

Artificial Intelligence in Telecommunications for Digital Education: Policy and Ethical Perspectives from Southeast Asia

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Abstract: The present study aims to explore how artificial intelligence is being integrated into telecommunications for digital education across Southeast Asia. The research has particularly focused on policy, ethical, and sustainability dimensions. By adopting a mixed-methods design, we conducted twelve semi-structured interviews with policymakers, telecom experts, educators, and representatives from civil society. We also conducted an extensive review of secondary sources, including policy documents, literature, and reports. Results showed that AI in education is offering clear benefits, such as personalized learning, improved access, and efficiency regarding the utilization of resources. Results also showed that without inclusive policies, AI risks can reinforce the existing divides rather than bridging them. Results from content analysis reinforced these findings. In this regard, the regional initiatives are important, such as the ASEAN Digital Masterplan 2025 and national strategies in Indonesia, Malaysia, and Vietnam. The results suggest that AI has transformative potential for expanding access and improving learning outcomes. However, there are a few risks that are related to inequity, privacy, and overreliance on external actors that remain pressing. The study underscored the importance of local ownership, regulatory safeguards, and collaborative governance so that ethical and sustainable integration of AI can be ensured in digital education.

Keywords: Artificial Intelligence, Telecommunications, Digital Education, Southeast Asia, Equity and Access

1. Introduction

Artificial intelligence (AI) and telecommunications are instrumental to digital education transformation across the world, and especially in Southeast Asia. AI technologies, including machine learning, natural language processing, and predictive analytics, can be used to improve the educational delivery process by providing personalised learning experiences, real-time feedback, and managing resources efficiently (Sheriffdeen, 2024). AI can be used in Southeast Asia to overcome educational access and quality disparities, as well as provide equity assistance to remote and underserved regions (Hara, 2024). Telecommunications infrastructure facilitates digital education because of the provision of connectivity between urban and rural areas concerning online learning systems, virtual lessons, and delivery of learning content (Aashish & Rohit, 2024). It is an infrastructure network that helps in accessing educational material without restrictions by geographical and economic barriers. Moreover, AI supplements the efforts of telecommunications services because it both optimises the network and incorporates intelligent systems into educational devices, including adaptive learning systems and robotised content delivery systems (Koukaras *et al.*, 2025). By integrating telecommunications services and AI, a comprehensive and productive system of education will be created, and it will ensure that everyone has equal access to high-quality education in the region.

In Southeast Asia, there are certain educational challenges that include high rates of digital disparities, inaccessibility to good education, and infrastructural deficits, especially in underserved and rural areas (Amin, 2024). With the assistance of AI, such problems can be addressed by enhancing the quality, equity, and access to education. To make sure that the individual learning needs of students are met, AI technologies, including personalised learning platforms, adaptive

learning platforms, and automated support services, could be used (Ayeni *et al.*, 2024). Besides, the issue of inadequate infrastructure will be addressed as soon as AI helps to ensure that the resources at its disposal are used efficiently, the results of the learning will be improved, and the educational accessibility of the region will become equal.

Artificial intelligence (AI) is rapidly introducing new opportunities to telecommunications, which can greatly change digital education in Southeast Asia. Nevertheless, there are a number of obstacles to overcome, such as digital inequity, unequal access to good education, and the infrastructural gaps, especially in rural and underserved regions. Although AI presents chances to improve access, equity, and the quality of education, to be effectively integrated, it would be necessary to resolve ethical issues, unmet policy gaps, and sustainable implementation plans (Ahmed, 2024). This study aims to explore how artificial intelligence in telecommunications can support the advancement of digital education in Southeast Asia, with a particular focus on policy frameworks, ethical considerations, and sustainable implementation pathways.

The study plays a pivotal role in informing the future of AI in education in Southeast Asia. It also enriches insights regarding the formulation of policies, ethical usage of AI, and scalable forms of education (Hara, 2024). The findings are also proactive in informing policy-makers, telecommunication firms, and institutions in the region on how to aptly and equitably introduce AI technologies with the ultimate aim of ensuring that AI becomes an enabler of cheap and quality education to all.

2. Literature Review

2.1 AI Technologies in Telecommunications

AI is transforming the telecommunications sector in that it enables machines to perform the things that machines have traditionally been unable to perform, in that they are able to learn, solve problems, and make decisions, i.e., the area traditionally involved with human intelligence being uncovered by Slimani *et al.* (2024). AI in telecommunication improves the performance of the network, automates customer service, and presents innovative solutions to increase service delivery. Digital education is one of the areas where AI is particularly vital in the context of telecommunication integration in Southeast Asia, where issues of access, equity, and the quality of education continue to be significant concerns in the area (Singh, 2025).

The study by Mehta (2025) explores machine learning (ML), the processing of large datasets to facilitate predictive analytics and optimization of networks to improve the efficiency of services and personalization of user experiences, which is one of the key AI technologies in telecommunications. NLP is applied in automating customer support, where chatbots and virtual assistants are used, and language translation is also done in real-time. AI-enabled networks are optimized to make intelligent routing, incorporate 5G technology, and also support the Internet of Things (IoT), which can form self-healing networks that are scalable and reliable. Also, data analytics powered by Jain (2025) AI can be used to provide personalized educational content, better analyze student performance, and deliver digital content. The effect of AI on telecommunication services in education is immense (Jain, 2025; Koukaras *et al.*, 2025). AI guarantees the optimization of the network resources, which enables the effective management of bandwidth, creating uninterrupted access to the online learning opportunities, particularly in the underserved areas. The study by Koukaras *et al.* (2025) states that the AI-powered systems, which include virtual tutors and live support systems, contribute to personalized learning experiences, making the student more engaged and improving learning outcomes throughout Southeast Asia.

2.2 Policy Frameworks for AI in Digital Education

The policy frameworks play a role in defining how AI will be ethically and effectively used in education. However, Chan (2023) claims that the structures help implement AI technologies in national education systems, establishing the principles of their responsible use and exploiting their potential to the full extent. On the other hand, Keith (2024) observes that Governments can ensure that AI is implemented in a way that supports equity, access, and quality in education by putting in place formulated policies. In Southeast Asia, the national policies have been formulated towards the support of AI as a component of digital education. Frana (2024) highlighted that, to draw on an example, the Smart Nation Initiative in Singapore and the Digital Education Blueprint in Malaysia are more focused on the application of AI in terms of personalized learning, digital literacy, and the development of the infrastructure. According to, there are also some government initiatives, such as AI literacy courses, government-industry partnerships, and investments in digital infrastructure, which have entered the scene to establish AI integration in education. However, even now, the existing policies have gaps that cannot permit the smooth adoption of AI. The issue of the lack of effective regulatory frameworks, the lack of codes of ethics, and issues related to the use of AI in underserved communities are limitations (Adegbesan *et al.*, 2024). Moreover, global cooperation must exist to standardize AI policies across the Southeast Asia region in order to ensure there is uniformity and effective policy execution.

2.3 Ethical and Sustainable Implementation of AI in Digital Education

It is possible to define ethical AI in online learning as a responsible use of AI technologies, which are aware of privacy, equity, and transparency, and offer equal opportunities to gain access to education. A study conducted by Mhlanga (2023) suggested that the ethical frameworks will inform the development and use of the AI systems in such a manner that it

will be beneficial to all students, regardless of their socio-economic status, in terms of promoting fairness and accountability. One of the largest ethical problems is data privacy and security. Similarly, Nguyen et al. (2023) revealed that the AI systems have raised privacy, monitoring, and security breach concerns in the processing of student data. The ethical principles shall be followed to ensure that the data is collected in a consensual manner, used transparently, and kept safe.

Data usage should be transparent in order to create trust amongst the stakeholders. Bias in AI algorithms is another problem, and it may result in unfairness, especially in grading, adaptive learning, and customized learning pathways (Mhlanga, 2023; Nguyen *et al.*, 2023). Lata (2024) observes that the prejudices in Southeast Asia have led to unequal access to education. The solution to this problem is to apply various datasets and provide regular audits that are used to guarantee the absence of inequality. Fan et al. (2023) point out that the question of sustainability also arises, with AI technologies, particularly on the scale of their implementation, depleting a lot of energy. It is necessary to use sustainable practices, including reducing energy consumption in AI-based learning systems. Sustainability in the long term involves investment in infrastructure, allocation of resources, and local experience. Efforts such as Singapore AI governance and ethical AI policies in Thailand are the best examples of how ethical and sustainable AI can be applied in the educational sector. Stakeholders and policymakers are highly important in responsible AI usage in Southeast Asia (Hara, 2024).

2.4 Challenges and Barriers

The study conducted by Alabdali et al. (2023) found that the application of AI in digital learning in Southeast Asia is challenged on the technological, cultural, economic, and regulatory levels. The technological barrier is quite high, specifically in rural areas, as AI systems are not used extensively in rural areas due to the absence of infrastructure. Evidence from the study by Koukaras et al. (2025) explores how access to the internet and technologies that can be used with AI is not stable in such areas, which obstructs the appropriate use of AI tools. Data-sensitive requirements of AI must be supported through an upgrade of telecommunication networks, and allow AI-enhanced education to be delivered in remote areas. The cultural and social barriers would be the resistance to AI implementation based on the fear of being replaced and the uncertainty about its use in the education process (Koukaras *et al.*, 2025; Peter, 2025). Also, Peter (2025) found out the limitation to the use of AI technologies is the issue of digital illiteracy of teachers, students, and parents, especially in the countryside. The economic constraints can be attributed to the prohibitive cost of adopting AI technologies and telecommunication infrastructure, which is made worse by the fact that one cannot get funding to purchase AI-based learning resources, especially in state schools and universities (Peter, 2025). Walter (2024) suggested that regulatory and policy barriers include the absence of legal frameworks that deal with the ethics of AI, data privacy, and accountability, and the disparity in AI policies across the region, which makes it challenging to implement them uniformly.

3. Methodology

3.1. Research Design

The present study has followed a mixed-method research design as we aim to capture both the lived experiences of key stakeholders and the broader structural dynamics that shape the role of artificial intelligence in telecommunications for digital education in Southeast Asia (Abowitz & Toole, 2010; Östlund *et al.*, 2011). This methodological choice is grounded in past studies, as researchers have recently adopted similar designs. Past studies have used qualitative interviews with teachers and a secondary design exploring how AI has been integrated in education across Asia. (Irwanto, 2025; Tripathi *et al.*, 2025). Recently, Sonni et al. (2025) have also studied the role of AI media narratives in shaping digital literacy and information resilience through the integration of mixed-method design, including interviews, surveys, and content analysis. Thus, our study has integrated AI in telecommunications in the context of Southeast Asia, which is distinct from the existing studies. The mixed-method approach offered an in-depth exploration that has been noted to be limited in prior studies.

Instead of integrating a single method, we aimed to ensure that the findings of this study were grounded in both practice and evidence. Thus, we combined insights from individuals directly engaged in policy, technology, education, and civil society, and also conducted a review of existing reports and documents. This design was effective in generating a richer picture regarding the role of AI being integrated into the telecommunications sector for education.

3.2. Data Collection

We have collected primary data through semi-structured discussions (Adeoye-Olatunde & Olenik, 2021). These interviews were conducted with the participants who represent diverse perspectives regarding the policy, telecom, education, and civil society sectors (Table 1). These conversations were conducted over several weeks. Moreover, a combination of purposive and convenience sampling was implemented so that the relevance and diversity of viewpoints can be ensured (Etikan *et al.*, 2016).

As it was a mixed-method study, we also collected secondary data from various sources (Table 2). It included policy reports, strategy documents, regional education frameworks, and publications from organizations such as

UNESCO, ASEAN, and national ministries of education. These sources were important in providing context regarding the interpretation of the primary findings. This dual data collection approach made it possible for us to both capture experiences of individuals and locate them within the broader ecosystem of digital education in Southeast Asia through the secondary data collection.

3.3. Respondent Profile

Hennink and Kaiser (2022) explained that for studies that have relatively focused aims, saturation of themes often occurs by 9-17 interviews. Ando et al. (2014) also found that 12 interviews are generally considered sufficient to identify the main themes. Vasileiou et al. (2018) further agree that qualitative studies require a minimum sample of 12 so that data saturation can be achieved. Thus, 12 participants were interviewed in this study, as recommended by previous researchers. Table 1 summarizes the groups, codes, and general designations used:

Table 1: Participants for interviews

Respondent Group	No. of Respondents	Codes Used	Designation / Background
Policy Makers & Regulators	3	PM	Ministry of Education official, telecom regulatory officer, policy advisor
Telecom & Technology Experts	3	TT	Telecom network manager, AI solutions specialist, ICT consultant
Educational Practitioners	4	EP	School principal, university lecturer, e-learning coordinator, rural teacher
Ethics & Civil Society Reps	2	CS	NGO education advocate, digital rights activist

3.4. Secondary Sources Reviewed

To complement the primary data, we also systematically collected documents and reports that addressed AI, telecommunications, and education in Southeast Asia. These sources were reviewed so that relevant themes could be identified. In this way, we also validated the perspectives of participants.

Table 2: Description of secondary data

Source Type	Examples	Purpose in Study
Policy Reports	ASEAN Digital Masterplan 2025; UNESCO AI in Education reports	Understand regional and international policy frameworks
Government Documents	National digital education strategies from Indonesia, Malaysia, and Vietnam	Compare participant accounts with official national directions.
Academic Literature	Recent journal articles on AI, telecom, and education (2020–2025)	Provide scholarly grounding for thematic areas

3.5. Data Analysis

For the primary data, we employed inductive thematic analysis (Byrne, 2022). N-vivo was used for systematically performing the thematic analysis and generating associated figures to yield meaningful insights. It allowed us to identify recurring themes while also preserving variations in individual perspectives. This step was important because it ensured a structured yet flexible interpretation of participants’ narratives.

The secondary data were analyzed using qualitative content analysis (Forman & Damschroder, 2007). We categorized information from reports and documents based on the same thematic framework as the interviews, which made it possible to triangulate findings. By integrating these two streams of data in the form of mixed methods, we were able to construct a comprehensive understanding of how AI in telecommunications is shaping digital education in Southeast Asia, the challenges it faces, and the pathways for ethical and sustainable implementation.

4. Results

4.1. Primary Qualitative Thematic Analysis

A systematic thematic coding process was conducted, followed by inductive thematic analysis. It initiated with first-order codes directly drawn from respondents’ words. It was then clustered into interpreted second-order categories. However, the second-order coding was finally refined into five overarching third-order themes. It ensures both the authentic voices of participants and analytical abstraction are represented in the findings.

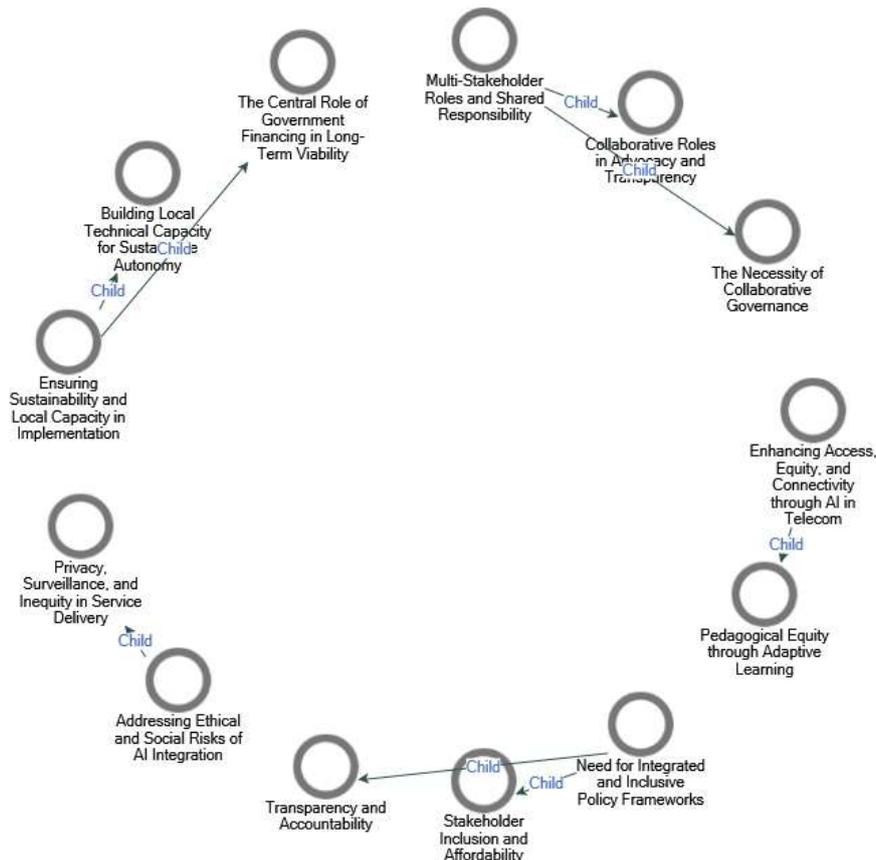


Figure 1: Project Map
Source: Author Generated

Figure 1 shows the circular thematic framework developed from the interview transcriptions. It positions all five themes and their sub-themes as interdependent rather than hierarchical. This layout shows how sustainability, ethics, equity, policy, and collaboration reinforce one another continuously in the integration of AI in telecommunications for digital education.

Table 3: Thematic Coding

First-Order Coding	Second-Order Coding	Third-Order Coding
“balance things so rural areas don’t get left out” (PM1); “spotting weak spots” (PM2); “AI-powered cross-border networks” (PM3); “Netflix later, education first” (TT1); “stable connection keeps kids motivated” (EP3)	Respondents highlight AI’s technical role in ensuring equitable access, predicting system weaknesses, and prioritizing education over commercial traffic.	Theme I: Enhancing Access, Equity, and Connectivity through AI in Telecom <i>Theme I (a): Pedagogical Equity through Adaptive Learning</i>
“unified policy” (PM1); “ASEAN-level guidelines” (PM2); “fairness and accountability in regulations” (PM3); “subsidized student data packages” (EP1); “child safety must be included” (CS1); “civil society needs a seat at the table” (CS2)	Stakeholders emphasize the need for coordinated policy frameworks, cross-border rules, affordability, and inclusivity in regulation-making.	Theme II: Need for Integrated and Inclusive Policy Frameworks <i>Theme II (a): Stakeholder Inclusion and Affordability</i> <i>Theme II (b): Transparency and Accountability</i>
“data privacy, students are minors” (PM1); “algorithmic bias” (PM2); “fairness challenge, premium vs education users” (TT1); “students surveilled too much” (EP1); “digital colonialism” (CS2)	Ethical concerns include privacy, bias, over-surveillance, and corporate control, with calls for stronger safeguards and accountability.	Theme III: Addressing Ethical and Social Risks of AI Integration <i>Theme III (a): Privacy, Surveillance, and Inequity in Service Delivery</i>
“government financing is number one” (PM1); “renewable energy for rural towers” (TT2); “teachers need continuous training” (EP1); Respondents stress financial, infrastructural, and social sustainability, with training, local		Theme IV: Ensuring Sustainability and Local Capacity in Implementation

First-Order Coding	Second-Order Coding	Third-Order Coding
“community engagement helps” (EP4); “equity audits before scaling” (CS2)	capacity, and accountability mechanisms as core factors.	<i>Theme IV (a): The Central Role of Government Financing in Long-Term Viability</i> <i>Theme IV (b): Building Local Technical Capacity for Sustainable Autonomy</i>
“governments set the vision” (PM1); “collaboration’s the only way” (PM3); “balance profit with service” (TT1); “teachers advocate for disadvantaged” (EP2); “civil and society push transparency” (CS2)	Respondents underline multi-stakeholder collaboration, where governments, telecoms, educators, and civil society each have complementary but essential roles.	<i>Theme V: Multi-Stakeholder Roles and Shared Responsibility</i> <i>Theme V (a): Collaborative Roles in Advocacy and Transparency</i> <i>Theme V (b): The Necessity of Collaborative Governance</i>



Figure 2: Items Clustered by Word Similarity
Source: Author Generated

Figure 2 visually represents the hierarchical coding structure that emerged from the thematic analysis. Each main theme is divided into sub-themes. It shows how participant responses were grouped, refined, and connected to capture insights regarding AI in telecommunications for digital education.

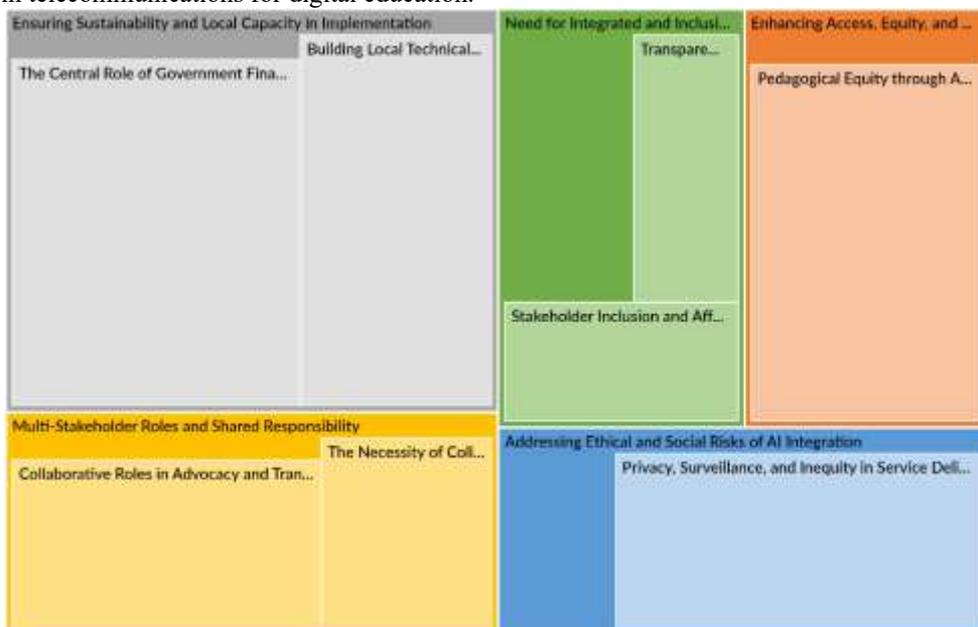


Figure 3: Treemap of Interviews

The treemap in Figure 3 shows the relative prominence of themes and sub-themes that have emerged from the qualitative coding. Larger blocks show important areas of stronger emphasis in participant reflections. However, the smaller blocks highlight but are less frequently discussed concerns.

Theme I: Enhancing Access, Equity, and Connectivity through AI in Telecom (Figure 4)

Policymakers and practitioners both emphasized that connectivity is not just about laying down infrastructure. It is also about making sure networks are reliable, efficient, and inclusive. As one educational practitioner explained: “*Yeah, I’ve noticed dropout rates fall when connections are stable. AI keeps things running, and that keeps kids motivated to stay online.*” (EP3). This shows how improved connectivity directly supports student engagement and retention.

Similarly, a policymaker noted: “*Oh, honestly, AI-powered systems can still connect them through cross-border networks. That’s a big deal.*” (PM3). This illustrates how AI not only addresses local equity gaps but also strengthens cross-border collaboration, ensuring access is more regionally balanced.

Theme I (a): Pedagogical Equity through Adaptive Learning

Apart from the infrastructure optimization, participants also stressed that AI can support pedagogical equity by tailoring content delivery to diverse learners. For instance, one educational practitioner explained that the tools of adaptive learning powered by AI can personalize the educational journey. As they put it: “*AI can make platforms adaptive... stronger students keep moving while weaker ones don’t fall behind.*” (EP2). This highlights the dual role of AI in telecommunications, which also enhances technical access. It promotes social equity by ensuring that no student is left behind due to connectivity or learning pace.

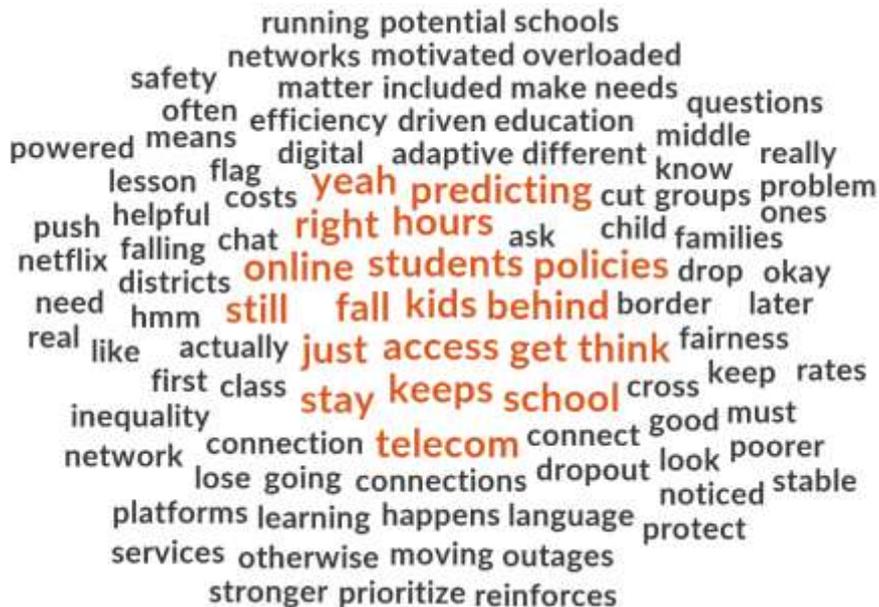


Figure 4: Word Cloud for Theme I
Source: Author Generated

Theme II: Need for Integrated and Inclusive Policy Frameworks (Figure 5)

Respondents were particularly critical regarding fragmented structures of governance. In this regard, ministries and sectors work in silos rather than in coordinated ways.

Theme II (a): Stakeholder Inclusion and Affordability

The fragmentation weakens the implementation of AI-driven educational reforms and creates regulatory gaps. This concern was strongly voiced by a civil society representative, who insisted: “*Oh yeah, and civil society needs a seat at the table. Regulations should be co-created, not just top-down.*” (CS2). This highlights that inclusivity in policy-making goes beyond state actors and requires active engagement from wider stakeholders. Similarly, an educational practitioner stressed the equity dimension of policy, saying: “*I feel strongly that there should be subsidized student data packages. Otherwise, families just can’t afford to use these systems.*” (EP1). The results show that the regulatory measures should address affordability directly. In this way, digital divides will also not be fostered due to AI-enabled education.

Theme II (b): Transparency and Accountability

Apart from the structural integration, results also emphasized inclusive governance. It also included transparency and accountability of AI systems. In this regard, a technology expert explained the importance of making AI systems open to

scrutiny by saying that: “Governments should make algorithmic transparency mandatory.” (TT2). This insistence on transparency shows a wider ethical focus regarding AI regulation, mainly fairness in access and use.



Figure 5: Word Cloud for Theme II
Source: Author Generated

Theme III: Addressing Ethical and Social Risks of AI Integration (Figure 6)

Results also consistently declared that ethical risks must be carefully focused. In this way, undermining trust in AI-enabled education systems can be avoided. Thus, a civil society representative drew attention to broader accountability concerns by indicating: “Yeah, and without accountability, it’s digital colonialism all over again. Big companies benefit, while local communities lose control.” (CS2). This highlights that ethical risks extend beyond technical concerns to issues of power and ownership. It shapes whether AI systems serve local communities or external interests.

Theme III (a): Privacy, Surveillance, and Inequity in Service Delivery

Similarly, an educational practitioner also highlighted the dangers of surveillance within classrooms, by explaining: “I sometimes feel like students are being surveilled too much. It’s not healthy if they feel constantly watched.” (EP1). This underscores the importance of protecting the psychological safety of students alongside their data. In this way, it can be ensured that AI-enabled tools support learning without creating environments of constant monitoring and distrust.

Apart from privacy, there were several participants who raised concerns regarding the risks of inequity in the delivery of services. A telecom expert described it by emphasizing that AI-driven prioritization could reinforce digital divides if these are left unchecked: “AI might give better service to premium users, and that’s not acceptable for education.” (TT1).



Figure 6: Word cloud for Theme III

Theme IV: Ensuring Sustainability and Local Capacity in Implementation (Figure 7)

A repeated concern across the interviews was related to the role of AI in telecommunications. But its benefits often fade if projects are not sustained after the pilot stage. Participants also emphasized that lasting impact is based on both financial stability and the development of strong local capacity.

Theme IV (a): The Central Role of Government Financing in Long-Term Viability

Sustainability was also noted as another important theme, as the participants underscored that pilot projects can fail due to limited financial support. One policymaker put it simply yet powerfully: *“Government financing is number one. If we don’t keep it affordable, it won’t last.”* (PM1). It also underscores the fundamental role of state investment in ensuring long-term viability. This is because reliance solely on private actors or international donors can leave projects vulnerable to market or political fluctuations.

Theme IV (b): Building Local Technical Capacity for Sustainable Autonomy

Equally, results showed that a technology expert emphasized the importance of building local technical capacity, stating: *“Local training is important... we can’t rely on foreign vendors forever.”* (TT3). This insight highlights the risk of dependency on external providers. It can also undermine regional autonomy and sustainability. Thus, Southeast Asia can ensure that AI in telecom is not just imported but also owned, adapted, and maintained locally.



Figure 7: Word Cloud for Theme IV
Source: Author Generated

Theme V: Multi-Stakeholder Roles and Shared Responsibility (Figure 8)

Participants consistently pointed out that the successful integration of AI in digital education cannot rest on the shoulders of a single actor.

Theme V (a): Collaborative Roles in Advocacy and Transparency

Governments, telecom companies, educators, and civil society were all seen as indispensable in creating a balanced ecosystem. The emphasis here was not only on dividing responsibilities but also on fostering collaborative governance where all actors contribute their unique strengths. One educational practitioner highlighted: *“I think educators also need to speak up for disadvantaged students. We’re the ones who see which kids are struggling at home, who can’t afford data or devices. If we don’t advocate for them, AI might only serve the students who already have resources.”* (EP2). Similarly, a civil society representative emphasized: *“Civil society also has to push hard for transparency. Like, if an AI system decides who gets access or what content is shown, people need to know how that decision was made. Otherwise, it’s just a black box, and that’s risky.”* (CS2).

Theme V (b): The Necessity of Collaborative Governance

Another policymaker extended this argument by highlighting the importance of collaboration over isolated efforts: *“Collaboration’s the only way forward... if they come together, AI in education could actually work.”* (PM3). This underlines the idea that without coordination, efforts may become fragmented and counterproductive. Contrarily, inclusive collaboration allows AI-driven solutions to be scaled effectively while maintaining accountability.

inclusive society in ASEAN. These commitments strongly resonate with the concerns of participants in this study, particularly in terms of affordability, inclusivity, and prioritising education over commercial applications.

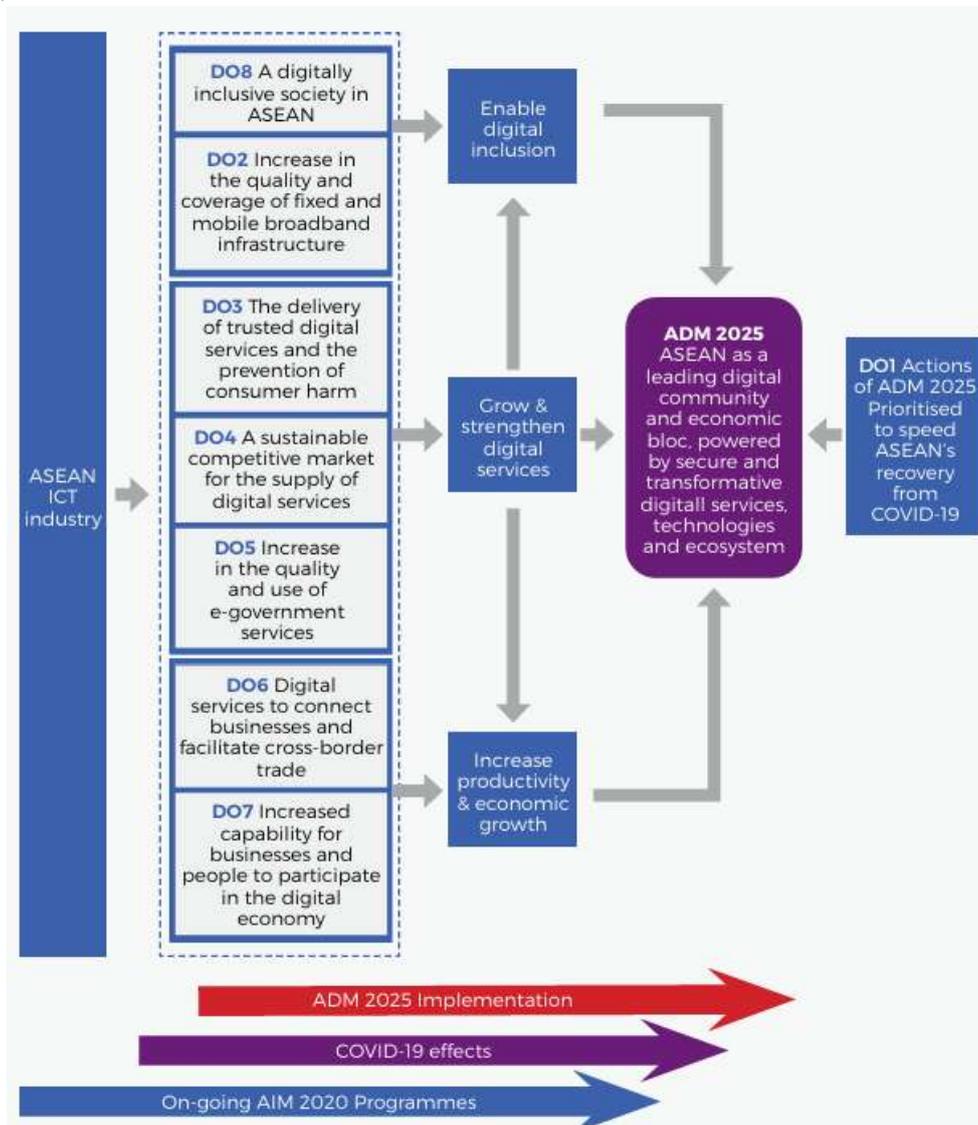


Figure 10: ASEAN Digital Masterplan 2025
Source: (ASEAN, 2025)

Similarly, UNESCO’s AI in Education reports also highlight the ethical, pedagogical, and governance dimensions of AI adoption. UNESCO underscores that AI has the potential to accelerate teaching and learning practices. It also underscores that the core principles of inclusion and equity guide its application in educational contexts. Another UNESCO (2025) report on AI and education, *Protecting the Rights of Learners*, highlights a rights-based approach that advocates for robust data protection, ethical frameworks, transparent governance, inclusive access policies, and effective accountability mechanisms. Thus, these frameworks underscore a regional consensus that AI-enabled education must go beyond technical efficiency. In this way, social and ethical concerns can be addressed. However, alignment with local realities also remains uneven. In this regard, challenges such as affordability, capacity, and sustainability persist in practice.

4.2.2. National Strategies and Governmental Priorities

National strategies in Southeast Asia show both shared ambitions and country-specific priorities regarding the adoption of AI in education and telecommunications. A report by the Indonesian News Agency (2025) stated that the government is expanding equitable internet access through the Sekolah Rakyat (People’s Schools) program, particularly in remote regions. MIDA (2025) describes Malaysia’s National Artificial Intelligence Roadmap 2021–2025. It includes the integration of AI into curricula, up-skilling educators, and enhancing the

capacity of institutions. It highlights the training of teachers, institutional innovation, and Malaysia's desire to build a future-ready workforce.

Meanwhile, Vietnam AI Academy has partnered with NVIDIA and the National Innovation Centre (NIC). It aims to train thousands in AI & contribute to research (including local datasets) for the growth of local expertise (VNA, 2025). Figure 11 shows that Vietnam, Indonesia, and Malaysia are expected to see significant growth in their digital economies by 2030. In this regard, Indonesia is expected to have the largest digital economy in the region.

For all three countries, as well as the broader ASEAN region, "Digitisation of operations" is a top strategic priority for firms (Figure 11).

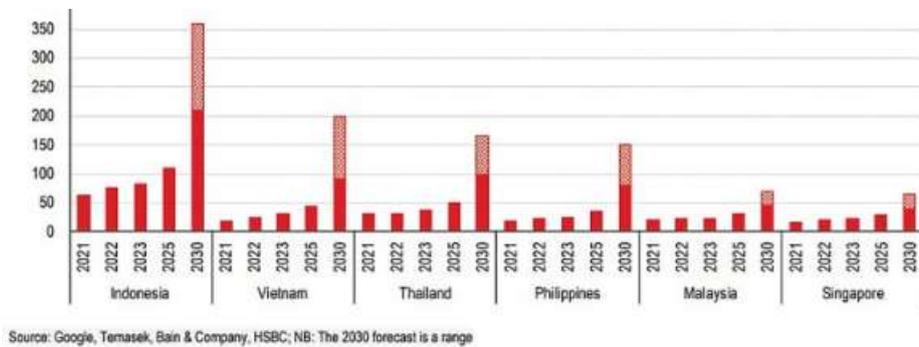


Chart 2: Digitalisation is a key business priority for firms in ASEAN

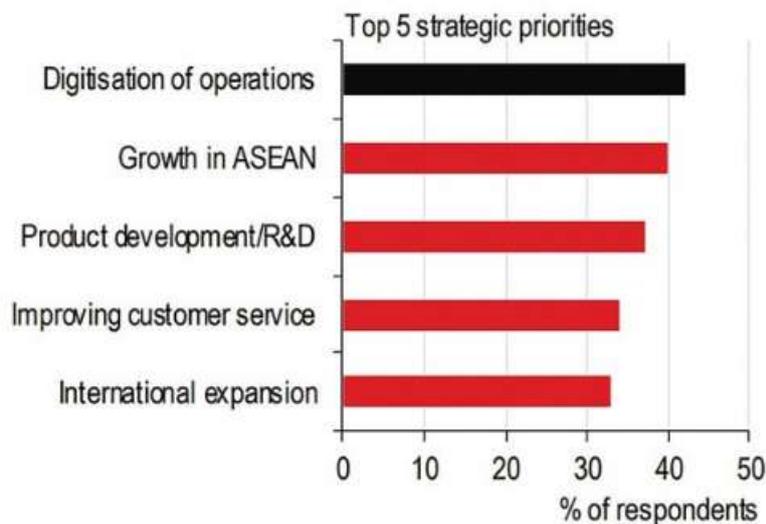


Figure 11: Vietnam Online Education Market Size
Source: (VIR, 2024)

Across these cases, governments have also acknowledged the transformative potential of AI. However, it often frames it primarily in terms of economic growth and national competitiveness. A gap was identified in this context compared to the lived concerns of the participants. Financing and equity were consistently highlighted in interviews. However, the official policies tend to focus on innovation in technology and competitiveness. This divergence highlighted the importance of aligning a state's vision with the community's needs to ensure sustainability.

4.2.3. Scholarly Perspectives and Theoretical Insights

Recent academic literature has provided valuable insights into the ways artificial intelligence is influencing education and telecommunications (Zafrullah *et al.*, 2024). It involves important implications for access, equity, and governance. Researchers have also highlighted the significant promise of AI-driven adaptive learning in meeting the needs of students. This is because it significantly improves their engagement and reduces the risks related to dropout. A recent study by Naseer and Khawaja (2025) found that students who receive AI-adaptive feedback can significantly refine their conceptual mastery and experience increased engagement. At the same time, critical perspectives were also evident in past studies that such technologies may deepen practices of surveillance. It also fosters ethical concerns regarding the

privacy and psychological well-being of the students if safeguards are not in place (Kamenskih, 2022; Klimova & Pikhart, 2025). Prior research has also shown digital divides in Southeast Asia (Subramaniam *et al.*, 2024; Yap *et al.*, 2024; Yulianto, 2025). In this regard, there is an uneven connectivity and affordability in these regions. Studies have also shown that, in the absence of adequate policy interventions, AI can reinforce rather than reduce the inequities related to education (Bulathwela *et al.*, 2024; Ghimire & Edwards, 2024). Recent research has also shown that the adoption of AI plays a key role in offering sustainability benefits. It includes the management of energy and employee well-being; however, it also poses costs related to deployment, ethics, and environmental issues (Kumar *et al.*, 2024). Similarly, a systematic scoping review has shown that readiness for scale, ethical risks, and reliance on external vendors can potentially threaten long-term sustainability (Yan *et al.*, 2024). Together, this evidence from the existing literature emphasises the need for transparent governance and local capacity building. It also highlights a need for balanced decision-making for sustainable AI integration. In this way, the literature is valuable in providing both optimism regarding the transformative potential of AI and a critical lens regarding the challenges. Most importantly, these challenges must be addressed so that a fair and sustainable adoption can be ensured.

5. Discussion

This research explores how AI can deliver digital learning in Southeast Asia more affordably, equitably, and with a focus on quality by addressing the issues, opportunities, and ethics. It applies to a mixed-methods research design, in which primary qualitative interviews and secondary content analysis were employed to develop the opinions of key stakeholders.

The use of AI to increase the number of connective points and equitable access to education. The interviewees suggested that AI could be applied to improve connectivity in underserved areas by simplifying telecommunications networks, thereby facilitating access to education. The stable internet connection is the one that respondents have specifically cited as having a direct impact on student engagement and retention. One education practitioner had said that AI keeps the wheels turning, and that keeps the kids using the internet (EP3). Additionally, policymakers emphasised that AI has the capacity to support cross-border educational cooperation, counter regional disparities (PM3). These findings do not contradict those of Mehta (2025), who explains the possibility of using AI to optimize telecommunication networks and have continuous access to education. Similarly, Sherifdeen (2024) supports the idea of AI-powered personalised learning, which was also identified by the respondents as one of the effective tools for reducing educational disparities. Such advantages, however, require massive infrastructure investment, which Mhlanga (2023) identified as a drawback of the ethical application of AI.

The need to have cohesive and inclusive policies to integrate AI. The respondents condemned disjointed governance systems, which make it challenging to roll out AI in education. One of the representatives of the civil society emphasised the necessity of inclusive policy-making, adding that civil society requires a seat at the table (CS2). Another important aspect of the results was the affordability of the use of AI tools, and educators propose that students be offered data packages at reduced prices (EP1). This realisation aligns with Keith (2024), who proposes the adoption of inclusive policies, as digital education must be made fairly accessible. Moreover, AI systems were considered to require transparency and responsibility, and specialists are calling on governments to mandate algorithmic transparency (TT2), a notion echoed by Frana (2024) in the context of AI governance.

Ethical risks, such as privacy concerns and algorithm bias, were identified as a significant issue in the integration of AI. The respondents cautioned that AI would exacerbate social inequalities and erode trust in the educational system. One of the representatives of civil society referred to it as digital colonialism (CS2). This is consistent with Mhlanga (2023), who expressed concerns about data privacy and surveillance in classrooms where AI will be used, and the necessity of effective ethical principles to safeguard student privacy.

It is a theme of sustainability of AI initiatives and the significance of local capacity-building. Respondents emphasised the importance of government funding and local technical expertise for long-term success. According to one of the policymakers, government funding is the first. Unless we make it affordable, it will not last (PM1). It was also noted that local training is important to prevent excessive reliance on external vendors (TT3). These results are echoed by Fan *et al.* (2023), who advocate for renewable energy and local ownership to ensure the sustainability of AI projects. This theme highlights the importance of collaboration among governments, telecommunications organisations, educators, and civil society. The respondents noted that it is impossible to integrate AI effectively without a multi-stakeholder approach. According to one educator, AI may only benefit already privileged students unless we advocate on behalf of disadvantaged students (EP2). One of the representatives of a civil society emphasized the significance of transparency and said, "Citizens should be informed about the way AI decisions are reached (CS2). These perceptions can be correlated with those of Sonni (2025), who believes that collaboration in governance is the key to successful scaling of AI solutions in the Southeast Asian region.

The secondary qualitative content analysis revealed that regional frameworks, such as the ASEAN Digital Masterplan 2025 and UNESCO, emphasise the importance of equitable access to AI in education. The barriers to such access include factors like affordability, infrastructure, and inclusivity. The Indonesian Sekolah Rakyat and Malaysian National AI Roadmap national strategies are both centred on increasing accessibility and including AI in the curricula. These results are consistent with those of the OECD (2025) and Keith (2024), who emphasise the necessity of consistent

policies. Nevertheless, as Yan et al. (2024) note, digital divides and ethical issues also pose major obstacles to successful practice, which need to be addressed openly and sustainably (Bulathwela *et al.*, 2024; Ghimire & Edwards, 2024).

6. Research Implications

6.1 Theoretical Implications

Theoretically, the study emphasises the importance of coordinated policies that ensure equal access to AI-based education in Southeast Asia. The difficult challenges to make sure the successful introduction of AI into the educational systems are removing digital gaps and improving infrastructure in regions with limited coverage (Onoja and Ajala, 2022). The analysis means that the regional and international policy frameworks have to be aligned to offer a logical mechanism of offering equal access to education opportunities, and also consider the local realities and complexities (Khan, 2024).

6.2 Practical Implications

In practice, this research explores the need for schools to apply AI technologies, which provide personalized learning, a way to close the access gap. To realize the success of implementation, institutions and educators are to focus on ethical practices of AI and should include strong data privacy tools to develop the trust of stakeholders (Khan, 2024). In light of the findings, a combined approach, when all society components, such as governments, educators, telecommunication companies, and civil society, are involved, is critical to the effective adoption of AI in education to ensure that it positively influences every student.

7. Limitations

The limitation of this study is that it is geographically based on Southeast Asia, and hence it may not fully address the difficulties and opportunities experienced in other regions where educational and infrastructural settings are different, according to the study by Hong and Songan (2011). The research also did not explore the technological limitations in detail, e.g., the absence of digital devices or good-quality internet access in rural locations, which may hinder the usefulness of AI solutions (Costa *et al.*, 2023). The study identifies some of the most important ethical and policy challenges, but does not pay much attention to the readiness of educational organizations to introduce AI, which restricts the relevance of the study to those regions that do not have such a well-developed digital infrastructure.

8. Future Research Directions

The future research must pursue comprehending how the different nations in Southeast Asia are adopting AI in the learning process by considering the diversity in the infrastructural, economic, and cultural environments that could influence the adoption of AI (Abanga & Dotse, 2024). Future research should explore the long-term verifiability and scalability of AI in education, focusing on ethical frameworks addressing privacy, bias, and fairness to align with local educational needs and values. This will assist in developing AI systems that are efficient and ethical as well as fair (Xu *et al.*, 2024).

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Conflict of Interest

The authors declare no conflicts of interest.

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