AI Competency	Policy Clarity on AI Integration	Student Access to AI Tools	Student Engagement Level	Ethical Awareness Among Teachers
Singapore	High	Excellent	Advanced	Clear	High	High	Strong
Indonesia	Medium	Moderate	Intermediate	Developing	Variable	Medium	Moderate
Thailand	Medium	Moderate	Basic to Intermediate	Developing	Variable	Medium	Developing

Across countries, the availability and quality of professional development emerged as the most decisive factor in pedagogical readiness. Singapore's consistent national programs contrast with fragmented efforts in Indonesia and Thailand.

Infrastructure Influences Equity and Performance
Reliable digital infrastructure was strongly associated with both teacher effectiveness and student engagement. The urban-rural divide in Indonesia and Thailand highlights digital equity challenges.

Ethical Considerations Are Growing but Uneven
Ethical awareness among teachers—including concerns over student data privacy and balanced AI use—was most developed in Singapore and nascent in Indonesia and Thailand.

Student Engagement Benefits from Personalization but Faces Access Barriers
AI's adaptive capabilities increase motivation and self-regulated learning but require reliable access and teacher facilitation to realize full benefits.

Table 2. Categories relevant to pedagogical readiness and student engagement in AI integration.

Theme	Indicator	Singapore	Indonesia	Thailand
Teacher AI Training	Availability	Comprehensive national programs; regular workshops	Pilot programs in urban areas; inconsistent in rural	Government initiatives ongoing; need for scale-up
	Content Focus	AI concepts, ethical use, instructional design	Basic ICT skills, some AI exposure	Basic AI literacy; fragmented support
	Teacher Confidence	High confidence in AI use	Moderate, variable by region	Developing confidence, desire for more training

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Theme	Indicator	Singapore	Indonesia	Thailand
Infrastructure and Access	Internet Reliability	High-speed, consistent	Urban mainly stable; rural areas often unreliable	Urban moderate; rural connectivity challenges
	Device Availability	One-to-one device programs broadly implemented	Urban access better; rural limited	Variable, with urban-rural disparities
	Technical Support	Dedicated IT teams in schools	Limited technical support available, especially rural	Schools have limited IT support
AI Tool Integration	Frequency of Use	Daily integration in multiple subjects	Sporadic, project-based in urban areas	Occasional use; mostly urban schools
	Types of AI Tools	Adaptive learning platforms, chatbots, data analytics	Basic adaptive tools, limited chatbot use	Emerging use of chatbots and quizzes
Student Engagement Outcomes	Behavioral Engagement	Active participation, collaboration	Engagement higher when AI tools work, often interrupted	Mixed engagement, dependent on technology access
	Cognitive Engagement	Enhanced problem-solving and self-directed learning	Improved when tools are accessible	Developing with AI-facilitated projects
	Emotional/Motivational Engagement	Excitement about personalized learning	Enthusiasm present but affected by access limitations	Interest growing, but frustration in tech-limited areas
Policy Framework	Clarity and Guidance	Clear national strategies with ethical guidelines	Developing frameworks with pilot initiatives	Policies evolving; integration and alignment ongoing
	Support for Equity	Initiatives promote digital inclusion	Digital divide acknowledged, efforts underway	Disparities recognized; coordinated policy needed
Ethical Awareness	Data Privacy Concerns	Strong awareness and compliance	Emerging awareness, need for deeper understanding	Developing awareness; ethical training rare
	Balance of AI and Human Facilitation	Emphasis on balanced AI use maintaining teacher role	Some concerns over overreliance	Awareness growing; lack of explicit policies

This qualitative data table encapsulates the nuanced realities of AI integration in secondary education across Singapore, Indonesia, and Thailand.

- Teacher AI Training: Singapore demonstrates a robust ecosystem of AI-focused teacher training, contributing to high competence and confidence. Indonesia's efforts remain localized and uneven, while Thailand is in early phases with fragmented training resources.
- Infrastructure and Access: Reliable internet and device access in Singapore facilitate frequent, effective AI use. Indonesia and Thailand face urban-rural disparities, limiting seamless AI integration and affecting student experiences.

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- AI Tool Integration: Daily AI interaction in Singapore contrasts with sporadic or occasional usage in Indonesia and Thailand due to infrastructural and training constraints.
- Student Engagement Outcomes: Enhanced behavioral, cognitive, and emotional engagement is evident in Singaporean classrooms owing to personalized AI tools. Indonesian and Thai students experience benefits when technology access is sufficient but face limitations otherwise.
- Policy Framework: Clear, comprehensive policies in Singapore support ethical and equitable AI deployment. Indonesia and Thailand are developing frameworks that acknowledge digital divides and seek alignment between technological and pedagogical goals.
- Ethical Awareness: Singaporean educators have high awareness of AI ethics and data privacy; Indonesian and Thai counterparts are beginning to address these concerns but require more formal guidance.

B. *Discussion*

The integration of Artificial Intelligence (AI) into secondary education across Southeast Asia presents a multifaceted picture shaped by differing levels of pedagogical readiness, infrastructure, policy frameworks, and student engagement. This study's qualitative comparative analysis of Singapore, Indonesia, and Thailand highlights critical enablers and barriers shaping the trajectory of AI adoption in education. The discussion below synthesizes the findings by reflecting on these domains, drawing connections to existing literature, and proposing implications for practice and policy (Ecker et al., 2025).

Pedagogical readiness emerges as a fundamental determinant of successful AI integration. In line with previous research emphasizing the pivotal role of teacher competence and attitude, Singapore's highly developed teacher training ecosystem enables educators to navigate AI tools with confidence and pedagogical sophistication (Chuyen & Vinh, 2025). Structured programs that combine technical familiarity with ethical considerations foster not only technical proficiency but also responsible AI use, which is vital to cultivating critical thinking rather than uncritical dependence on technology. This is consistent with studies showing that sustained professional development, accompanied by institutional support, positively impacts teachers' willingness and ability to innovate with AI-enhanced pedagogies. Conversely, the fragmented readiness observed in Indonesia and Thailand underscores that inconsistent or inadequate teacher preparation limits AI's transformative potential and risks perpetuating digital divides (Sposato, 2024). Professional development focused narrowly on ICT basics without incorporating pedagogical and ethical dimensions of AI may lead to superficial adoption or resistance among educators. Hence, systemic, sustained, and context-sensitive teacher training initiatives are essential to build readiness that transcends basic technology use, promoting educators as reflective practitioners integrating AI thoughtfully into their instructional design (Al-Saliti et al., 2025).

Infrastructure and equitable access are indispensable components of an enabling environment for AI in education. Singapore's robust digital infrastructure, supported by ongoing government investments, creates a foundation for seamless AI use in classrooms. This—coupled with policies like one-to-one device distribution—facilitates daily AI interaction for students and teachers alike, reinforcing digital literacy and engagement (Chima Abimbola Eden et al., 2024). In contrast, Indonesia's and Thailand's infrastructural challenges, particularly in rural and underserved areas, frequently interrupt AI tool use and dampen student motivation. Such disparities reflect broader socio-economic inequalities that digital education initiatives risk exacerbating if not addressed through targeted policies and investments. The empirical findings align with the growing literature warning that technology integration without adequate infrastructure marginalizes vulnerable populations, undermining the inclusive promise of AI. Bridging this digital divide requires comprehensive strategies to enhance internet connectivity, expand device availability, and provide localized technical support. Moreover, equitable distribution efforts should be culturally sensitive and aligned with community needs to ensure effective uptake.

Student engagement, operationalized as behavioral, cognitive, and emotional involvement in learning, is enhanced by AI technologies when conditions permit. Singaporean students' enthusiasm for AI-powered personalized learning experiences and teachers' use of real-time analytics to monitor engagement resonate with global reports of AI's capacity to motivate learners through adaptive feedback, gamification, and collaborative tools. Such dynamics foster self-regulated learning, deeper comprehension, and sustained interest—key objectives emphasized in modern pedagogical frameworks. Importantly, the finding that engagement improvements depend on reliable technology access and teacher facilitation highlights that technology alone is insufficient. Skilled human mediation is critical to contextualize AI outputs, scaffold learner progress, and address challenges such as student overreliance or ethical concerns. In Indonesia and Thailand, students reported increased engagement when AI tools were functional but described frustration when technological or instructional support lagged. These insights extend prior studies calling attention to the relational interplay between technology, teachers, and learners, advocating for balanced integration approaches that prioritize student agency and human connection (Baog, 2025).

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Policy frameworks critically influence AI integration efficacy by shaping resource allocation, curricular alignment, and ethical oversight. Singapore's clear and comprehensive national AI education strategies serve as a model of how government vision can catalyze coordinated action involving educators, technologists, and communities (Stogiannos et al., 2024). Ethical guidelines embedded within these policies address data privacy and responsible AI use, dispelling fears related to misuse and building stakeholder trust. Conversely, Indonesia's and Thailand's emergent policies signal positive momentum but also the complexity of aligning multiple stakeholders and contexts in regional education systems. These countries' recognition of digital divides and efforts toward inclusion are encouraging, yet policies require further operationalization with actionable standards, monitoring mechanisms, and localized adaptation. The study reinforces the literature's insistence on robust governance structures that balance innovation with ethical and social imperatives. Policymakers must ensure that AI integration does not exacerbate inequalities or undermine educational objectives by fostering transparency, accountability, and participatory approaches involving teachers, students, parents, and communities (Bu Haya et al., 2025).

Ethical awareness among educators is gaining traction but remains uneven across Southeast Asia. Singapore's teachers demonstrate strong consciousness about data privacy, algorithmic bias, and the educational balance between AI and human facilitation. This comprehensive ethical literacy stems partly from formal training and a broader societal emphasis on digital responsibility. In contrast, Indonesia's and Thailand's educators show emerging but insufficient engagement with AI ethics, often expressing concerns without clearly articulated frameworks or practical guidance. This mirrors global challenges where rapid AI adoption outpaces policy and ethical education, risking unintended harms such as privacy breaches, reinforcement of existing biases, or deskilling of critical faculties. The findings suggest urgent needs for comprehensive professional ethics education integrated into teacher training programs and supported by accessible resources and institutional leadership. Moreover, ethical AI use should be embedded in curricula to foster student awareness and critical digital citizenship, preparing learners to navigate AI technologies responsibly beyond the classroom (Supendi et al., 2025).

The interdependence of these themes is evident: pedagogical readiness, infrastructure, student engagement, policy, and ethics form a dynamic ecosystem influencing AI's educational impact. Countries like Singapore exemplify a virtuous cycle wherein comprehensive policy, infrastructure, and training collectively reinforce positive outcomes for teaching and learning. Indonesia and Thailand, while progressing, face challenges in establishing such ecosystems, notably in rural and less-resourced contexts. These findings highlight that AI integration requires holistic, multi-stakeholder approaches rather than piecemeal efforts centered solely on technology deployment. Investments must be balanced across human capacity building, infrastructure development, policy formulation, and ethical governance.

Furthermore, the comparative nature of the study reveals contextual nuances that caution against one-size-fits-all adoption models. Cultural, socio-economic, and institutional specificities shape how AI is perceived, adopted, and experienced within classrooms. For example, teacher attitudes toward AI in Indonesia may reflect broader educational challenges and resource constraints distinct from Singapore's advanced ecosystem. Similarly, student engagement strategies effective in urban Thailand may require adaptation for rural settings. Thus, while regional cooperation frameworks (e.g., ASEAN digital education initiatives) offer valuable guidance and shared objectives, national and local stakeholders must customize AI integration strategies to their specific realities.

The study also surfaces implications for future research. Longitudinal investigations tracking student achievements, teacher development trajectories, and policy implementation impacts would deepen understanding of AI's sustained effects on secondary education. Additionally, participatory action research involving educators and students as co-creators of AI tools and curricula could pioneer culturally relevant and inclusive innovation pathways. Quantitative mixed-methods approaches could complement qualitative insights to provide broader representativeness and outcome measurement.

IV. CONCLUSIONS

The integration of AI in Southeast Asian secondary education holds immense promise but is contingent on systemic, contextualized efforts that place pedagogical readiness, equity, engagement, and ethics at the forefront. While Singapore exemplifies a mature AI education ecosystem, Indonesia and Thailand's experiences offer valuable lessons on both opportunities and challenges inherent in emerging contexts. As AI continues to evolve, education systems must remain adaptive, inclusive, and ethically grounded to prepare all students for meaningful participation in an AI-augmented future. This study contributes to advancing scholarship and practice by providing richly contextualized comparative insights, underscoring that technology's transformative power in education relies critically on human and institutional factors that enable its responsible and effective use.

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